



# Contrast Documentation

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This document contains guidance on the core, supported, and recommended way to use Contrast Security products.



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# Get started

Welcome to Contrast!

Contrast supports real-time application security through all phases of your software development life cycle (SDLC).

Take a walk through (page 15) an example of how you can use Contrast in your environment.

If you want to...	Contrast offers...
<p>Analyze your applications for security vulnerabilities during the development and test (QA) phases of your SDLC:</p> <ul style="list-style-type: none"> <li>• <b>In the development phase:</b> Get instant and accurate vulnerability feedback for applications and the libraries that they use. By exercising your application, you can simulate the routes in your application and, with the data from Contrast, ensure that you are checking in secure code.</li> <li>• <b>In the test phase:</b> Get assurance that applications are evaluated for security vulnerabilities as you apply manual or automated test cases or in a CI/CD pipeline.</li> <li>• <b>In production:</b> Get full visibility into attacks and defend applications from malicious exploitation in the production phase of your SDLC.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Agents (page 29)</b> Supports a variety of programming languages, frameworks, and container technologies that instrument your applications with sensors.</li> <li>• <b>Contrast Assess: (page 21)</b> Uses tuneable detection rules to accurately find vulnerabilities. It provides details on how the issue was discovered, how to reproduce it, and how to fix it.</li> <li>• <b>Scan: (page 24)</b> Identifies vulnerabilities in uploaded binary packages by performing a fast and efficient static scan.</li> <li>• <b>Protect: (page 23)</b> Automatically identifies attacks and either monitors them or prevents them from being exploited in production. Protect discovers and blocks attacks from within the running application but can also integrate with Web Application Firewalls (WAF).</li> </ul>
<p>Analyze libraries that your applications use.</p>	<p><b>Contrast SCA: (page 22)</b> Offers visibility into security risks and legal issues introduced by open-source libraries used during applications at run time. It identifies vulnerabilities in open-source libraries. It also identifies if a current library is out-of-date and should be updated.</p>
<p>Find vulnerabilities in your code earlier in the SDLC and get easy-to-understand guidance on how to fix them.</p>	<p>View <b>vulnerability (page 522)</b> data that includes suggestions on <b>how to fix (page 531)</b> vulnerabilities that Assess, Scan, and SCA discover.</p>
<p>View an architecture diagram that provides an interactive view of where data and resources are shared within your organization and beyond it.</p>	<p><b>Flow maps (page 439)</b> provide a detailed diagram of your application, the layers of technologies within it, and the back-end systems to which it connects.</p>
<p>Integrate Contrast into your CI/CD pipeline.</p>	<p>A wide variety of <b>integrations (page 553)</b> that let you to integrate Contrast actions and data into developer IDEs, build system, communication tools, and more.</p>

## Customization

Contrast provides a variety of options for customizing data access, data views, and data collection from applications that you've added to Contrast. Customization helps you to enhance your views of the data that Contrast provides.

Option	Description
Role-based access control	<p><a href="#">Access groups (page 637)</a> let you assign permissions and capabilities for specific users. You can assign different types of access, based on role, for each application associated with a group.</p> <p>It is useful to plan a group strategy before you add applications to Contrast.</p> <p>If you do not specify the group in the Contrast configuration file when you first add the application to Contrast, you can only add it to a group from the Contrast web interface. If you want to add applications using a Contrast configuration file, you will need to delete the application and add it again to associate it with your access group.</p> <p>Start by creating or adding a user or application (or both) to an existing group in the Contrast web interface.</p> <p>Then, using a Contrast configuration file for each application, you can associate an application with an access group when you add the application to Contrast.</p> <pre># application:  # Add the name of the application group with which this # application should be associated in the Contrast UI. # group: <b>NEEDS_TO_BE_SET</b></pre>
Custom filters	<p>Contrast provides tag options that let you create customized filters. The benefit of creating custom filters is you can view data according to your specific needs, in addition to using the default filters.</p> <p>You can create custom filters through the use of <a href="#">application metadata (page 644)</a></p> <p>You can also apply tags to specific <a href="#">application (page 427)</a> data or <a href="#">vulnerability (page 528)</a> data in Contrast. After you tag an application or a vulnerability, you can use that tag as a filter on the Applications page or the Vulnerabilities page in the Contrast application.</p> <p><b>Example: Application metadata</b></p> <p>This example shows how to create free form, custom fields in the Contrast web interface to request application metadata:</p> <ul style="list-style-type: none"> <li>• <b>Custom field:</b> managersInfo <b>Value:</b> "John Doe"</li> <li>• <b>Custom field:</b> businessUnit <b>Value:</b> "NodeGoat Group"</li> <li>• <b>Custom field:</b> officeLocation <b>Value:</b> "New York City"</li> </ul> <p><b>Example: Application tags</b></p> <ul style="list-style-type: none"> <li>• <b>Appname:</b> The name of a specific application.</li> <li>• <b>Groupname:</b> The name of an access group.</li> <li>• <b>Environment:</b> The environment in which you are testing the application (development, QA, or production).</li> <li>• <b>Server Name:</b> The name of the server hosting the application.</li> </ul> <p><b>Example: Vulnerability tags</b></p> <ul style="list-style-type: none"> <li>• <b>Build:</b> A specific build number</li> <li>• <b>Version:</b> A specific release version</li> </ul>
Custom data from applications	<p><a href="#">Session metadata (page 431)</a> lets you identify the source of vulnerabilities in your application.</p> <p>When you add the necessary property to your agent configuration file, the agent reports this information along with the rest of the standard vulnerability data to the Contrast web interface for filtering.</p> <p>If you change the values of metadata in the Contrast configuration file for the agent, you can filter the vulnerability data based on the different values. For example, if you change the values for Branch name or Version, you can filter data based on the different versions or branches.</p> <p><b>Example:</b></p> <p>In this example for a Java application, you add an entry in the line where you add your java-agent flag. In this example, you set the property <code>contrast.application.session_metadata</code> to a set of key-value pairs that identify a branch, a committer, and a repository.</p> <pre>-Dcontrast.application.session_metadata="branchName=build22,committer=Jane,repository=Contrast-Java"</pre>

Option	Description
Custom naming	<p>You have the option of providing customized names for <a href="#">applications (page 427)</a> and <a href="#">servers (page 470)</a> that host the applications.</p> <p>By default, a Contrast agent creates a name based on data it discovers in your code.</p> <p>To specify a custom name, you can use an agent configuration file when you <a href="#">add the application (page 30)</a> to Contrast or set the name in the Contrast web interface after you add an application.</p>

## Next steps

- Get an overview of [how Contrast works \(page 13\)](#)
- Try Contrast for free - [Community Edition \(CE\) \(page 27\)](#)
- [Install and configure a Contrast agent \(page 30\)](#)
- [Install Contrast \(on-premises\) \(page 670\)](#)
- Get started with a particular [integration \(page 553\)](#)

## How Contrast works

Contrast Security provides accurate, continuous, real-time application security testing and attack blocking for your application portfolio. Contrast works within each application to secure it across the entire software development life cycle (SDLC).

Contrast transforms functional tests into security tests, so that you get security feedback every time you exercise your applications through your quality assurance function. Contrast delivers results continuously and in real time, so you are integrating security into your entire development pipeline from source code to running applications, and all points in between.

## How Contrast integrates with your development environment



## Analysis techniques and data sources

Contrast combines numerous data sources and a variety of analysis techniques including:

- Runtime control flow and dataflow (IAST)
- Application code or APIs (SAST)

- HTTP requests and responses
- All libraries and frameworks in the application and how they are used (SCA)
- Configuration information
- Back-end connections
- Static scans of local files (SAST)

## Contrast agents

Contrast Assess and Contrast Protect use [agents \(page 29\)](#) to analyze data flow and identify vulnerabilities in fully-assembled and running applications. Contrast Assess and Contrast Protect use the same agent to analyze data flow and identify vulnerabilities in fully-assembled and running applications. You do not need one agent for Assess and another for Protect.

[Adding and configuring an agent \(page 30\)](#) inserts Contrast code in the application's existing methods across custom code and libraries. Sensors in the agents observe the locations where data enters and leaves the application (routes). This action creates real-time visibility into any data that flows through the application and allows Contrast to detect security flaws or vulnerabilities in this code path and report them to Contrast. The agents also allow Contrast to identify and block attacks.

## Agent configuration

Configuring an agent consists of editing a YAML configuration file, using environment variables on a command line, or other methods native to the language and tools you are using.

When you configure an agent for an application, you specify information for the following settings:

- Agent communication with Contrast
- Agent-specific settings
- Settings for Assess and Protect rules
- Application-specific settings
  - These settings include session and custom metadata that are available to you as additional information for each vulnerability reported or as a way to filter them.
- The server hosting the application and the agent:
  - Developer's local application server running in the integrated development environment (IDE)
  - Continuous integration application server that's used during the automated testing process
  - Application test server
  - Application staging server
  - Embedded server in an appliance
  - Application server running in a virtual machine
  - Remote application server running in the cloud
  - Production application server

## Static scans

[Contrast Scan \(page 441\)](#) is a static application security testing (SAST) tool that makes it easy for you to find and remediate vulnerabilities during the development phase of software development lifecycle (SDLC).

To scan applications, you [upload a source code or bytecode file \(page 445\)](#). Contrast technology identifies vulnerabilities based on a set of rules that Contrast defines for you.

## Protection for cloud-native applications

[Contrast Serverless Application Security \(page 25\)](#) is a next-generation application security testing solution for serverless-based applications.

Contrast Serverless Application Security uses cloud-native architecture to map all resources within your environment, while automatically validating and prioritizing the results, eliminating false-positive

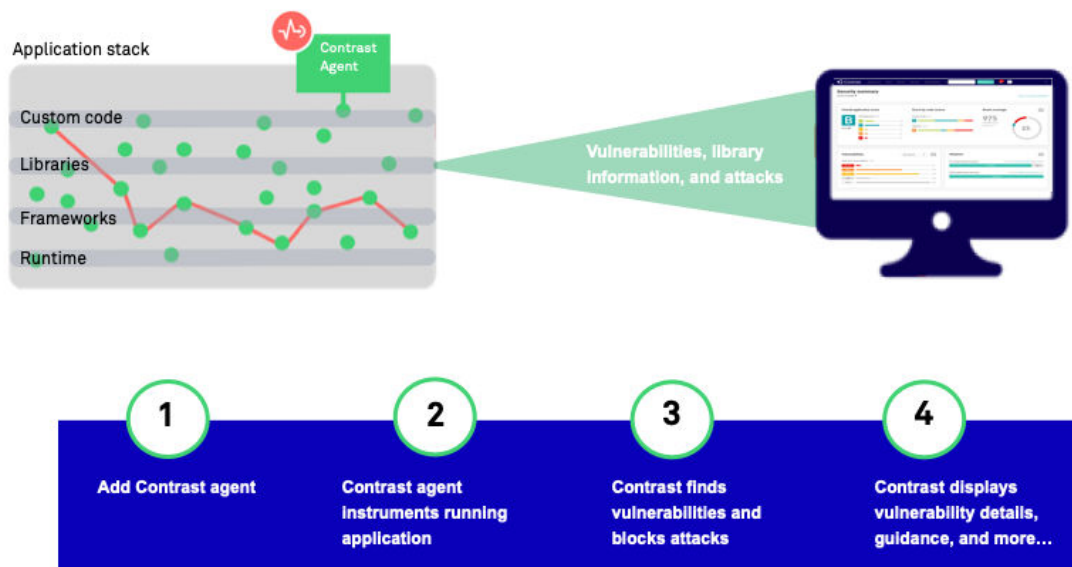
results and alert fatigue. It uses a ReadOnly access to your AWS account to continuously monitor the environment and collect relevant information.

## Integrations

Contrast works with several different [integrations \(page 553\)](#) to provide accurate security feedback with tools you are already using. This approach accelerates the software development process by encouraging security and development to work together effectively.

## Contrast walk through

Let's take a closer look at how you can use Contrast to ensure your code is secure from critical vulnerabilities and protect your applications from attacks.



In this example, you are using the Contrast Java agent to configure applications for security testing and blocking attacks, as the application is exercised.

## Customize the Contrast environment

Once you have access to the Contrast web interface, you think about customizing your environment so that you can find important test results easily and control access to Contrast data.

## Access groups

You have three teams involved with your financial applications. You create these access groups and specify them in the Contrast configuration files:

- **Team1-Dev** is for developers and has these settings:

**Add Group**

Group Name  
Team1-Dev

Application Access  
Applications onboarded to group × Edit ×

+ Add Access

Developers can remediate findings, add tags, manage vulnerabilities, edit attributes, merge applications, add or delete applications, and create servers.

- **Team2-Test** is for your test team and has these settings:

**Add Group**

Group Name  
Team2-Test

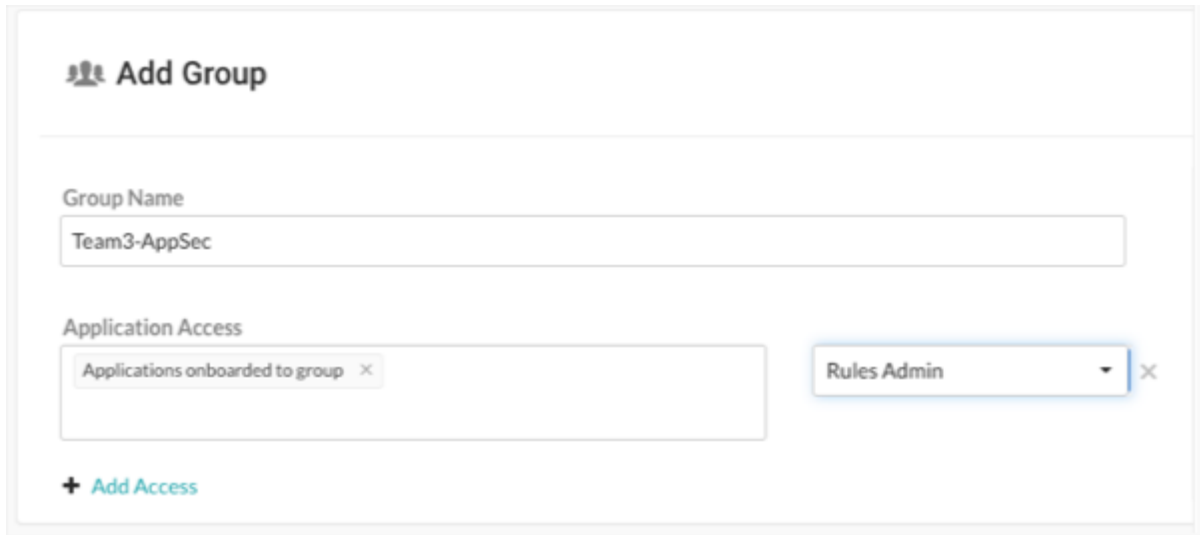
Application Access  
Applications onboarded to group × View ×

+ Add Access

Test staff can see scores, libraries, vulnerabilities and comments, but can't perform edits to traces to the application.

- **Team3-AppSec** is for your AppSec team and has these settings:





The AppSec team can edit rules and policies in the application, enable Protect, and manage notifications and scoring for the application.

### Application and server naming

Since all teams are working on the same application, you use the same name in each Contrast configuration file. You plan to use one configuration file for the development environment and one for the test environment.

Although you are using two configuration files, since you use the same name for the application in both files, Contrast displays data as if you only have a single instance of the application.

You decide to let Contrast determine the server name.

### Session metadata

You want to be able to view vulnerabilities and route information for a specific branch, committer, and repository. You define session metadata values in your Contrast configuration file to collect this information:

```
-Dcontrast.application.session_metadata="branchName=release24,committer=Jane,repository="
```

### Step 1: Configure applications for security testing

During development, you want to make sure developers are checking in code that's secure. During testing, you want to verify that your applications have no vulnerabilities that will allow attacks when in production.

You decide to add Contrast to your applications so that you can do the necessary security testing before releasing your products to the public. Since your applications use Java, you are going to use the Contrast Java agent.

1. You [download the agent \(page 53\)](#) from the Maven Central repository because you use Maven for your build processes. You also download a [YAML configuration file \(page 33\)](#) from the Contrast web interface.
2. For your development environment, you edit the YAML configuration file to include settings similar to these:

```
api:
  # ***** REQUIRED *****
  # Set the URL for the Contrast UI.
  url:https://mycontrast.mycompany.com:8080/Contrast/
  # ***** REQUIRED *****
```

```

# Set the API key needed to communicate with the Contrast UI.
api_key:A2xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxG9N
# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key:service_key:88xxxxxxxxxxxx5Z
# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name:agent_xxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx@mydevorg
.
.
.

# =====
# server
# Use the properties in this section to set
# metadata for the server hosting this agent.
# =====
# server:
# Override the reported server environment.
environment: development
.
.
.

```

- For your test environment, you edit a Contrast YAML configuration file with settings similar to these:

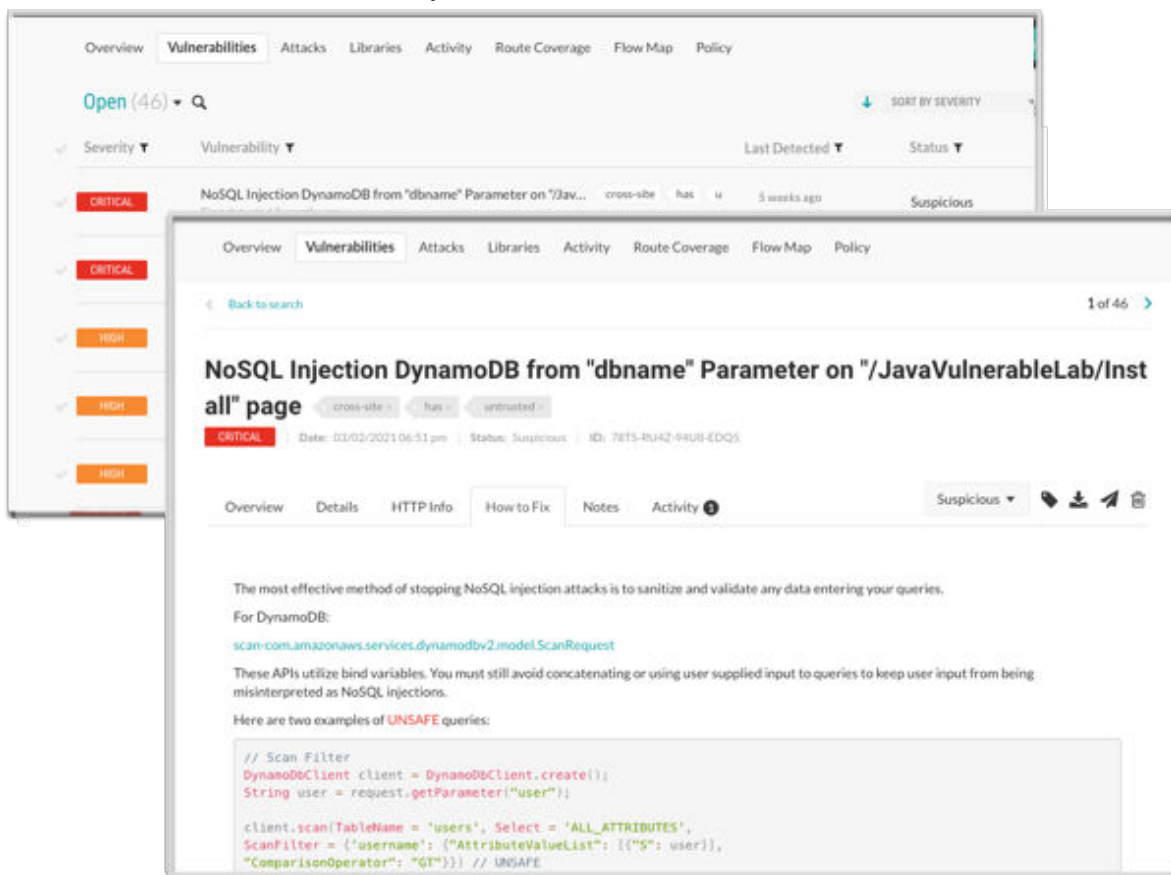
```

api:
# ***** REQUIRED *****
# Set the URL for the Contrast UI.
url:https://mycontrast.mycompany.com:8080/Contrast/
# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
api_key:A2xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxG9N
# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key:service_key:88xxxxxxxxxxxx5Z
# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name:agent_xxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx@mydevorg
.
.
.

# =====
# server
# Use the properties in this section to set
# metadata for the server hosting this agent.
# =====
# server:
# Override the reported server environment.
environment: QA
.

```

- Next, you start your application and run functional tests to exercise all the routes and data endpoints that the application and business logic expose.
- Using the Contrast web interface, you first check the Application page to make sure that Contrast recognizes your application. Then, you check for vulnerabilities and how to fix guidelines to determine what actions to take to secure your code.



- After initial tests, you decide to use the [Maven plugin \(page 592\)](#) to integrate Contrast in to your CI/CD process. You configure the integration so that builds fail if Contrast discovers vulnerabilities with a Critical or High status.

## Step 2: Configure applications to block attacks

Although you've been using Contrast during your development and test phases, you also want make sure that your users are not subject to malicious activity when they use your product. You decide to add Contrast to the applications that are in production to protect your application, users, and data.

First, you make sure that you have a Protect license and that Protect is enabled for your organization.

Similar to how you installed and configured an agent for your application in development and test, you need to configure a new configuration file for the production environment that enables Contrast Protect. After you create the new configuration file, you run the application and verify that the Contrast web interface displays your application for a production environment.

```
api:
# ***** REQUIRED *****
# Set the URL for the Contrast UI.
url:https://mycontrast.mycompany.com:8080/Contrast/
# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
```

```

api_key:A2xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxG9N
# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key:service_key:88xxxxxxxxxxxx5Z
# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name:agent_XXXXXXXX-XXXX-XXXX-XXXX-XXXXXXXXXXXX@myprodorg
.
.
.
# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: true
.
.
.
# =====
# server
# Use the properties in this section to set
# metadata for the server hosting this agent.
# =====
# server:
# Override the reported server environment.
environment: production
.
.
.

```

Once the application is in production, you monitor the Attacks page in the Contrast web interface to see if attacks occur.

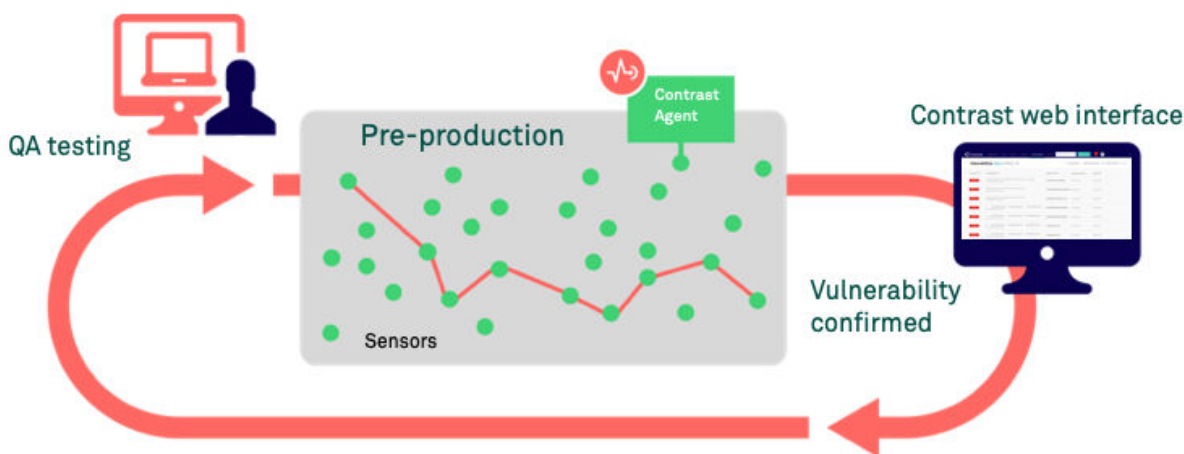
Source IP	Status	Application	Server	Rule	Start	End	Events
01	EXPLOITED	Cat-Engine-2	Cat-Server	Command Injection Cross-Site Scripting Path Traversal	5 hours ago	5 hours ago	55
01	EXPLOITED	Cat-Engine-2	Cat-Server	Command Injection Cross-Site Scripting Path Traversal	8 hours ago	8 hours ago	22
01	EXPLOITED	Cat-Engine-2	Cat-Server	Command Injection Cross-Site Scripting Path Traversal	a day ago	a day ago	11
01	EXPLOITED	Cat-Engine-1 Cat-Engine-2	Cat-Server	Command Injection Cross-Site Scripting Path Traversal	5 days ago	5 days ago	66
01	BLOCKED IP	Grape-on-rack	Grape-Server	Cross-Site Scripting	7 days ago	7 days ago	8

### Step 3: Fix code and retest applications

After you analyze the results of testing with Contrast and identified attacks, you update the code and ensure that Contrast displays the latest version of your application. You verify that the new version is free of the vulnerabilities you blocked in production and re-deploy the application.

### Assess

Contrast Assess is an application security testing tool that combines Static (SAST), Dynamic (DAST), and Interactive Application Security Testing (IAST) approaches to provide highly accurate and continuous information on security vulnerabilities in your applications.



Contrast Assess uses an agent that instruments applications with sensors. The sensors look at data flow in real time and analyze the application from within to help figure out vulnerabilities in:

- Libraries, frameworks, and custom code
- Configuration information
- Runtime control and data flow
- HTTP requests and responses
- Back-end connections

Assess is appropriate for environments such as a test, QA, or staging servers. It is also applicable to developer workstations. When coupled with Contrast integrations, such as Visual Studio, developers can find and fix vulnerabilities without leaving their integrated development environment (IDE).

## Features

Once you [install and configure an agent \(page 30\)](#) and [enable Assess \(page 630\)](#), Contrast offers you these features:

- A list of [vulnerabilities \(page 522\)](#) in the application, along with remediation guidance.
- [Application scores \(page 748\)](#) to gauge the security of an application at a glance.
- [Route coverage \(page 434\)](#) that detects possible routes by associating vulnerabilities with the originating web request.
- [Flow maps \(page 439\)](#) that provide insight into the architecture of the running application.
- [Compliance and policy reporting \(page 546\)](#).

## Customization

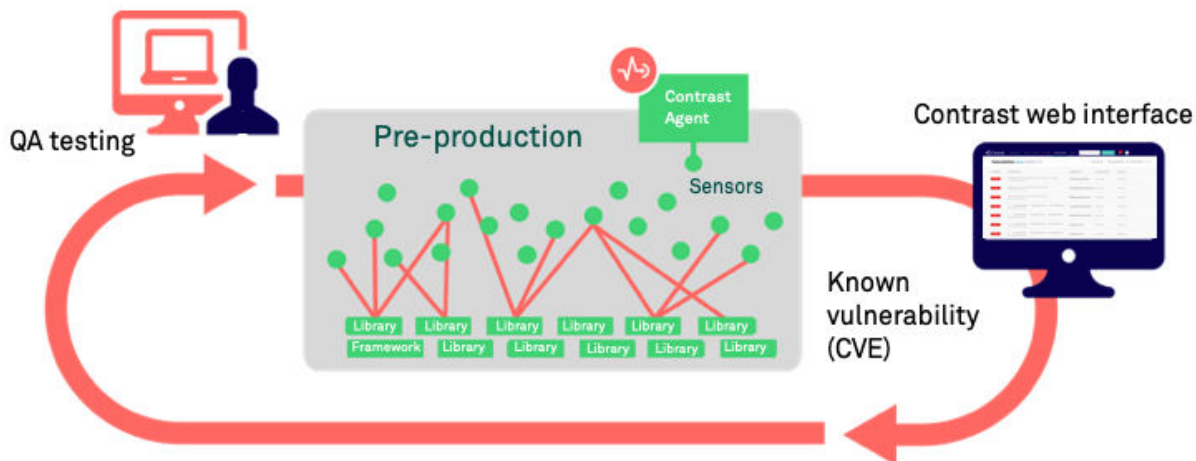
To customize Assess for your needs, you have the option of configuring these types of policies:

- [Assess rules \(page 600\)](#) that you can enable or disable to fine tune the detection capabilities of Assess.
- [Security controls \(page 601\)](#) are methods in your code that make sure data is safe to use.

## SCA

Contrast SCA identifies open-source components through run-time analysis, file system scanning, and dependency analysis. Leveraging these techniques, SCA reports an exact inventory to Contrast.

By default, Contrast Assess includes powerful SCA capabilities. With an SCA license, you have access to advanced SCA capabilities.



## Features

To simplify the process and merge open-source analysis with custom code analysis, SCA is integrated as part of the Contrast platform. Here's what you can do with SCA (some of these features are free and other require an SCA license):

- **Open-source license management:** Contrast SCA provides [license data \(page 482\)](#) tied to open-source components. This data helps you understand intellectual property compliance and mitigate operational risk.  
This feature requires an SCA license.

- **Open-source policy:** With SCA, you can set policies to denylist open-source licenses. If a denylisted license type is deployed in your applications, it triggers an alert. To keep your library usage safe, [set compliance policies \(page 625\)](#) for your organization. To restrict use of specific open-source libraries and licenses, as well as set version requirements, you can [set library policies \(page 628\)](#). This feature requires an SCA license.
- **Identification of CVE vulnerabilities** Contrast SCA identifies the CVE vulnerabilities for each library that your applications are using. This data includes a description of each CVE vulnerability for a selected library as well as the number of applications using that library. This feature is available without an SCA license.
- **CLI and dependency tree:** The Contrast CLI performs software composition analysis (SCA) on your application to show you the dependencies between open source libraries, including where vulnerabilities were introduced. The data that the [Contrast CLI \(page 515\)](#) collects is used to display a [dependency tree \(page 483\)](#) that brings awareness to underlying library dependencies. This feature is available without an SCA license.
- **GitHub action:** Use this integration to analyze a project's dependencies for vulnerabilities. The action will run Contrast SCA Action to detect vulnerable libraries. See [Contrast SCA Action](#) for more information.

## Contrast data

Once a library is reported to Contrast, you can access:

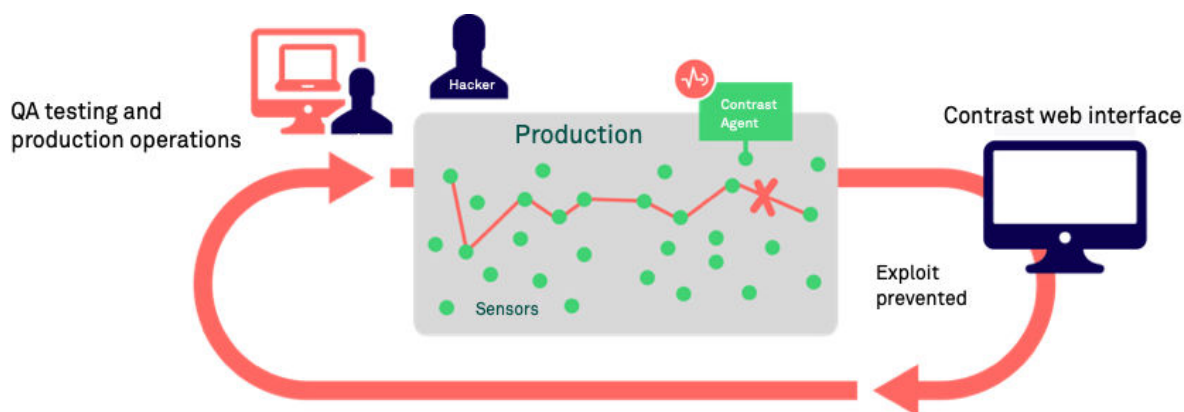
- Library usage analysis to identify whether vulnerable components are actually used by the application
- Library version identification and guidance on the latest version
- Comprehensive vulnerabilities coverage
- Portfolio wide, real-time reporting of open-source components

## Protect

Protect is a defensive control for production environments that monitors attacks and actively defends applications based on specific vulnerabilities, for example, command injection.

It offers Runtime Application Self-Protection (RASP) that complies with NIST 800-53, PCI-DSS, PCI-SSS, and other industry standards. Protect operates directly inside runtimes such as [Java \(page 50\)](#), [.NET \(page 123\)](#), [.NET Core \(page 173\)](#), [Node.js \(page 221\)](#), [Ruby \(page 344\)](#), and [Python \(page 290\)](#), to leverage in-app intelligence without any manual tuning.

Contrast Protect blocks both automated and advanced threats attacking web applications and API, and provides valuable and timely application layer threat intelligence across the entire application portfolio.



## How Protect works

Contrast Protect works inside application software to understand complete data flow rather than network traffic. Instead of only analyzing incoming data, Protect sees the same data and watches its impact on underlying actions, such as complete SQL queries, command arguments, and more.

This analysis improves detection accuracy, separating the noise of many attacks that might be false positives to focus on attacks that met their intended target. This insight can be shared with external systems, such as a SIEM, to focus on key attack events.

Protect limits its impact on application performance by operating with the same shared memory as the application to avoid additional overhead. Contextual defense improves performance by avoiding unnecessary actions. For example, NoSQL applications do not need checks against SQL injection if the SQL APIs are never invoked.

## Customization

When Protect is enabled, you can customize these policies and rules:

- **Protect Rules:** (page 610) Set applications to monitor for attacks.
- **CVE shields:** (page 614) Specify how to CVE shields to block vulnerabilities.
- **Virtual Patches:** (page 618) Define custom defenses against specific vulnerabilities.
- **Log Enhancers:** (page 620) Provide additional instrumentation instructions.
- **IP Management:** (page 626) Manage a denylist and allowlist (trusted hosts).

## Scan

**Contrast Scan** (page 441) is a static application security testing (SAST) tool that makes it easy for you to find and remediate vulnerabilities. It is a valuable tool to use during the development phase of an application. Licensed, hosted customers have access to this feature.

To scan an application, you upload binary packages to a Contrast secure environment. After you upload the code, you start the scan. The scan observes the data flows in the source code and identifies vulnerabilities that could allow malicious attacks. Some examples of these malicious attacks include SQL injections, command injections, and server-side injections.

The scan results identify vulnerabilities in custom code. After fixing these issues, running the scan again verifies that the code changes removed one or more vulnerabilities.

No open-source code or libraries are included in the scan.





## Features

- Ability to create scan groups that enable you to track results of multiple scans
- Scan settings that let you change the name of a scans
- Starting or stopping scans
- Views of identified vulnerability details
- Monitoring of scan progress and history
- Assignment of status to vulnerability records
- Integration of scanning into your CI/CD pipeline
- Information about risk and approaches for fixing each type of vulnerability

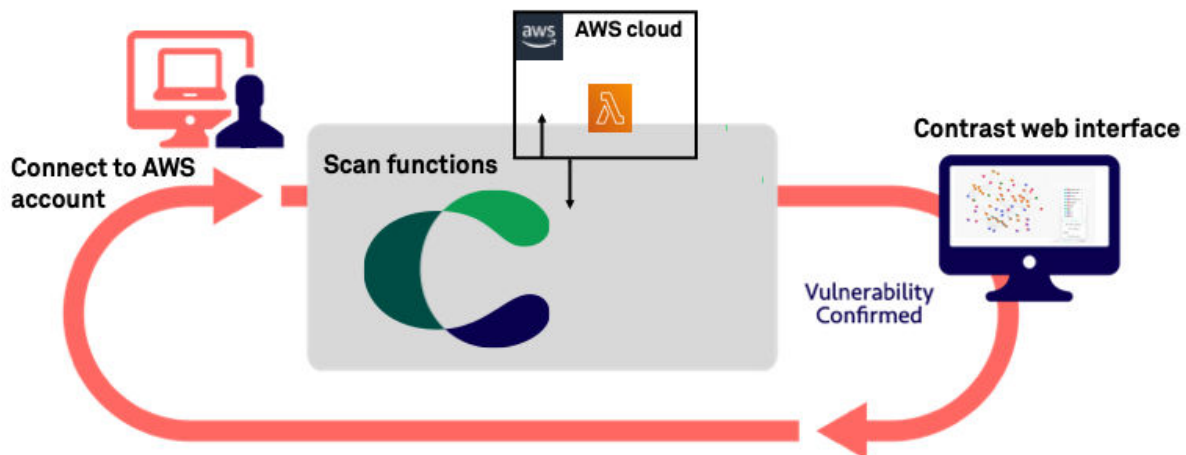
## See also

[Scan supported languages \(page 443\)](#)

## Serverless Application Security

Contrast Serverless Application Security is a next-generation application security testing solution for serverless-based applications.

Contrast Serverless Application Security uses cloud-native architecture to map all resources within your environment, while automatically validating and prioritizing the results, eliminating false-positive results and alert fatigue. It scans for vulnerabilities in your custom code (for example, injection attacks), dependencies (for example, CVEs), and configuration risks (over-permissive function policies).



## Features

- **Easy connection to AWS**  
With two clicks and approximately two minutes, you connect to your AWS account through the Contrast web application.
- **Discovery of your inventory**  
Once you connect to your AWS account, Contrast creates an inventory of your functions, resources, policies, and services in your AWS environment.
- **Analysis of vulnerabilities**  
Dynamic and static scans analyze your code, discovering weaknesses, data flows, attack surfaces, and exposure to vulnerabilities.
- **Continuous monitoring**  
As your code changes, Contrast continues to monitor your Lambda functions, identifying vulnerabilities that require attention.

- **Simulation of attacks**

A dynamic scan generates and executes curated attacks on resources and data flows, without making changes to your code.

- **Visual representation of function and service relationships**

In addition to viewing relationships between functions and services in your account, you can view details about each element including applicable risks.

- **Reporting**

Scan results list CVEs, permission violations, vulnerabilities, and other exposures in your code.

## Benefits

- **Fast and easy deployment**

You do not need a large staff of specialists or consultants or a lot of time to integrate with Contrast.

- **Non-intrusive integration**

You can add serverless security without significant changes to the development process. It's easy to find and fix exploitable vulnerabilities early in the development phase, ensuring that your applications are more secure when you deploy them to production.

## How it works

Contrast connects to your AWS account with ReadOnly access. It uses this access to continuously monitor the environment and collect relevant information.

Contrast deploys one Lambda function (Cloud Agent) within the monitored environment, to perform activities such as code analysis and sending back to Contrast meta-data about the scanned resources (Lambda functions).

All the information is used by our contextual engine to build a tailored attack profile for every resource and change to this environment. The attack simulations will be executed, inside the customer's account, by the Cloud Agent.

All finding results will go through an internal validation mechanism to qualify them, providing zero false-positive and real prioritized results.

## Security and privacy

- Contrast does not collect code or code-snippets from your monitored account. Contrast only sends back meta-data information such as:
  - Identified vulnerabilities
  - Function names and metadata (for example, policy handlers)
  - Used libraries
  - AWS API calls (for example, boto3 and asw-sdk)
  - Service configurations (for example, bucket notifications, API gateway paths, and methods)
- Contrast makes no changes to your code. However, during the scan time (for example, when a function is deployed or modified), Contrast temporarily instruments a layer into the scanned function and makes some configuration changes (for example, timeouts or handlers).

Once the scan completes, Contrast restores the layer and the configurations to their original states. This process is completely transparent and occurs automatically.

During a scan, you can continue to run your own tests (function calls).
- During dynamic scans, Contrast executes with scanned function using malicious data. This process has no effect on your code. It does, however, execute code that could potentially trigger any action that the function makes.

This function is disabled by default. Use the Settings tab to enable it at any time.
- All data that Contrast receives from the monitored AWS account is encrypted in transit and at rest. Contrast uses Amazon EventBridge with a shared secret to send and receive all data. There are no web or REST APIs that Contrast uses to communicate with your AWS account.

## Requested permissions

When you use Contrast to connect to your AWS account, you consent to these access permissions:

- **ReadOnlyAccess** from the Contrast AWS account to your monitored AWS account. This policy is used during beta activities only.
- **Lambda Read/Write** access from the Contrast AWS account to the Lambda functions deployed in your AWS account.
- The Lambda function that Contrast installs in your monitored AWS account requires these access policies:
  - Read CloudWatch Logs
  - Read Layer versions
  - Invoke function
  - Change function configuration
  - Write EventBus messages
  - Read KMS keys
  - Read/Write objects to specific S3 buckets (Contrast creates these buckets)

## See also

- [Get started with Contrast Serverless \(page 486\)](#)

## Contrast performance and resource consumption

Minimize the impact of Contrast on production servers by using the proper configuration:

- **Development environments:** Contrast Assess should be on and Protect can be off. This provides the strongest insight into an application's security posture. This detailed insight favors deep insight over performance to focus on helping developers locate security flaws.
- **Test environments:** Contrast Assess or Protect should be enabled based on what the team needs. Teams should strike a balance to achieve the overall goals of the team:
  - If little testing is done in development, teams should leverage Assess to find vulnerabilities as the application is used.
  - When evaluating performance, Contrast Assess should be turned off and only Protect should be enabled. This provides a corrective control that favors performance but still retrieves code-level information when corrective action is needed.
- **Production environments:** Only Contrast Protect should be on. This provides contextual defense while favoring performance.

## Community Edition (CE)

Community Edition offers near full access to Contrast products (Assess, SCA, and Protect), with developers receiving interactive application security testing (IAST), software composition analysis (SCA), and runtime application self-protection (RASP) solutions—all for free.

[Sign up for a Community Edition account](#) and install an agent to get started. Learn more on the [Community Edition blog](#).



### NOTE

Community Edition lets you add **one** Java, .NET Core, or Node.js application to Contrast.

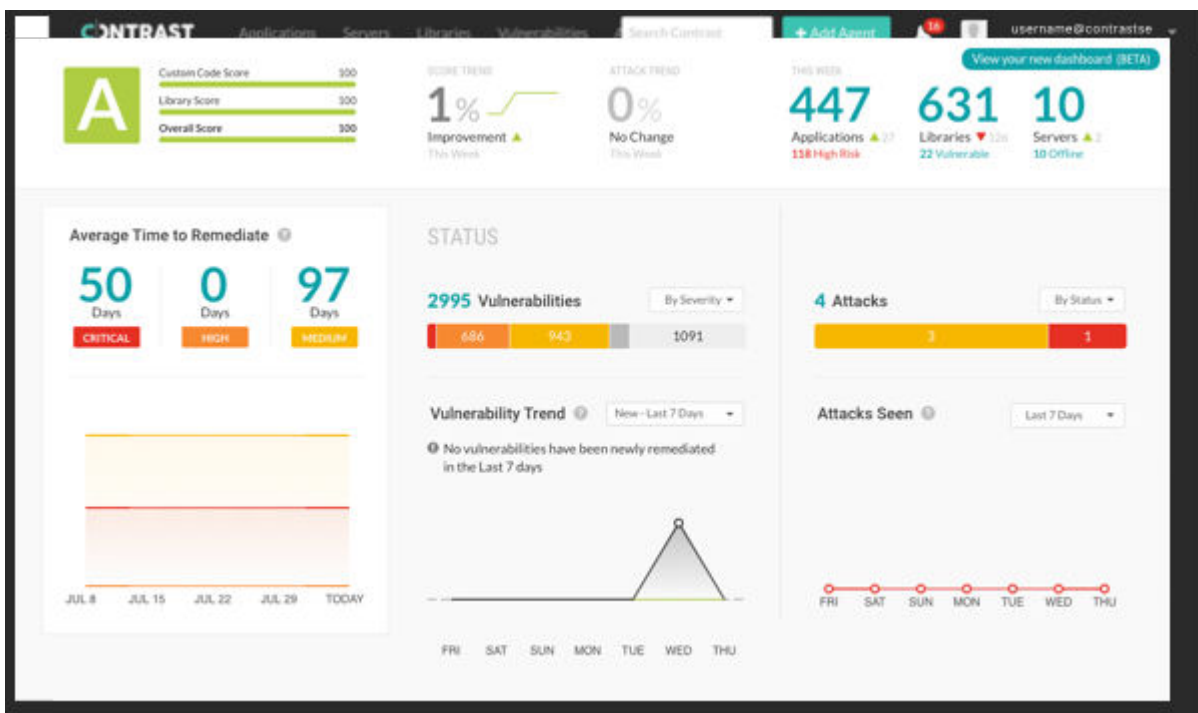
## Community Edition features

Community Edition offers:

- Contrast Assess, which allows developers to focus only on fixing vulnerabilities derived from custom code that actually matter.
- Contrast SCA, which delivers unparalleled visibility into and management of security risks from vulnerabilities introduced through open-source and third-party libraries  
Contrast SCA is an open-source security or software composition analysis (SCA) solution.
- Contrast Protect, which monitors and automatically blocks attacks on applications using instrumentation from within the application— even if the vulnerability still exists in self-written code or open-source libraries.

## Community Edition portal

Here's an example of the CE portal that you interact with when using Contrast:



## Next steps

- [Install the .NET Core agent \(page 175\)](#)
- [Install the Java agent \(page 52\)](#)
- [Install the Node.js agent \(page 224\)](#)

# Agents

Contrast agents are responsible for gathering security relevant data from an application, analyzing that data, and reporting findings to Contrast when necessary. In specific situations, a Contrast agent can also take actions within an application to prevent exploitation or enable a security defense.

A Contrast agent gathers security relevant information using a variety of security instrumentation techniques, including code scanning, library scanning, [instrumenting an application \(page 30\)](#), configuration file scanning, and other techniques. Any security instrumentation technique that gathers information is a sensor.

Sensors generate events that snapshot information directly from within an application. For example, a sensor might capture an incoming HTTP parameter, or the details of a SQL query being made to the database. Some sensors may also take action if necessary to help strengthen defenses or block malicious activity, typically by throwing a security exception that causes a vulnerability to be bypassed.

Events generated by sensors are all reported to the tracking and analysis part of the agent. Over time, the analysis engine [receives events \(page 530\)](#) from all over the code of the application and builds them into traces. The analysis engine watches these traces for patterns of behavior that represent a violation of the Contrast rules.

For example, the analysis engine might see a data flow like this:

- An incoming HTTP parameter event
- Then another event shows that parameter being appended to a SQL query
- Finally another event shows that query being sent to a database

If the analysis engine sees that data flow without the proper defenses (escaping or parameterization), it recognizes that trace to match the Contrast rule for SQL injection reports it to Contrast. The vast majority of the analysis is done locally in the agent, which enables Contrast's scalability and performance.

Use the agents that matches the language of the application you want to instrument:

- [Go \(page 396\)](#) instruments Go web applications for library support and vulnerability reporting.
- [Java \(page 50\)](#) instruments Java web applications and web APIs running on your container.
- [.NET Framework \(page 123\)](#) instruments .NET web applications and APIs running on IIS.
- [.NET Core \(page 173\)](#) instruments applications and APIs running in the .NET Core runtime.
- [Node.js \(page 221\)](#) instruments Node.js web applications and APIs.
- [Ruby \(page 344\)](#) instruments Ruby on Rails web applications.
- [PHP \(page 261\)](#) analyzes PHP web applications at runtime for library usage and vulnerability detection.
- [Python \(page 290\)](#) instruments Django, Flask and Pyramid web applications.



## NOTE

Contrast agents are supported for one year after release. Older agents may continue to function and remain compatible, but they are no longer fully supported.

Contrast applies bug fixes and develops new features on the latest version of the agent. Code changes are not backported to previous versions. While a workaround may be provided for a bug, to resolve issues, you should update to the release in which the issue was addressed.

## Install and configure an agent

To instrument an application with Contrast you need to install and configure the agent that corresponds to the language your application uses. Most agents can be downloaded from a package manager or repository.

Installation varies depending on the agent, which Contrast product(s) you are using, and where you want to install Contrast. For example, this could be:

- On an application server or web server
- In a build pipeline or container
- In a Develop, QA or Production environment

### Installation

Depending on your situation, you may install the agent directly or with the help of [integrations \(page 553\)](#) that work with Contrast.

Consider your goals for Contrast and consult specific installation instructions for the agent you want to use:

- [Go \(page 398\)](#)
- [Java \(page 52\)](#)
- [.NET Framework \(page 125\)](#)
- [.NET Core \(page 175\)](#)
- [Node.js \(page 224\)](#)
- [PHP \(page 262\)](#)
- [Python \(page 292\)](#)
- [Ruby \(page 346\)](#)

### Configuration

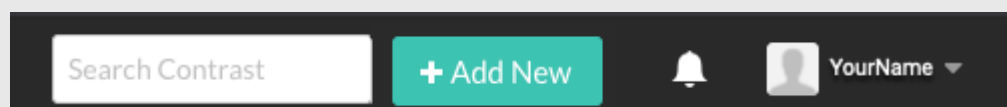
When you install an agent, you must configure it so that it recognizes your application and can communicate information back to Contrast. At a minimum, you need to supply four basic agent keys ([find them here](#)) (page 32):

- **api.api\_key**: Your organization's API key
- **api.user\_name**: Contrast user account (in most cases your login ID)
- **api.service\_key**: Contrast user account service key
- **api.url**: Address of the Contrast installation you would like your agent to report to. Defaults to: `https://app.contrastsecurity.com`



#### TIP

You can download a YAML configuration file that is pre-populated with your organization keys. Select **Add new** in the Contrast web interface and choose your application language to find a download link. And you can also configure the file with the [Contrast agent configuration editor \(page 34\)](#) via the **Open YAML Editor** link.



You can further configure by using [environment variables \(page 49\)](#), [a YAML configuration file \(page 33\)](#), command line or other methods native to the language and tools you are using. Configuration follows this [order of precedence \(page 31\)](#).

Consider your goals for Contrast and consult specific configuration instructions for the agent you want to use:

- [Go \(page 402\)](#)
- [Java \(page 70\)](#)
- [.NET Framework \(page 137\)](#)
- [.NET Core \(page 189\)](#)
- [Node.js \(page 230\)](#)
- [PHP \(page 264\)](#)
- [Python \(page 293\)](#)
- [Ruby \(page 348\)](#)

## Order of precedence

Active configuration values are determined using the following order of precedence:

1. An expired license or exceeding a license quota disables all agent behavior regardless of configuration.
2. Command line or system property value (if appropriate for the language you are using).  
For example: `-Dcontrast.enable`
3. Environment variables.  
For example: `CONTRAST__ENABLE`
4. An application-specific configuration file (.NET Framework only).  
For example: [web.config \(page 137\)](#)
5. Configuration values in a YAML file are pulled from the first file found in the following order:
  - a. A YAML file indicated by the user  
For example:
    - Java: the `contrast.config.path` [system property \(page 71\)](#)
    - Node.js: the `--configFile` [command line flag](#)
    - Any agent: the `CONTRAST_CONFIG_PATH` [environment variable \(page 49\)](#)
  - b. A `contrast_security.yaml` file in the current working directory (all agents except Java)  
For example: `./contrast_security.yaml`
  - c. A `contrast_security.yaml` file in the application's configuration directory (Ruby and Python only)  
For example:
    - Ruby on Rails: `./config/contrast_security.yaml`
    - Django: `./settings/contrast_security.yaml`
  - d. A `contrast_security.yaml` file in an agent-specific configuration directory. For agents that use a service, use this directory if you need to use separate YAML files for agent and service.  
For example:
    - `/etc/contrast/agentname/contrast_security.yaml` (where `agentname` is one of: `dotnet`, `go`, `java`, `node`, `python`, `ruby`, or `webserver`)
    - `%ProgramData%\Contrast\agentname\contrast_security.yaml` (where `agentname` is one of: `dotnet`, `dotnet-core`, `java`, `node`, `python`, `ruby`, or `webserver`)
  - e. A `contrast_security.yaml` file within the server's `/etc/contrast` directory (all agents except Java, .NET Framework, and .NET Core). For agents that use a service, use this directory if you need to share YAML files between agent and service.  
For example:
    - `/etc/contrast/contrast_security.yaml`
    - `%ProgramData%\Contrast\contrast_security.yaml`

6. Values set in the Contrast web interface.  
For example: Server mode toggles for Assess and Protect, which map to `assess.enable` and `protect.enable`
7. The default value set by Contrast Security.

## Find the agent keys



### IMPORTANT

If you download the YAML configuration file from Contrast (select **Add new** in the top right) the file is pre-populated with your agent keys.

If you create your own YAML file, you'll need to add the keys yourself.

Agent keys are common to all agents in an organization. They are values that represent and identify the agents as well as the organization being accessed.

All these keys are required when installing agents:

- Agent username
- Agent service key
- API key  
This API key is for all agents. For the API key to use with custom scripts, use the API key under User settings.
- Contrast URL

## Steps

1. Select **User name > Organization settings** in the top right corner.
2. Select **Agent** to see the values for agent keys.

The screenshot shows the 'Organization Settings' page in the Contrast web interface. On the left is a navigation menu with options: Organization, Groups, Users, Security, Agent (highlighted), Integrations, Servers, Applications, Notifications, and Score Settings. The main content area is titled 'AGENT KEYS' and contains the following information:

- Get vulnerability information, download agents, set up integrations, and more through the Contrast API. Learn how in our [API documentation](#). Use Agent keys when configuring agents to communicate with Contrast.
- Agent Keys**
- Agent Username: agent\_12 [redacted] ty
- Agent Service Key: PK [redacted] FG Rotate
- API Key: demo Rotate  
This is not your API Key. Go to [User Settings](#) to access your API Key.
- Contrast URL: http://localhost:30080/Contrast
- Looking for your API keys? Go to [User Settings](#).
- Generate Sample API Request

The Contrast URL is `https://app.contrastsecurity.com/Contrast`, or the URL of your on-premises or private cloud instance.



**NOTE**

If you don't see the agent username or service key on this page, it may mean that a license has not been applied to your organization. [Contact Support](#) for help with this.

3. You can **Rotate** agent keys to generate new keys if your credentials have been compromised.

**IMPORTANT**

Rotating agent service keys will take all agents offline. Your applications will still function, but data will not be sent to Contrast. To begin using the new credentials, reconfigure the agents and restart your applications. You can use a credential management system to coordinate this change among your systems.

## YAML configuration

You can use a YAML configuration file to set configuration properties for your agent. These values can be overridden with environment variables or command line arguments.

While all Contrast agents share the same property formatting in YAML configuration files, each agent must use its own specified file as there are unique properties that apply to each agent.

The configuration file must be called *contrast\_security.yaml* and placed properly in the [load path \(page 31\)](#).

When you download the agent configuration file from Contrast, it will contain all the basic properties required for your instance of Contrast. If you create your own configuration file, you will need to add [these keys \(page 32\)](#) yourself.

The minimum required *contrast\_security.yaml* content for all agents should look like this:

```
api:
  url: https://app.contrastsecurity.com
  user_name: contrast_user
  api_key: demo
  service_key: demo
```

**TIP**

- Use the [Contrast agent configuration editor \(page 34\)](#) to create or upload a YAML configuration file, validate YAML and get setting recommendations.
- Since YAML is a natural superset of JSON, you can also configure your agent using JSON in your YAML file.

You can use these YAML templates to create a *contrast\_security.yaml* for each agent:

- [Go \(page 402\)](#)
- [Java \(page 71\)](#)
- [.NET Framework \(page 139\)](#)
- [.NET Core \(page 191\)](#)

- [Node.js \(page 231\)](#)
- [PHP \(page 265\)](#)
- [Python \(page 294\)](#)
- [Ruby \(page 349\)](#)



### CAUTION

Take care when editing the YAML template as it relies on whitespace, and uses spaces but not tabs. Configuration guidance is provided in the template as comments. (A space followed by the pound sign "#" starts a comment.)

## Use the Contrast agent configuration editor

The [Contrast agent configuration editor](#) is a web application that can be used to validate and generate the configuration for Contrast agents.

### Before you begin

- Use this editor to help edit, validate, and generate configurations for Contrast agents.
- If you already have a YAML file, you can open it in the editor by selecting **Import**.
- The editor executes entirely in the browser and any sensitive information such as your API key won't leave the local machine.

### Steps

1. Open the [Contrast agent configuration editor](#) in your browser.

The screenshot shows the Contrast Agent Configuration Editor interface. At the top, there are buttons for 'Validate using the .NET Core Agent', 'Reset', 'Import', 'Export', and 'Share'. The main area contains a YAML configuration:

```

1  api:
2  url: https://app.contrastsecurity.com/Contrast/
3  api_key: TODO
4  service_key: TODO
5  user_name: TODO
6

```

Below the editor is a table of error messages:

Type	Message	Line number
TODO	Placeholder value 'TODO' should be replaced for setting: api.api_key	3
TODO	Placeholder value 'TODO' should be replaced for setting: api.service_key	4
TODO	Placeholder value 'TODO' should be replaced for setting: api.user_name	5

The right sidebar shows configuration options for various settings:

- api.url**: Set the URL for the Contrast UI.
- api.api\_key**: Set the API key needed to communicate with the Contrast UI.
- api.service\_key**: Set the service key needed to communicate with the Contrast UI. It is used to calculate the Authorization header.
- api.user\_name**: Set the user name used to communicate with the Contrast UI. It is used to calculate the Authorization header.
- inventory.tags**: Apply a list of labels to libraries. Labels must be formatted as a comma-delimited list. Example - label1, label2, label3
- assess.tags**: Apply a list of labels to vulnerabilities and preflight messages. Labels must be formatted as a comma-delimited list. Example - label1, label2, label3
- application.name**: Override the reported application name. Note - On Java systems where multiple, distinct applications may be served by a single process, this configuration causes the agent to report all discovered applications as one application with the given name.
- application.group**: Add the name of the application group with which this application should be associated in the Contrast UI.
- application.code**: Add the application code this application should use in the Contrast UI.
- application.version**: Add the application version this application should use in the Contrast UI.

2. Either import an existing YAML file by selecting **Import**, or paste your YAML content in the main window.
3. As you edit text, an error warning will appear if you enter invalid YAML. Select an option from the **Validate using the** list for agent-specific YAML validation. These types of validation are performed:

- **YAML syntax validation** verifies that the text can be parsed as YAML. Invalid YAML will result in an **error** that prevents further validation.
- **Setting key validation** verifies that the YAML nodes represent setting keys supported by the selected agent. An unrecognized setting key will result in a **warning**.
- **Setting value validation** verifies that the YAML values match type expectations including boolean, numeric, and enum (e.g., log level). Invalid values will result in a **warning**.
- **Setting compatibility validation** verifies that specific incompatible settings are not both present. This is currently limited to `application.session_id` and `application.session_metadata` settings. Incompatible settings will result in a **warning**.
- **Placeholder value validation** notifies the user when a setting has the placeholder value `TODO`. Placeholder value will result in a **note**.

Select the **error**, **warning**, or **note** in the list of issues to move the text editor's cursor to the start of text causing the issue.

4. Use the panel on the right to search for available settings with descriptions. Select the plus sign (+) to add that setting to your YAML file.

Adding new settings using this feature will format the YAML which may re-order nodes and will remove any extra whitespace in the YAML.

Click **Reset** to go back to the original file settings.



#### NOTE

YAML generation is disabled when the YAML in the text editor has a syntax error or is not valid YAML.

5. When you are finished, export your agent configuration file either as a YAML or environment variables. You can also share the file with other collaborators.



#### NOTE

At this time, the Contrast agent configuration editor executes completely offline (meaning after first visit, the page is accessible without an internet connection). Updates are downloaded in the background automatically. Upgrading to newer versions requires closing all agent configuration app tabs; refreshing is not enough to activate the new version.

## Agent Operator (Kubernetes operator)

The Contrast Agent Operator is a standard [Kubernetes operator](#) that executes within Kubernetes and OpenShift clusters to automate injecting Contrast agents into existing workloads, configuring injected agents, and facilitating agent upgrades.

To get started, [install the agent operator \(page 36\)](#) or use the [agent operator walkthrough \(page 37\)](#) for a full example.

The operator is configured using declarative Kubernetes native resource types. Resources types are documented in the [agent operator configuration \(page 44\)](#) section.



#### NOTE

The Contrast Agent Operator is an open source project. You can review the code and contribute to its development [here](#).

## See also

- [Agent Operator supported technologies \(page 36\)](#)
- [Agent Operator telemetry \(page 49\)](#)
- [Agent Operator minimum configuration \(page 41\)](#)

## Supported technologies for Agent Operator

### Kubernetes / OpenShift support

Kubernetes version	OpenShift version	Supported	End-of-support
v1.23	v4.10	Yes	2023-02-28
v1.22	v4.9	Yes	2022-10-28
v1.21	v4.8	Yes	2022-06-28

- The Contrast Agent Operator follows the upstream [Kubernetes community support policy](#). End-of-life dates are documented on the [Kubernetes releases](#) page.
- OpenShift support is dependent on the included version of Kubernetes. For example, OpenShift v4.10 uses Kubernetes v1.23 and will be supported by Contrast until 2023-02-28. See Red Hat's [support article](#) for the mapping between Kubernetes and OpenShift versions.
- The Contrast Agent Operator only supports executing on Linux amd64 hosts and will refuse to be scheduled onto incompatible nodes. Additionally, the operator only supports injecting workloads running on Linux amd64 hosts, even if the Contrast Agent supports additional platforms. Contact [Contrast Support](#) if Kubernetes on Windows or arm64 support is desired.

### Agent types

Agent	Agent type	Support status	Compatibility notes
.NET Core	dotnet-core	Supported	<a href="#">Supported .NET Core technologies (page 174)</a>
Java	java	Supported	<a href="#">Supported Java technologies (page 51)</a>
NodeJS	nodejs	Supported	<a href="#">Supported NodeJS technologies (page 222)</a>
	OR nodejs-protect		
PHP	php	Beta	<a href="#">Supported PHP technologies (page 261)</a>



### NOTE

- Injection of a PHP application is in beta. Beta status means the feature might change or act unexpectedly. By using this feature, you agree to the [Contrast Beta Terms and Conditions \(page 754\)](#).
- Injection of the NodeJS Agent may result in a substantial increase in the startup time of the instrumented application. If startup time is unacceptable, injecting the agent during compilation may be desirable. If the application was injected by the NodeJS agent during compilation then injection during runtime by the operator should be disabled. See the [rewriter CLI \(page 258\)](#) for more information.

## Install the Agent Operator

Contrast provides a single-file installation YAML that can be directly applied to a cluster and provides reasonable defaults. Additional modifications may be desired based on your specific circumstances.

## Custom registries

If you want to use Agent Operator in an air-gapped environment (or you cannot use DockerHub), use the [Contrast custom registry examples](#) to guide you.

### Steps

1. Executing as a cluster administrator, apply the operator manifests using `kubectl` (Kubernetes) or `oc` (OpenShift).

```
kubectl apply -f https://github.com/Contrast-Security-OSS/agent-operator/releases/latest
```

```
oc apply -f https://github.com/Contrast-Security-OSS/agent-operator/releases/latest
```

The manifests:

- Create the `contrast-agent-operator` namespace.
- Install the operator Deployment workload.
- Install the required Custom Resource Definitions.
- Configure RBAC with the minimum necessary permissions.
- Register the operator for admission webhooks.



#### NOTE

It is possible to install into a namespace other than the default `contrast-agent-operator`, although modifications to the deployment manifests will be required.

2. After applying the operator manifests, wait for the cluster to converge.

```
kubectl -n contrast-agent-operator wait pod --for=condition=ready --selector=app.kubernetes.io/name=contrast-agent-operator
```

```
oc -n contrast-agent-operator wait pod --for=condition=ready --selector=app.kubernetes.io/name=contrast-agent-operator
```

3. When the wait command succeeds the operator is ready to be [configured \(page 41\)](#).

### See also

- [Agent Operator walkthrough \(page 37\)](#)
- [Agent Operator minimum configuration \(page 41\)](#)
- [Agent Operator telemetry \(page 49\)](#)

## Agent Operator walkthrough

### Before you begin

This topic provides a complete walk-through of installing the Contrast Agent Operator and injecting an example workload as a cluster administrator, using vanilla Kubernetes.

To follow this example using OpenShift, the Kubernetes commands will need to be converted to their OpenShift equivalents. All commands are expected to execute within a Bash-like terminal.

You should have a basic understanding of how Kubernetes and related software work. You may need to adjust the instructions to meet your specific circumstances.

### Step 1: Install the operator

To install the operator, the operator manifests must be applied to the cluster. Contrast provides a single-file installation YAML that can be directly applied to a cluster and provides reasonable defaults. Additional modifications may be desired based on your specific circumstances, in which case, a configuration management framework, such as [Kustomize](#), is recommended.

**NOTE**

This single-file installation YAML will create and install into the `contrast-agent-operator` namespace. This namespace will be used later.

After waiting for cluster convergence, the operator should be ready in the `Running` status.

```
% kubectl -n contrast-agent-operator get pods
```

NAME	READY	STATUS	RESTARTS	AGE
contrast-agent-operator-57f5cfbf7-9svtt	1/1	Running	0	27s
contrast-agent-operator-57f5cfbf7-fp4vp	1/1	Running	0	39s

The operator is ready to be configured.

**Step 2: Configure the operator**

The operator must first be configured before injecting cluster workloads.

Kubernetes secrets are used to store connection authentication keys. Note that the name of the Secret created in the next part is called `default-agent-connection-secret` and is created in the `contrast-agent-operator` namespace.

```
% kubectl -n contrast-agent-operator \
  create secret generic default-agent-connection-secret \
  --from-literal=apiKey=TODO \
  --from-literal=serviceKey=TODO \
  --from-literal=username=TODO
```

```
secret/default-agent-connection-secret created
```

**NOTE**

Replace `TODO` with the equivalent values for your Contrast server instance. [Find the agent keys \(page 32\)](#) describes how to retrieve agent keys from the Contrast UI.

To complete the connection configuration, a `ClusterAgentConnection` is needed. Note that `ClusterAgentConnection` created in the next part is created in the `contrast-agent-operator` namespace and refers to the Secret's key values used above.

```
% kubectl apply -f - <<EOF
apiVersion: agents.contrastsecurity.com/v1beta1
kind: ClusterAgentConnection
metadata:
  name: default-agent-connection
  namespace: contrast-agent-operator
spec:
  template:
    spec:
      url: https://app.contrastsecurity.com/Contrast
      apiKey:
```

```

        secretName: default-agent-connection-secret
        secretKey: apiKey
    serviceKey:
        secretName: default-agent-connection-secret
        secretKey: serviceKey
    userName:
        secretName: default-agent-connection-secret
        secretKey: userName
EOF

```

```
clusteragentconnection.agents.contrastsecurity.com/default-agent-connection created
```



### NOTE

The name of the ClusterAgentConnection is not important and can be named anything.

The operator is now configured and can inject agents into existing workloads.

### Step 3: Inject workloads

This example will focus on injecting the Contrast .NET Core Agent into the [ASP.NET Core sample application](#) using a Deployment workload.

First, deploy the ASP.NET Core sample application to the cluster. Note that the Deployment created in the next part is created in the `default` namespace.

```

% kubectl apply -f - <<EOF
apiVersion: apps/v1
kind: Deployment
metadata:
  name: hello-world-app
  namespace: default
  labels:
    arbitrary-label: arbitrary-value
spec:
  selector:
    matchLabels:
      app: hello-world-app
  template:
    metadata:
      labels:
        app: hello-world-app
    spec:
      containers:
        - image: mcr.microsoft.com/dotnet/samples:aspnetapp
          name: hello-world-app
EOF

```

```
deployment.apps/hello-world-app created
```

After waiting for cluster convergence, the deployed workload should be ready in the `Running` status.

```
$% kubectl -n default get pods
```

NAME	READY	STATUS	RESTARTS	AGE
hello-world-app-7479d5ff96-p28zx	1/1	Running	0	19s

Next, the operator can be configured to inject the .NET Core agent using an AgentInjector configuration entity. Note that the AgentInjector needs to be created in the same namespace that the previous Deployment was deployed into, default in this case.

```
% kubectl apply -f - <<EOF
apiVersion: agents.contrastsecurity.com/v1beta1
kind: AgentInjector
metadata:
  name: injector-for-hello-world
  namespace: default
spec:
  type: dotnet-core
  selector:
    labels:
      - name: arbitrary-label
        value: arbitrary-value
EOF
```

agentinjector.agents.contrastsecurity.com/injector-for-hello-world created

Checking the logs of the hello-world-app Pod shows that the Contrast .NET Core agent is now instrumenting the application.

```
% kubectl -n default logs Deployment/hello-world-app
```

```
Defaulted container "hello-world-app" out of: hello-world-app, contrast-init (init)
warn: Microsoft.AspNetCore.DataProtection.Repositories.FileSystemXmlRepository[60]
      Storing keys in a directory '/root/.aspnet/DataProtection-Keys' that may not be per
warn: Microsoft.AspNetCore.DataProtection.KeyManagement.XmlKeyManager[35]
      No XML encryptor configured. Key {0ad20893-267f-4635-99b0-1ee74bccbc8b} may be per
```

```

  _.-|____|                | \_ / , |   ( \   Contrast .NET Core Agent 2.1.13.0
 [  |____|                | o o |__ _ )
  `-.|____|                _.( T   )  `  /   Contrast UI: https://app.contrastsecurity.com
   .--'--'-.                _(( _ `^--' /_< \   Mode:           Assess & Protect
  .+|_____|__.-||__)`-'(((/  (((/
```

```
info: Microsoft.Hosting.Lifetime[14]
      Now listening on: http://[::]:80
info: Microsoft.Hosting.Lifetime[0]
      Application started. Press Ctrl+C to shut down.
info: Microsoft.Hosting.Lifetime[0]
      Hosting environment: Production
info: Microsoft.Hosting.Lifetime[0]
      Content root path: /app/
```

#### Step 4: Uninstall the operator (optional)

To restore the original state of the cluster, first remove existing AgentInjectors.

```
% kubectl -n default delete agentinjector injector-for-hello-world
```

agentinjector.agents.contrastsecurity.com "injector-for-hello-world" deleted

After which, the operator will restore all injected workloads to their previous non-instrumented state. Once the cluster converges, the operator can be safely removed.



```
% kubectl delete -f https://github.com/Contrast-Security-OSS/agent-operator/releases/lat
namespace "contrast-agent-operator" deleted
customresourcedefinition.apiextensions.k8s.io "agentconfigurations.agents.contrastsecuri
customresourcedefinition.apiextensions.k8s.io "agentconnections.agents.contrastsecurity.
customresourcedefinition.apiextensions.k8s.io "agentinjectors.agents.contrastsecurity.co
customresourcedefinition.apiextensions.k8s.io "clusteragentconfigurations.agents.contras
customresourcedefinition.apiextensions.k8s.io "clusteragentconnections.agents.contrastse
serviceaccount "contrast-agent-operator-service-account" deleted
clusterrole.rbac.authorization.k8s.io "contrast-agent-operator-service-role" deleted
clusterrolebinding.rbac.authorization.k8s.io "contrast-agent-operator-service-role-bindin
service "contrast-agent-operator" deleted
deployment.apps "contrast-agent-operator" deleted
poddisruptionbudget.policy "contrast-agent-operator" deleted
mutatingwebhookconfiguration.admissionregistration.k8s.io "contrast-web-hook-configurati
```

## See also

- [Install the Agent Operator \(page 36\)](#)
- [Agent Operator minimum configuration \(page 41\)](#)
- [Agent Operator configuration \(page 44\)](#)

## Agent Operator minimum configuration

All configuration of the operator is handled through the use of Kubernetes native configuration entities defined by [custom resource definitions](#) (CRDs). The CRDs are deployed with the operator and define how to interact with the operator's configuration entities.

Tooling such as Visual Studio Code's Kubernetes [extension](#) can aid in creating syntactically correct entities in your cluster.

The full schema is documented in the [Agent Operator configuration \(page 44\)](#). This section only covers the minimal setup required and may not cover all situations.

## Minimum configuration

For a minimum setup, 3 manifests are required.

1. First, a standard Kubernetes Secret contains the necessary connection keys to authenticate to your Contrast server instance. The Secret must be deployed into the same namespace as the ClusterAgentConnection entity. You can find your agent keys under [find the agent keys \(page 32\)](#).

```
apiVersion: v1
kind: Secret
metadata:
  name: default-agent-connection-secret
  namespace: contrast-agent-operator
type: Opaque
stringData:
  apiKey: TODO
  serviceKey: TODO
  userName: TODO
```

2. Second, a ClusterAgentConnection configuration entity. The ClusterAgentConnection provides the default connection settings for agents within the cluster and maps to the above mentioned Secret containing connection authentication keys. For security, ClusterAgentConnection entities must be deployed into the same namespace as the operator to be used. This example assumes that the default namespace `contrast-agent-operator` hasn't been customized.

```
apiVersion: agents.contrastsecurity.com/v1beta1
kind: ClusterAgentConnection
```

```

metadata:
  name: default-agent-connection
  namespace: contrast-agent-operator
spec:
  template:
    spec:
      url: https://app.contrastsecurity.com/Contrast
      apiKey:
        secretName: default-agent-connection-secret
        secretKey: apiKey
      serviceKey:
        secretName: default-agent-connection-secret
        secretKey: serviceKey
      userName:
        secretName: default-agent-connection-secret
        secretKey: userName

```

3. Finally, a `AgentInjector` configuration entity. The `AgentInjector` selects workloads eligible for automatic injection using workload labels e.g. `metadata.labels` within the namespace in which the `AgentInjector` is deployed.

```

apiVersion: agents.contrastsecurity.com/v1beta1
kind: AgentInjector
metadata:
  name: dotnet-hello-world
  namespace: default
spec:
  type: dotnet-core
  selector:
    labels:
      - name: app
        value: dotnet-hello-world

```

In this example manifest, the Contrast Agent Operator will automatically inject the .NET Contrast agent into workloads (e.g. Deployments, DeploymentConfigs, etc.) that have the label `app=dotnet-hello-world` in the namespace `default`.

## See also

- [Agent Operator configuration \(page 44\)](#)
- [Agent Operator supported technologies \(page 36\)](#)

## Upgrade the operator

The Contrast Agent Operator follows [semantic versioning](#).

- **MAJOR** versions may include breaking changes to the operator API. Care should be taken when upgrading between MAJOR versions as manifests may have changed or existing CRDs may need to be updated.
- **MINOR** versions contain new features and are fully backwards compatible and are safe to apply to an existing cluster. Optional manifest changes may be needed to use new functionality.
- **Patch** versions contain security and bug fixes and are fully backwards compatible and are safe to apply to an existing cluster. No manifest changes are required.

Contrast publishes image tags in the following format:

```

:2
:2.1

```

```
:2.1.10
:latest
```

Where `:2` represents the latest release in the `2.X.X` semantic version branch. To simplify upgrades, prefix versions may be used based on your risk tolerance (ensure `imagePullPolicy` is set to `Always`).



## NOTE

While the Contrast Agent Operator supports high availability setups using multiple replicas and leader leases, Contrast only supports deployments where all operator instances are running the same version for extended periods of time. The option `imagePullPolicy` should not be relied on to keep multiple instances on the same version. Using an operator, such as [Keel](#) to facilitate safe upgrades, is recommended if automatic upgrades are desired.

## Minor and patch upgrades

Upgrading to new versions follows the same steps as installing into a fresh cluster. Executing as a cluster administrator, apply the operator manifests using `kubectl` (Kubernetes) or `oc` (OpenShift).

```
kubectl apply -f https://github.com/Contrast-Security-OSS/agent-operator/releases/latest
oc apply -f https://github.com/Contrast-Security-OSS/agent-operator/releases/latest/download
```

## Major upgrades

Major upgrades may include additional manifest changes. Deleting only the `contrast-agent-operator` namespace maintains the installed CRDs (and by extension any cluster configurations).

```
kubectl delete namespace contrast-agent-operator
kubectl apply -f https://github.com/Contrast-Security-OSS/agent-operator/releases/latest

oc delete project contrast-agent-operator
oc apply -f https://github.com/Contrast-Security-OSS/agent-operator/releases/latest/download
```

While these generic steps may work in most major upgrades, care should be taken to follow the migration steps provided in the release notes, if any, to ensure the major upgrade is successful.

## See also

- [Agent Operator configuration \(page 44\)](#)
- [Operator supported technologies \(page 36\)](#)

## Uninstall the Agent Operator

The Contrast Agent Operator stores all data in the Kubernetes backplane, and is designed to completely remove all modifications when removed from a cluster. To ensure that everything is cleaned up correctly, it is recommended the following steps are taken in order.

```
kubectl delete crd agentconfigurations.agents.contrastsecurity.com
kubectl delete crd agentconnections.agents.contrastsecurity.com
kubectl delete crd agentinjectors.agents.contrastsecurity.com
kubectl delete crd clusteragentconfigurations.agents.contrastsecurity.com
kubectl delete crd clusteragentconnections.agents.contrastsecurity.com

oc delete crd agentconfigurations.agents.contrastsecurity.com
oc delete crd agentconnections.agents.contrastsecurity.com
```

```
oc delete crd agentinjectors.agents.contrastsecurity.com
oc delete crd clusteragentconfigurations.agents.contrastsecurity.com
oc delete crd clusteragentconnections.agents.contrastsecurity.com
```

Deleting the CRDs will delete any operator configuration entities automatically. Allow the Contrast Agent Operator to reverse any changes it has made to cluster workloads once the configuration entities have been removed.



**NOTE**

This may cause substantial shifting of deployed pods as Kubernetes redeploys impacted workloads, depending on how many workloads were injected by the operator. Caution is advised in larger clusters.

After the cluster settles, the operator is safe to remove.

```
kubectl delete -f https://github.com/Contrast-Security-OSS/agent-operator/releases/latest
oc delete -f https://github.com/Contrast-Security-OSS/agent-operator/releases/latest/download
```



**NOTE**

Errors around missing CRDs is normal if the CRDs were deleted in the first step as recommended.

## Agent Operator configuration

The topic describes the schema for every configuration entity type the Contrast Agent Operator accepts. Some entities are optional.

### AgentConfiguration

```
apiVersion: agents.contrastsecurity.com/v1beta1
kind: AgentConfiguration
metadata:
  name: example-agent-configuration
  namespace: default
spec:
  yaml: |
    server:
      environment: QA
  suppressDefaultServerName: false
  suppressDefaultApplicationName: false
```

Property	Type	Re-quired	Default value	Description
spec.yaml	string	No		A YAML configuration file as documented "YAML configuration"

Property	Type	Required	Default value	Description
spec.suppressDefaultServerName	boolean	No	False	If false, automatically set the Contrast server name on injected workloads ('kubernetes-{namespace}'), rather than use the default (normally the pod name).
spec.suppressDefaultApplicationName	boolean	No	False	If false, automatically set the Contrast application name on injected workloads (the workload name), rather than use the default (generated by the agent).



**NOTE**

Connection keys will be ignored in the provided YAML file and should not be provided.

**AgentConnection**

```

apiVersion: agents.contrastsecurity.com/v1beta1
kind: AgentConnection
metadata:
  name: example-agent-connection
  namespace: default
spec:
  url: https://app.contrastsecurity.com/Contrast
  apiKey:
    secretName: example-agent-connection-secret
    secretKey: apiKey
  serviceKey:
    secretName: example-agent-connection-secret
    secretKey: serviceKey
  userName:
    secretName: example-agent-connection-secret
    secretKey: userName
    
```

Property	Type	Required	Default value	Description
spec.url	string	Yes		The URL of your Contrast server.
spec.apiKey.secretName	string	Yes		The name of the Secret containing the apiKey.
spec.apiKey.secretKey	string	Yes		The key of the value in the named Secret containing the apiKey.
spec.serviceKey.secretName	string	Yes		The name of the Secret containing the serviceKey.
spec.serviceKey.secretKey	string	Yes		The key of the value in the named Secret containing the serviceKey.
spec.userName.secretName	string	Yes		The name of the Secret containing the userName.
spec.userName.secretKey	string	Yes		The key of the value in the named Secret containing the userName.



**IMPORTANT**

For security, Secrets referenced must be contained in the same namespace as the AgentConnection.

## AgentInjector

```

apiVersion: agents.contrastsecurity.com/v1beta1
kind: AgentInjector
metadata:
  name: example-injector-dotnet-core
  namespace: default
spec:
  enabled: true
  version: latest
  type: dotnet-core
  image:
    registry: docker.io/contrast
    name: agent-dotnet-core
    pullSecretName: contrastdotnet-pull-secret
    pullPolicy: Always
  selector:
    images:
      - "*"
    labels:
      - name: app
        value: example-*
  connection:
    name: example-agent-connection
  configuration:
    name: example-agent-configuration

```

Property	Type	Re-quired	Default value	Description
spec.enabled	boolean	No	TRUE	Enables or disables this agent injector.
spec.version	string	No	latest	The version of the agent to inject. The literal 'latest' will inject the latest version. Partial version matches are supported, e.g. '2' will select version '2.1.0'.
spec.type	agent-Type	Yes		The type of agent to inject. Can be one of ['dotnet-core', 'java', 'nodejs' or 'nodejs-protect', 'php'].
spec.image.regis-try	string	No	docker.io/contrast	The image registry to use for downloading agent im-ages. This registry must be accessible by the pods being injected and by the operator.
spec.image.name	string	No	{based on type}	The name of the injector image to use.
spec.image.pull-SecretName	string	No		The name of a pull Secret to append to the pod's imagePullSecrets list.
spec.image.pull-Policy	string	No	Always	The pull policy to use when fetching Contrast im-ages. See Kubernetes imagePullPolicy for more in-formation.
spec.selector.im-ages	string[]	No	Select all contain-ers in Pod.	Container images to inject the agent into. Glob pat-terns are supported.
spec.selector.la-bels	labelSe-lector[]	No	Select all work-loads in name-space.	Deployment/StatefulSet/DaemonSet/Deployment-Config labels whose pods are eligible for agent injection.
spec.connec-tion.name	string	No	Defaults Agent-Connection speci-fied by a ClusterA-gentConnection.	The name of AgentConnection resource. Must exist within the same namespace.
spec.configura-tion.name	string	No	Defaults a Agent-Configuration specified by a ClusterAgent-Configuration.	The name of a AgentConfiguration resource. Must exist within the same namespace.

- Disabling an existing AgentInjector will remove all injections from selected workloads.
- The referenced AgentConnection and AgentConfiguration must exist in the same namespace as the AgentInjector.
- If using a custom registry, both the Pod being injected and the operator must have access, either through the default pull secret, or custom pull secrets.
- Agent version `latest` is recommended when using the agent in pre-production environments.
- The AgentInjector supports selecting Deployment, StatefulSet, DaemonSet, and DeploymentConfig (on OpenShift) workloads. Injecting pods directly is not supported.
- If the selected workload creates many containers in a single Pod, `spec.selector.images` can be used to filter which containers are injected.

### labelSelector

Property	Type	Required	Default value	Description
name	string	Yes		The name of the label to match.
value	string	Yes		The value of the label to match. Glob patterns are supported.



### NOTE

Label selections are cumulative using the logical AND operation.

### agentType

Agent	Agent Type
.NET Core	dotnet-core
Java	java
Node.js	nodejs
	OR
	nodejs-protect
PHP	php

Types are further documented in [Operator supported technologies \(page 36\)](#).

### ClusterAgentConfiguration

```

apiVersion: agents.contrastsecurity.com/v1beta1
kind: ClusterAgentConfiguration
metadata:
  name: default-agent-configuration
  namespace: contrast-agent-operator
spec:
  namespaces:
    - default
  template:
    spec:
      yaml: |
        server:
          environment: QA
    
```

Property	Type	Required	Default value	Description
spec.namespace	string[]	No	All namespaces.	The namespaces to apply this AgentConfiguration template to. Glob syntax is supported.
spec.template	AgentConfiguration	Yes		The default AgentConfiguration to apply to the namespaces selected by 'spec.namespaces'.



**NOTE**

For security, ClusterAgentConfiguration manifests must be deployed into the same namespace of the operator.

**ClusterAgentConnection**

```

apiVersion: agents.contrastsecurity.com/v1beta1
kind: ClusterAgentConnection
metadata:
  name: default-agent-connection
  namespace: contrast-agent-operator
spec:
  namespaces:
    - default
  template:
    spec:
      url: http://app.contrastsecurity.com/Contrast
      apiKey:
        secretName: default-agent-connection-secret
        secretKey: apiKey
      serviceKey:
        secretName: default-agent-connection-secret
        secretKey: serviceKey
      userName:
        secretName: default-agent-connection-secret
        secretKey: userName
  
```

Property	Type	Required	Default value	Description
spec.namespace	string[]	No	All namespaces.	The namespaces to apply this AgentConfiguration template to. Glob syntax is supported.
spec.template	AgentConnection	Yes		The default AgentConnection to apply to the namespaces selected by 'spec.namespaces'.



**NOTE**

- For security, ClusterAgentConnection manifests must be deployed into the same namespace of the operator.
- Secrets referenced by ClusterAgentConnection must exist in the same namespace in which the ClusterAgentConnection entity is deployed.



## See also

- [Install Agent Operator \(page 36\)](#)
- [Agent Operator supported technologies \(page 36\)](#)
- [Agent operator telemetry \(page 49\)](#)

## .NET Core chaining support

The .NET Core Agent, paired with the [Contrast Agent Operator \(page 35\)](#), supports profiler chaining with Dynatrace using the [Dynatrace Operator](#). Support is enabled automatically when the Dynatrace Operator is used to inject the Dynatrace agent into workloads.

If you use the Dynatrace Operator in `classicFullStack` mode, set the `CONTRAST_ENABLE_EARLY_CHAINING=true` environment variable for the Contrast Agent Operator and restart the affected pods. Use this [manifest example](#) to guide you.

Vendor	Version	Support validated on
Dynatrace	Operator v0.6.0	2022/06/09

Future Dynatrace versions may break chaining. Chaining can introduce incompatibilities and can be disabled using the `agent.dotnet.enable_chaining: false` option.

## Agent Operator Telemetry

The Contrast Agent Operator uses telemetry to collect usage data. Telemetry is collected when the operator is first installed in a cluster and then periodically (every few hours) afterwards.

Your privacy is important to us. The telemetry feature doesn't collect application data. The data is anonymized before being sent securely to Contrast. Then the aggregated data is stored encrypted and under restricted access control. Any collected data will be deleted after one year.

To opt-out of the telemetry feature, set the `CONTRAST_AGENT_TELEMETRY_OPTOUT` environment variable to `1` or `true`.

Telemetry data is securely sent to `telemetry.dotnet.contrastsecurity.com`. You can also opt out of telemetry by blocking communication at the network level.

The telemetry feature collects the following data:

### Operator v0.3.0

- The version of the operator.
- The uptime of the operator.
- Cluster version information and platform as published by the Kubernetes API.
- A cryptographically (SHA256) anonymous hash of the cluster ID, a randomly generated GUID created at first launch by the operator and stored in the operator's namespace as a Secret.
- The count of watched resources in the cluster (all operator entities, DaemonSets, DeploymentConfigs, Deployments, Namespaces, Pods, Secrets, and StatefulSets).
- Exceptions thrown internally by the operator, including log message, exception type, exception message, and stack trace frames.

## Environment variables

You can configure the agent with any of the supported properties through environment variables.

The environment variables need to be set before the agent starts up, and in a location where the agent has access to it. Environment variables can be set within the same process or system-wide.



### IMPORTANT

If you set system-wide environment variables, this may impact other Contrast agents running on the same server.

You can convert any Contrast property between command line, YAML and an environment variable.

To convert a command line formatted variable to an environment variable, replace the path segment delimiters (.) with double underscores (\_\_).

To convert a YAML formatted variable to an environment variable, start with the top-level property and separate every nested property with a double underscore (\_\_).

Then, prepend the "contrast" namespace (either `contrast.` or `CONTRAST__`).

Environment variables should be in all caps and have no spaces.

For example:

Command line	YAML property	Environment variable
<code>contrast.server.name</code>	<code>server:   name:</code>	<code>CONTRAST__SERVER__NAME</code>
<code>contrast.api.api_key</code>	<code>api:   api_key:</code>	<code>CONTRAST__API__API_KEY</code>

You can see a list of all supported properties for each agent in their respective YAML templates:

- [Go \(page 402\)](#)
- [Java \(page 71\)](#)
- [.NET Framework \(page 139\)](#)
- [.NET Core \(page 191\)](#)
- [Node.js \(page 231\)](#)
- [PHP \(page 265\)](#)
- [Python \(page 294\)](#)
- [Ruby \(page 349\)](#)

## Java agent

The Contrast Java agent adds either Contrast Assess or Contrast Protect analysis to Java based applications. The agent analyzes Java web applications built on traditional application servers, and newer Java web applications such as those built with Netty, Play or Spring Boot. If there's a JVM, the Java agent can provide security insights.

As your application runs, the Java agent's sensors gather information about the application's security, architecture and libraries. You can see the results of the agent's analysis in Contrast.

To start analyzing an application, [install the Java agent \(page 52\)](#).

## Supported technologies for Java (Kotlin, Scala) agent

### Java

Technology	Supported versions	Notes
Java runtime	<ul style="list-style-type: none"> <li>• IBM 8</li> <li>• Oracle 8. *Versions 11+ follow our OpenJDK support.</li> <li>• OpenJDK 8, 11, 12, 13, 14, 15, 16, 17, 18, 19</li> </ul>	<p>OpenJDK support is designed to work with all <a href="#">publicly available builds</a> within the current version support shown here. Popular varieties like Azul and Amazon Corretto fall into this category of supported JDKs.</p> <p><b>Not supported:</b></p> <p>JDK preview features</p>
Java runtime for <a href="#">Legacy Java agent (page 122)</a> Use with Java agent 3.x only	<ul style="list-style-type: none"> <li>• IBM 6, 7</li> <li>• Oracle 6, 7</li> <li>• OpenJDK 6, 7</li> </ul>	<p><b>See also</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Support-Bulletin-End-of-Support-of-Java-6-and-7</a></li> <li>• <a href="#">FAQ: End of Support for Java 6 and 7</a></li> </ul>
Application servers	<ul style="list-style-type: none"> <li>• GlassFish 4</li> <li>• Grizzly 2.3.20 and later</li> <li>• JBoss EAP 6.X and 7.X</li> <li>• Jetty 7, 8, 9, 10, 11</li> <li>• Karaf 3.0.X</li> <li>• Netty 4.X</li> <li>• Play 2.4</li> <li>• Resin 4</li> <li>• Tomcat 5, 6, 7, 8, 9,10</li> <li>• Vert.X 3.1.0, 4.X</li> <li>• WebLogic 10, 11g, 12c</li> <li>• WebSphere* 8.5, 9.0</li> <li>• WebSphere Liberty 22</li> <li>• WildFly 10, 11, 14, 18</li> </ul>	<p>* Contrast offers limited support for zSeries and AIX environments. Customers using WebSphere on SPARC Solaris require version 8.5.5.11.</p>
Optimizers	Proguard	<p><a href="#">Proguard</a> includes Java bytecode optimization features which break basic assumptions that runtime agents like Contrast rely on. Proguard users that want to protect their applications with Contrast need to avoid these optimizations by using Proguard's <a href="#">-dontoptimize configuration option</a>.</p>
Databases	<ul style="list-style-type: none"> <li>• DB2</li> <li>• DynamoDB</li> <li>• MySQL</li> <li>• Oracle</li> <li>• PostgreSQL</li> <li>• SQL Server</li> <li>• SQLite JDBC drivers</li> </ul>	
Message services	<ul style="list-style-type: none"> <li>• Message services: JMS 2.0</li> <li>• IBM MQ 9.x</li> <li>• Spring JMS 2.x</li> </ul>	<ul style="list-style-type: none"> <li>• Agent version: Java 4.7.0 and later</li> <li>• Contrast version: 3.9.9 and later</li> </ul>
	<ul style="list-style-type: none"> <li>• Kafka Queues and Streaming</li> </ul>	<ul style="list-style-type: none"> <li>• Agent version: Java 5.0.0 and later</li> </ul>

Technology	Supported versions	Notes
Other Java technologies	<ul style="list-style-type: none"> <li>• ADF JSF</li> <li>• Apache POI, fileupload, HttpComponents</li> <li>• Axis (RPC), XMLRPC, RMI, Apache CXF, JMS (javax.jms)</li> <li>• Direct Web Remoting (DWR)</li> <li>• DropWizard</li> <li>• Freemarker</li> <li>• Glowroot*</li> <li>• GSON, Kryo, minidev, org.json</li> <li>• Google Web Toolkit (GWT)</li> <li>• Hibernate</li> <li>• http4k (4.6.0.0 and 4.17 for Contrast Assess)</li> <li>• J2SE</li> <li>• JDBC, JDBI, MongoDB</li> <li>• JSF (MyFaces, RichFaces, Sun)</li> <li>• java.nio, java.beans</li> <li>• Java EE/J2EE, Servlet/JSP</li> <li>• Jersey</li> <li>• MyBatis</li> <li>• OWASP ESAPI, AntiSamy, Coverity</li> <li>• Quarkus RESTeasy</li> <li>• Seam</li> <li>• Spring, Spring Boot, Spring AOP</li> <li>• Struts, Struts 2</li> <li>• Wicket</li> <li>• XStream, Jackson (JSON/XML)</li> <li>• Xerces, JAXB, nu.xom</li> </ul>	*If you are using Glowroot, the Contrast Java Agent jar should be included and loaded prior to the Glowroot jar.

## Kotlin

Technology	Supported versions
Contrast agent	3.9.1.25108 and later
Java Run Time	JDK 8 and up
Kotlin version	1.5.X

## Scala

Technology	Supported versions
Contrast agent	3.8.11.23624 and later
Java Run Time	JDK 8 and up
Scala version	2.12, 2.13
Play version	2.6, 2.7, 2.8
Akka HTTP	10.2.4

## WebSphere configuration

If you are using WebSphere as an application server, refer to the information in [Configure the Java agent for Websphere \(page 67\)](#) before you deploy the agent.

## Install the Java agent

There are several ways to install the Java agent depending on your situation. You might want to consider where you want to use Contrast (for example, Assess in your development environment or Protect in your production environment), your existing build tools, and how your application is deployed.

**TIP**

If you are using multiple agent-based technologies in parallel with the Contrast Java agent, ensure that you specify the Contrast Java agent as the first agent that loads at startup. For example:

```
java -javaagent:contrast.jar -javaagent:newrelic.jar
```

Loading the Contrast Java agent first helps to limit performance impacts.

**Quick start**

Just want to try out the Java agent and see how it works? Check out this [Java Quick Start Guide \(page 69\)](#).

**Basic installation**

To install the Java agent in most situations (like in an application server like Tomcat, or a container like Docker), choose a repository and follow these instructions to download and install the agent:

- [Maven Central \(page 53\)](#)
- [Debian \(page 54\)](#)
- [RPM \(page 55\)](#)

**Build-integrated installation**

If you are using Assess in a development environment, and you want to set the build outcome in an existing software project if vulnerabilities are found, install the agent with:

- [Maven plugin \(page 592\)](#)
- [Gradle plugin \(page 578\)](#)
- [Jenkins plugin \(page 580\)](#)

**Install the Java agent using Maven Central**

The Contrast Java agent is [available from Maven Central](#) using group ID `com.contrastsecurity` and artifact ID `contrast-agent`. To install the Java agent:

1. Get the `contrast-agent.jar` from Maven Central. ([See examples](#) of how to download from the Maven repository.)
2. [Configure the agent \(page 70\)](#). You can create or download a [YAML configuration file \(page 33\)](#). You must provide Contrast connection parameters using [these agent keys \(page 32\)](#).
3. Tell the agent where to find the yaml configuration file (`contrast.yaml`). In the example below, substitute `<YourContrastJarPath>` with the path to your Contrast JAR (this may vary depending on your internal file structure and how you downloaded the file) and `<ApplicationJar>` with the name of your application JAR.

```
java -javaagent:<YourContrastJarPath> -Dcontrast.config.path=contrast.yaml -jar <App>
```

**NOTE**

If you are using system properties, environment variables to configure instead of YAML, or you have placed the YAML in a [standard location \(page 31\)](#) where the agent can find it automatically, set the JVM parameter to include the Java agent.

```
java -javaagent:<YourContrastJarPath> -jar <AppName>.jar
```

4. Use the application as you normally would (for example, click on the web interface, send API commands). Verify that Contrast sees your application (for example, view your application in the Contrast web interface, view logs).

Contrast artifacts deployed to Maven Central are signed with our GPG key hosted on <https://keyserver.ubuntu.com>. Contrast's public signing key has ID 1AAD9AFB3FC5CCA6940D021534D84B137E8F1053 and can be installed to a local keyring with the following command:

```
gpg --keyserver keyserver.ubuntu.com --recv-keys 1AAD9AFB3FC5CCA6940D021534D84B137E8F1053
```

You can also provide security analysis for applications running in a test/QA or production environment, by installing the agent with an application server like:

- [Jetty \(page 65\)](#)
- [JBoss/Wildfly \(page 63\)](#)
- [Tomcat \(page 65\)](#)
- [WebLogic \(page 66\)](#)
- [WebSphere \(page 67\)](#)

You can also [install using a container \(page 56\)](#), like Docker.



#### TIP

Check the [Contrast Support Portal](#) for more information about other compatible ways to install the agent using tools like [Pivotal Cloud Foundry \(now VMware Tanzu\)](#).

## Install the Java agent using the Debian repository

You can configure your system to retrieve and install the Java agent from the Contrast Debian repository. To do this:

1. Use the following commands to configure your system to receive packages from the repository:

```
curl https://pkg.contrastsecurity.com/api/gpg/key/public | sudo apt-key add -  
echo "deb https://pkg.contrastsecurity.com/debian-public/ all contrast" | sudo tee /e
```

2. Install the Contrast Java agent:

```
sudo apt-get update && sudo apt-get install contrast-java-agent
```

3. You will now see the Contrast Java agent JAR file at `/opt/contrast/contrast-agent.jar`.
4. [Configure the agent \(page 70\)](#). You can create or download a [YAML configuration file \(page 33\)](#). You must provide Contrast connection parameters using [these agent keys \(page 32\)](#).
5. Tell the agent where to find the yaml configuration file (`contrast.yaml`). In the example below, substitute `<YourContrastJarPath>` with the path to your Contrast JAR (this may vary depending on your internal file structure and how you downloaded the file) and `<ApplicationJar>` with the name of your application JAR.

```
java -javaagent:<YourContrastJarPath> -Dcontrast.config.path=contrast.yaml -jar <AppJ
```

**NOTE**

If you are using system properties, environment variables to configure instead of YAML, or you have placed the YAML in a [standard location \(page 31\)](#) where the agent can find it automatically, set the JVM parameter to include the Java agent.

```
java -javaagent:<YourContrastJarPath> -jar <AppName>.jar
```

6. Use the application as you normally would (for example, click on the web interface, send API commands). Verify that Contrast sees your application (for example, view your application in the Contrast web interface, view logs).

You can also provide security analysis for applications running in a test/QA or production environment, by installing the agent with an application server like:

- [Glassfish](#)
- [Jetty \(page 65\)](#)
- [JBoss/Wildfly \(page 63\)](#)
- [Tomcat \(page 65\)](#)
- [WebLogic \(page 66\)](#)
- [WebSphere \(page 67\)](#)

You can also [install using a container \(page 56\)](#), like Docker.

**TIP**

Check the [Contrast Support Portal](#) for more information about other compatible ways to install the agent using tools like [Pivotal Cloud Foundry \(now VMware Tanzu\)](#).

## Install the Java agent with the RPM repository

To install the Java agent with the RPM repository:

1. Use the following commands to configure your system to retrieve packages from the Contrast RPM repository:

```
OSREL=$(rpm -E "%{rhel}")
sudo -E tee /etc/yum.repos.d/contrast.repo << EOF
[contrast]
name=contrast repo
baseurl=https://pkg.contrastsecurity.com/rpm-public/centos- $\$$ OSREL/
gpgcheck=0
enabled=1
EOF
```

2. Once you've finished configuration, install the Contrast Java agent:

```
sudo yum install contrast-java-agent
```

3. The Contrast Java agent JAR is now installed at `/opt/contrast/contrast-agent.jar`.
4. [Configure the agent \(page 70\)](#). You can create or download a [YAML configuration file \(page 33\)](#). You must provide Contrast connection parameters using [these agent keys \(page 32\)](#).
5. Tell the agent where to find the yaml configuration file (`contrast.yaml`). In the example below, substitute `<YourContrastJarPath>` with the path to your Contrast JAR (this may vary depend-

ing on your internal file structure and how you downloaded the file) and `<ApplicationJar>` with the name of your application JAR.

```
java -javaagent:<YourContrastJarPath> -Dcontrast.config.path=contrast.yaml -jar <AppJ
```



#### NOTE

If you are using system properties, environment variables to configure instead of YAML, or you have placed the YAML in a [standard location \(page 31\)](#) where the agent can find it automatically, set the JVM parameter to include the Java agent.

```
java -javaagent:<YourContrastJarPath> -jar <AppName>.jar
```

6. Use the application as you normally would (for example, click on the web interface, send API commands). Verify that Contrast sees your application (for example, view your application in the Contrast web interface, view logs).

You can also provide security analysis for applications running in a test/QA or production environment, by installing the agent with an application server like:

- [Glassfish](#)
- [Jetty \(page 65\)](#)
- [JBoss/Wildfly \(page 63\)](#)
- [Tomcat \(page 65\)](#)
- [WebLogic \(page 66\)](#)
- [WebSphere \(page 67\)](#)

You can also [install using a container \(page 56\)](#), like Docker.



#### TIP

Check the [Contrast Support Portal](#) for more information about other compatible ways to install the agent using tools like [Pivotal Cloud Foundry \(now VMware Tanzu\)](#).

## Install the Java agent using a container

### Before you begin

This topic provides general guidance for installing the Contrast Java agent in a containerized application, with Docker as an example.

You should have a basic understanding of how containers and related software work. You may need to adjust the instructions to meet your specific circumstances.

### ECS support

Using this procedure, you can install the Contrast Java agent using a Docker container in an Amazon Elastic Container Service (ECS) environment.

### Step 1: Add the agent to base application image

If you add the agent to a base image, you can make a single image change and Contrast will be available to all applications using that base image. Also, this way, updates will depend on the base image update. To do this:




1. Add the Contrast agent and [basic configuration \(page 70\)](#) to a Docker base image, but don't enable it. The preferred location is `/opt/contrast`. For example:

```
FROM BASE_IMAGE
ARG CONTRAST_AGENT_VERSION
ADD https://repo1.maven.org/maven2/com/contrastsecurity/contrast-agent/$CONTRAST_AGENT_VERSION/contrast-agent-$CONTRAST_AGENT_VERSION.jar /opt/contrast/contrast.jar
```

Optionally, you can change the URL to download agents from an internal repository. You can pass a specific agent version at build time by replacing `<YourAgentVersion>` with the version number you want to download, as shown in this example:

```
docker build --build-arg CONTRAST_AGENT_VERSION=<YourAgentVersion> -t image_with_contrast agent
```



**TIP**  
If you want more flexibility to use any version of the Java agent, and to avoid automatic updates, apply the ADD instruction directly to an application's Docker image.

2. To enable Contrast in the application's Docker image or container, use [JVM parameters \(page 58\)](#).

### Step 2: Configure the agent

Configuration of the Java agent follows this order of precedence. When installing into a container:

- Use a **YAML configuration file** for common configuration so it can be placed in the base image. For example, common configuration might include redirecting logging to console output, proxy configuration, or performance tuning.

Here is a sample YAML configuration file:

```
agent:
  java:
    scan_all_classes: false
    scan_all_code_sources: false
  logger:
    stdout: true
```

Create and copy the YAML file into the base image, then copy the file into the base image Dockerfile using:

```
COPY WORKSPACE/contrast_security.yaml /opt/contrast/contrast_security.yaml
```

- Use **Java system properties** or **environment variables** for application-specific configuration values so you can uniquely configure options for each application.

Contrast configuration	Function	Java system property	Environment variable
Application metadata	Specify application-specific metadata	<code>-Dcontrast.application.metadata</code>	<code>CONTRAST__APPLICATION_METADATA</code>
Application session metadata	Send application details like build number, version, GIT hash, and other <a href="#">session metadata (page 431)</a> .	<code>-Dcontrast.application.session_metadata</code>	<code>CONTRAST__APPLICATION_SESSION_METADATA</code>

Contrast configuration	Function	Java system property	Environment variable
Application group	Specify the application access group for this application during onboarding. <a href="#">Create these groups (page 637)</a> in Contrast first.	<code>-Dcontrast.application.group</code>	CONTRAST_APPLICATION_GROUP
Server environment	Specify in which environments the application is running: Development, QA and Production.	<code>-Dcontrast.server.environment</code>	CONTRAST_SERVER_ENVIRONMENT

### Step 3: Update JVM parameters

To attach any profiler to a Java application, you need to pass a `-javaagent` flag to the application by setting `JAVA_TOOL_OPTIONS` environment variables.

Pre-populate the Contrast common JVM parameters in a separate environment variable in the base image, so the application team can use it in `JAVA_TOOL_OPTIONS`. For example:

- For the base image Dockerfile:

```
ENV CONTRAST_OPTS "-javaagent:/opt/contrast/contrast.jar \
-Dcontrast.config.path=/opt/contrast/contrast_security.yaml"
```

- For the application image Dockerfile:

```
ENV JAVA_TOOL_OPTIONS $CONTRAST_OPTS \
-Dcontrast.application.metadata=bU=<value>,contactEmail=<value>,contactName=<value> \
-Dcontrast.application.group=APP_GROUP
```

### Step 4: Run the application image

After you [add \(page 56\)](#) and [configure \(page 57\)](#) the agent in a base image, run the image.

For the agent to send data to Contrast, it needs [agent authentication keys \(page 32\)](#). To protect the agent credentials, you can use the Docker secret and pass them as environment variables during deployment time. Here is an example of the Docker run command:

```
docker run -e CONTRAST_API_URL=https://app.contrastsecurity.com -e CONTRAST_API_API
```

You can verify that Contrast is running by checking the container log. You should see messages like these:

```
2020-05-28 22:36:29,910 [main STDOUT] INFO - Copyright: 2019 Contrast Security, Inc
2020-05-28 22:36:29,910 [main STDOUT] INFO - Contact: support@contrastsecurity.com
2020-05-28 22:36:29,910 [main STDOUT] INFO - License: Commercial
2020-05-28 22:36:29,910 [main STDOUT] INFO - NOTICE: This Software and the patented inve
2020-05-28 22:36:29,910 [main STDOUT] INFO - Contrast Security's commercial offerings. E
2020-05-28 22:36:29,910 [main STDOUT] INFO - repositories, use of this Software is subje
2020-05-28 22:36:29,910 [main STDOUT] INFO - found at https://www.contrastsecurity.com/e
2020-05-28 22:36:29,910 [main STDOUT] INFO - Contrast Security and the End User. The Sof
2020-05-28 22:36:29,910 [main STDOUT] INFO - repackaged, sold, redistributed or otherwis
2020-05-28 22:36:29,910 [main STDOUT] INFO - License Agreement.
[Contrast] Thu May 28 22:36:30 EDT 2020 Effective instructions: Assess=false, Protect=tr
[Contrast] Thu May 28 22:36:30 EDT 2020 String Supporter has been disabled
[Contrast] Thu May 28 22:36:30 EDT 2020 Logging security messages to /Users/usernamehere
[Contrast] Thu May 28 22:36:31 EDT 2020 Starting JVM [1862ms]
```

## See also

[Agent Operator \(Kubernetes operator\) \(page 35\)](#)

Contrast Support Portal [AWS Fargate and Contrast agents](#) and [Java agent with Docker](#)

## Install the Java agent in an existing Gradle project with Docker

This example uses a sample Gradle project, which includes the [Application Plugin](#) and the [Docker Plugin](#) to build a Java web application. It also runs JUnit 5 integration tests that verify the web application's behavior. As part of the process, you will include Contrast in the Docker image used for testing so that Contrast Assess analyzes your code during integration testing. See an [example of a Gradle project](#) in our Github repo.



### NOTE

Any part of the following procedures that refer to any form of packaging or distribution are meant for your organization's internal use. Do not distribute Contrast with your application or Docker container outside of your organization. See [Contrast's Terms of Service agreement](#) for more information.

To add the Contrast Java agent to an existing Gradle project with Docker:

1. Open a command prompt, and run the following command to clone Contrast's **examples** repository:

```
$ git clone https://github.com/Contrast-Security-OSS/contrast-java-examples.git
```

2. Enter the `gradle-docker` directory:

```
$ cd contrast-java-examples/gradle-docker
```

3. Run a test build to make sure everything is working:

```
$ ./gradlew build
```

```
BUILD SUCCESSFUL in 3s
4 actionable tasks: 3 executed, 1 up-to-date
```



### NOTE

On Windows, run `gradlew.bat build` instead.

4. If the test build doesn't work, check to make sure you have Java 11 correctly installed (Java 11 or later is required to build the sample application. [Java supported technologies \(page 51\)](#) lists the versions of Java supported that the Contrast Java agent supports):

```
$ java -version
openjdk version "11.0.18" 2023-01-17
OpenJDK Runtime Environment Temurin-11.0.18+10 (build 11.0.18+10)
OpenJDK 64-Bit Server VM Temurin-11.0.18+10 (build 11.0.18+10, mixed mode)
```

5. If you've made changes, run the build again. If it still doesn't work, [open an issue](#) that explains the problem.
6. Use the [agent keys \(page 32\)](#) to configure the agent's communication with Contrast. You'll need these keys:

- Contrast URL: This URL, <https://app.contrastsecurity.com/Contrast> or the URL of your on-premises or private cloud instance.
  - Organization API key
  - Agent username
  - Agent service key
7. Add the keys as Gradle properties to the `gradle.properties` file in your [Gradle user home directory](#). If this file does not exist, create it. Be sure to replace `<contrast_url>`, `<your_api_key>`, `<agent_user_name>` and `<agent_user_service_key>` with the Contrast URL, API key, username and service key values you obtained from the Contrast:

```
contrastUrl=<contrast_url>
contrastAgentUserName=<agent_user_name>
contrastAgentServiceKey=<agent_user_service_key>
contrastApiKey=<your_api_key>
```

8. Add the Contrast agent and configure the application to use it by modifying the `createDockerfile` task in `build.gradle`:

```
task createDockerfile(type: Dockerfile) {
    // ... rest of block omitted

    copyFile(new Dockerfile.CopyFile("/contrast/contrast-agent.jar", "/contrast.jar").w
    environmentVariable("JAVA_TOOL_OPTIONS", "-javaagent:/contrast.jar")
}
```

9. Pass the configuration variables into the container by adding the following commands to the `createContainer` task in `build.gradle`:

```
task createContainer(type: DockerCreateContainer) {
    // ... rest of the config omitted

    envVars = [
        CONTRAST__API__URL: project.property("contrastUrl"),
        CONTRAST__API__USER_NAME: project.property("contrastAgentUserName"),
        CONTRAST__API__SERVICE_KEY: project.property("contrastAgentServiceKey"),
        CONTRAST__API__API_KEY: project.property("contrastApiKey"),
        CONTRAST__APPLICATION__NAME: "${project.name}-how-to"
    ]
}
```

10. Run the build again:

```
./gradlew clean build
```



#### NOTE

On Windows, run `gradlew.bat clean build` instead.

The Docker container now runs the application with Contrast enabled. When the integration test runs, it detects the vulnerable endpoint and reports it to Contrast. To see the vulnerability report, log in to the Contrast web interface, navigate to the [Vulnerabilities list \(page 523\)](#) and filter your view by the application name `gradle-application-how-to`.

## Install the Java agent with automatic updates on Linux

Some users like to automatically update their Contrast Java agent software to the latest version. Linux users can schedule Java agent updates from Maven Central using common Linux tools `cron` and `curl`.

Here's how to configure a scheduled Java agent update job on an Ubuntu 18.04 Linux host:



## NOTE

Use your preferred editor to create a file with the following contents. The examples provided use `tee` to create the file.

1. If you want to perform each step as you follow along with this guide, you can use [Vagrant](#) and [VirtualBox](#) to create a new Ubuntu 18.04 virtual machine:

```
vagrant init ubuntu/bionic64
```

```
vagrant up
```

```
vagrant ssh
```

2. Create a shared directory for Contrast software:

```
sudo mkdir -p /opt/contrast
```

3. Create a script for installing the latest Java agent in the `/etc/cron.daily` directory. Scripts in this directory execute once daily; as a result, the host updates the latest Java agent each day.

4. Use `tee` to create this script. Press `CTRL+D` when you've finished typing all the lines:

```
$ sudo tee -a /etc/cron.daily/install-latest-contrast-agent > /dev/null
#!/bin/bash -u
```

```
CONTRAST_DIRECTORY=/opt/contrast
CONTRAST_FILE_NAME=contrast-agent.jar
```

```
curl --fail --silent --location "https://repository.sonatype.org/service/local/artifa
if [ $? -ne 0 ]; then
    echo "Failed to download Contrast Java agent" >&2
    exit 1
fi
mv /tmp/$CONTRAST_FILE_NAME $CONTRAST_DIRECTORY/$CONTRAST_FILE_NAME
```

5. Set the execute bit on the new script file:

```
sudo chmod +x /etc/cron.daily/install-latest-contrast-agent
```

6. To test the script, execute it and then verify that the file exists using `stat`:

```
$ sudo /etc/cron.daily/install-latest-contrast-agent
$ stat /opt/contrast/contrast-agent.jar
stat /opt/contrast/contrast-agent.jar
  File: /opt/contrast/contrast-agent.jar
  Size: 10568283      Blocks: 20648      IO Block: 4096   regular file
Device: 801h/2049d  Inode: 256034      Links: 1
Access: (0644/-rw-r--r--)  Uid: (   0/   root)   Gid: (   0/   root)
Access: 2019-04-11 02:02:01.265775928 +0000
Modify: 2019-04-11 02:24:47.849796936 +0000
Change: 2019-04-11 02:24:47.849796936 +0000
 Birth: -
```

7. The Contrast agent requires some configuration to communicate with Contrast. You can [find agent key information here \(page 32\)](#).

- When Contrast is installed on a Linux host, users typically want Contrast-enabled web applications on the host to share basic configuration parameters, such as the ones required to connect to Contrast. By convention, Contrast look for configuration in a YAML file at path `/etc/contrast/java/contrast_security.yaml` on Linux hosts.
- Create the `/etc/contrast/java` directory:

```
sudo mkdir -p /etc/contrast/java
```

- Use `tee` to create the configuration file. Replace `<contrast_url>`, `<your_api_key>`, `<agent_user_name>` and `<agent_user_service_key>` with the values you obtained from Contrast in the previous step:

```
$ sudo tee -a /etc/contrast/java/contrast_security.yaml > /dev/null
api:
  url: <contrast_url>
  api_key: <your_api_key>
  user_name: <agent_user_name>
  service_key: <agent_user_service_key>
```

- Press `CTRL+D` when you've finished typing all the lines.
- Run a diagnostic test to verify that Contrast is installed and properly configured. The host must have Java installed to execute the diagnostic test:

```
sudo apt install --yes openjdk-11-jre-headless
```

- Finally, execute the Java agent's diagnostic test to verify that the agent is installed correctly and can communicate with Contrast using the configuration parameters from `/etc/contrast/java/contrast_security.yaml`:

```
$ java -jar /opt/contrast/contrast-agent.jar diagnostic
*** Contrast Agent (version 3.6.3-SNAPSHOT)
[!] Attempting to connect to the Contrast TeamServer at https://apptwo.contrastsecurity.com
[!] Attempting to resolve domain: apptwo.contrastsecurity.com
    Resolved domain apptwo.contrastsecurity.com to IP Address 52.200.215.12
[+] Client successfully resolved the DNS of the Contrast TeamServer. No proxy needed.
[!] Issuing HTTP request to Contrast...
    Executing request...
    Reading response [200]
    Response size = 4209
    Snippet: <!doctype html> <!--[if gt IE 8]><!--> <html class="no-js" i
[+] Client can connect directly to the Contrast TeamServer. No proxy needed.
```

## Scala

You can use the Contrast Java agent with Contrast Assess or Contrast SCA to analyze Scala-based applications.

The Java agent analyzes Scala web applications built on traditional application servers, and newer Scala web applications such as those built with Play. If there's a JVM, the Scala agent can provide security insights.

As your application runs, the Java agent's sensors gather information about the application's security, architecture and libraries. You can see the results of the agent's analysis in Contrast.

The Scala agent supports these Contrast features:

- Route coverage
- Flow maps
- SCA library discovery

## Kotlin

You can use the Contrast Java agent with Contrast Assess or Contrast SCA to analyze Kotlin-based applications.

The Java agent analyzes Kotlin web applications built on traditional application servers, and newer Kotlin server-side applications, such as SpringBoot.


If there's a JVM, the Kotlin agent can provide security insights. As your application runs, the Java agent's sensors gather information about the application's security, architecture and libraries. You can see the results of the agent's analysis in Contrast.

Run your application as you would with the Contrast Java agent. Kotlin support is automatic.

## Java application servers



### NOTE

This documentation provides content for supported content. Links indicated by the  icon take you to other documentation that may be helpful.

The following application servers are available:

-  [Axis2](#)
-  [Glassfish](#)
- [JBoss / Wildfly \(page 63\)](#)
- [Jetty \(page 65\)](#)
- [Tomcat \(page 65\)](#)
- [Weblogic \(page 66\)](#)
- [WebSphere \(page 67\)](#)

### See also

- [Install the Java agent \(page 52\)](#)
- [Supported technologies \(page 51\)](#)
- [Configure the Java agent \(page 70\)](#)

## Configure the Java agent for JBoss EAP, JBoss AS or WildFly



### CAUTION

Be careful not to confuse version numbers. JBoss EAP prior to version 7 is based on JBoss AS. JBoss EAP 7.X is based on WildFly.

## Run JBoss with the Java agent

1. Download the Java agent JAR from one of these repositories:
  - [Maven Central \(page 53\)](#)

- [Debian \(page 54\)](#)
  - [RPM \(page 55\)](#)
2. You can either run JBoss from a BAT file, or in domain mode.

- **BAT file:** If you run JBoss from *domain.bat*, *standalone.bat*, or *run.bat* with a *.conf* file, modify the configuration file. It should enable the Contrast JVM parameters and return to the start-up script.

To do this, replace `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#) file, and use the JBoss server directory for your environment. Then add this line to the end of your *.conf* file:

- **Windows:**

```
set JAVA_OPTS=-javaagent:<YourContrastJarPath> %JAVA_OPTS%
```

- **Unix:**

```
JAVA_OPTS=-javaagent:<YourContrastJarPath> $JAVA_OPTS
```

- **Domain mode:** If you run JBoss 6 EAP or JBoss AS 7.X in Domain mode using *domain.bat* or *domain.sh*, you must add the `-javaagent` switch to the JVM options in *\$JBOSS\_HOME/domain/configuration/domain.xml*.

In this example, replace `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#) file:

```
<server-group ...>
  <jvm name="default">
    <jvm-options>
      <option value="-javaagent:<YourContrastJarPath>" />
    </jvm-options>
  </jvm>
  ...
</server-group>
```

## Use WildFly with Java 2 security manager

You can configure the Java agent when using WildFly with [Java 2 security \(page 121\)](#). WildFly versions 9 through 20 are supported. WildFly 8 is not supported.

To enable the Java 2 security manager in Wildfly:

1. Either pass a command-line argument `-secmgr`, or set an environment variable `SECMGR` to true:

```
SECMGR="true"
```

2. To enable permissions for the Java agent, append this Contrast policy to *\$JAVA\_HOME/jre/lib/security/java.policy* (for JDK 6-8), or *\$JAVA\_HOME/lib/security/default.policy* (for JDK 9 and later). Replace `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#) and use:

```
grant codeBase "file:<YourContrastJarPath>" {
  permission java.security.AllPermission;
};
```

3. To allow the agent to function with Wildfly's classloader system, modify the value of the environment variable `JBOSS_MODULES_SYSTEM_PKGS` (originally `org.jboss.byteman`), to also include the Java agent base package: `com.contrastsecurity.agent,org.jboss.byteman`



### TIP

Learn more about using [Java EE 7 security manager with WildFly](#), or read the [default policy implementation and policy file syntax](#).



## Configure the Java agent for Jetty

To configure the Java agent with a Jetty distribution:

1. Download the Java agent JAR from one of these repositories:
  - [Maven Central \(page 53\)](#)
  - [Debian \(page 54\)](#)
  - [RPM \(page 55\)](#)
2. On your Jetty environment, replace `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#) file. Then add the following line to your `<JettyDirectory>/start.ini` file:

```
-javaagent:<YourContrastJarPath>
```

3. If you are using Java 2 security manager, create a `contrast.policy` file that contains this code. (Replace `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#) file.)

```
grant codeBase "file:<YourContrastJarPath>" {  
    permission java.security.AllPermission;  
};
```

Then complete these configurations:

- **Jetty 7-8:** Copy the file to the `JETTY_HOME/lib/policy` folder. Add `--secure` to the `JETTY_ARGS` environment variable.
- **Jetty 9:** Add the policy you created to your own configured policy. Replace `<YourPolicy>` with the name of your policy and enable the security manager with the standard environment variable settings:

```
-Djava.security.manager -Djava.security.policy=<YourPolicy>
```



### IMPORTANT

Jetty 9 and later do not officially support security management policies.



### TIP

See the [Jetty Policy](#) for more information about using Jetty with Java 2 security manager.

## Configure the Java agent for Tomcat

First, download the Java agent JAR from one of these repositories:

- [Maven Central \(page 53\)](#)
- [Debian \(page 54\)](#)
- [RPM \(page 55\)](#)

Use the guidelines below to configure the Java agent depending on how you run Contrast with Tomcat.

### Run from Windows or Unix

The `CATALINA_OPTS` environment variable is used to pass configuration flags and system properties to the JVM that runs the Tomcat server.

Tomcat recommends using a `setenv` script to specify environment variables. You can learn more about the `setenv` script, including how to find or create it as needed, by consulting `RUNNING.txt`, which is included with every distribution of Tomcat.

To enable Contrast add the `-javaagent` configuration to `CATALINA_OPTS` in either `setenv.sh`, if running on a Unix-like operating system, or `setenv.bat` if running on Windows. For example:

- **Windows:**

```
set "CATALINA_OPTS=%CATALINA_OPTS% -javaagent:<YourContrastJarPath>"
```

- **Unix:**

```
export CATALINA_OPTS="$CATALINA_OPTS -javaagent:<YourContrastJarPath>"
```

## Run on the Tomcat service in Windows

1. If you run Tomcat as a service, open the Tomcat service manager and change the JVM options to add the agent.
2. Double-click the Tomcat icon in the system tray (or right-click and select **Configure**). (If the icon isn't there, you might have to start it manually by running `tomcat9w.exe` in the Tomcat bin directory.)
3. Switch to the **Java** tab to see where you need to add the `-javaagent` flag.

## Run Tomcat with Java 2 security

1. Create a `contrast.policy` file that contains this code (or append it to the `catalina.policy` file). Replace `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#) file. For example:

```
grant codeBase "file:<YourContrastJarPath>" {
    permission java.security.AllPermission;
};
```

2. Append the `contrast.policy` file to the `$CATALINA_HOME/conf/catalina.policy` file. No additional configuration is needed. Run your Tomcat installation with command-line parameter `-security`.

## Configure the Java agent for WebLogic

First, download the Java agent JAR from one of these repositories:

- [Maven Central \(page 53\)](#)
- [Debian \(page 54\)](#)
- [RPM \(page 55\)](#)

Use the guidelines below to configure the Java agent depending on how you run Contrast with WebLogic.

### Unix

1. If you launch WebLogic yourself, you must add Contrast's JVM parameter to the `startWebLogic` file in your installation's `bin` directory. For UNIX-based operating systems, the path to this file looks like:

```
/path/to/appserver/userprojects/domains/base_domain/bin/startWebLogic.sh
```

2. In this file, add the Contrast engine as a `-javaagent` to the `JAVA_OPTIONS` environment variable before the Java execution step. Replace `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#) file. For example:

```
export JAVA_OPTIONS="$JAVA_OPTIONS -javaagent:<YourContrastJarPath>"
```

### Windows

1. For Windows systems, the path looks like:

```
C:\Oracle\Middleware\userprojects\domains\base_domain\bin\startWebLogic.bat
```

- At the beginning of the file, add the Contrast engine as a `-javaagent` to the `JAVA_OPTIONS` environment variable. Replace `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#) file. Substitute the WebLogic server for your environment. For example:

```
set "JAVA_OPTIONS=%JAVA_OPTIONS% -javaagent:<YourContrastJarPath>"
```

## Use Java 2 with WebLogic

- Create a `contrast.policy` file that contains this code (or append it to the `catalina.policy` file). Replace `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#) file. For example:

```
grant codeBase "file:<YourContrastJarPath>" {
    permission java.security.AllPermission;
};
```

- WebLogic includes a template file under `@WL_HOME/server/lib/weblogic.policy` which contains the suggested starting point for booting a WebLogic server with the security manager enabled. Older versions of WebLogic (10 and prior) will require `@WL_HOME` in the template file replaced with the actual path to the root directory of the WebLogic install.
- When the security manager is enabled, the policy `@WL_HOME/server/lib/weblogic.policy` file acts as the default. Otherwise, a custom policy file may be specified with `-Djava.security.policy==<YourPath>` where `<YourPath>` is the path to your custom file. The `==` is important as it overrides the default path setting that WebLogic boots with.



### TIP

For more information read about [using Java Security to protect WebLogic resources](#).

## Configure the Java agent for WebSphere

First, download the Java agent JAR from one of these repositories:

- [Maven Central \(page 53\)](#)
- [Debian \(page 54\)](#)
- [RPM \(page 55\)](#)

Use the guidelines below to configure the Java agent, depending on how you run Contrast with WebSphere.



### NOTE

IBM J9 doesn't allow the Java Instrumentation API to alter core Java classes when using the [Shared Classes](#) feature. You must disable this feature by specifying `-Xshare-classes:none` in your JVM parameters, as shown above.

Similarly, if `-Dcom.ibm.oti.shared.enabled=true` is set, you may also run into problems in older J9 JREs.

## WebSphere trust and key store

WebSphere maintains its own trust and key store, separate from the trust store included as part of the Java JRE. The agent starts before WebSphere is initialized and so the WebSphere specific trust

store is not configured. Therefore, the agent uses the default trust store located in the Java `JRE/lib/security/cacerts` file, unless extra configuration is provided to the JVM.

However, in some scenarios, (like requiring a proxy server that uses internal only or self-signed certificates) specific extra steps are necessary. You can either:

1. Install the required certs into both the JRE `cacerts` trust store and also the WebSphere specific trust store. This means the certificate chain can be validated by both the agent and also your web application.
2. Provide Java with the standard trust store system properties to change the trust store to be the same as the WebSphere trust store. This has the advantage of only requiring the certificate to be installed in one location: the WebSphere trust store. For example:

```
-Djavax.net.ssl.trustStore=opt/IBM/WebSphere/AppServer/profiles/AppSrv01/config/cells
-Djavax.net.ssl.trustStoreType=PKCS12
-Djavax.net.ssl.trustStorePassword=secret
```

WebSphere itself supports methods of encoding the password but these are not available when setting the trust store password for the agent, as it is executing before WebSphere starts.

### Add Contrast with Websphere

If you launch WebSphere yourself, add Contrast's JVM parameter to the `server.xml` file in your cell directory. Replace `<CellName>` and `<NodeName>` with the name of the cell and node. Replace `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#) file. For example:

```
<WebsphereDirectory>\AppServer\profiles\AppSrv01\config\cells\<CellName>\nodes\<NodeName>
<jvmEntries genericJvmArguments="-javaagent:<YourContrastJarPath> -Xshareclasses:none">
...
</jvmEntries>
```

### Add Contrast with the WebSphere Administration Console

You can also add Contrast through the WebSphere administration console by following instructions from the [Websphere support site](#).

### Use Java 2 with WebSphere

1. Create a `contrast.policy` file that contains this code (or append it to the `server.policy` file). Replace `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#) file. For example:

```
grant codeBase "file:<YourContrastJarPath>" {
    permission java.security.AllPermission;
};
```

2. Append the `contrast.policy` file to the `$WEBSPPHERE_HOME/AppServer/profiles/AppSrv01/properties/server.policy`.
3. Enable the security manager with the `wsadmin` tool:
  - **Jacl:** `$AdminTask setAdminActiveSecuritySettings {-enforceJava2Security true}`
  - **Jython:** `AdminTask.setAdminActiveSecuritySettings('-enforceJava2Security true')`



#### TIP

Learn more about [Java security manager](#) and [enabling and disabling Java 2 security manager using scripting](#).

## Java Quick Start Guide

Contrast uses agents to install sensors that monitor your code for vulnerabilities. Agents analyze for vulnerabilities in development environments and look for attacks in runtime production environments.

As your application runs, the agent analyzes information (such as HTTP requests, data flow, backend connections, and library dependencies) and sends vulnerabilities and attacks to Contrast where you can view, prioritize, and take immediate action on them.

This guide should get Contrast up and running on your application in just a few minutes, so you can see how it works.



### TIP

For future installations, you may want to consider your organization's build tools and deployment pipeline, your security goals and the environments where you want to use Contrast. You can read about [other methods to install Contrast \(page 553\)](#) that may better adapt to your situation.

## Prerequisites

This guide assumes you use an application that meets these prerequisites:

- The application must have access to the internet without using a proxy.
- Your web application is packaged in a JAR file.
- It must use [supported versions, frameworks, and tools \(page 51\)](#).

You will also need access to a command line interface (with a chosen directory for downloading the agent) and your organization's instance of Contrast. If you don't already have Contrast, you can sign up for the [Community Edition \(page 27\)](#) for free.

## Install

1. Use this command to download the agent JAR file from Maven Central. From your command line interface, enter this curl request to pull down the latest version of the agent to your current directory.

### Linux:

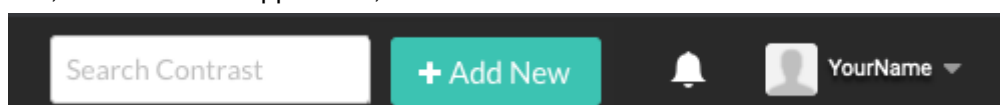
```
curl -L 'https://repository.sonatype.org/service/local/artifact/maven/redirect?r=cent
```

### Windows:

```
curl -L "https://repository.sonatype.org/service/local/artifact/maven/redirect?r=cent
```

Once complete, you should see the `contrast.jar` file in your current directory. (For example: `./contrast.jar`)

2. Download the YAML configuration file from the agent wizard (if you haven't already done so). To do this, in the Contrast application, select **Add new**.



Select **Java** as your language, then select **Download YAML configuration file**. The file will download locally and will contain the specific agent keys for your organization that will connect your application to Contrast.

- To configure the agent, open the YAML configuration file in an editor.

```
api:
  url: https://xxx.contrastsecurity.com/Contrast
  api_key: A2xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxG9N
  service_key: 88xxxxxxxxxxxxx5Z
  user_name: agent_xxxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxxx@OrgName
```

- Tell the agent where to find your YAML configuration file by entering this command in your command line interface.

```
java -javaagent:./contrast.jar -Dcontrast.config.path=contrast_security.yaml -jar <Ap
```

Be sure to replace <ApplicationJarPath> with the path to your application. For example: ./MyApplication.jar

- To verify that Contrast is working, use your application as you normally would. For example, click on your application's web interface, or send some API commands. Then in the Contrast web interface, select **Applications** in the header. You should see the name of your application. You can also select **Server** in the header and you should see the hostname of your (local) server listed here.

## Configure the Java agent

The [standard installation \(page 30\)](#) for all agents uses this [order of precedence \(page 31\)](#).

You can configure the Java agent using:

- Java system properties
- [Environment variables \(page 49\)](#)
- Java YAML template



### TIP

Use the [Contrast agent configuration editor \(page 34\)](#) to create or upload a YAML configuration file, validate YAML and get setting recommendations.

You may need to configure your application's Java environment to work effectively with the agent if your system uses:

- [Multi-tenant application configuration](#): If your JVM application server hosts multiple applications during a deployment, you can distinguish applications from each other and then apply individual configuration options.  
[Multi-tenant application configuration](#): If your JVM application server hosts multiple applications during a deployment, you can distinguish applications from each other and then apply individual configuration options.
- [TLS certificates \(page 121\)](#)
- [Java 9 Modules \(page 121\)](#)
- [Java 2 Security \(page 121\)](#)
- [Integrations: \(page 553\)](#) The Contrast Java agent, can also be configured and run in conjunction with several third-party tools, plugins and integrations. Consult the remote product documentation for information about how other products work.

## Java system properties

Substitute <YourContrastJarPath> with the path to your [Contrast JAR \(page 50\)](#), and use these commands to learn more about system properties:

- To generate a list of general properties using the Contrast agent JAR, use:

```
java -jar <YourContrastJarPath> properties
```

- Use command line with tools to search for commands. For example, these commands display a list of proxy-related properties:

**Using the built-in filter:**

```
java -jar <YourContrastJarPath> properties --filter=proxy
```

## Java YAML configuration template

Use this template to configure the Java agent using a YAML configuration file. (Learn more about [YAML configuration \(page 33\)](#).)

Place your YAML file in the default location:

- Unix:** /etc/contrast/java/contrast\_security.yaml
- Windows:** C:/ProgramData/contrast/java/contrast\_security.yaml

```
# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

  # ***** REQUIRED *****
  # Set the URL for the Contrast UI.
  url: https://app.contrastsecurity.com/Contrast

  # ***** REQUIRED *****
  # Set the API key needed to communicate with the Contrast UI.
  api_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the service key needed to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  service_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the user name used to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  user_name: NEEDS_TO_BE_SET
```

```

# Set the timeout for communicating with TeamServer. This property will be
# respected over the deprecated legacy configuration *contrast.timeout*.
# timeout_ms: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid **contrast.proxy.host**
# and **contrast.proxy.port** will enable the proxy.
# enable: NEEDS_TO_BE_SET

# Set the proxy host. It must be set with port and scheme.
# host: localhost

# Set the proxy port. It must be set with host and scheme.
# port: 1234

# Set the proxy scheme (e.g., `http` or
# `https`). It must be set with host and port.
# scheme: http

# Set this property as an alternate for `scheme://host:port`. It takes
# precedence over the other settings, if specified; however, an error
# will be thrown if both the URL and individual properties are set.
# url: NEEDS_TO_BE_SET

# Set the proxy user.
# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

# Set the proxy authentication type. Value
# options are `NTLM`, `Digest`, and `Basic`.
# auth_type: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# Set the amount of time to run the agent before shutting down itself
# (in milliseconds). A negative value disables scheduled shutdown.
# shutdown_time_ms: NEEDS_TO_BE_SET

```



```

# =====
# agent.reporting
# Use the following settings to configure reporting to the Contrast UI.
# =====
# reporting:

# Set the grace period (in milliseconds) after
# agent shutdown to allow draining pending reports.
# shutdown_grace_period_ms: 120000

# =====
# agent.effective_config
# None
# =====
# effective_config:

# =====
# agent.effective_config.reporting
# None
# =====
# reporting:

# Defaults to `true`. Controls whether configuration
# setting reports are sent to the Contrast web interface.
# enable: true

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# Set to `true` to redirect all logs to `stderr` instead of
# the file system. May be combined with the corresponding

```

```

# `stdout` configuration to write to both streams.
# stderr: false

# Change the Contrast logger from a file-sized based rolling scheme
# to a date-based rolling scheme. At midnight server time, the
# previous day log is renamed to *file_name.yyyy-MM-dd*. Note -
# this scheme does not have a size limit; manual log pruning is
# required. You must set this flag to use the backups and size flags.
# roll_daily: false

# Set the roll size for log files in megabytes. The agent will
# attempt to prevent the log file from being larger than this size.
# roll_size: 100

# Set the number of backup files to keep. Set to `0` to disable.
# backups: 10

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# Change the Contrast security logger from a file-sized based rolling
# scheme to a date-based rolling scheme. At midnight server time,
# the log from the previous day is renamed to *file_name.yyyy-MM-dd*.
# Note - this scheme does not have a size limit; manual log
# pruning will be required. This flag must be set to use the
# backups and size flags. Value options are `true` or `false`.
# roll_daily: NEEDS_TO_BE_SET

# Specify the file size cap (in MB) of each log file.
# roll_size: NEEDS_TO_BE_SET

# Specify the number of backup logs that the agent will create before
# Contrast cleans up the oldest file. A value of `0` means that no backups
# are created, and the log is truncated when it reaches its size cap.
#
# Note - this property must be used with
# `agent.security_logger.roll_daily=false`; otherwise,
# Contrast continues to log daily and disregard this limit.
#
# backups: NEEDS_TO_BE_SET

# =====
# agent.security_logger.syslog

```

```

# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# =====
# agent.security_logger.syslog.heartbeat
# Define the following properties to
# set the Syslog heartbeat properties.
# =====
# heartbeat:

# Set to `true` to enable the Syslog heartbeat.
# The heartbeat will issue a Syslog message at
# the INFO level after every interval passes.
# enable: false

# Set the interval at which to send heartbeat
# messages to the Syslog server (in milliseconds).
# interval_ms: 60000

```

```

# =====
# agent.java
# The following properties apply to any Java agent-wide configurations.
# =====
# java:

# Configure the Java agent to skip its application discovery
# algorithm, and instead associate all libraries, vulnerabilities,
# and web traffic to a single application with the name specified
# by this property. This configuration is preferred when deploying
# Java SE applications with embedded web servers (e.g., applications
# built with Spring Boot, Dropwizard, and embedded Jetty). When used
# with an application server, this configuration associates all
# web traffic with the single, standalone application, including
# web traffic handled by application server-hosted endpoints that
# would not be associated with a discovered application otherwise.
#
# Note - This settings takes preferences
# over the `application.name` setting.
#
# standalone_app_name: NEEDS_TO_BE_SET

# By default, the Java agent visits all classes at startup to look
# for vulnerabilities, which the agent may detect by scanning a
# class (e.g., hardcoded passwords). Set this property to `false`
# to disable the default behavior. If disabled, the agent will
# only visit classes which are likely to require sensors; this
# can improve application startup time, but may produce fewer
# findings (most likely findings that require static analysis).
#
# scan_all_classes: true

# By default, the Java agent deeply inspects all JAR and WAR files loaded
# by the JVM to build a comprehensive understanding of the type hierarchy.
# This understanding allows Contrast to instrument sensors into types
# that it might have overlooked. In most cases, this produces a slight
# increase in accuracy at the cost of increased application startup
# time. Set this property to `false` to disable this level of inspection.
#
# scan_all_code_sources: true

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Define a list of directories where libraries are stored.
# Directories must be formatted as a semicolon-delimited list.
# Example - `path1;path2;path3`
#

```

```

# library_dirs: NEEDS_TO_BE_SET

# Set the maximum archive unpacking depth when analyzing libraries.
# library_depth: 10

# Set the boolean to more aggressively limit the
# manifest information reported for libraries. If true,
# the limit is 1,000 characters, otherwise it's 3,000.
# prune_package_details: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules

```

```

# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# profile
# Set configuration values under a profile name to enable
# multi-tenant application configuration on web servers. See
# https://support.contrastsecurity.com/hc/en-us/articles/360052187171-Multi-Application-
# for more details.
# =====
# profile: {}

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.

```

```
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Tell the agent to detect when semantic analysis of the query
# reveals tautologies used in exfiltration attacks (e.g., "or
# 1=1" or "or 2<>3"). The agent blocks if blocking is enabled.
# detect_tautologies: true

# Tell the agent to detect when semantic analysis of the query
# reveals the invocation of dangerous functions typically used in
# weaponized exploits. The agent blocks if blocking is enabled.
# detect_dangerous_functions: true

# Tell the agent to detect when semantic analysis of the query
# reveals chained queries, which is uncommon in normal usage but
# common in exploit. The agent blocks if blocking is enabled.
# detect_chained_queries: true

# Tell the agent to detect when semantic analysis of the query
# reveals database queries are being made for system tables and
# sensitive information. The agent blocks if blocking is enabled.
# detect_suspicious_unions: true

# Tell the agent to be more aggressive in detecting user
# inputs as SQL comments. This enables the agent to better
# detect SQL Injection input vectors that use comments to
# terminate queries. The agent blocks if blocking is enabled.
# aggressive_comment: false

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Detect when the agent sees user parameters being executed as
# system commands. The agent blocks if blocking is enabled.
# detect_parameter_command_backdoors: true
```

```

# Detect when a system command is issued which contains
# chained commands. The agent blocks if blocking is enabled.
# detect_chained_commands: true

# Detect when a system command is issued with an argument matching a
# known dangerous file path. The agent blocks if blocking is enabled.
# detect_dangerous_path_args: true

# Tell the agent to detect when commands come directly
# from input. The agent blocks if blocking is enabled.
# detect_phased_commands: true

# =====
# protect.rules.cmd-injection-process-hardening
# Use the following settings to configure whether
# the agent blocks all attempts to start an external
# process. To enable blocking, set to 'true'.
# =====
# cmd-injection-process-hardening:

# Set to `true` to enable the agent to block
# all attempts to start external processes.
# enable: false

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Detect when custom code attempts to access sensitive
# system files. The agent blocks if blocking is enabled.
# detect_custom_code_accessing_system_files: true

# Detect when users attempt to bypass filters by
# using "::$DATA" channels or null bytes in file
# names. The agent blocks if blocking is enabled.
# detect_common_file_exploits: true

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

```



```

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.csrf
# Use the following properties to configure how
# the cross-site request forgery rule works.
# =====
# csrf:

# Set the mode of the rule. Value options are
# `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====

```

```
# protect.rules.padding-oracle
# Use the following properties to configure
# how the padding-oracle rule works.
# =====
# padding-oracle: {}

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
```

```

# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

# ***** REQUIRED *****
# Set the URL for the Contrast UI.

```

```

url: https://app.contrastsecurity.com/Contrast

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

# Set the timeout for communicating with TeamServer. This property will be
# respected over the deprecated legacy configuration *contrast.timeout*.
# timeout_ms: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid **contrast.proxy.host**
# and **contrast.proxy.port** will enable the proxy.
# enable: NEEDS_TO_BE_SET

# Set the proxy host. It must be set with port and scheme.
# host: localhost

# Set the proxy port. It must be set with host and scheme.
# port: 1234

# Set the proxy scheme (e.g., `http` or
# `https`). It must be set with host and port.
# scheme: http

# Set this property as an alternate for `scheme://host:port`. It takes
# precedence over the other settings, if specified; however, an error
# will be thrown if both the URL and individual properties are set.
# url: NEEDS_TO_BE_SET

# Set the proxy user.
# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

```

```

# Set the proxy authentication type. Value
# options are `NTLM`, `Digest`, and `Basic`.
# auth_type: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# Set the amount of time to run the agent before shutting down itself
# (in milliseconds). A negative value disables scheduled shutdown.
# shutdown_time_ms: NEEDS_TO_BE_SET

# =====
# agent.reporting
# Use the following settings to configure reporting to the Contrast UI.
# =====
# reporting:

# Set the grace period (in milliseconds) after
# agent shutdown to allow draining pending reports.
# shutdown_grace_period_ms: 120000

# =====
# agent.effective_config
# None
# =====
# effective_config:

# =====
# agent.effective_config.reporting
# None
# =====
# reporting:

# Defaults to `true`. Controls whether configuration
# setting reports are sent to the Contrast web interface.
# enable: true

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#

```

```

# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# Set to `true` to redirect all logs to `stderr` instead of
# the file system. May be combined with the corresponding
# `stdout` configuration to write to both streams.
# stderr: false

# Change the Contrast logger from a file-sized based rolling scheme
# to a date-based rolling scheme. At midnight server time, the
# previous day log is renamed to *file_name.yyyy-MM-dd*. Note -
# this scheme does not have a size limit; manual log pruning is
# required. You must set this flag to use the backups and size flags.
# roll_daily: false

# Set the roll size for log files in megabytes. The agent will
# attempt to prevent the log file from being larger than this size.
# roll_size: 100

# Set the number of backup files to keep. Set to `0` to disable.
# backups: 10

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: ./contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# Change the Contrast security logger from a file-sized based rolling
# scheme to a date-based rolling scheme. At midnight server time,
# the log from the previous day is renamed to *file_name.yyyy-MM-dd*.
# Note - this scheme does not have a size limit; manual log
# pruning will be required. This flag must be set to use the
# backups and size flags. Value options are `true` or `false`.
# roll_daily: NEEDS_TO_BE_SET

```

```
# Specify the file size cap (in MB) of each log file.
# roll_size: NEEDS_TO_BE_SET

# Specify the number of backup logs that the agent will create before
# Contrast cleans up the oldest file. A value of `0` means that no backups
# are created, and the log is truncated when it reaches its size cap.
#
# Note - this property must be used with
# `agent.security_logger.roll_daily=false`; otherwise,
# Contrast continues to log daily and disregard this limit.
#
# backups: NEEDS_TO_BE_SET

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING
```

```
# =====
# agent.security_logger.syslog.heartbeat
# Define the following properties to
# set the Syslog heartbeat properties.
# =====
# heartbeat:

# Set to `true` to enable the Syslog heartbeat.
# The heartbeat will issue a Syslog message at
# the INFO level after every interval passes.
# enable: false

# Set the interval at which to send heartbeat
# messages to the Syslog server (in milliseconds).
# interval_ms: 60000

# =====
# agent.java
# The following properties apply to any Java agent-wide configurations.
# =====
# java:

# Configure the Java agent to skip its application discovery
# algorithm, and instead associate all libraries, vulnerabilities,
# and web traffic to a single application with the name specified
# by this property. This configuration is preferred when deploying
# Java SE applications with embedded web servers (e.g., applications
# built with Spring Boot, Dropwizard, and embedded Jetty). When used
# with an application server, this configuration associates all
# web traffic with the single, standalone application, including
# web traffic handled by application server-hosted endpoints that
# would not be associated with a discovered application otherwise.
#
# Note - This settings takes preferences
# over the `application.name` setting.
#
# standalone_app_name: NEEDS_TO_BE_SET

# By default, the Java agent visits all classes at startup to look
# for vulnerabilities, which the agent may detect by scanning a
# class (e.g., hardcoded passwords). Set this property to `false`
# to disable the default behavior. If disabled, the agent will
# only visit classes which are likely to require sensors; this
# can improve application startup time, but may produce fewer
# findings (most likely findings that require static analysis).
#
# scan_all_classes: true

# By default, the Java agent deeply inspects all JAR and WAR files loaded
# by the JVM to build a comprehensive understanding of the type hierarchy.
# This understanding allows Contrast to instrument sensors into types
# that it might have overlooked. In most cases, this produces a slight
# increase in accuracy at the cost of increased application startup
# time. Set this property to `false` to disable this level of inspection.
#
```



```

# scan_all_code_sources: true

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Define a list of directories where libraries are stored.
# Directories must be formatted as a semicolon-delimited list.
# Example - `path1;path2;path3`
#
# library_dirs: NEEDS_TO_BE_SET

# Set the maximum archive unpacking depth when analyzing libraries.
# library_depth: 10

# Set the boolean to more aggressively limit the
# manifest information reported for libraries. If true,
# the limit is 1,000 characters, otherwise it's 3,000.
# prune_package_details: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.

```

```

# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# profile
# Set configuration values under a profile name to enable
# multi-tenant application configuration on web servers. See
# https://support.contrastsecurity.com/hc/en-us/articles/360052187171-Multi-Application-
# for more details.
# =====
# profile: {}

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.

```

```

# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Tell the agent to detect when semantic analysis of the query
# reveals tautologies used in exfiltration attacks (e.g., "or
# 1=1" or "or 2<>3"). The agent blocks if blocking is enabled.
# detect_tautologies: true

# Tell the agent to detect when semantic analysis of the query
# reveals the invocation of dangerous functions typically used in
# weaponized exploits. The agent blocks if blocking is enabled.
# detect_dangerous_functions: true

# Tell the agent to detect when semantic analysis of the query
# reveals chained queries, which is uncommon in normal usage but
# common in exploit. The agent blocks if blocking is enabled.
# detect_chained_queries: true

# Tell the agent to detect when semantic analysis of the query
# reveals database queries are being made for system tables and
# sensitive information. The agent blocks if blocking is enabled.
# detect_suspicious_unions: true

# Tell the agent to be more aggressive in detecting user
# inputs as SQL comments. This enables the agent to better
# detect SQL Injection input vectors that use comments to
# terminate queries. The agent blocks if blocking is enabled.
# aggressive_comment: false

# =====
# protect.rules.cmd-injection
# Use the following properties to configure

```

```

# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Detect when the agent sees user parameters being executed as
# system commands. The agent blocks if blocking is enabled.
# detect_parameter_command_backdoors: true

# Detect when a system command is issued which contains
# chained commands. The agent blocks if blocking is enabled.
# detect_chained_commands: true

# Detect when a system command is issued with an argument matching a
# known dangerous file path. The agent blocks if blocking is enabled.
# detect_dangerous_path_args: true

# Tell the agent to detect when commands come directly
# from input. The agent blocks if blocking is enabled.
# detect_phased_commands: true

# =====
# protect.rules.cmd-injection-process-hardening
# Use the following settings to configure whether
# the agent blocks all attempts to start an external
# process. To enable blocking, set to 'true'.
# =====
# cmd-injection-process-hardening:

# Set to `true` to enable the agent to block
# all attempts to start external processes.
# enable: false

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

```

```

# Detect when custom code attempts to access sensitive
# system files. The agent blocks if blocking is enabled.
# detect_custom_code_accessing_system_files: true

# Detect when users attempt to bypass filters by
# using "::$DATA" channels or null bytes in file
# names. The agent blocks if blocking is enabled.
# detect_common_file_exploits: true

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====

```

```
# protect.rules.csrf
# Use the following properties to configure how
# the cross-site request forgery rule works.
# =====
# csrf:

# Set the mode of the rule. Value options are
# `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.padding-oracle
# Use the following properties to configure
# how the padding-oracle rule works.
# =====
# padding-oracle: {}

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET
```

```

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

```

## Java system properties

Substitute `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#), and use these commands to learn more about system properties:

- To generate a list of general properties using the Contrast agent JAR, use:

```
java -jar <YourContrastJarPath> properties
```

- Use command line with tools to search for commands. For example, these commands display a list of proxy-related properties:

**Using the built-in filter:**

```
java -jar <YourContrastJarPath> properties --filter=proxy
```

### Java YAML configuration template

Use this template to configure the Java agent using a YAML configuration file. (Learn more about [YAML configuration \(page 33\)](#).)

Place your YAML file in the default location:

- **Unix:** /etc/contrast/java/contrast\_security.yaml
- **Windows:** C:/ProgramData/contrast/java/contrast\_security.yaml

```
# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

  # ***** REQUIRED *****
  # Set the URL for the Contrast UI.
  url: https://app.contrastsecurity.com/Contrast

  # ***** REQUIRED *****
  # Set the API key needed to communicate with the Contrast UI.
  api_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the service key needed to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  service_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the user name used to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  user_name: NEEDS_TO_BE_SET

# Set the timeout for communicating with TeamServer. This property will be
# respected over the deprecated legacy configuration *contrast.timeout*.
# timeout_ms: NEEDS_TO_BE_SET
```



```

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid **contrast.proxy.host**
# and **contrast.proxy.port** will enable the proxy.
# enable: NEEDS_TO_BE_SET

# Set the proxy host. It must be set with port and scheme.
# host: localhost

# Set the proxy port. It must be set with host and scheme.
# port: 1234

# Set the proxy scheme (e.g., `http` or
# `https`). It must be set with host and port.
# scheme: http

# Set this property as an alternate for `scheme://host:port`. It takes
# precedence over the other settings, if specified; however, an error
# will be thrown if both the URL and individual properties are set.
# url: NEEDS_TO_BE_SET

# Set the proxy user.
# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

# Set the proxy authentication type. Value
# options are `NTLM`, `Digest`, and `Basic`.
# auth_type: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# Set the amount of time to run the agent before shutting down itself
# (in milliseconds). A negative value disables scheduled shutdown.
# shutdown_time_ms: NEEDS_TO_BE_SET

# =====
# agent.reporting
# Use the following settings to configure reporting to the Contrast UI.
# =====

```

```

# reporting:

# Set the grace period (in milliseconds) after
# agent shutdown to allow draining pending reports.
# shutdown_grace_period_ms: 120000

# =====
# agent.effective_config
# None
# =====
# effective_config:

# =====
# agent.effective_config.reporting
# None
# =====
# reporting:

# Defaults to `true`. Controls whether configuration
# setting reports are sent to the Contrast web interface.
# enable: true

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# Set to `true` to redirect all logs to `stderr` instead of
# the file system. May be combined with the corresponding
# `stdout` configuration to write to both streams.
# stderr: false

# Change the Contrast logger from a file-sized based rolling scheme

```

```

# to a date-based rolling scheme. At midnight server time, the
# previous day log is renamed to *file_name.yyyy-MM-dd*. Note -
# this scheme does not have a size limit; manual log pruning is
# required. You must set this flag to use the backups and size flags.
# roll_daily: false

# Set the roll size for log files in megabytes. The agent will
# attempt to prevent the log file from being larger than this size.
# roll_size: 100

# Set the number of backup files to keep. Set to `0` to disable.
# backups: 10

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# Change the Contrast security logger from a file-sized based rolling
# scheme to a date-based rolling scheme. At midnight server time,
# the log from the previous day is renamed to *file_name.yyyy-MM-dd*.
# Note - this scheme does not have a size limit; manual log
# pruning will be required. This flag must be set to use the
# backups and size flags. Value options are `true` or `false`.
# roll_daily: NEEDS_TO_BE_SET

# Specify the file size cap (in MB) of each log file.
# roll_size: NEEDS_TO_BE_SET

# Specify the number of backup logs that the agent will create before
# Contrast cleans up the oldest file. A value of `0` means that no backups
# are created, and the log is truncated when it reaches its size cap.
#
# Note - this property must be used with
# `agent.security_logger.roll_daily=false`; otherwise,
# Contrast continues to log daily and disregard this limit.
#
# backups: NEEDS_TO_BE_SET

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

```

```

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# =====
# agent.security_logger.syslog.heartbeat
# Define the following properties to
# set the Syslog heartbeat properties.
# =====
# heartbeat:

# Set to `true` to enable the Syslog heartbeat.
# The heartbeat will issue a Syslog message at
# the INFO level after every interval passes.
# enable: false

# Set the interval at which to send heartbeat
# messages to the Syslog server (in milliseconds).
# interval_ms: 60000

# =====
# agent.java
# The following properties apply to any Java agent-wide configurations.

```

```
# =====
# java:

# Configure the Java agent to skip its application discovery
# algorithm, and instead associate all libraries, vulnerabilities,
# and web traffic to a single application with the name specified
# by this property. This configuration is preferred when deploying
# Java SE applications with embedded web servers (e.g., applications
# built with Spring Boot, Dropwizard, and embedded Jetty). When used
# with an application server, this configuration associates all
# web traffic with the single, standalone application, including
# web traffic handled by application server-hosted endpoints that
# would not be associated with a discovered application otherwise.
#
# Note - This settings takes preferences
# over the `application.name` setting.
#
# standalone_app_name: NEEDS_TO_BE_SET

# By default, the Java agent visits all classes at startup to look
# for vulnerabilities, which the agent may detect by scanning a
# class (e.g., hardcoded passwords). Set this property to `false`
# to disable the default behavior. If disabled, the agent will
# only visit classes which are likely to require sensors; this
# can improve application startup time, but may produce fewer
# findings (most likely findings that require static analysis).
#
# scan_all_classes: true

# By default, the Java agent deeply inspects all JAR and WAR files loaded
# by the JVM to build a comprehensive understanding of the type hierarchy.
# This understanding allows Contrast to instrument sensors into types
# that it might have overlooked. In most cases, this produces a slight
# increase in accuracy at the cost of increased application startup
# time. Set this property to `false` to disable this level of inspection.
#
# scan_all_code_sources: true

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Define a list of directories where libraries are stored.
# Directories must be formatted as a semicolon-delimited list.
# Example - `path1;path2;path3`
#
# library_dirs: NEEDS_TO_BE_SET

# Set the maximum archive unpacking depth when analyzing libraries.
# library_depth: 10
```

```

# Set the boolean to more aggressively limit the
# manifest information reported for libraries. If true,
# the limit is 1,000 characters, otherwise it's 3,000.
# prune_package_details: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

```

```

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# profile
# Set configuration values under a profile name to enable
# multi-tenant application configuration on web servers. See
# https://support.contrastsecurity.com/hc/en-us/articles/360052187171-Multi-Application-
# for more details.
# =====
# profile: {}

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are

```

```

# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Tell the agent to detect when semantic analysis of the query
# reveals tautologies used in exfiltration attacks (e.g., "or
# 1=1" or "or 2<>3"). The agent blocks if blocking is enabled.
# detect_tautologies: true

# Tell the agent to detect when semantic analysis of the query
# reveals the invocation of dangerous functions typically used in
# weaponized exploits. The agent blocks if blocking is enabled.
# detect_dangerous_functions: true

# Tell the agent to detect when semantic analysis of the query
# reveals chained queries, which is uncommon in normal usage but
# common in exploit. The agent blocks if blocking is enabled.
# detect_chained_queries: true

# Tell the agent to detect when semantic analysis of the query
# reveals database queries are being made for system tables and
# sensitive information. The agent blocks if blocking is enabled.
# detect_suspicious_unions: true

# Tell the agent to be more aggressive in detecting user
# inputs as SQL comments. This enables the agent to better
# detect SQL Injection input vectors that use comments to
# terminate queries. The agent blocks if blocking is enabled.
# aggressive_comment: false

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Detect when the agent sees user parameters being executed as
# system commands. The agent blocks if blocking is enabled.
# detect_parameter_command_backdoors: true

# Detect when a system command is issued which contains
# chained commands. The agent blocks if blocking is enabled.
# detect_chained_commands: true

```



```

# Detect when a system command is issued with an argument matching a
# known dangerous file path. The agent blocks if blocking is enabled.
# detect_dangerous_path_args: true

# Tell the agent to detect when commands come directly
# from input. The agent blocks if blocking is enabled.
# detect_phased_commands: true

# =====
# protect.rules.cmd-injection-process-hardening
# Use the following settings to configure whether
# the agent blocks all attempts to start an external
# process. To enable blocking, set to 'true'.
# =====
# cmd-injection-process-hardening:

# Set to `true` to enable the agent to block
# all attempts to start external processes.
# enable: false

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Detect when custom code attempts to access sensitive
# system files. The agent blocks if blocking is enabled.
# detect_custom_code_accessing_system_files: true

# Detect when users attempt to bypass filters by
# using "::$DATA" channels or null bytes in file
# names. The agent blocks if blocking is enabled.
# detect_common_file_exploits: true

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#

```

```

# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.csrf
# Use the following properties to configure how
# the cross-site request forgery rule works.
# =====
# csrf:

# Set the mode of the rule. Value options are
# `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.padding-oracle
# Use the following properties to configure
# how the padding-oracle rule works.
# =====

```

```

# padding-oracle: {}

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
    
```

```

# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

# ***** REQUIRED *****
# Set the URL for the Contrast UI.
url: https://app.contrastsecurity.com/Contrast

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.

```

```
api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

# Set the timeout for communicating with TeamServer. This property will be
# respected over the deprecated legacy configuration *contrast.timeout*.
# timeout_ms: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid **contrast.proxy.host**
# and **contrast.proxy.port** will enable the proxy.
# enable: NEEDS_TO_BE_SET

# Set the proxy host. It must be set with port and scheme.
# host: localhost

# Set the proxy port. It must be set with host and scheme.
# port: 1234

# Set the proxy scheme (e.g., `http` or
# `https`). It must be set with host and port.
# scheme: http

# Set this property as an alternate for `scheme://host:port`. It takes
# precedence over the other settings, if specified; however, an error
# will be thrown if both the URL and individual properties are set.
# url: NEEDS_TO_BE_SET

# Set the proxy user.
# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

# Set the proxy authentication type. Value
# options are `NTLM`, `Digest`, and `Basic`.
# auth_type: NEEDS_TO_BE_SET
```

```

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# Set the amount of time to run the agent before shutting down itself
# (in milliseconds). A negative value disables scheduled shutdown.
# shutdown_time_ms: NEEDS_TO_BE_SET

# =====
# agent.reporting
# Use the following settings to configure reporting to the Contrast UI.
# =====
# reporting:

# Set the grace period (in milliseconds) after
# agent shutdown to allow draining pending reports.
# shutdown_grace_period_ms: 120000

# =====
# agent.effective_config
# None
# =====
# effective_config:

# =====
# agent.effective_config.reporting
# None
# =====
# reporting:

# Defaults to `true`. Controls whether configuration
# setting reports are sent to the Contrast web interface.
# enable: true

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

```

```

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# Set to `true` to redirect all logs to `stderr` instead of
# the file system. May be combined with the corresponding
# `stdout` configuration to write to both streams.
# stderr: false

# Change the Contrast logger from a file-sized based rolling scheme
# to a date-based rolling scheme. At midnight server time, the
# previous day log is renamed to *file_name.yyyy-MM-dd*. Note -
# this scheme does not have a size limit; manual log pruning is
# required. You must set this flag to use the backups and size flags.
# roll_daily: false

# Set the roll size for log files in megabytes. The agent will
# attempt to prevent the log file from being larger than this size.
# roll_size: 100

# Set the number of backup files to keep. Set to `0` to disable.
# backups: 10

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# Change the Contrast security logger from a file-sized based rolling
# scheme to a date-based rolling scheme. At midnight server time,
# the log from the previous day is renamed to *file_name.yyyy-MM-dd*.
# Note - this scheme does not have a size limit; manual log
# pruning will be required. This flag must be set to use the
# backups and size flags. Value options are `true` or `false`.
# roll_daily: NEEDS_TO_BE_SET

# Specify the file size cap (in MB) of each log file.
# roll_size: NEEDS_TO_BE_SET

# Specify the number of backup logs that the agent will create before

```

```

# Contrast cleans up the oldest file. A value of `0` means that no backups
# are created, and the log is truncated when it reaches its size cap.
#
# Note - this property must be used with
# `agent.security_logger.roll_daily=false`; otherwise,
# Contrast continues to log daily and disregard this limit.
#
# backups: NEEDS_TO_BE_SET

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# =====
# agent.security_logger.syslog.heartbeat
# Define the following properties to
# set the Syslog heartbeat properties.

```



```
# =====
# heartbeat:

# Set to `true` to enable the Syslog heartbeat.
# The heartbeat will issue a Syslog message at
# the INFO level after every interval passes.
# enable: false

# Set the interval at which to send heartbeat
# messages to the Syslog server (in milliseconds).
# interval_ms: 60000

# =====
# agent.java
# The following properties apply to any Java agent-wide configurations.
# =====
# java:

# Configure the Java agent to skip its application discovery
# algorithm, and instead associate all libraries, vulnerabilities,
# and web traffic to a single application with the name specified
# by this property. This configuration is preferred when deploying
# Java SE applications with embedded web servers (e.g., applications
# built with Spring Boot, Dropwizard, and embedded Jetty). When used
# with an application server, this configuration associates all
# web traffic with the single, standalone application, including
# web traffic handled by application server-hosted endpoints that
# would not be associated with a discovered application otherwise.
#
# Note - This settings takes preferences
# over the `application.name` setting.
#
# standalone_app_name: NEEDS_TO_BE_SET

# By default, the Java agent visits all classes at startup to look
# for vulnerabilities, which the agent may detect by scanning a
# class (e.g., hardcoded passwords). Set this property to `false`
# to disable the default behavior. If disabled, the agent will
# only visit classes which are likely to require sensors; this
# can improve application startup time, but may produce fewer
# findings (most likely findings that require static analysis).
#
# scan_all_classes: true

# By default, the Java agent deeply inspects all JAR and WAR files loaded
# by the JVM to build a comprehensive understanding of the type hierarchy.
# This understanding allows Contrast to instrument sensors into types
# that it might have overlooked. In most cases, this produces a slight
# increase in accuracy at the cost of increased application startup
# time. Set this property to `false` to disable this level of inspection.
#
# scan_all_code_sources: true

# =====
# inventory
```

```

# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Define a list of directories where libraries are stored.
# Directories must be formatted as a semicolon-delimited list.
# Example - `path1;path2;path3`
#
# library_dirs: NEEDS_TO_BE_SET

# Set the maximum archive unpacking depth when analyzing libraries.
# library_depth: 10

# Set the boolean to more aggressively limit the
# manifest information reported for libraries. If true,
# the limit is 1,000 characters, otherwise it's 3,000.
# prune_package_details: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.

```

```

# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# profile
# Set configuration values under a profile name to enable
# multi-tenant application configuration on web servers. See
# https://support.contrastsecurity.com/hc/en-us/articles/360052187171-Multi-Application-
# for more details.
# =====
# profile: {}

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker

```

```

# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Tell the agent to detect when semantic analysis of the query
# reveals tautologies used in exfiltration attacks (e.g., "or
# 1=1" or "or 2<>3"). The agent blocks if blocking is enabled.
# detect_tautologies: true

# Tell the agent to detect when semantic analysis of the query
# reveals the invocation of dangerous functions typically used in
# weaponized exploits. The agent blocks if blocking is enabled.
# detect_dangerous_functions: true

# Tell the agent to detect when semantic analysis of the query
# reveals chained queries, which is uncommon in normal usage but
# common in exploit. The agent blocks if blocking is enabled.
# detect_chained_queries: true

# Tell the agent to detect when semantic analysis of the query
# reveals database queries are being made for system tables and
# sensitive information. The agent blocks if blocking is enabled.
# detect_suspicious_unions: true

# Tell the agent to be more aggressive in detecting user
# inputs as SQL comments. This enables the agent to better
# detect SQL Injection input vectors that use comments to
# terminate queries. The agent blocks if blocking is enabled.
# aggressive_comment: false

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

```

```

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Detect when the agent sees user parameters being executed as
# system commands. The agent blocks if blocking is enabled.
# detect_parameter_command_backdoors: true

# Detect when a system command is issued which contains
# chained commands. The agent blocks if blocking is enabled.
# detect_chained_commands: true

# Detect when a system command is issued with an argument matching a
# known dangerous file path. The agent blocks if blocking is enabled.
# detect_dangerous_path_args: true

# Tell the agent to detect when commands come directly
# from input. The agent blocks if blocking is enabled.
# detect_phased_commands: true

# =====
# protect.rules.cmd-injection-process-hardening
# Use the following settings to configure whether
# the agent blocks all attempts to start an external
# process. To enable blocking, set to 'true'.
# =====
# cmd-injection-process-hardening:

# Set to `true` to enable the agent to block
# all attempts to start external processes.
# enable: false

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Detect when custom code attempts to access sensitive
# system files. The agent blocks if blocking is enabled.
# detect_custom_code_accessing_system_files: true

```

```

# Detect when users attempt to bypass filters by
# using ":::$DATA" channels or null bytes in file
# names. The agent blocks if blocking is enabled.
# detect_common_file_exploits: true

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.csrf
# Use the following properties to configure how
# the cross-site request forgery rule works.
# =====

```

```
# csrf:

# Set the mode of the rule. Value options are
# `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.padding-oracle
# Use the following properties to configure
# how the padding-oracle rule works.
# =====
# padding-oracle: {}

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
```

```
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET
```



## Configure the Java agent for standalone applications



### NOTE

Standalone application configuration is not needed with the Java agent 4.X.

If you are still using 3.X, check the [Java agent legacy \(page 122\)](#) documentation.

## Transport Layer Security (TLS)

The Contrast Java agent uses a secure TLS connection to communicate with Contrast.

For hosted customers, Contrast uses strong TLSv1.2 connections and certificates signed by industry standard certificate authorities (CAs). However, on-premises customers may need to configure the Java agent to use enterprise CAs, and may want the Java agent to send client certificates in the TLS handshake.

The Contrast Java agent uses the standard [Java Cryptography Architecture](#) for configuring TLS. Specifically, the Java agent uses the system's "TLS" [javax.net.ssl.SSLContext](#). For most users, this means that you can adjust the certificates trusted by the agent using the standard `javax.net.ssl.trustStore` system properties. You can also adjust the certificate the agent sends when the TLS server requests a client certificate using the standard `javax.net.ssl.keyStore` system properties.

This example configures the Java agent to use a custom key store and trust store:

```
java \  
-javaagent:contrast.jar \  
-Djavax.net.ssl.trustStore=/etc/pki/tls/my-enterprise-truststore.p12 \  
-Djavax.net.ssl.trustStorePassword=changeit \  
-Djavax.net.ssl.trustStoreType=PKCS12 \  
-Djavax.net.ssl.keyStore=/etc/pki/tls/server-client-certificate.p12 \  
-Djavax.net.ssl.keyStorePassword=password \  
-Djavax.net.ssl.keyStoreType=PKCS12 \  
-jar my-server.jar
```

## Use the Java Agent with the Java Platform Module System (JPMS)

JPMS is a way to encapsulate code that is present in Java versions 9 and later. Contrast supports inspection of modules and launching of applications written with the JPMS.

The Java Agent requires that the `java.sql` package be required by the application's `module-info.java` files:

```
module mymodule {  
    requires java.sql;  
}
```

or supplied by the `--add-modules` command-line argument at runtime:

```
java -javaagent:/opt/contrast/contrast-agent.jar --add-modules java.sql --module-path li
```

## Java 2 security

The Java 2 security manager allows system administrators to enforce policies that dictate the permissions available to Java code within a JVM.

If you are using the Java 2 security manager with the Java agent, you will need to configure Java security policy files to apply permissions to Java code principals.

Java code principals are typically identified by a CodeSource (like, a JAR), and in rare cases, by the entity that signed the JAR.

For example, in Tomcat's [default catalina.policy file](#), the policy grants permissions to the JDBC driver JAR:

```
// The permission granted to your JDBC driver
grant codeBase "jar:file:${catalina.base}/webapps/examples/WEB-INF/lib/driver.jar!/-" {
    permission java.net.SocketPermission "dbhost.mycompany.com:5432", "connect";
};
```

The Java 2 security manager can be useful in situations where the system administrator can't fully trust the code deployed by users. For example, if you are hosting users' applications on multi-tenant Tomcat instances, you could use the Java 2 security manager to constrain users' applications from taking down their whole service (for example, by disallowing calls to `System.exit()`).

If you are using the Java 2 security manager with the Contrast Java agent, you should grant the Java agent the full set of permissions in your security policy file (*java.security.AllPermission*). To do this, replace `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#), and use:

```
grant codeBase "file:<YourContrastJarPath>" {
    permission java.security.AllPermission;
};
```

If you are using Java 2 security manager and one of these environments, you may also need to complete further configuration:

- [Glassfish](#)
- [Jetty \(page 65\)](#)
- [Tomcat \(page 65\)](#)
- [WebLogic \(page 66\)](#)
- [WebSphere \(page 67\)](#)
- [WildFly \(page 63\)](#)

## Legacy Java agent

Since the release of Java agent 4.x and EOP version 3.9.5, the legacy Contrast Java agent (3.x and earlier) can be used to analyze Java 6 and 7 web applications running on legacy technologies including:

- Jboss 4.2, 6.1, 7.1
- Weblogic 9, 10, 11

The legacy agent includes a JNDI rule in Protect which provides protection against CVE-45046.

## Steps

In agent versions 3.15 and below, for certain features like Route Coverage to function you will need to set additional properties.

1. Open the YAML configuration file in an editor.
2. In addition to the pre-populated authentication keys, add the `agent.java.standalone_app_name` property.

This property assigns the name of your application as you'd like to see it in Contrast. In this example, replace `<MyAppName>` with the name you'd like to use:

```
api:
  url: https://xxx.contrastsecurity.com/Contrast
```

```

api_key: A2xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxG9N
service_key: 88xxxxxxxxxxxxx5Z
user_name: agent_xxxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxxxxxx@OrgName
agent:
  java:
    standalone_app_name: <MyAppName>
    
```

The legacy agent can be downloaded from [Maven Central Repository Search](#).

### Java agent telemetry

The Contrast Java agent use telemetry to collect usage data. Telemetry is collected when an instrumented application first loads the agent’s sensors and then periodically (every few hours) afterwards.

Your privacy is important to us (page 754). The telemetry feature doesn't collect application data. The data is anonymized before being sent securely to Contrast. Then the aggregated data is stored encrypted and under restricted access control. Any collected data will be deleted after one year.

The telemetry feature collects the following data (optional):

Agent version	Data collected
Java 3.16.XXXX	<ul style="list-style-type: none"> <li>• Operating system and version</li> <li>• Whether the agent is running in a container</li> <li>• Memory limits configured in the JVM</li> <li>• Java version and vendor</li> <li>• Physical memory available</li> <li>• CPU count</li> </ul>



#### NOTE

To opt-out of the telemetry feature, set `CONTRAST_AGENT_TELEMETRY_OPTOUT` environment variable to `true` or `1`. Telemetry data is securely sent to `telemetry.java.contrastsecurity.com`. You can also opt out of telemetry by blocking communication at the network level.

### .NET Framework agent

The Contrast .NET Framework agent analyzes the behavior of .NET web applications as users interact with these applications.

Once installed, the .NET Framework agent automatically instruments ASP.NET applications deployed to IIS. Agent analysis is performed as applications are exercised by users (or by automated scripts or tests).

You can view the results of the agent's analysis in the Contrast application. The Contrast .NET Framework agent consists of several components:

- **Background Windows service:** (*DotnetAgentService.exe*) This service prepares the environment for instrumentation and manages communication between agent components. This is the main service that controls agent behavior. You can disable Contrast's instrumentation and analysis by stopping the agent's background Windows service.
- **The .NET Profiler:** This instruments applications to weave in method calls out to agent sensors.
- **Sensors:** These gather security, architecture and library information.
- **The .NET Framework Contrast tray (page 169):** This is a Windows system tray application that displays high-level information about the health of the agent.

As a next step, you can:

- [Install the .NET Framework agent \(page 125\)](#)
- [View supported technologies \(page 124\)](#)
- [View system requirements \(page 124\)](#)
- [Use the agent with IIS Express \(page 166\)](#)
- [Use application pools in IIS \(page 171\)](#)

## Supported technologies for the .NET Framework agent

The Contrast .NET agent supports analysis of web applications built on the following technologies.

Technology	Supported versions	Notes
<b>.NET Framework for Windows</b>		
Application runtime version	4.5 and later	<p>Most users are able to use the modern .NET Framework agent, even if their application targets an older version of .NET 4, due to .NET framework application compatibility.</p> <p><b>Not supported:</b></p> <ul style="list-style-type: none"> <li>• Classic ASP Classic ASP applications don't run on the .NET runtime.</li> <li>• Mono runtime The agent uses the CLR Profiling API to instrument applications. The CLR Profiling API is a Component Object Model (COM)-based interface exposed by the CLR. Linux does not support COM. Therefore Mono does not support the CLR Profiling API and Contrast cannot support Mono.</li> </ul>
Server runtime version	4.7.1, 4.7.2, 4.8	
CLR	CLR4	
Web servers	<ul style="list-style-type: none"> <li>• IIS</li> <li>• IIS Express</li> </ul>	
Application frameworks	<ul style="list-style-type: none"> <li>• ASP.NET MVC 3-5</li> <li>• ASP.NET Web Forms</li> <li>• ASP.NET Web Pages</li> <li>• IIS-Hosted ASMX-based Web Services</li> <li>• IIS-Hosted Web API</li> <li>• IIS-Hosted WCF Services</li> <li>• OWIN Hosted Web API (via a Windows service or a command line application)</li> </ul>	<p>These frameworks are explicitly tested, however, you may still be able to analyze other applications if the framework simply wraps the typical ASP.NET classes (for example, System.Web.HttpRequest).</p> <p>Not supported:</p> <ul style="list-style-type: none"> <li>• Analysis of .NET Framework ASP.NET Core applications (use our <a href="#">.NET Core agent (page 173)</a> to analyze .NET Core applications).</li> <li>• Applications running under partial trust.</li> </ul>



### NOTE

- For Azure App Service, .NET Framework applications must use the .NET Framework [site extension](#) or [NuGet package](#).
- .NET Core applications must use the .NET Core-specific [site extension](#) or [NuGet package](#).

## System requirements for .NET Framework agent

Before installing the .NET Framework agent, you must meet the following requirements:

- You have administrative access to a web server, and the server is supported by Contrast.
- There is a deployed application to be analyzed, and the web application technology is supported by Contrast.
- IIS can be restarted.
- The web server has network connectivity with Contrast.
- The server meets the minimum requirements.

Requirements	Recommended	Notes
Server runtime version	4.7.1 or later	While .NET 4.7.1 or later is required to install the .NET Framework agent, the agent can analyze applications that target .NET 4.5 and later due to .NET Framework application compatibility.
Operating system	<ul style="list-style-type: none"> <li>• Windows 10</li> <li>• Windows Server 2012, 2012 R2, 2016, 2019</li> <li>• Azure Virtual Machines, Cloud Services, Mobile Services</li> <li>• Azure App Service</li> </ul>	
Processor architecture	<ul style="list-style-type: none"> <li>• 32-bit</li> <li>• 64-bit</li> </ul>	On 64-bit systems, you can use the agent to analyze both 32-bit and 64-bit web applications.
CPU	At least 4	Minimum: 2
Memory	At least 8 GB	Minimum: 4 GB
	The .NET agent roughly doubles the memory requirements of analyzed applications. Applications should use less than half of the available memory when the .NET agent is not installed.	
Server	<ul style="list-style-type: none"> <li>• .NET Framework 4.7.1</li> <li>• CLR 4 (.NET 4.0 and later).</li> </ul>	For servers on earlier versions use the <a href="#">Legacy .NET Framework agent</a> .



**NOTE**

- The .NET Framework agent uses the CLR Profiling API to perform data and code flow analysis (for example, detect SQL-injection, XSS, weak cryptography) as well as to detect libraries and technologies used by analyzed applications.
- The Contrast agent can [exist alongside other .NET Profiler agents \(page 168\)](#), such as performance or APM tools with the `agent.dotnet.enable_chaining` configuration setting enabled.
- For servers on earlier versions use the [Legacy .NET Framework agent](#).

**Install the .NET Framework agent**

In most deployments, much of the installation is done automatically by the installer or site extension. A basic installation of the .NET Framework agent looks like this:

1. Download the installer and place it on the server.
2. Run the installer.
3. Use the application as you normally would and verify that Contrast sees your application.



**NOTE**

If you are using Windows 2008, a version of .NET Framework prior to 4.7.1 or if your application targets CLR2, you should use the [Legacy .Net Framework agent installer](#).

Specifically, installation varies depending on how you want to install the .NET Framework agent:

- [.NET Framework Windows installer \(page 126\)](#)
- [Azure App Service \(page 128\)](#)
- [Into a container, like Docker \(page 129\)](#)
- [Web API-OWIN \(page 132\)](#)

To auto-upgrade your agent, enable this option with the [Agent Upgrade Service \(page 134\)](#).

## .NET Framework agent installer for Windows

The Contrast .NET Framework agent installer is a normal Windows application installer built using standard MSI technology. It validates that the target server satisfies several requirements (for example, that the server's operating system is a supported operating system). If all requirements are met, the installer:

- Registers the .NET Framework agent as a standard Windows program.
- Places the agent's files on a disk in the specified install location (for example, *C:\Program Files\Contrast\dotnet*). This includes several dynamic link libraries (DLLs) and executables, such as the background Windows service that drives agent behavior.
- Creates the specified data directory for the agent that's primarily used to store agent log files and configuration (for example, *C:\ProgramData\Contrast\dotnet*).
- Registers the agent's background Windows service with the operating system.
- Adds the agent's Native Module to IIS. The Native Module registers the agent's profiler component with IIS through environment variables. This causes the CLR to load the agent's profiler, which is responsible for instrumenting analyzed applications.
- Starts the agent's background Windows service and [Contrast tray \(page 169\)](#) application. This service is responsible for:
  - Communication with profiler and sensor components through local named pipes.



### NOTE

- If you are using the agent with [self-hosted Web API and OWIN \(page 132\)](#) (outside of IIS), further configuration is needed.
- If you are using Windows 2008, a version of .NET Framework prior to 4.7.1 or if your application targets CLR2, you should use the [Legacy .NET Framework agent installer](#).

Install the .NET Framework agent using Contrast:

### Install the .NET Framework agent using Contrast

1. In the Contrast web application, select **Add new** in the top right.
2. Choose **.NET Framework** in the application language dropdown, then select **IIS hosted** and select the link to **Download the agent and YAML configuration file**.
3. Extract the downloaded ZIP archive on the web server, and run *ContrastSetup.exe*. This installs the .NET Framework agent.

The *contrast\_security.yaml* file is copied to the agent's data directory by the installer and placed in *C:\ProgramData\Contrast\dotnet\contrast\_security.yaml* by default. The installer does not copy the YAML file if it already exists at the destination.

- You can [use the command line \(page 137\)](#) to access additional options supported by the .NET Framework agent installer for Windows.

- If you are using another profiler in this environment, such as an APM like New Relic or AppDynamics, then you need to enable [Contrast profiler chaining \(page 168\)](#).
- 4. You can further configure the agent using the [.NET Framework YAML template \(page 139\)](#).
- 5. Use the application as you normally would and verify that Contrast sees your application. If there are some applications you don't need to analyze, or if you are trying to be lean on performance, consider using [application pools \(page 171\)](#) to limit the number of applications instrumented.

### Install the .NET Framework agent using command line

You can use the command line to access additional options supported by the .NET Framework agent installer for Windows.

The .NET agent can be installed using the Windows UI, and uninstalled or repaired using standard Windows features (including the Programs and Features Control Panel and Powershell). However, you may want to use the .NET Framework agent installer for Windows to perform these actions instead for certain scenarios such as automated scripting.

Use these commands for attended mode:

- **Install:** ContrastSetup.exe
- **Uninstall:** ContrastSetup.exe -uninstall
- **Repair:** ContrastSetup.exe -repair

Use these commands for unattended or silent mode:

- **Install:** ContrastSetup.exe -s -norestart
- **Uninstall:** ContrastSetup.exe -uninstall -s -norestart
- **Repair:** ContrastSetup.exe -repair -s -norestart

The .NET Framework agent installer for Windows supports several additional options that are accessible when you use the command line for installation.

Option	Description	Example
INSTALLFOLDER	This specifies the install directory. Program files will be written to this directory. Defaults are dependent on OS variables.	INSTALLFOLDER="D:\Programs\Contrast"
DATAFOLDER	This specifies the data directory. Logs and the <code>contrast_security.yaml</code> file will be written to this directory. Defaults are dependent on OS variables.	DATAFOLDER = "D:\Data\Contrast"
StartTray	When set to 0, this suppresses the start of the tray application when agent installation is completed. This is recommended when installing the agent on Windows Server Core instances. The default is 1.	StartTray=0
PathToYaml	This specifies a custom YAML configuration file. The default is the <code>contrast_security.yaml</code> file located relative to the installer's location.	PathToYaml=c:\contrast_security.yaml
SERVICE_STARTUP_TYPE_MANUAL	This must be provided when installing, upgrading and repairing the agent. If set to 1, this option sets the Contrast service startup type to Manual. The default is 0 (Automatic Delayed Start).	SERVICE_STARTUP_TYPE_MANUAL=1
SUPPRESS_SERVICE_START	This must be provided when installing, upgrading and repairing the agent. If set to 1, this option suppresses automatically starting the service. The default is 0.	SUPPRESS_SERVICE_START=1
USE_VIRTUAL_SERVICE_ACCOUNT	Run the agent service under a restricted virtual service account. Configures the service to run as the NT Service\DotnetAgentSvc virtual account instead of SYSTEM.	USE_VIRTUAL_SERVICE_ACCOUNT=0
INSECURE_YAML_FILE	Restrict edits to the <code>contrast_security.yaml</code> file of non-elevated users.	INSECURE_YAML_FILE=0
INSTALL_UPGRADE_SERVICE	Set to 0 to not install the agent upgrade service. Default value is 1.	INSTALL_UPGRADE_SERVICE=1

Option	Description	Example
UPGRADE_SERVICE_INSTALLFOLDER	Specify the location where the installer will place upgrade service files.	UPGRADE_SERVICE_INSTALLFOLDER="C:\Program Files (x86)\Contrast\upgrade-service"



**TIP**

To install the .NET agent using scripts, you can use this command:

```
ContrastSetup.exe -s -norestart StartTray=0 PathToYaml=C:\Temp\custom.yaml
```

This command installs the .NET agent in silent and unattended mode, suppresses the start of the tray application, and uses a custom path to the YAML configuration file.



**IMPORTANT**

Contrast automatically restarts IIS when you install the agent.

## Install the .NET Framework agent for Azure App Service



**NOTE**

If you don't have access to the site extension, you can [manually install the .NET Framework agent with NuGet \(page 132\)](#).

### Steps

To install the .NET Framework agent using Azure Portal Extensions:

1. Create an application hosted on Azure App Service.  
To do this you must have an [Azure account](#) and [create an ASP.NET Framework web app](#). Publish your application to Azure, and confirm that it works as expected without Contrast.
2. Configure settings that allow the agent to connect to Contrast by adding the following values in the **Application Settings** section of the **Configuration** blade for your application.

Key	Value
CONTRAST_API_USER_NAME	Replace with your <a href="#">agent username (page 32)</a> .
CONTRAST_API_SERVICE_KEY	Replace with your <a href="#">agent service key (page 32)</a> .
CONTRAST_API_API_KEY	Replace with your agent <a href="#">API key (page 32)</a> .
CONTRAST_API_URL	Defaults to <a href="https://app.contrastsecurity.com">https://app.contrastsecurity.com</a> . Replace with another URL, if you're using a Contrast application that's hosted elsewhere.

3. In the Azure Portal, select your hosted application.
4. Select **Extensions**.
5. Select **Add**.
6. Select the **Contrast .NET Site Extension**. This is the extension for .NET Framework applications.



7. Select **OK**, and agree to the terms and conditions.
8. Wait a few seconds and confirm the site extension installed correctly.
9. Go back to the application overview and **Restart** the application.
10. Navigate to the application, and confirm the application is reporting to Contrast.

**TIP**

You can also install the agent from the Site Extensions area of your application management SCM (Kudu) site.

**IMPORTANT**

If a new version of the agent is available, it's indicated in the Azure Portal or Kudu dashboard. You must stop the site before starting the update; otherwise, the update may fail.

**NOTE**

The site extension sets a number of environment variables, including:

```
COR_ENABLE_PROFILING=1
COR_PROFILER={EFEB8EE0-6D39-4347-A5FE-4D0C88BC5BC1}
COR_PROFILER_PATH_32=D:\home\siteextensions\Contrast.Net.Azure.SiteExtension\C
COR_PROFILER_PATH_64=D:\home\siteextensions\Contrast.Net.Azure.SiteExtension\C
CONTRAST_INSTALL_DIRECTORY=D:\home\siteextensions\Contrast.Net.Azure.SiteExtens
MicrosoftInstrumentationEngine_ConfigPath32_ContrastX86Config=D:\home\siteexter
MicrosoftInstrumentationEngine_ConfigPath64_ContrastX64Config=D:\home\siteexter
```

If the CLR instrumentation engine (CIE) is configured for the application (for example, because Application Insights is enabled), Azure should automatically overwrite the `COR_PROFILER*` variables to point to the profiler of the CIE.

The CIE will then use the `MicrosoftInstrumentationEngine_*` variables to load the Contrast agent.

If the CIE is not configured for the application, the standard `COR_PROFILER*` variables will be used to load the Contrast agent.

## Install the .NET Framework agent using a container

### Before you begin

This topic provides general guidance for installing the Contrast .NET Framework agent in a containerized application, with Docker as an example.

You should have a basic understanding of how containers and related software work. You may need to adjust the instructions to meet your specific circumstances.

## Step 1: Install the agent

In this example, the latest .NET Framework agent is copied. Check DockerHub for available tags.

```
FROM mcr.microsoft.com/dotnet/framework/sdk:4.8

# Hidden for brevity...

# Copy the required agent files from the official Contrast agent image.
COPY --from=contrast/agent-dotnet-framework:latest C:\Contrast C:\Contrast
```

In this example, the latest .NET Framework agent is copied. Check DockerHub for available tags.

## Step 2: Configure the agent

Contrast agents accept configuration from multiple sources, with order of precedence documented in the [order of precedence \(page 31\)](#) section.

A mixed approach is recommended:

- Use a YAML file so that you can share a common configuration between multiple applications.
- Use environment variables for application-specific configuration values, to override values specified in a YAML file, or for sensitive keys that are injected during runtime.

### YAML file configuration:

When you use a [YAML file to configure \(page 33\)](#) the agent, you can use the environment variable `CONTRAST_CONFIG_PATH` to indicate where the YAML file is located inside the container.

For example, given a YAML file called `contrast_security.yaml` that exists in the Docker build context:

```
agent:
  logger:
    path: /var/tmp
    level: WARN
```

You can use the `CONTRAST_CONFIG_PATH` environment variable to add the agent YAML file to the container image as follows:

```
FROM mcr.microsoft.com/dotnet/framework/sdk:4.8

# Hidden for brevity...


# Add the Contrast agent to the image.
COPY --from=contrast/agent-dotnet-framework:latest C:\Contrast C:\Contrast

# Copy the contrast_security.yaml file from Docker build context.
COPY ./contrast_security.yaml /contrast_security.yaml

# Finally configure the agent to use the YAML file previously copied.
ENV CONTRAST_CONFIG_PATH=/contrast_security.yaml
```

### Environment variable configuration:

To set an application-specific configuration, use [environment variables. \(page 49\)](#) This table contains some common configuration options.

Title	Usage	Environment variable
Application name	Specify the application name reported to Contrast.	CONTRAST__APPLICATION__NAME
Application group	Specify the application access group for this application during onboarding.	CONTRAST__APPLICATION__GROUP
 <b>NOTE</b> Create application access groups in Contrast before using this variable.		
Application tags	Add labels to an application.	CONTRAST__APPLICATION__TAGS
Server name	Specify the server name reported to Contrast.	CONTRAST__SERVER__NAME
Server environment	Specify in which environment the application is running. Valid values for this configuration are: Development, QA, and Production.	CONTRAST__SERVER__ENVIRONMENT
Server tag	Add labels to the server.	CONTRAST__SERVER__TAG

### Step 3: Add profiler variables and authentication credentials

To enable instrumentation of your application, the .NET agent requires [additional environment variables \(page 49\)](#). The `COR_CLR` variables load the agent and the `CONTRAST_` variables are for agent authentication to the server.

Using the Dockerfile example in this topic:

```
FROM mcr.microsoft.com/dotnet/framework/sdk:4.8

COPY --from=contrast/agent-dotnet-framework:latest C:\Contrast C:\Contrast

ENV COR_ENABLE_PROFILING=1 \
    COR_PROFILER={EFEB8EE0-6D39-4347-A5FE-4D0C88BC5BC1} \
    COR_PROFILER_PATH_32=C:\Contrast\runtimes\win-x86\native\ContrastProfiler.dll \
    COR_PROFILER_PATH_64=C:\Contrast\runtimes\win-x64\native\ContrastProfiler.dll
```

Additionally, the [following environment variables \(page 32\)](#) are required for agent authentication to the server.

```
CONTRAST__API__URL=https://app.contrastsecurity.com/Contrast
CONTRAST__API__API_KEY={Your API KEY here}
CONTRAST__API__SERVICE_KEY={Your Service key here}
```

Get the API values ([agent keys \(page 32\)](#)) from the Contrast web interface or by [downloading a YAML file \(page 139\)](#) for the .NET Framework agent.

### Examples

You can see examples of finished code in this [GitHub repository](#). In particular, these ASP.NET application use cases might be helpful:

- Default AppPool:
  - [Dockerfile](#)
  - [Entrypoint script](#)
- Custom AppPool:
  - [Dockerfile](#)
  - [Entrypoint script](#)

## See also

Contrast Support Portal [Kubernetes and Contrast](#)

Contrast Support Portal [AWS Fargate and Contrast agents](#)

## Install the .NET Framework agent manually with NuGet

In some instances, you may prefer to manually install the .NET Framework agent using NuGet. For example, this can be useful if you are unable to access the [Azure App Service site extension \(page 128\)](#) or if you prefer to include the .NET Framework agent as a dependency.

1. Add the Contrast NuGet package to your application.  
In Visual Studio, under the application project in the Solution Explorer, right-click on **References** and select **Manage NuGet Packages**.  
Search for the **Contrast.Net.Azure.AppService** package, select it and add it to your project.  
Build your application. Confirm that Contrast assemblies (for example, `ContrastProfiler.dll`) are in a new `contrastsecurity` folder that's created in the application's root directory.
2. Add application authentication settings for Contrast.  
You can either add the authentication settings through the App Service Settings window in Visual Studio's "Publish to Azure App Service", or directly through the Azure App Service Portal.  
Set the Contrast authentication keys that the agent needs to connect to Contrast, and select **Save**. You can [find your keys \(page 32\)](#) in your profile.
3. Follow the build process from the dotnet source code repository.
4. Go to the **Application settings** area of your application in the Azure Portal. Set the Contrast authentication keys that the agent needs to connect to Contrast, and select **Save**.
5. Using Visual Studio, publish the application to Azure.  
Once the application has loaded, use the application and then open Contrast to verify that the server and application are active, and that any expected vulnerabilities appear.

## Install the .NET Framework agent with Web API and Owin

The .NET agent supports analysis of Web API applications that are self-hosted with the Open Web Interface for .NET (OWIN). The Web Api can be deployed as a command line application and Windows service.



### NOTE

Web API applications hosted in the IIS integrated pipeline using the SystemWeb HttpModule and those deployed with an OWIN Host are **not supported**.

1. Install the .NET agent with [.NET Framework agent installer for Windows \(page 126\)](#).
2. Set the environment variables, depending on how you deploy your Web API hosted by OWIN.
  - **Deployed as a command line application:** Set these environment variables before running the command line application that is being used to self-host OWIN:

Environment variable	Value
COR_ENABLE_PROFILING	1
COR_PROFILER	{EFEB8EE0-6D39-4347-A5FE-4D0C88BC5BC1}
COR_PROFILER_PATH_32	C:\Program Files\Contrast\dotnet\runtimes\win-x86\native\ContrastProfiler.dll
COR_PROFILER_PATH_64	C:\Program Files\Contrast\dotnet\runtimes\win-x64\native\ContrastProfiler.dll



**NOTE**

COR\_PROFILER\_PATH\_32 / COR\_PROFILER\_PATH\_64 must match the installation directory chosen during the install of the .NET Framework agent.

• **Deployed as a Windows service:**

Install the service that contains the Web API application. Note the name of the service. Under the service's registry key, create a REG\_MULTI\_SZ value called Environment. If there is already an Environment value, add the new values below the existing values. Set the required environment variables. Each environment variable key/value pair must be separated by a new line. Environment variables that are unique for each service can be set under that service's registry key. The service's registry key can be found at: HKLM\SYSTEM\CurrentControlSet\Services\YourServiceName.

Environment variable	Value
COR_ENABLE_PROFILING	1
COR_PROFILER	{EFEB8EE0-6D39-4347-A5FE-4D0C88BC5BC1}
COR_PROFILER_PATH_32	C:\Program Files\Contrast\dotnet\runtimes\win-x86\native\ContrastProfiler.dll
COR_PROFILER_PATH_64	C:\Program Files\Contrast\dotnet\runtimes\win-x64\native\ContrastProfiler.dll
CONTRAST_CONFIG_PATH	C:\ProgramData\contrast\dotnet\contrast_security.yaml



**NOTE**

COR\_PROFILER\_PATH\_32 / COR\_PROFILER\_PATH\_64 must match the installation directory chosen during the install of the .NET Framework agent.

- Restart the service so that new values are loaded. This PowerShell script can be used to set the required environment variables:

```
param (
    # Name of the service that it was given at installation.
    [Parameter(Mandatory=$true)]
    [string]
    $ServiceName,

    # Path to the 64-bit Contrast profiler DLL.
    # Defaults to: "C:\Program Files\Contrast\dotnet\runtimes\win-x64\native\Contrast
    [string]
    $ProfilerPath64 = "C:\Program Files\Contrast\dotnet\runtimes\win-x64\native\Contr

    # Path to the 32-bit Contrast profiler DLL.
    # Defaults to: "C:\Program Files\Contrast\dotnet\runtimes\win-x86\native\Contrast
    [string]
    $ProfilerPath32 = "C:\Program Files\Contrast\dotnet\runtimes\win-x86\native\Contr

    # Path to the Contrast agent configuration YAML file.
    # Defaults to: "C:\ProgramData\contrast\dotnet\contrast_security.yaml"
    [string]
    $ConfigYamlPath = "C:\ProgramData\contrast\dotnet\contrast_security.yaml"
)

if (-Not (Test-Path -Path $ProfilerPath64 -PathType Leaf)) {
```

```

    Write-Host "Cannot find 64-bit profiler DLL at path `"$ProfilerPath64`"."
    exit 1
}

if (-Not (Test-Path -Path $ConfigYamlPath -PathType Leaf)) {
    Write-Host "Cannot find configuration YAML file at path `"$ConfigYamlPath`"."
    exit 1
}

if (-Not (Test-Path -Path $ProfilerPath32 -PathType Leaf)) {
    Write-Host "Cannot find 32-bit profiler DLL at path `"$ProfilerPath32`"."
    exit 1
}

# Check if there is a service with the specified name installed.
$service = Get-Service -Name $ServiceName -ErrorAction Ignore

if ($null -Eq $service) {
    Write-Host "The service `"$ServiceName`" was not found."
    exit 2
}

# Create value for multiline registry string.
$values = @(
    "COR_ENABLE_PROFILING=1",
    "COR_PROFILER={EFEB8EE0-6D39-4347-A5FE-4D0C88BC5BC1}",
    "COR_PROFILER_PATH_64=$ProfilerPath64",
    "COR_PROFILER_PATH_32=$ProfilerPath32",
    "CONTRAST_CONFIG_PATH=$ConfigYamlPath"
)

$registryKey = "HKLM:\SYSTEM\CurrentControlSet\Services\$ServiceName"

# Check if the Environment value already exists.
$environmentValue = Get-ItemProperty -Path $registryKey -Name "Environment" -ErrorAct

if ($null -Ne $environmentValue) {
    # Add the Contrast environment variables to the existing variables.
    $existingValues = [System.Collections.ArrayList]@($environmentValue.Environment)
    foreach ($item in $values) {
        $idx = $existingValues.Add($item)
    }
    $values = $existingValues
}

# Set the environment variables for the service.
Set-ItemProperty -Path $registryKey -Type MultiString -Name "Environment" -Value $val

# Restart the service so it picks up the new environment variables.
Restart-Service -Name $ServiceName

```

## Agent upgrade service

The Agent Upgrade Service is a background Windows service that helps you keep the .NET Framework and .NET Core for IIS agents automatically updated to the most recent version on Windows. The Agent

Upgrade Service is included with the .NET Framework Agent Installer and .NET Core Agent for IIS Installer; the agent installers install two products:

- the corresponding agent, and
- the Agent Upgrade Service.

By default, the Agent Upgrade Service checks for new agent versions released to NuGet when the service first starts up (when the Windows Server is restarted.) If a new agent version is found, the Upgrade Service will download the new agent version, verify the installer’s signature, and then finally execute the installer.

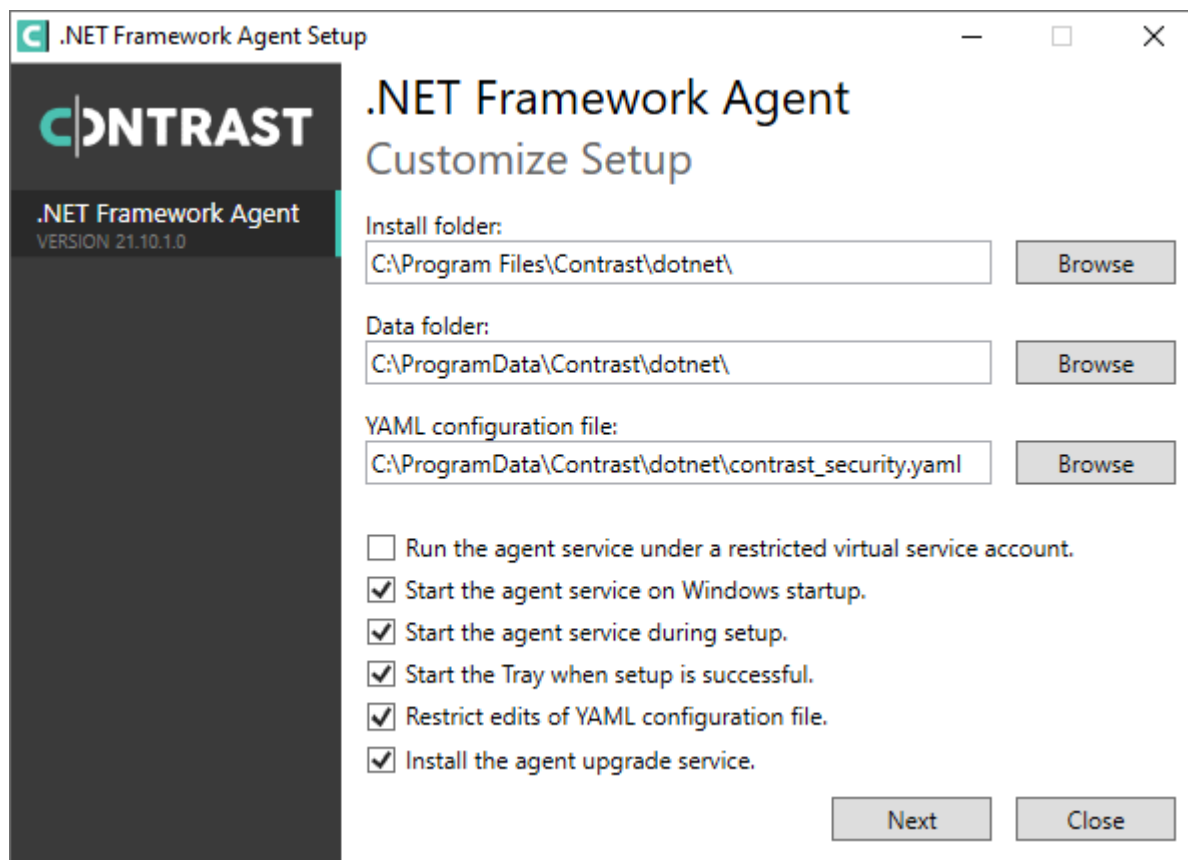


**NOTE**

When a new agent version installed, IIS will be restarted.

The Agent Upgrade Service is an optional component and is not required for agent Assess and Protect features.

- De-select the **Install the agent upgrade service** checkbox when installing the agent if you do not want to use the Agent Upgrade Service.
- If installing the agent via command line, add `INSTALL_UPGRADE_SERVICE=0` argument to not install the Agent Upgrade Service.



The behavior of the Agent Upgrade Service can be modified via an agent-specific configuration file in the Contrast data directory. The default location is `C:\ProgramData\Contrast\upgrade-service`.

The configuration for upgrading the .NET Core agent is located in the .NET Core YAML file.

```
enable: true # Set to `true` for the agent to automatically upgrade to newer versions.
checks: Startup # Set the frequency with which the agent checks for updates. Valid value
timeout_ms: 60000 # Set the time allocated to execute the downloaded agent installer before
nuget_repository_url: https://api.nuget.org/v3/index.json # Set the URL of the NuGet repository
nuget_package_name: Contrast.CoreIIS.Installer # Set the name of the .NET Core Agent for
installer_upgrade_code: 82468c04-dfc0-4a4c-9eb9-c4b314c67fdc # Used internally to retrieve
```



## NOTE

The Agent Upgrade Service is only included with the agent installer. It is not included with the manual .NET Core Agent, agent NuGet packages, or Azure App Service site extensions.

## Update the .NET Framework agent

The .NET Framework has two versions, legacy and modern. The method of keeping the agent up-to-date will depend on which of the legacy/modern agent you are using.

There are three ways to update the .NET Framework agent:

- Automatically update the agent
- Download the agent from the JFrog repository (legacy agent versions only)
- Use Contrast API to download the agent and install with the command line

### Before you begin

- Confirm your .NET Framework application runs properly without the Contrast .NET Framework agent.
- Previously successfully installed the Contrast .NET Framework agent.
- Defined a policy for how and when to update the agent, based on your change management policy, workflow, and the environment where you deploy agents.
- Have some familiarity with Windows scripting methods, including PowerShell.

### Update the agent automatically (modern)

The modern agent automatically updates through the [Agent upgrade service \(page 134\)](#). Contrast supports and releases new versions of the modern agent, versions 20.5.1 and later. The modern agent will not auto-update if it detects an [unsupported environment \(page 124\)](#).

### Download the agent from the JFrog repository (legacy)

You can download the agent from the JFrog Artifactory if you need to stay on the legacy agent. This agent does not automatically update, and needs to be manually updated.

1. [Download](#) the new version.
2. Use the silent installer with command line to update the agent:

```
ContrastSetup.exe -s -norestart
```

### Use the Contrast API to download the agent (modern)

1. Download the Contrast agent directly from the Contrast API. This works for both hosted and on-premises instances of Contrast.  
You need an account (service or user) to access the API.



2. Use the silent installer to install the agent with command line, after downloading the agent. You can find your credentials by [viewing your organization and personal keys \(page 421\)](#).

### See also

- [Agent upgrade service \(page 134\)](#)

## Configure the .NET Framework agent

The [standard configuration \(page 30\)](#) uses this [order of precedence \(page 31\)](#).

Configure the .NET Framework agent:

- [For Azure App Service \(page 137\)](#)
- [In the web.config file \(page 137\)](#)
- [With the .NET Framework YAML template \(page 139\)](#)



### TIP

Use the [Contrast agent configuration editor \(page 34\)](#) to create or upload a YAML configuration file, validate YAML and get setting recommendations.

## .NET Framework agent-specific settings for Azure App Service

You can configure the .NET Framework agent for Azure App Service in the Azure Portal in three ways:

- Use the environment variable convention of agent configuration. Add all settings to the **Application Settings** section of the **Configuration** blade in the Azure Portal using [environment variable syntax \(page 49\)](#).
- Specify `application` configuration options in an application's `web.config` file. For the agent to pick up customized application settings, you must place these settings in the application `web.config` file's root configuration `appSettings` section. See [application-specific settings for Windows \(page 137\)](#) for more details.
- Instead of setting individual options in the Azure Portal, you may use a YAML configuration file containing Contrast settings. First, upload the file to your Azure web application by including it in your application deployment or using the Kudu console. Then add an application setting, `CONTRAST_CONFIG_PATH`, that points to this file.

For example, To use the `contrast_security.yaml` file in the root of your application, add an application setting with key `CONTRAST_CONFIG_PATH` and value `D:\Home\site\wwwroot\contrast_security.yaml`. Application files in Azure App Service are deployed to `D:\home\site\wwwroot`.

## Configure .NET Framework with web.config file

You can specify the configuration options in an application's `web.config` file or using YAML configuration. For the agent to pick up customized application settings with `web.config`, you must place these settings in the application `web.config` file's root configuration `appSettings` section.

For example, two applications hosted in the same application pool will report as different servers if you configure the `contrast.server.name` property in the `appSettings` in each application's `web.config` file. Or, you could use `web.config` to configure the `contrast.application.name`, like this:

```
<configuration>
  <appSettings>
    <add key="contrast.application.name" value="MyWebAppName" />
    <add key="contrast.application.version" value="1.2.3" />
  </appSettings>
</configuration>
```

```
</appSettings>
<system.web>
  ...
```

See the [.NET Framework YAML template \(page 139\)](#) for a description of other available properties.

If your agent version is earlier than 21.1.4, only some properties can be configured with *web.config* as listed here.

Properties	Introduced with this .NET Framework agent version
contrast.application.code	19.6.3
contrast.application.group	19.1.3
contrast.application.metadata	19.1.3
contrast.application.name	19.1.3
contrast.application.session_id	20.6.6
contrast.application.session_metadata	20.6.6
contrast.application.tags	19.1.3
contrast.application.version	19.1.3
contrast.assess.tags	19.1.3
contrast.inventory.tags	19.1.3



**NOTE**

If `contrast.application.name` is not specified, the .NET Framework agent will use the application's virtual path as an application name. If the application is hosted in the root of a site (meaning, the virtual path is /), the .NET Framework agent will use the site's name as the application name.



### IMPORTANT

Starting with agent version 21.1.4, users can set most agent configuration settings either with the application's `web.config` file or with a `contrast_security.yaml` file in the same directory as the application. For example, two applications hosted in the same application pool can now report as different servers by setting `contrast.server.name` in the `appSettings` in each application's `web.config` file.

The following configuration settings are applied at the *process* level and cannot be customized separately for each application. You cannot set these properties using `web.config` and must set these configurations another way (like with YAML).

- `agent.dotnet.app_pool_denylist`
- `agent.dotnet.app_pool_allowlist`
- `agent.dotnet.enable_instrumentation_optimizations`
- `agent.dotnet.enable_jit_inlining`
- `agent.dotnet.enable_transparency_checks`
- `agent.dotnet.enable_struct_dataflow`
- `assess.enable_control_detection`

Additionally, the agent's profiler component uses the process-level settings for the following keys, while the agent's sensor component will use the application-specific settings (if specified):

- `agent.logger.level`
- `agent.logger.stdout`

## .NET Framework YAML template

Configure the .NET Framework agent using a [YAML configuration \(page 33\)](#) file.

The `contrast_security.yaml` file is copied to the agent's data directory by the installer (`C:\ProgramData\Contrast\dotnet\contrast_security.yaml` by default). The installer does not copy the YAML file if it already exists at the destination.

The template below contains all valid YAML options for this agent. For example, you can use the file to set the server name reported by the .NET Framework agent. To do this, update the `contrast_security.yaml` file, add a new line and the code below, and then continue the installation as normal.

```
server:
  name: MyServerName

# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
```

```

# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

# ***** REQUIRED *****
# Set the URL for the Contrast UI.
url: https://app.contrastsecurity.com/Contrast

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

# Set the version of the TLS protocol the agent uses to communicate with the
# Contrast UI. The .NET agent default behavior is (SecurityProtocolType.Tls
# | SecurityProtocolType.Tls11 | SecurityProtocolType.Tls12).
# tls_versions: tls|tls11|tls12

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Determine the location from which the agent loads a client
# certificate. Value options include `File` or `Store`.
# certificate_location: NEEDS_TO_BE_SET

# Set the absolute path to the client certificate's
# .CER file for communication with Contrast UI. The
# `certificate_location` property must be set to `File`.
# cer_file: NEEDS_TO_BE_SET

# Specify the name of certificate store to open. The
# `certificate_location` property must be set to `Store`.
# Value options include `AuthRoot`, `CertificateAuthority`,
# `My`, `Root`, `TrustedPeople`, or `TrustedPublisher`.
# store_name: NEEDS_TO_BE_SET

# Specify the location of the certificate store. The
# `certificate_location` property must be set to `Store`.

```

```

# Value options include `CurrentUser` or `LocalMachine`.
# store_location: NEEDS_TO_BE_SET

# Specify the type of value the agent uses to find the certificate
# in the collection of certificates from the certificate store.
# The `certificate_location` property must be set to `Store`.
# Value options include `FindByIssuerDistinguishedName`,
# `FindByIssuerName`, `FindBySerialNumber`,
# `FindBySubjectDistinguishedName`, `FindBySubjectKeyIdentifier`,
# `FindBySubjectName`, or `FindByThumbprint`.
# find_type: NEEDS_TO_BE_SET

# Specify the value the agent uses in combination with
# `find_type` to find a certification in the certificate store.
#
# Note - The agent will use the first certificate from
# the certificate store that matches this search criteria.
#
# find_value: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate
# with the Contrast web interface over a proxy. Set
# value to `false` if you don't want to use the proxy.
# enable: NEEDS_TO_BE_SET

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# Set the proxy user.
# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

# Set the proxy authentication type. Value
# options are `NTLM`, `Digest`, and `Basic`.
# auth_type: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# =====
# agent.logger
# Define the following properties to set logging values.

```

```

# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# Set the roll size for log files in megabytes. The agent will
# attempt to prevent the log file from being larger than this size.
# roll_size: 100

# Set the number of backup files to keep. Set to `0` to disable.
# backups: 10

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.

```

```
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# Set the connection type used for Syslog messages.
# Value options are `UNENCRYPTED` and `ENCRYPTED`.
# connection_type: UNENCRYPTED

# =====
# agent.dotnet
# The following properties apply to any .NET agent-wide configurations.
# =====
# dotnet:

# Set a list of application pool names that the agent does not
# instrument or analyze. Names must be formatted as a comma-separated
# list. New after .NET Framework 19.1.3 and .NET Core 4.0.2.
# app_pool_denylist: NEEDS_TO_BE_SET

# Set a list of application pool names that the agent instruments or
# analyzes. If set, other application pools are ignored. Allowlist takes
# precedence over denylist. Names must be formatted as a comma-separated
# list. New after .NET Framework 19.1.3 and .NET Core 4.0.2.
# app_pool_allowlist: NEEDS_TO_BE_SET

# Set a list of application names that the agent does not
# analyze. (The applications are still instrumented).
# Names must be formatted as a comma-separated list.
# New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# application_denylist: NEEDS_TO_BE_SET

# Set a list of application names that the agent analyzes.
# If set, other applications are not analyzed, but are
# still instrumented. Allowlist takes precedence over
# denylist. Names must be formatted as a comma-separated
# list. New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# application_allowlist: NEEDS_TO_BE_SET

# Enable a profiler chaining feature to allow Contrast to
# work alongside other tools that use the CLR Profiling
```

```
# API. Defaults to `true`. New after .NET Framework 19.1.3
# (Installed Only) and .NET Core 1.9.3 (Installed Only).
# enable_chaining: true

# Indicate that the agent should produce a report that
# summarizes application hosting on the server (e.g.,
# CLR versions, bitness or pipeline modes). Defaults to
# `true`. New after .NET Framework 19.1.3 (Installed Only).
# enable_dvnr: true

# Indicate that the agent should allow CLR optimizations
# of JIT-compiled methods. Defaults to `true`. New
# after .NET Framework 19.1.3 and .NET Core 1.0.0.
# enable_instrumentation_optimizations: true

# Indicate that the agent should allow the CLR to inline
# methods that are not instrumented by Contrast. Defaults to
# `true`. New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# enable_jit_inlining: true

# Indicate that the agent should allow the CLR to perform
# transparency checks under full trust. Defaults to `false`.
# New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# enable_transparency_checks: false

# Responses for request paths (e.g., HttpRequest.Path)
# that match this regex are not analyzed. Defaults to
# `WebResource.axd`. New after .NET Framework 19.1.3.
# web_module_allowlist: WebResource.axd

# Set to display ASCII art to std::out on agent startup. Defaults
# to `true`. New after .NET Framework 20.6.3 and .NET Core 1.0.0.
# enable_cat: true

# Sets the maximum amount of time a Protect regular expression
# is allowed to run before being cancelled. Set to -1 to never
# cancel regular expression execution. Defaults to `20_000`.
# New after .NET Framework 20.4.3 and .NET Core 1.5.0.
# protect_searchers_single_pattern_deadline_ms: 20_000

# Sets the maximum amount of time a 'Probe Analysis' Protect
# regular expression is allowed to run before being cancelled. Set
# to -1 to never cancel regular expression execution. Defaults to
# `5_000`. New after .NET Framework 20.7.3 and .NET Core 1.5.11.
# protect_searchers_probe_analysis_single_pattern_deadline_ms: 5_000

# Sets the maximum amount of time a Protect rule is
# allowed to run before being cancelled. Set to -1 to never
# cancel Protect rule execution. Defaults to `60_000`.
# New after .NET Framework 20.4.3 and .NET Core 1.5.0.
# protect_searchers_total_rule_deadline_ms: 60_000

# Sets the maximum amount of time a 'Probe Analysis' Protect
# rule is allowed to run before being cancelled. Set to -1 to
# never cancel Protect rule execution. Defaults to `10_000`.
```



```

# New after .NET Framework 20.7.3 and .NET Core 1.5.11.
# protect_searchers_probe_analysis_total_rule_deadline_ms: 10_000

# Sets the maximum duration of time agent log files should be kept
# since last write before being deleted by the agent. Defaults to
# `604_800_000`. New after .NET Framework 20.6.1 and .NET Core 1.5.5.
# log_cleanup_maximum_age_ms: 604_800_000

# Suppresses gathering process-level metrics (process level metrics are
# gathered by default), used to identify performance problems. Metric
# counters may further decrease the stability of already unstable
# systems and can be disabled (set to true) if issues occur. Defaults
# to `false`. New after .NET Framework 20.6.6 and .NET Core 1.5.10.
# suppress_metric_counters: false

# Enable file based application watching. Set to false if
# file watching is causing locking issues. Defaults to `true`.
# New after .NET Framework 20.7.3 and .NET Core 1.5.11.
# enable_file_based_app_watching: true

# Enables HttpClient isolation using AppDomain remoting. This can be used
# to workaround .NET TLS version limitations at the cost of performance
# and stability. Enabled by default on applications targeting .NET
# Framework < 4.7.0, else disabled. New after .NET Framework 21.5.1.
# enable_http_client_app_domain_isolation: false

# Enables LINQ optimizations to improve performance
# at the cost of possible false negatives. Defaults
# to `true`. New after .NET Framework 50.0.1.
# enable_linq_optimizations: true

# =====
# agent.dotnet.file_analysis_time_ms
# Controls the interval in milliseconds to perform file
# analysis for supported rules. Setting a value > 0 will
# result in the job running at that interval and not just when
# the application loads. If set to `-1`, the job just runs
# once. Defaults to `-1`. New after .NET Framework 50.0.15.
# =====
# file_analysis_time_ms: {}

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

```

```

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Control the values captured by Assess vulnerability events. `Full`
# captures most values by calling ToString on objects, which can
# provide more info but causes increased memory usage. `Minimal`
# has better performance as it only captures String type objects
# as strings and uses type name for other object type values.
# event_detail: minimal

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# Value options are `ALL`, `SOME`, or `NONE`.
# stacktraces: ALL

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.

```

```

# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.sql-injection-semantic-chaining
# Use the following properties to configure how the

```

```

# sql injection semantic analysis chaining rule works.
# =====
# sql-injection-semantic-chaining:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.sql-injection-semantic-dangerous-functions
# Use the following properties to configure how the sql
# injection semantic analysis dangerous functions rule works.
# =====
# sql-injection-semantic-dangerous-functions:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.sql-injection-semantic-suspicious-unions
# Use the following properties to configure how the sql
# injection semantic analysis suspicious unions rule works.
# =====
# sql-injection-semantic-suspicious-unions:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.sql-injection-semantic-tautologies
# Use the following properties to configure how the sql
# injection semantic analysis tautologies rule works.
# =====
# sql-injection-semantic-tautologies:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

```

```

# Tell the agent to detect when commands come directly
# from input. The agent blocks if blocking is enabled.
# detect_phased_commands: true

# =====
# protect.rules.cmd-injection-semantic-chained-commands
# Use the following properties to configure how the
# 'command injection - chained commands' rule works
# =====
# cmd-injection-semantic-chained-commands:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.cmd-injection-semantic-dangerous-paths
# Use the following properties to configure how the
# 'command injection - dangerous paths' rule works
# =====
# cmd-injection-semantic-dangerous-paths:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.cmd-injection-command-backdoors
# Use the following properties to configure how the
# 'command injection - command backdoors' rule works
# =====
# cmd-injection-command-backdoors:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.path-traversal-semantic-file-security-bypass
# Use the following properties to configure how the
# 'path traversal - file security bypass' rule works
# =====
# path-traversal-semantic-file-security-bypass:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

```

```

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.unsafe-file-upload
# Use the following properties to configure
# how the unsafe file upload rule works.
# =====
# unsafe-file-upload:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====

```

```

# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.untrusted-deserialization
# Use the following properties to configure
# how the untrusted deserialization rule works.
# =====
# untrusted-deserialization:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must

```

```

# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Override the reported server path. New after
# .NET Framework v21.3.1 and .NET Core v1.8.0.
# path: NEEDS_TO_BE_SET

```



```
# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

  # ***** REQUIRED *****
  # Set the URL for the Contrast UI.
  url: https://app.contrastsecurity.com/Contrast

  # ***** REQUIRED *****
  # Set the API key needed to communicate with the Contrast UI.
  api_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the service key needed to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  service_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the user name used to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  user_name: NEEDS_TO_BE_SET

  # Set the version of the TLS protocol the agent uses to communicate with the
  # Contrast UI. The .NET agent default behavior is (SecurityProtocolType.Tls
  # | SecurityProtocolType.Tls11 | SecurityProtocolType.Tls12).
  # tls_versions: tls|tls11|tls12

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

  # If set to `false`, the agent will ignore the
  # certificate configuration in this section.
  # enable: true

  # Determine the location from which the agent loads a client
  # certificate. Value options include `File` or `Store`.
  # certificate_location: NEEDS_TO_BE_SET
```

```
# Set the absolute path to the client certificate's
# .CER file for communication with Contrast UI. The
# `certificate_location` property must be set to `File`.
# cer_file: NEEDS_TO_BE_SET

# Specify the name of certificate store to open. The
# `certificate_location` property must be set to `Store`.
# Value options include `AuthRoot`, `CertificateAuthority`,
# `My`, `Root`, `TrustedPeople`, or `TrustedPublisher`.
# store_name: NEEDS_TO_BE_SET

# Specify the location of the certificate store. The
# `certificate_location` property must be set to `Store`.
# Value options include `CurrentUser` or `LocalMachine`.
# store_location: NEEDS_TO_BE_SET

# Specify the type of value the agent uses to find the certificate
# in the collection of certificates from the certificate store.
# The `certificate_location` property must be set to `Store`.
# Value options include `FindByIssuerDistinguishedName`,
# `FindByIssuerName`, `FindBySerialNumber`,
# `FindBySubjectDistinguishedName`, `FindBySubjectKeyIdentifier`,
# `FindBySubjectName`, or `FindByThumbprint`.
# find_type: NEEDS_TO_BE_SET

# Specify the value the agent uses in combination with
# `find_type` to find a certification in the certificate store.
#
# Note - The agent will use the first certificate from
# the certificate store that matches this search criteria.
#
# find_value: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate
# with the Contrast web interface over a proxy. Set
# value to `false` if you don't want to use the proxy.
# enable: NEEDS_TO_BE_SET

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# Set the proxy user.
# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

# Set the proxy authentication type. Value
```

```

# options are `NTLM`, `Digest`, and `Basic`.
# auth_type: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# Set the roll size for log files in megabytes. The agent will
# attempt to prevent the log file from being larger than this size.
# roll_size: 100

# Set the number of backup files to keep. Set to `0` to disable.
# backups: 10

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

```

```

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# Set the connection type used for Syslog messages.
# Value options are `UNENCRYPTED` and `ENCRYPTED`.
# connection_type: UNENCRYPTED

# =====
# agent.dotnet
# The following properties apply to any .NET agent-wide configurations.
# =====
# dotnet:

# Set a list of application pool names that the agent does not
# instrument or analyze. Names must be formatted as a comma-separated
# list. New after .NET Framework 19.1.3 and .NET Core 4.0.2.
# app_pool_denylist: NEEDS_TO_BE_SET

# Set a list of application pool names that the agent instruments or
# analyzes. If set, other application pools are ignored. Allowlist takes
# precedence over denylist. Names must be formatted as a comma-separated
# list. New after .NET Framework 19.1.3 and .NET Core 4.0.2.
# app_pool_allowlist: NEEDS_TO_BE_SET

# Set a list of application names that the agent does not
# analyze. (The applications are still instrumented).
```

```
# Names must be formatted as a comma-separated list.
# New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# application_denylist: NEEDS_TO_BE_SET

# Set a list of application names that the agent analyzes.
# If set, other applications are not analyzed, but are
# still instrumented. Allowlist takes precedence over
# denylist. Names must be formatted as a comma-separated
# list. New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# application_allowlist: NEEDS_TO_BE_SET

# Enable a profiler chaining feature to allow Contrast to
# work alongside other tools that use the CLR Profiling
# API. Defaults to `true`. New after .NET Framework 19.1.3
# (Installed Only) and .NET Core 1.9.3 (Installed Only).
# enable_chaining: true

# Indicate that the agent should produce a report that
# summarizes application hosting on the server (e.g.,
# CLR versions, bitness or pipeline modes). Defaults to
# `true`. New after .NET Framework 19.1.3 (Installed Only).
# enable_dvnr: true

# Indicate that the agent should allow CLR optimizations
# of JIT-compiled methods. Defaults to `true`. New
# after .NET Framework 19.1.3 and .NET Core 1.0.0.
# enable_instrumentation_optimizations: true

# Indicate that the agent should allow the CLR to inline
# methods that are not instrumented by Contrast. Defaults to
# `true`. New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# enable_jit_inlining: true

# Indicate that the agent should allow the CLR to perform
# transparency checks under full trust. Defaults to `false`.
# New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# enable_transparency_checks: false

# Responses for request paths (e.g., HttpRequest.Path)
# that match this regex are not analyzed. Defaults to
# `WebResource.axd`. New after .NET Framework 19.1.3.
# web_module_allowlist: WebResource.axd

# Set to display ASCII art to std::out on agent startup. Defaults
# to `true`. New after .NET Framework 20.6.3 and .NET Core 1.0.0.
# enable_cat: true

# Sets the maximum amount of time a Protect regular expression
# is allowed to run before being cancelled. Set to -1 to never
# cancel regular expression execution. Defaults to `20_000`.
# New after .NET Framework 20.4.3 and .NET Core 1.5.0.
# protect_searchers_single_pattern_deadline_ms: 20_000

# Sets the maximum amount of time a 'Probe Analysis' Protect
# regular expression is allowed to run before being cancelled. Set
```

```

# to -1 to never cancel regular expression execution. Defaults to
# `5_000`. New after .NET Framework 20.7.3 and .NET Core 1.5.11.
# protect_searchers_probe_analysis_single_pattern_deadline_ms: 5_000

# Sets the maximum amount of time a Protect rule is
# allowed to run before being cancelled. Set to -1 to never
# cancel Protect rule execution. Defaults to `60_000`.
# New after .NET Framework 20.4.3 and .NET Core 1.5.0.
# protect_searchers_total_rule_deadline_ms: 60_000

# Sets the maximum amount of time a 'Probe Analysis' Protect
# rule is allowed to run before being cancelled. Set to -1 to
# never cancel Protect rule execution. Defaults to `10_000`.
# New after .NET Framework 20.7.3 and .NET Core 1.5.11.
# protect_searchers_probe_analysis_total_rule_deadline_ms: 10_000

# Sets the maximum duration of time agent log files should be kept
# since last write before being deleted by the agent. Defaults to
# `604_800_000`. New after .NET Framework 20.6.1 and .NET Core 1.5.5.
# log_cleanup_maximum_age_ms: 604_800_000

# Suppresses gathering process-level metrics (process level metrics are
# gathered by default), used to identify performance problems. Metric
# counters may further decrease the stability of already unstable
# systems and can be disabled (set to true) if issues occur. Defaults
# to `false`. New after .NET Framework 20.6.6 and .NET Core 1.5.10.
# suppress_metric_counters: false

# Enable file based application watching. Set to false if
# file watching is causing locking issues. Defaults to `true`.
# New after .NET Framework 20.7.3 and .NET Core 1.5.11.
# enable_file_based_app_watching: true

# Enables HttpClient isolation using AppDomain remoting. This can be used
# to workaround .NET TLS version limitations at the cost of performance
# and stability. Enabled by default on applications targeting .NET
# Framework < 4.7.0, else disabled. New after .NET Framework 21.5.1.
# enable_http_client_app_domain_isolation: false

# Enables LINQ optimizations to improve performance
# at the cost of possible false negatives. Defaults
# to `true`. New after .NET Framework 50.0.1.
# enable_linq_optimizations: true

# =====
# agent.dotnet.file_analysis_time_ms
# Controls the interval in milliseconds to perform file
# analysis for supported rules. Setting a value > 0 will
# result in the job running at that interval and not just when
# the application loads. If set to `-1`, the job just runs
# once. Defaults to `-1`. New after .NET Framework 50.0.15.
# =====
# file_analysis_time_ms: {}

# =====

```

```

# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Control the values captured by Assess vulnerability events. `Full`
# captures most values by calling ToString on objects, which can
# provide more info but causes increased memory usage. `Minimal`
# has better performance as it only captures String type objects
# as strings and uses type name for other object type values.
# event_detail: minimal

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# Value options are `ALL`, `SOME`, or `NONE`.
# stacktraces: ALL

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*

```

```

# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====

```



```

# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.sql-injection-semantic-chaining
# Use the following properties to configure how the
# sql injection semantic analysis chaining rule works.
# =====
# sql-injection-semantic-chaining:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.sql-injection-semantic-dangerous-functions
# Use the following properties to configure how the sql
# injection semantic analysis dangerous functions rule works.
# =====
# sql-injection-semantic-dangerous-functions:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.sql-injection-semantic-suspicious-unions
# Use the following properties to configure how the sql
# injection semantic analysis suspicious unions rule works.
# =====
# sql-injection-semantic-suspicious-unions:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.sql-injection-semantic-tautologies
# Use the following properties to configure how the sql
# injection semantic analysis tautologies rule works.
# =====
# sql-injection-semantic-tautologies:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====

```

```

# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Tell the agent to detect when commands come directly
# from input. The agent blocks if blocking is enabled.
# detect_phased_commands: true

# =====
# protect.rules.cmd-injection-semantic-chained-commands
# Use the following properties to configure how the
# 'command injection - chained commands' rule works
# =====
# cmd-injection-semantic-chained-commands:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.cmd-injection-semantic-dangerous-paths
# Use the following properties to configure how the
# 'command injection - dangerous paths' rule works
# =====
# cmd-injection-semantic-dangerous-paths:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.cmd-injection-command-backdoors
# Use the following properties to configure how the
# 'command injection - command backdoors' rule works
# =====
# cmd-injection-command-backdoors:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.path-traversal-semantic-file-security-bypass
# Use the following properties to configure how the
# 'path traversal - file security bypass' rule works

```

```

# =====
# path-traversal-semantic-file-security-bypass:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.unsafe-file-upload
# Use the following properties to configure

```

```

# how the unsafe file upload rule works.
# =====
# unsafe-file-upload:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.untrusted-deserialization
# Use the following properties to configure
# how the untrusted deserialization rule works.
# =====
# untrusted-deserialization:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#

```

```

# name: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.

```

```
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Override the reported server path. New after
# .NET Framework v21.3.1 and .NET Core v1.8.0.
# path: NEEDS_TO_BE_SET
```

## Certificate exceptions

If you see certificate exception messages and feel that it's safe to ignore them, add this setting to the YAML configuration file:

```
api:
  certificate:
    ignore_cert_errors: true
```

[Learn more](#) about managing certificate issues.

## Use the .NET Framework agent with IIS Express

The .NET agent can analyze ASP.NET applications hosted on IIS Express but it takes a little bit of work to enable instrumentation on IIS Express. The Contrast tray displays a tab for IIS Express if IIS Express is installed on the server.

The [Contrast tray \(page 169\)](#) initially displays a **Set environment variables** button to enable instrumentation of IIS Express-hosted applications. Selecting this button sets environment variables for the current user so that any new IIS Express process will load the .NET agent's profiler, and be instrumented and analyzed.

Once you set environment variables, the tray displays a **Remove environment variables** button that you can use to disable Contrast analysis of IIS Express-hosted applications.

Any instrumented applications currently running on IIS Express are displayed in the IIS Express tab along with a count of the number of URLs (without the `querystring`) observed.



### NOTE

IIS Express process instances are commonly launched by other programs such as Visual Studio or a command window. You should restart these programs after setting these user environment variables. Any programs (such as Visual Studio) that were running before you set user environment variables will consequently launch IIS Express without the environment variables, and the IIS Express-hosted application won't be instrumented and analyzed.

Setting user environment variables also causes any .NET applications launched by the user to load the Contrast Profiler. The Contrast Profiler will safely detach from any non-IIS/non-IIS Express process. Windows treats detachment of a profiler DLL as an error message in the Windows Event Log; however, you can safely ignore these errors.

## Use the .NET Framework agent with applications on Azure

Use the Contrast .NET Framework agent to analyze ASP.NET applications running on Azure Virtual Machines (VMs), Azure Cloud Services, Mobile Services or Azure App Service (formerly Azure Web Sites).

To install the .NET Framework agent on Azure Virtual Machines:

1. Set up the Azure VM or the Azure Cloud Services as you would normally, and deploy the ASP.NET applications to be analyzed.
2. Log in to Contrast, and download the ZIP file for the .NET Framework agent.
3. Access the Remote Desktop [Azure VM](#) or [Azure Cloud Service](#) instance.
4. Copy the .NET Framework agent ZIP file to the Azure VM or to the Azure Cloud Services instance, and extract the archive.
5. Run the .NET Framework agent installer (*ContrastSetup.exe*).
6. Exercise the application so that Contrast can analyze it.



### TIP

To install with Azure App Service (formerly Azure Web Apps), install with [Nu-Get \(page 132\)](#) or [Azure Portal Extension \(page 128\)](#).

## Use Azure Service Fabric with the .NET Framework or .NET Core agent

If you are using a container image, follow the instructions to [install in containers \(page 129\)](#). Otherwise, to add the Contrast .NET Framework or .NET Core agent to an Azure Service Fabric service:



### TIP

For Standalone Executable services, the `ServiceManifest.xml` file is located in the top-level Azure Service Fabric project (for example, the `sfproj` file).

1. Install the appropriate NuGet package to the main project for the service.
  - **.NET Framework:** Install `Contrast.NET.Azure.AppService`. All files in the `contrastsecurity` folder must have `Copy to Output Directory` set to `Copy if newer`.
  - **.NET Core:** Install `Contrast.SensorsNetCore`. All files in the `contrast` folder have `Copy to Output Directory` set to `Copy if newer`.
2. Set `ServiceManifest/CodePackage/EntryPoint/ExeHost/WorkingDirectory` in `ServiceManifest.xml` to `CodePackage`.

```
<CodePackage Name="Code" Version="1.0.0">
  <EntryPoint>
    <ExeHost>
      <Program>DemoNetFxStatelessService.exe</Program>
      <WorkingFolder>CodePackage</WorkingFolder>
    </ExeHost>
  </EntryPoint>
</CodePackage>
```

3. Set environment variables in `ServiceManifest.xml` to configure the profiler.

```
• .NET Framework:

<CodePackage>
  <EnvironmentVariables>
```

```
<EnvironmentVariable Name="COR_ENABLE_PROFILING" Value="1"/>
<EnvironmentVariable Name="COR_PROFILER" Value="{EFEB8EE0-6D39-4347-A5F
<EnvironmentVariable Name="COR_PROFILER_PATH_32" Value=".\contrastsecur
<EnvironmentVariable Name="COR_PROFILER_PATH_64" Value=".\contrastsecur
<EnvironmentVariable Name="CONTRAST_CONFIG_PATH" Value="contrast_securi
```

• **.NET Core:**

```
<CodePackage>
  <EnvironmentVariables>
    <EnvironmentVariable Name="CORECLR_ENABLE_PROFILING" Value="1"/>
    <EnvironmentVariable Name="CORECLR_PROFILER" Value="{8B2CE134-0948-48CA
    <EnvironmentVariable Name="CORECLR_PROFILER_PATH_32" Value="contrast\ru
    <EnvironmentVariable Name="CORECLR_PROFILER_PATH_64" Value="contrast\ru
    <EnvironmentVariable Name="CONTRAST_CONFIG_PATH" Value="contrast_securi
```

4. Configure the agent with either:

- **A YAML file:** Add it to the main project for the service. Make sure Copy to Output Directory for the file is set to Copy if newer. Add an environment variable to ServiceManifest.xml specifying the location of the file, like this:

```
<CodePackage>
  <EnvironmentVariables>
    <EnvironmentVariable Name="CONTRAST_CONFIG_PATH" Value="contrast_se
```

- **Environment variables:** Add them to ServiceManifest.xml, like this:

```
<CodePackage>
  <EnvironmentVariables>
    <EnvironmentVariable Name="CONTRAST__API__URL" Value="https://teamservice
    <EnvironmentVariable Name="CONTRAST__API__API_KEY" Value="aBcD0123"/>
    <EnvironmentVariable Name="CONTRAST__API__SERVICE_KEY" Value="ABCD0123"
    <EnvironmentVariable Name="CONTRAST__API__USER_NAME" Value="agent_123@T
```

5. Deploy the Azure Service Fabric application as usual.

### Profiler chaining for the .NET Framework agent

You can use profiler chaining to run the .NET Framework agent alongside other .NET profiler agents, such as performance or APM tools.

The Contrast .NET Framework agent is tested and proven to be compatible with these profiling tools:

Profiling tool	Versions tested
AppDynamics	4.5.18.1
Dynatrace One Agent	1.253.245
New Relic	8.23.107
Riverbed SteelCentral Aternity APM	12.9.0



**NOTE**

The agent may also be compatible with other profiling tools if those tools follow the conventions of the CLR Profiling API and do not make assumptions about the profiling environment.

Profiler chaining is enabled by default. To disable profiler chaining, [configure the .NET Framework agent \(page 137\)](#) so that the agent `.dotnet.enable_chaining` setting is set to `false`. For example, you could use this YAML configuration:



```
agent :
  dotnet :
    enable_chaining: false
```

Once configured, you must restart the agent. On restart, the Contrast .NET Framework agent automatically detects the presence of other profiling tools registered with IIS and configures the environment to load both the Contrast .NET Framework agent profiler and the third-party profiler.



### IMPORTANT

If you are using profiler chaining with:

- **IIS:**  
Install the third-party agent, then the Contrast .NET Framework agent. (If you install the Contrast .NET Framework agent before the third-party agent, you need to restart the Contrast.NET Main Service under **Windows Services**.)
- **Outside of IIS:**  
The `agent.dotnet.enable_chaining` configuration flag will not work if you are using profiler chaining for applications:
  - hosted outside of IIS, or
  - that use the third-party agent's Nuget package (rather than the installed agent).
 If this applies to you, replace the CLR environment variables for the profiling tool with `CONTRAST_CCC_COR` versions. Any of these names should be transformed:

Change this	To this
<code>COR_PROFILER</code>	<code>CONTRAST_CCC_COR_PROFILER</code>
<code>COR_PROFILER_PATH</code>	<code>CONTRAST_CCC_COR_PROFILER_PATH</code>
<code>COR_PROFILER_PATH_32</code>	<code>CONTRAST_CCC_COR_PROFILER_PATH_32</code>
<code>COR_PROFILER_PATH_64</code>	<code>CONTRAST_CCC_COR_PROFILER_PATH_64</code>

Then follow the usual setup instructions for your environment and application.

- **AppInsights in Azure App Service:**  
As of version 20.9.3, the Contrast .NET Framework Site Extension now supports compatibility with Application Insights (using the CLR Instrumentation Engine (CIE)). There is no further action required to use AppInsights with the Contrast .NET Framework Site Extension. The .NET Framework agent's profiler will be loaded by the CIE if it is registered as the profiling tool in the Azure AppService instance (for example because AppInsights is enabled).

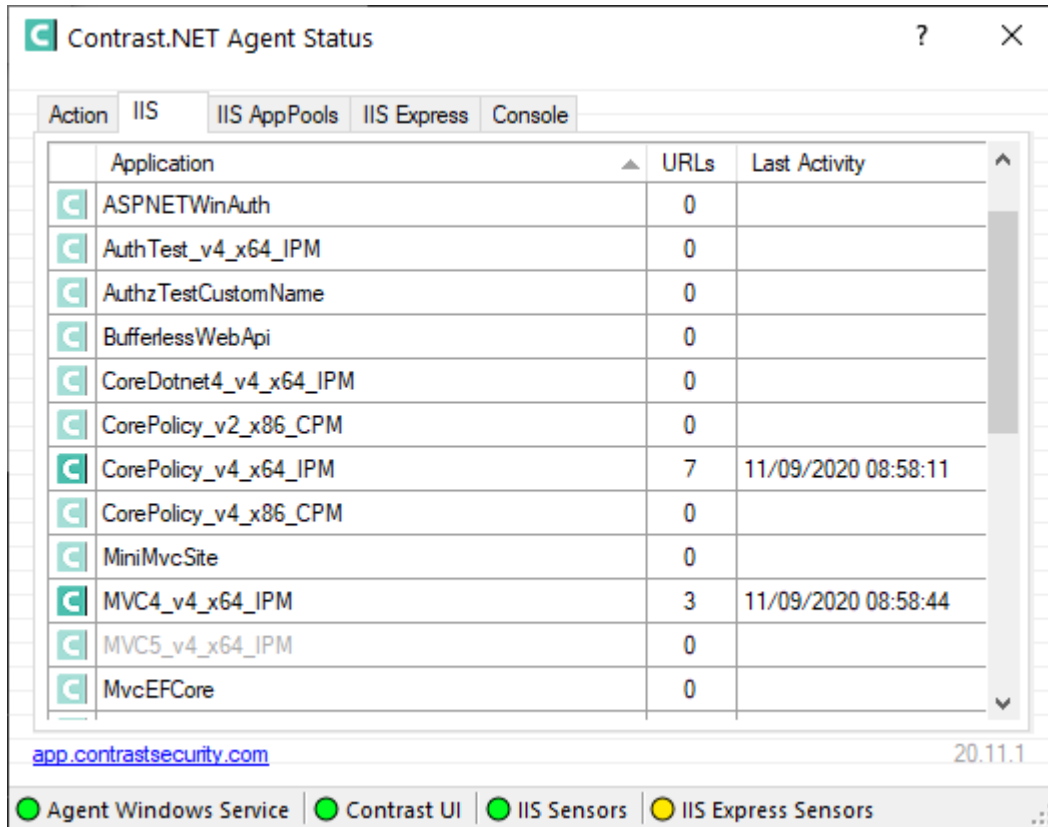
## .NET Framework Contrast tray

The .NET Framework Contrast tray is a Windows system tray application (*ContrastTray.exe*) that displays high-level information about the health of the agent.



### NOTE

You do not have to run the .NET Framework Contrast tray to analyze applications with Contrast. It exists only to provide status information about the agent. This helps verify that the agent works as expected, especially when you initially install the agent.



The Contrast tray provides these status indicators:

- **Agent Windows Service** displays a green light when you correctly install and run the Contrast service.
- **Contrast** displays a green light when the Agent Windows Service can communicate with the Contrast application. The most common communication failure is incorrect proxy settings.
- **IIS Sensors** displays a green light when you successfully instrument an application hosted on IIS. A yellow light indicates you did instrument an application with the agent, but IIS hasn't loaded the application yet.
- **IIS Express Sensors** displays a green light for applications hosted on IIS Express when the application loads and you correctly install and run the Contrast agent. A yellow light indicates you correctly installed the Contrast agent, but IIS Express did not load the application yet. A red light indicates you have not set environment variables for IIS Express.

Select tabs in Contrast tray for more information and help:

- **Action:** Select this to see high-level user instructions for the .NET Framework agent. The instructions change based on the state of the agent. For example, if the agent can't connect to Contrast, the Action tab provides details on the error and suggestions on how to resolve the problem.
- **IIS:** Select this to see a list of all web applications running on the IIS server. The name displayed matches the alias that IIS uses to identify the application unless you [specify a custom application name for Windows \(page 137\)](#). The URLs column displays the number of unique URLs (not including the query string) that the agent observed for the application. The Last Activity column displays the time of the last request analyzed by the agent for that application.
- **IIS AppPools:** Select this to display a list of all application pools on the IIS server. You can see configuration details for each application pool: architecture, pipeline mode, CLR version, and identity. You can also see whether Contrast will analyze applications in this application pool. You can [configure application pool filtering \(page 171\)](#) with IIS for the .NET Framework agent.
- **IIS Express:** Select this to display a list of all web applications running on IIS Express.

- **Console:** Select this tab to see status and error messages that will help you troubleshoot problems with the Contrast .NET agent.

## Use application pools in IIS

The .NET agent automatically instruments all ASP.NET applications deployed to IIS. If you install the .NET agent and ensure the background Windows service runs for the agent, Contrast will instrument all IIS-hosted applications.

You might want to exclude some applications from instrumentation because:

- You don't need to gather security, architecture and library information for these applications.
- The applications are on resource-constrained servers or need to avoid additional performance demands for Contrast instrumentation.

Web applications hosted in IIS run in application pools. If you need to disable the .NET agent for an application, you can [denylist the application pool \(page 171\)](#) where it runs.

There are three ways to find the application pool that runs a specific application:

- **Internet Information Services (IIS) Manager**

Start IIS Manager with the command: `%windir%\system32\inetsrv\InetMgr.exe`. Select the web application you want, and select **Basic Settings**. You will see a field that displays the application pool name.

- **AppCmd.exe**

If you Administrator privileges, run `cmd.exe`. Navigate to `C:\Windows\System32\inetsrv`. Enter `appcmd list apps` to see a list of applications and the application pools for each.

- **Contrast .NET logs**

Start the Contrast .NET agent. Browse to an application. In Windows, navigate to `C:\ProgramData\Contrast\dotnet\LOGS`. Open the most recent Profiler log (`XXXXX_Profiler_[AppDomain]XXXXX[XX].log`). The application pool name is on the line that starts with **ApplicationPool Name**.

## Denylist or allowlist an application pool

Denylists and allowlists are based on the application pool name. Application pool denylists and allowlists also accept `*` as a variable-length wildcard. (`AppPool*` will match `AppPool1`, `AppPool_arb`, etc.)

Allowlists take precedence over denylists. Application pools that satisfy both lists aren't analyzed.

To disable the agent for a specific application, populate `agent.dotnet.app_pool_denylist` with the appropriate application pool in `C:\ProgramData\Contrast\dotnet\contrast_security.yaml`:

```
# Comma-separated list of application pools ignored by Contrast
agent:
  dotnet:
    app_pool_denylist: ExampleAppPoolName
```

To only enable the agent for specific applications hosted by IIS, configure `agent.dotnet.app_pool_allowlist` to only analyze certain application pools. If an application pool is allowlisted, the agent analyzes the matching pools. There should be no performance impact for any other applications.

To enable the agent for only specific application pools, populate `agent.dotnet.app_pool_allowlist` with the appropriate application pool in `C:\ProgramData\Contrast\dotnet\contrast_security.yaml`:

```
# Comma-separated list of application pools exclusively profiled by Contrast
agent:
```

```
dotnet:
  app_pool_allowlist: ExampleAppPoolName
```



**TIP**

Read more about [yaml configuration \(page 33\)](#).

## .NET Framework and .NET Core Telemetry

.NET Framework and .NET Core agents use telemetry to collect usage data. Telemetry is collected when an instrumented application first loads the agent’s sensors and then periodically (every few hours) afterwards.

[Your privacy is important to us \(page 754\)](#). The telemetry feature doesn't collect application data. The data is anonymized before being sent securely to Contrast. Then the aggregated data is stored encrypted and under restricted access control. Any collected data will be deleted after one year.

The telemetry feature collects the following data:

Agent versions	Data	
.NET Framework later than 2020.8.3	Agent version	
.NET Core later than 1.5.15	Operating system and version	
	Whether the agent is running in a container	
	Whether the agent is running in Azure App Service	
	Hashed Media Access Control (MAC) address: a cryptographically (SHA256) anonymous and unique ID for a machine	
	Kernel version	
	Process running time	
	Whether Assess is enabled	
	Whether Protect is enabled	
	.NET Framework later than 2020.8.3	.NET Framework runtime version
	.NET Core later than 1.5.15	.NET Core runtime version
.NET Framework later than 20.9.1	Hosted or on-premises Contrast instance	
.NET Core later than 1.5.17		
.NET Framework later than 20.9.3	CLR Instrumentation Engine (CIE) usage	
.NET Core later than 1.5.19	Application framework	
	Chained profiler vendor	
.NET Framework later than 20.10.1	Process hosting mode	
.NET Core later than 1.5.20	CIE Raw Profiler Hook usage	
.NET Framework later than 20.10.2	Names of configuration settings with non-default values	
.NET Core later than 1.5.21	Names of disabled Assess rules	
.NET Framework later than 20.12.2	Time elapsed for agent’s profiler component to initialize	
.NET Core later than 1.7.2	Time elapsed for agent’s first request to the Contrast web interface	
	Time elapsed for agent’s profiler component to initialize	
	Time elapsed between agent initialization and end of the first request	

Agent versions	Data
.NET Framework later than 21.1.1	<p>Metrics on IIS-hosted applications, including:</p> <ul style="list-style-type: none"> <li>Total application count</li> <li>Application count that will be analyzed (pass application allow list/deny list configuration)</li> <li>Count of apps hosted on CLR4 application pools</li> <li>Count of apps hosted on CLR2 application pools</li> </ul> <p>Metrics on IIS applications pools</p> <ul style="list-style-type: none"> <li>Total count</li> <li>Count with agent attached</li> <li>Count of CLR4</li> <li>Count of CLR2</li> </ul> <p>Minimum number of applications in a single app pool</p> <p>Maximum number of applications in a single app pool</p> <p>Median number of applications across all app pools</p>
.NET Framework later than 21.1.2	Rule mode (i.e. Monitor vs. Block) for each Protect rule
.NET Core later than 1.7.5	
.NET Framework later than 21.4.2	Exceptions thrown and caught within agent sensor code, including log message, exception type, exception message, and stack trace frames for <code>System</code> and <code>Contrast</code> methods.
.NET Core later than 1.8.4	
.NET Framework later than 21.7.1	<ul style="list-style-type: none"> <li>Process Architecture (x86/x64)</li> </ul>
.NET Core later than 1.9.7	<p>OS Architecture (x86/x64)</p> <p>In Azure App Service, the values of the following environment variables:</p> <ul style="list-style-type: none"> <li>WEBSITE_PHYSICAL_MEMORY_MB</li> <li>WEBSITE_PLATFORM_VERSION</li> <li>WEBSITE_SKU</li> </ul>
.NET Framework later than 21.9.2	Description of location where YAML config file was loaded from (i.e., path specified by environment variable, default location, application directory).
.NET Core later than 2.0.1	

To opt-out of the telemetry feature, set the `CONTRAST_AGENT_TELEMETRY_OPTOUT` environment variable to `1` or `true`.

Telemetry data is securely sent to `telemetry.dotnet.contrastsecurity.com`. You can also opt out of telemetry by blocking communication at the network level.

## .NET Core agent

The Contrast .NET Core agent analyzes the behavior of .NET Core web applications as users interact with them.

The agent automatically instruments the ASP.NET Core application when the host process is set up with profiling environment variables or an application launch profile.

The Contrast .NET Core agent consists of two components that run within the same process as your application:

- The **.NET Profiler** instruments applications by adding calls to Contrast sensor code in security relevant APIs used by the application and its dependencies (also known as IL weaving).
- Sensors** gather security, architecture and library information.

Once you [install the .NET Core agent \(page 175\)](#), its sensors will gather information about the application's security, architecture and libraries as users exercise the applications. You can view the results of the agent's analysis in Contrast. The agent uses these [supported technologies \(page 174\)](#) and these [system requirements \(page 175\)](#).

## .NET Core supported technologies

We support the following technologies for this agent.

Technology	Supported versions	Notes
Application frameworks	<ul style="list-style-type: none"> <li>ASP.NET Core (3.1.X, 5.0.X, 6.0.X, 7.0.X)</li> <li>Model-View-Controller (MVC)</li> <li>Razor Pages</li> </ul>	<p><b>Limited support</b></p> <p>ASP .NET Core 3.1.X and 5.0.X</p> <p><b>Not supported:</b></p> <ul style="list-style-type: none"> <li>.NET Core or ASP.NET Core version 2.1 or below</li> <li>ASP.NET Core applications running under the .NET Framework (Windows) or Mono (Linux/Windows)</li> </ul>
Runtime	<ul style="list-style-type: none"> <li>.NET Core Runtimes: 3.1.X, 5.0.X, 6.0.X, 7.0.X</li> <li>.NET Core target framework monikers:                             <ul style="list-style-type: none"> <li>netcoreapp3.1</li> <li>net5.0</li> <li>net6.0</li> <li>net7.0</li> </ul> </li> </ul>	<p><b>Limited support:</b></p> <p>.NET Core Runtimes 3.1.x and 5.0.X</p> <p><b>Not supported:</b></p> <ul style="list-style-type: none"> <li>Running with an ASP.NET Core application that's a higher version than the runtime (for example, an application with the .NET Core 3.1 runtime that references ASP.NET Core 5.0)</li> <li>Running with a .NET Core application for which the referenced ASP.NET Core version and the target runtime selected during compilation time don't match</li> </ul>
<b>.NET Core for Windows</b>		
Windows operating systems	<ul style="list-style-type: none"> <li>Windows Server (LTSC) (x86, x64): 2012 R2, 2016, 2019, 2022</li> <li>Windows Server (SAC) (x64): 1809, 1903</li> <li>Windows workstation (x86, x64): 7, 8/8.1, 10</li> </ul>	<p>On 64-bit systems, you can use the agent to analyze both 32-bit and 64-bit web applications.</p> <p><b>Not supported:</b></p> <ul style="list-style-type: none"> <li>Windows on ARM</li> </ul>
Server container	Kestrel, IISHttpServer	<p><b>Not supported:</b></p> <p>Http.sys (formerly called WebListener)</p>
Hosting container	Self-hosted, IIS, IIS Express	
<b>.NET Core for Linux</b>		
Linux operating systems	<ul style="list-style-type: none"> <li>Ubuntu: 16.04 and later</li> <li>Debian: 9 and later</li> <li>openSUSE: 15 and later</li> <li>Alpine: 3.12 and later</li> <li>CentOS: 7 and later</li> <li>Red Hat Enterprise Linux: 7, 8</li> </ul>	<p>All systems require x64 architectures.</p> <p>Not supported: Red Hat Enterprise Linux 6</p>
Server container	Kestrel	
Hosting container	Self-hosted	



### IMPORTANT

- .NET Core 2.2 is not supported after the .NET core agent version 1.5.20. If you are using .NET Core 2.2, you'll need to use .NET Core agent version 1.5.20 or lower until you can upgrade your application's .NET Core runtime.
- As of .NET core agent version 1.9.9, we no longer support .NET Core 2.1. If you are using .NET Core 2.1, you'll need to use .NET Core agent version 1.9.9 or lower until you can upgrade your application's .NET Core runtime.
- Microsoft support for .NET 5.0 ended on May 10th, 2022 and support for .NET Core 3.1 ended on December 13th, 2022. Contrast support for .NET 5.0 and .NET Core 3.1 entered limited support with .NET Core agent version 3.0.0. Under limited support, Contrast will only solve problems that can be reproduced under supported language versions. Contrast strongly recommends that you upgrade your applications to a supported version of .NET.



### NOTE

The .NET Core agent does not support applications that do not reference `System.Runtime` and ASPNET Core. The agent also does not support **trimmed self-contained deployments and executables**, because the compiler can potentially trim assemblies that the agent depends on.

## .NET Core system requirements

Before installing the .NET Core agent confirm you can meet the following requirements:

- You have administrative access to a server, and the [server is supported by Contrast \(page 174\)](#).
- There is a deployed application to be analyzed, and the [web application technology is supported \(page 174\)](#) by Contrast.
- The web server has network connectivity with Contrast.
- The server meets the minimum requirements (stated below).

Requirement	Recommended	Minimum	Notes
.NET Core versions	3.1.X, 5.0.X, 6.0.X, 7.0.X	2.1, 3.0, 3.1	
CPU	at least 4	2	
Memory	at least 8 GB	4 GB	Agents running in Assess roughly double the memory requirements of analyzed applications. Applications should use less than half of the available memory when an agent isn't installed.
Processor architecture	<ul style="list-style-type: none"> <li>• 32-bit processors</li> <li>• 64-bit processors</li> </ul>		The .NET Core agent does <b>not</b> support systems with ARM-based processors (for example, Apple M1 processors). This restriction includes the use of the agent within containers on these systems.

## Install the .NET Core agent

To install the .NET Core agent:

1. Place the agent's components on the server's file system.
2. Set environment variables so that the .NET runtime loads the agent's profiler component.
3. Use the application as you normally would and verify that Contrast sees your application.

Depending on your situation, use one of these installation methods:

- [Manual installation \(page 176\)](#) (if you are using self-hosted web application running on Windows, Linux or Docker)
- [.NET Core agent for IIS installer \(page 182\)](#) (if you are using IIS)
- [Azure App Service \(page 180\)](#)
- [NuGet \(page 179\)](#)

To auto-upgrade your agent, enable this option with the [Agent Upgrade Service \(page 134\)](#).

## Install the .NET Core agent manually

Use this method to install the .NET Core agent if you are using a web application hosted on IIS, or running a self-hosted application on Windows, Linux or Docker.

Before you begin, check the [system requirements \(page 175\)](#) and [supported technologies \(page 174\)](#) to be sure installation will work and ensure best performance.



### NOTE

Installing within containers can be complex, and these steps might not work for your situation. Read more about [installing with Docker](#).

1. Select **Add new** at the top right of the Contrast web interface. Choose **.NET Core** and select the link to download the .NET Core agent.
2. On the web server, extract the downloaded ZIP archive (for example, *Contrast.NET.Core\_1.0.1.zip*) to a directory that your applications have sufficient permissions to access.
3. Set the following environment variables on your application's process. Use the appropriate CORECLR\_PROFILER\_PATH settings for your operating system. Replace <UnzippedDirectoryRoot> with your archive directory.

- **Windows**

Environment variable	Value
CORECLR_PROFILER_PATH_64	<UnzippedDirectoryRoot>\runtimes\win-x64\native\ContrastProfiler.dll
CORECLR_PROFILER_PATH_32	<UnzippedDirectoryRoot>\runtimes\win-x86\native\ContrastProfiler.dll
CORECLR_PROFILER	{8B2CE134-0948-48CA-A4B2-80DDAD9F5791}
CORECLR_ENABLE_PROFILING	1
CONTRAST_CONFIG_PATH	<path_to_contrast_security.yaml>



### IMPORTANT

If you are running the .NET Core agent and the .NET Framework agent on the same server, the CONTRAST\_CONFIG\_PATH option applies to the [load path \(page 31\)](#) for both agents. To apply distinct paths for each agent, use these options to set the data directory:

- CONTRAST\_CORECLR\_DATA\_DIRECTORY
- CONTRAST\_DATA\_DIRECTORY

- **Linux**



Environment variable	Value
CORECLR_PROFILER_PATH_64	<UnzippedDirectoryRoot>/runtimes/linux-x64/native/ContrastProfiler.so
CORECLR_PROFILER	{8B2CE134-0948-48CA-A4B2-80DDAD9F5791}
CORECLR_ENABLE_PROFILING	1
CONTRAST_CONFIG_PATH	<path_to_contrast_security.yaml>

4. Ensure the following paths are accessible by the runtime user of the application.

Path	Usage	Customizable	Permissions
The path to <a href="#">.NET Core YAML (page 191)</a>	Configures the agent	Yes; set the environment variable CONTRAST_CONFIG_PATH	Read
<UnzippedDirectoryRoot>	The root "installation" directory; stores the agent binaries	No	Read
<ul style="list-style-type: none"> <li><b>Windows:</b> %ProgramData%\Contrast\dotnet-core\logs</li> <li><b>Linux:</b> /var/tmp/contrast/dotnet-core/logs</li> </ul>	Directory for Contrast agent logs. If missing, the directory will be created	Yes; set the environment variable CONTRAST_CORECLR_LOGS_DIRECTORY	Read/Write(or inherited from a parent directory)



**NOTE**

When running in IIS, make sure that the application pool can access these paths.

For example, given an application pool called `Default Web Site` using the default identity `ApplicationPoolIdentity`, ensure that the user `IIS AppPool\Default Web Site` has effective permissions to read the unzipped directory root.

5. [Configure the agent \(page 189\)](#) with authentication credentials and proxy settings to connect to Contrast.
6. Once the application has loaded, use the application and then verify that the server and application are active in Contrast, and that any expected vulnerabilities appear.



**TIP**

To [update the agent \(page 187\)](#), replace the agent files in the agent directory and restart your application. As the agent is running alongside your application, it can't update itself.

The agent automatically starts with your application as long as the environment is properly set up.

To stop the agent, stop the application and remove agent from its environment. Alternatively, you may change the `CORECLR_ENABLE_PROFILING` setting to 0.

Follow any of these examples to set environment variables using:

- [IIS \(page 178\)](#)
- [Bash \(Linux\) \(page 178\)](#)
- [Powershell or Powershell Core \(Windows\) \(page 178\)](#)
- [Launch profile \(dotnet.exe\) \(page 178\)](#)

## IIS and IIS Express

Set the environment variables with either:

- [The environmentVariables section in the application web.config](#)

```
<?xml version="1.0" encoding="utf-8"?>
<configuration>
  <system.webServer>
    <!-- ... -->
    <aspNetCore processPath="dotnet" arguments=".\\ExampleNetCoreApp.dll" stdoutLog
      <environmentVariables>
        <environmentVariable name="CORECLR_PROFILER_PATH_64" value="C:\\contras
        <environmentVariable name="CORECLR_PROFILER_PATH_32" value="C:\\contras
        <environmentVariable name="CORECLR_ENABLE_PROFILING" value="1" />
        <environmentVariable name="CORECLR_PROFILER" value="{8B2CE134-0948-48C
        <environmentVariable name="CONTRAST_CONFIG_PATH" value="C:\\contrast\\do
      </environmentVariables>
    </aspNetCore>
  </system.webServer>
</configuration>
```

- [The application pool setting on the server](#)

## Bash (Linux)

```
export CORECLR_PROFILER_PATH_64=/usr/local/contrast/runtimes/linux-x64/native/ContrastPr
export CORECLR_ENABLE_PROFILING=1
export CORECLR_PROFILER={8B2CE134-0948-48CA-A4B2-80DDAD9F5791}
export CONTRAST_CONFIG_PATH=/etc/contrast/contrast_security.yaml
```

Then run the application:

```
dotnet ./MyAppWithContrastAgent.dll
```

## Powershell or Powershell Core (Windows)

```
$env:CORECLR_PROFILER_PATH_64 = 'C:\\contrast\\dotnetcore\\runtimes\\win-x64\\native\\Contrast
$env:CORECLR_PROFILER_PATH_32 = 'C:\\contrast\\dotnetcore\\runtimes\\win-x86\\native\\Contrast
$env:CORECLR_ENABLE_PROFILING = '1'
$env:CORECLR_PROFILER = '{8B2CE134-0948-48CA-A4B2-80DDAD9F5791}'
$env:CONTRAST_CONFIG_PATH = 'C:\\contrast\\dotnet-core\\contrast_security.yaml'
```

Then run the application:

```
dotnet .\\MyAppWithContrastAgent.dll
```

## Launch profile (dotnet.exe)

```
{
  "MyAppWithContrastAgent": {
    "environmentVariables": {
      "CORECLR_PROFILER_PATH_64": "C:\\\\contrast\\\\dotnetcore\\\\runtimes\\\\win-x64\\\\na
      "CORECLR_PROFILER_PATH_32": "C:\\\\contrast\\\\dotnetcore\\\\runtimes\\\\win-x86\\\\na
      "CORECLR_ENABLE_PROFILING": "1",
      "CORECLR_PROFILER": "{8B2CE134-0948-48CA-A4B2-80DDAD9F5791}",
      "CONTRAST_CONFIG_PATH": "c:\\\\contrast\\\\config\\\\MyApp\\\\contrast_security.yaml"
    }
  }
}
```

Then run the application:

```
dotnet run --launch-profile MyAppWithContrastAgent
```

## Install the .NET Core agent manually with NuGet

In some instances, you may prefer to manually install the .NET Core agent using NuGet. For example, this can be useful if you are unable to access the [Azure App Service site extension \(page 180\)](#) or if you prefer to include the .NET Core agent as a dependency.

To manually install the .NET Core agent using NuGet:

1. Add the Contrast NuGet package to your application.  
Using dotnet command line:

```
dotnet add package Contrast.SensorsNetCore
```

Using Visual Studio:

- Under the application project in the Solution Explorer, right-click on **References** and select **Manage NuGet Packages**.
  - Search for the **Contrast.SensorsNetCore** package, select it and add it to your project.
  - Build your application. Confirm that a *contrast* folder appears in your project. When the application is published, this folder also appears in the build output directory.
2. Set environment variables so that the .NET runtime loads the agent's profiler component.:

**Windows:**

```
CORECLR_ENABLE_PROFILING: 1
CORECLR_PROFILER: {8B2CE134-0948-48CA-A4B2-80DDAD9F5791}
CORECLR_PROFILER_PATH_32: <application directory>\contrast\runtimes\win-x86\native\Co
CORECLR_PROFILER_PATH_64: <application directory>\contrast\runtimes\win-x64\native\Co
```

**Linux:**

```
CORECLR_ENABLE_PROFILING: 1
CORECLR_PROFILER: {8B2CE134-0948-48CA-A4B2-80DDAD9F5791}
CORECLR_PROFILER_PATH: <application directory>/contrast/runtimes/linux-x64/native/Co
```

3. Set the basic configuration either with the [YAML configuration file \(page 191\)](#) or with [environment variables \(page 190\)](#). For example:

```
CONTRAST_CONFIG_PATH: [Path to yaml config file]
```

At minimum, the following environment variables are required:

```
CONTRAST__API__URL: [IF USING ANOTHER SERVER THAN THE DEFAULT: https://app.contrastse
CONTRAST__API__USER_NAME: [REPLACE WITH YOUR AGENT USERNAME]
CONTRAST__API__SERVICE_KEY: [REPLACE WITH YOUR AGENT SERVICE KEY]
CONTRAST__API__API_KEY: [REPLACE WITH YOUR AGENT API KEY]
```

4. Deploy your application with the environment variables from the previous step.
5. Once the application has loaded, use the application and then verify that the server and application are active in Contrast, and that any expected vulnerabilities appear.



### IMPORTANT

When redeploying a web application that has Contrast agent running, you may run into an error that says "Files in use" on *ContrastProfiler.dll*. This happens because the agent DLL files are locked by .NET, and can't be overwritten while the application is still running.

## Install the .NET Core agent with Azure App Service

Before you begin, check the [system requirements \(page 175\)](#) and [supported technologies \(page 174\)](#) to be sure installation will work and ensure best performance.

To complete an express installation of the .NET Core agent using Azure Portal Extensions:

1. Create an [Azure account](#), if you don't have one already.
2. Create a [.NET Core web application](#) and deploy it to Azure App Service.
3. Publish your application to Azure, and confirm that it works as expected without Contrast.
4. Ensure that your application is deployed using a Windows plan. (Linux plans do not support Site Extensions.)



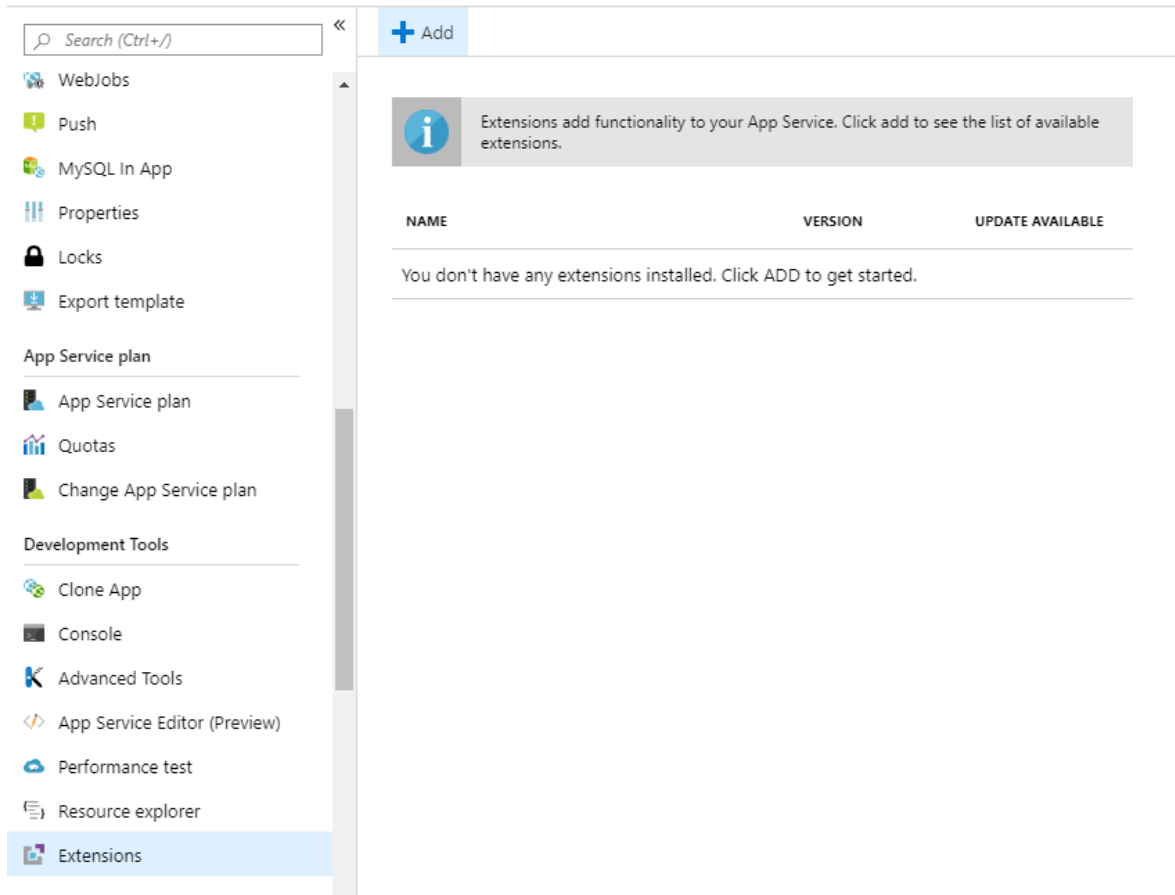
### NOTE

If you do not have access to the site extension, you can [install the .NET Core agent manually with NuGet \(page 179\)](#).

5. In the Azure Portal, select your hosted application.
6. Select **Configuration** under **Settings** to configure settings that allow the agent to connect to Contrast.
7. Select **New application setting** and add the following values for your application:

Key	Value
CONTRAST__API__USER_NAME	Replace with your <a href="#">agent username (page 32)</a> .
CONTRAST__API__SERVICE_KEY	Replace with your <a href="#">agent service key (page 32)</a> .
CONTRAST__API__API_KEY	Replace with your agent <a href="#">API key (page 32)</a> .
CONTRAST__API__URL	Defaults to <a href="https://app.contrastsecurity.com">https://app.contrastsecurity.com</a> . Replace with another URL, if you're using a Contrast application that's hosted elsewhere.

8. Select **Extensions**.



9. Select **Add**.
10. Select the **Contrast .NET Core Site Extension for Azure App Service**. This is the extension for .NET Core applications.
11. Select **OK**, and agree to the terms and conditions.
12. Wait a few seconds and confirm the site extension installed correctly.
13. Go back to the application overview and **Restart** the application.
14. Navigate to the application, and confirm the application is reporting to Contrast.



**TIP**

You can also install the agent from the Site Extensions area of your application management SCM (Kudu) site.



**IMPORTANT**

If a new version of the .NET Core agent is available, it's indicated in the Azure Portal or Kudu dashboard. You must stop the site before starting the update; otherwise, the update may fail.

**NOTE**

The site extension sets a number of environment variables, including:

```
CORECLR_ENABLE_PROFILING=1
CORECLR_PROFILER={8B2CE134-0948-48CA-A4B2-80DDAD9F5791}
CORECLR_PROFILER_PATH_32=D:\Home\siteextensions\Contrast.NetCore.Azure.SiteExt
CORECLR_PROFILER_PATH_64=D:\Home\siteextensions\Contrast.NetCore.Azure.SiteExt
CONTRAST_INSTALL_DIRECTORY=D:\Home\siteextensions\Contrast.NetCore.Azure.SiteE
MicrosoftInstrumentationEngine_ConfigPath32_ContrastCoreX86Config=D:\Home\site
MicrosoftInstrumentationEngine_ConfigPath64_ContrastCoreX64Config=D:\Home\site
```

If the CLR instrumentation engine (CIE) is configured for the application (for example, because Application Insights is enabled), Azure should automatically overwrite the `CORECLR_PROFILER*` variables to point to the profiler of the CIE.

The CIE will then use the `MicrosoftInstrumentationEngine_*` variables to load the Contrast agent.

If the CIE is not configured for the application, the standard `CORECLR_PROFILER*` variables will be used to load the Contrast agent.

**Install the .NET Core agent with the .NET Core agent for IIS installer**

The .NET Core agent for IIS installer is a normal Windows application installer built using standard MSI technology. It validates that the target server and satisfies several requirements (for example, that the server's operating system is a supported operating system). If all requirements are met, the installer:

- Registers the .NET Core agent for IIS as a standard Windows program.
- Places the agent's files on a disk in the specified install location (for example, `C:\Program Files\Contrast\dotnet-core`). This includes several dynamic link libraries (DLLs) and executables.
- Creates the specified data directory for the agent that's primarily used to store agent log files and configuration (for example, `C:\ProgramData\Contrast\dotnet-core`).
- Adds the .NET Core agent's native modules to IIS.

**Before you begin**

Before you begin, check the [system requirements \(page 175\)](#) and [supported technologies \(page 174\)](#) to be sure installation will work and ensure best performance.

**Install the agent using Contrast**

1. In the Contrast web application, select **Add new**.
2. Choose .NET Core in the **Choose an agent** dropdown menu.
3. Select the link **↓ .NET Core IIS agent installer** under **Install with IIS**. A ZIP archive downloads.
4. Extract the downloaded ZIP archive on the web server, and run `contrast-dotnet-core-agent-for-iis-installer.exe`. This installs the .NET Core agent for IIS.

**TIP**

You can use the command line to access additional options supported by the .NET Core agent for IIS installer.

5. [Configure the .NET Core agent with a YAML configuration file \(page 191\)](#) to set the [authentication keys \(page 32\)](#) and any application-specific configuration.

6. Copy the yaml file to `C:\ProgramData\Contrast\dotnet-core` if not already there.
7. Restart IIS to pick up the changes.
8. Use the application as you normally would and verify that Contrast sees your application.

### Install the agent using command line

Use the command line to access additional options supported by the .NET Core agent for IIS installer.

The .NET Core for IIS agent can be installed using the Windows interface, and uninstalled or repaired using standard Windows features (including the Programs and Features Control Panel and Powershell). However, you may want to use the Contrast Windows installer to perform these actions instead for certain scenarios such as automated scripting.

Use these commands for attended mode:

- **Install:**`contrast-dotnet-core-agent-for-iis-installer.exe`
- **Uninstall:**`contrast-dotnet-core-agent-for-iis-installer.exe -uninstall`
- **Repair:**`contrast-dotnet-core-agent-for-iis-installer.exe -repair`

Use these commands for unattended or silent mode:

- **Install:**`contrast-dotnet-core-agent-for-iis-installer.exe -s SUPPRESS_RESTARTING_IIS=1`
- **Uninstall:**`contrast-dotnet-core-agent-for-iis-installer.exe -uninstall -s SUPPRESS_RESTARTING_IIS=1`
- **Repair:**`contrast-dotnet-core-agent-for-iis-installer.exe -repair -s SUPPRESS_RESTARTING_IIS=1`

The .NET Core agent for IIS installer supports several additional options that are accessible when you use the command line for installation.

Option	Description	Example
INSTALLFOLDER	Specify the location where the installer will place agent files.	<code>INSTALLFOLDER=C:\Program Files\Contrast\dotnet-core</code>
DATAFOLDER	Specify the default location for agent log and configuration files.	<code>DATAFOLDER=C:\ProgramData\Contrast\dotnet-core</code>
SUPPRESS_RESTARTING_IIS	When set the installer will not restart IIS. Note that the agent will not be loaded by applications until IIS is restarted.	<code>SUPPRESS_RESTARTING_IIS=0</code>
UPGRADE_SERVICE_INSTALLFOLDER	Specify the location where the installer will place upgrade service files.	<code>UPGRADE_SERVICE_INSTALLFOLDER="C:\Program Files (x86)\Contrast\upgrade-service"</code>



### IMPORTANT

The .NET Core agent for IIS installer automatically restarts IIS when you install the agent for the first time. You may want to change the configuration of any web server monitoring tools that raise alarms when IIS restarts.

The .NET Profiling API requires that profiled processes be started with a profiler. Therefore, the .NET Core agent must restart IIS (and any IIS worker processes) to attach the Contrast profiler. This process is similar to how other profiling products (for example, memory or performance profilers) behave.

## Install the .NET Core agent in a container

### Before you begin

This topic provides general guidance for installing the Contrast .NET Core agent in a containerized application, with Docker as an example.

You should have a basic understanding of how containers and related software work. You may need to adjust the instructions to meet your specific circumstances.

### Step 1: Install the agent

Contrast can be added either before or after the application is added to the container image. The recommended approach is with the use of named [multi-stage builds](#). For example:

```
FROM mcr.microsoft.com/dotnet/aspnet:6.0

# Hidden for brevity...

# Copy the required agent files from the official Contrast agent image.
COPY --from=contrast/agent-dotnet-core:latest /contrast /contrast
```

Where in this example, the latest .NET Core agent is used (check DockerHub for available tags).

### Step 2: Configure the agent

Contrast agents accept configuration from multiple sources, with order of precedence documented in the [order of precedence \(page 31\)](#) section.

A mixed approach is recommended:

- Use a YAML file so that common configuration may be shared between many applications.
- Use environment variables for application-specific configuration values, to override values provided by a YAML file, or for sensitive keys that are injected during runtime.

#### YAML file configuration:

When using a [YAML file to configure the agent \(page 33\)](#), the environment variable `CONTRAST_CONFIG_PATH` can also be used to indicate where the YAML file is located inside the container.

For example, given a YAML file called `contrast_security.yaml` that exists in the Docker build context:

The environment variable `CONTRAST_CONFIG_PATH` can also be used to indicate where the YAML file is located.

```
agent:
  logger:
    path: /var/tmp
    level: WARN
```

The YAML file can be added to the container image as follows:

```
FROM mcr.microsoft.com/dotnet/aspnet:6.0

# Hidden for brevity...

# Add the Contrast agent to the image.
COPY --from=contrast/agent-dotnet-core:latest /contrast /contrast

# Copy the contrast_security.yaml file from Docker build context.
```




```
COPY ./contrast_security.yaml /contrast_security.yaml
```

```
# Finally configure the agent to use the YAML file previously copied.
ENV CONTRAST_CONFIG_PATH=/contrast_security.yaml
```

**Environment variable configuration:**

To set an application-specific configuration, use [environment variables \(page 49\)](#). Below are some common configuration options.

Title	Usage	Environment variable
<b>Application name</b>	Specify the application name reported to Contrast.	CONTRAST__APPLICATION__NAME
<b>Application group</b>	Specify the application access group for this application during onboarding.	CONTRAST__APPLICATION__GROUP
 <p><b>NOTE</b> Application access groups have to be created first in Contrast.</p>		
<b>Application tags</b>	Add labels to an application.	CONTRAST__APPLICATION__TAGS
<b>Server name</b>	Specify the server name reported to Contrast.	CONTRAST__SERVER__NAME
<b>Server environment</b>	Specify in which environment the application is running. Valid values for this configuration are: Development, QA and Production	CONTRAST__SERVER__ENVIRONMENT
<b>Server tag</b>	Add labels to the server.	CONTRAST__SERVER__TAG

**Step 3: Add profiler variables and authentication credentials**

To enable instrumentation of your application, the .NET agent requires [additional environment variables \(page 176\)](#). The CORECLR\_ variables load the agent and the CONTRAST\_ variables are for agent authentication to the server.

Using the Dockerfile example from before:

```
FROM mcr.microsoft.com/dotnet/aspnet:6.0

# Hidden for brevity...

COPY --from=contrast/agent-dotnet-core:latest /contrast /contrast

# Required variables to load the agent.
ENV CORECLR_PROFILER_PATH_64=/contrast/runtimes/linux-x64/native/ContrastProfiler.so \
    CORECLR_ENABLE_PROFILING=1 \
    CORECLR_PROFILER={8B2CE134-0948-48CA-A4B2-80DDAD9F5791}
```

Additionally, the [following environment variables \(page 32\)](#) are required for agent authentication to the server.

```
CONTRAST__API__URL=https://app.contrastsecurity.com/Contrast
CONTRAST__API__API_KEY={Your API KEY here}
CONTRAST__API__SERVICE_KEY={Your Service key here}
CONTRAST__API__USER_NAME={Your agent username here}
```

You can get API values ([agent keys \(page 32\)](#)) from Contrast or by downloading a YAML file for the .NET Core agent.



### IMPORTANT

The `API_KEY`, `SERVICE_KEY` and `USER_NAME` keys should be considered sensitive data and handled accordingly. Contrast recommends injecting these during runtime from your secrets store (e.g. Kubernetes Secrets).

## Step 4: Instrument your application

You can now run the application image with Contrast enabled. Contrast will instrument your application during startup and begin reporting security vulnerabilities to Contrast. You can verify that Contrast is running by checking the container.

## Agent upgrade service

The Agent Upgrade Service is a background Windows service that helps you keep the .NET Framework and .NET Core for IIS agents automatically updated to the most recent version on Windows. The Agent Upgrade Service is included with the .NET Framework Agent Installer and .NET Core Agent for IIS Installer; the agent installers install two products:

- the corresponding agent, and
- the Agent Upgrade Service.

By default, the Agent Upgrade Service checks for new agent versions released to NuGet when the service first starts up (when the Windows Server is restarted.) If a new agent version is found, the Upgrade Service will download the new agent version, verify the installer's signature, and then finally execute the installer.

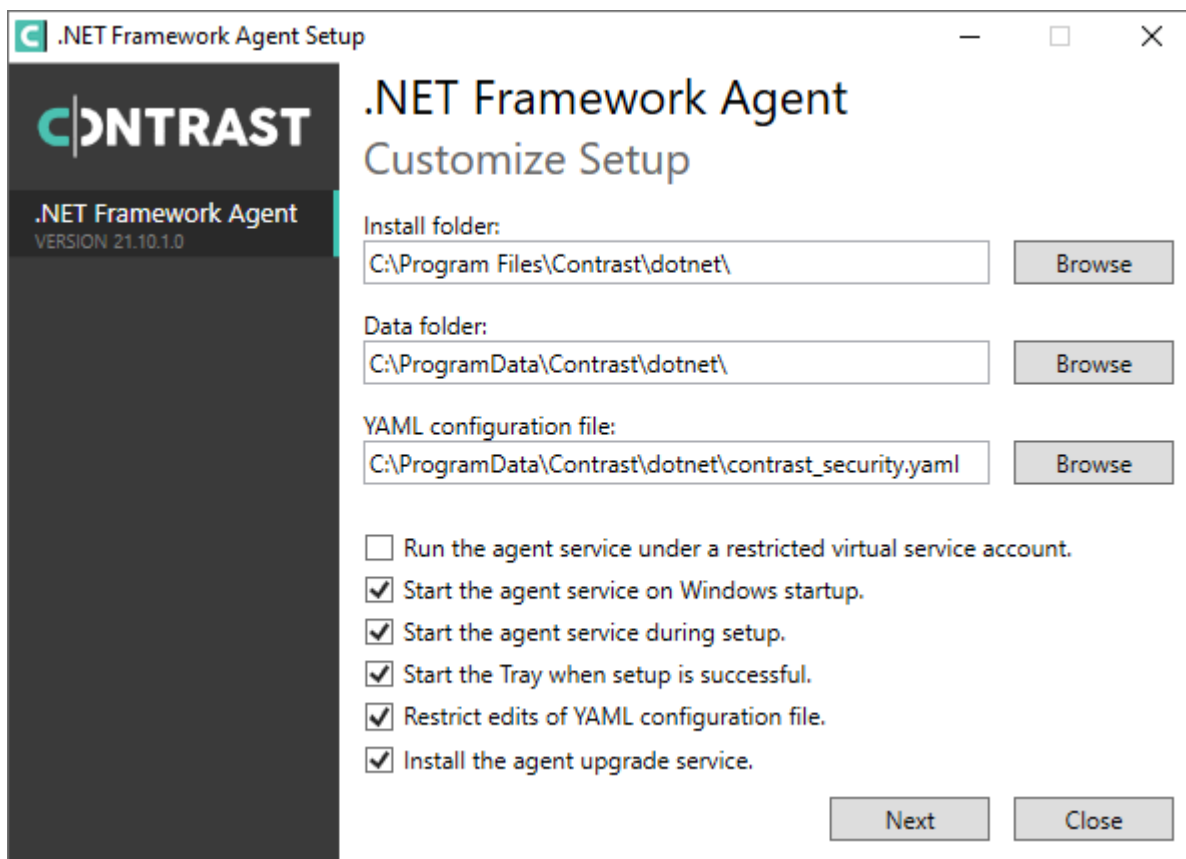


### NOTE

When a new agent version installed, IIS will be restarted.

The Agent Upgrade Service is an optional component and is not required for agent Assess and Protect features.

- De-select the **Install the agent upgrade service** checkbox when installing the agent if you do not want to use the Agent Upgrade Service.
- If installing the agent via command line, add `INSTALL_UPGRADE_SERVICE=0` argument to not install the Agent Upgrade Service.



The behavior of the Agent Upgrade Service can be modified via an agent-specific configuration file in the Contrast data directory. The default location is `C:\ProgramData\Contrast\upgrade-service`.

The configuration for upgrading the .NET Core agent is located in the .NET Core YAML file.

```
enable: true # Set to `true` for the agent to automatically upgrade to newer versions.
checks: Startup # Set the frequency with which the agent checks for updates. Valid value
timeout_ms: 60000 # Set the time allocated to execute the downloaded agent installer before
nuget_repository_url: https://api.nuget.org/v3/index.json # Set the URL of the NuGet repository
nuget_package_name: Contrast.CoreIIS.Installer # Set the name of the .NET Core Agent for IIS
installer_upgrade_code: 82468c04-dfc0-4a4c-9eb9-c4b314c67fdc # Used internally to retrieve
```



**NOTE**

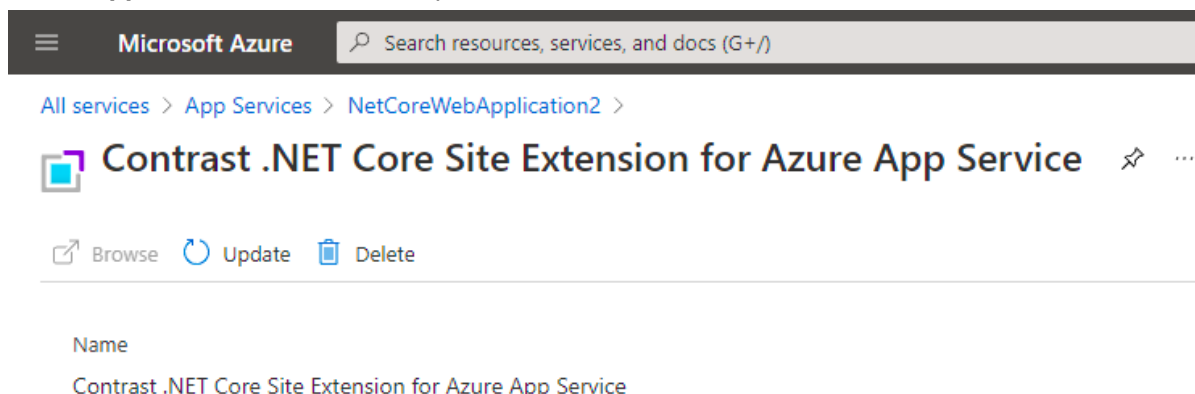
The Agent Upgrade Service is only included with the agent installer. It is not included with the manual .NET Core Agent, agent NuGet packages, or Azure App Service site extensions.

**Update the .NET Core agent**

Contrast frequently releases new versions of agents, these steps show you how to easily update the NuGet package or the manual .NET Core agent and keep it updated. To update the agent by installation:

- **.NET Core agent agent for IIS installer:** use the [Agent upgrade service \(page 134\)](#).

- **Azure App Service:** Use the Azure portal.



- **Manual installation:** use the instructions below to set up your own automation.

### Before you begin

- Confirmed your .NET Core application runs properly without the Contrast .NET Core agent.
- Previously installed the Contrast .NET Core agent.
- Defined a policy for how and when to update the agent, based on your change management policy and the environment where you deploy agents.
- An existing workflow to manage and keep application dependencies updated.

### Steps

1. Download the Contrast .NET Core agent to the same installation location by using the Contrast repository:
  - Hosted: Contrast synchronizes .NET Core agent releases with public NuGet repositories.
  - On-premises: Contrast does not recommend using newer versions of Contrast agents than those available from your Contrast instance. Use the same version of the .NET Core agent version you would otherwise download directly from the Contrast web interface.
2. Get the following API information

```

CONTRAST_URL=<TeamServer URL e.g. https://app.contrastsecurity.com >
ORG_ID=<YOUR TEAMSERVER ORGANIZATION ID>
AUTH_TOKEN=<YOUR TEAMSERVER AUTHENTICATION TOKEN>
API_KEY=<YOUR TEAMSERVER API KEY>
    
```

3. Use one of the following scripts to download Contrast .NET Core agent. Include the script in the application startup script, automated deployment pipeline, or add the script as a cron job to automatically update the agent.

- Bash script

```

CONTRAST_URL=https://app.contrastsecurity.com
ORG_ID=xxxxx
AUTH_TOKEN=xxxxx
API_KEY=xxxxx
curl -X GET $CONTRAST_URL/Contrast/api/ng/$ORG_ID/agents/default/DOTNET_CORE /-o ./
    
```

- Powershell

```

$ContrastUrl = "https://app.contrastsecurity.com/Contrast"
$UserId = ""
$ServiceKey = ""
$ApiKey = ""
$OrganizationId = ""
$InstallPath = ".\dotnet-core"
    
```

```
# Needed if the OS defaults to Tls1.1.
[Net.ServicePointManager]::SecurityProtocol = [Net.SecurityProtocolType]::Tls12

New-Item -ItemType Directory $InstallPath

Invoke-WebRequest `
  -Uri "$ContrastUrl/api/ng/$OrganizationId/agents/default/DOTNET_CORE" `
  -Headers @{
    "API-Key"          = $ApiKey
    "Authorization" = [Convert]::ToBase64String([System.Text.Encoding]::UTF8.GetBytes($ApiKey))
  } `
  -OutFile "$InstallPath\Contrast.zip"

Invoke-WebRequest -Uri `
  "$ContrastUrl/api/ng/$OrganizationId/agents/external/default/DOTNET_CORE" `
  -Headers @{
    "Accept"          = "text/yaml"
    "API-Key"         = $ApiKey
    "Authorization" = [Convert]::ToBase64String([System.Text.Encoding]::UTF8.GetBytes($ApiKey))
  } `
  -OutFile "$InstallPath\contrast_security.yaml"

Expand-Archive "$InstallPath\Contrast.zip" -DestinationPath $InstallPath
Remove-Item "$InstallPath\Contrast.zip"
```

- Unzip the downloaded file and save the contents to the current Contrast agent location. If you do not know the location, you can look up the environment variables using the command for your system.

- Windows (64-bit)

```
echo %CORECLR_PROFILER_PATH_64%CORECLR_PROFILER_PATH_64
```

- Windows (32-bit)

```
CORECLR_PROFILER_PATH_32
```

- Linux (64-bit)

```
CORECLR_PROFILER_PATH_64
```

- Powershell

```
printenv CORECLR_PROFILER_PATH_64
```

## Configure the .NET Core agent

The [standard configuration \(page 30\)](#) for all agents uses this [order of precedence \(page 31\)](#).

Depending on your situation, you can configure the .NET Core agent with:

- [Azure App Service \(page 190\)](#)
- [Environment variables \(page 190\)](#)
- [A YAML configuration file \(page 191\)](#)
- [Integrations \(page 553\)](#)

**TIP**

Use the [Contrast agent configuration editor \(page 34\)](#) to create or upload a YAML configuration file, validate YAML and get setting recommendations.

## Configure the .NET Core agent for Azure App Service

When using Azure App Service, you can configure the .NET Core agent with:

- **The Azure Portal:** Configure the .NET Core agent using [environment variables \(page 190\)](#). Add all settings to the **Application Settings** section of the **Configuration** blade using environment variable syntax.
- **Environment variables in a web.config file:** Place your overrides using the environment variable convention in the `<environmentVariables>` section of `<aspNetCore>` element.
- **A YAML configuration file (page 191):** Upload the file to your Azure web application by including it in your application deployment or using the Kudu console.  
In the **Configuration\Application Settings** blade, add a new application setting called `CONTRAST_CONFIG_PATH` with a value that points to this file.  
For example, to use the `contrast_security.yaml` file in the root of your application, add a new application setting with the key `CONTRAST_CONFIG_PATH` and value of `D:\Home\site\wwwroot\contrast_security.yaml` in **Configuration\Application Settings**. Application files in Azure App Service are deployed to `D:\homel\site\wwwroot`.

### See also

- [Install the .NET Core agent with Azure App Service \(page 180\)](#)

## Configure .NET Core agent with environment variables

You can configure environment variables in several ways:

- Under IIS, [the web.config file can be used to configure application environment variables](#)
- Under Azure App services, the Azure platform provides a UI to configure the web site's environment variables.
- When developing, the `launchSettings.json` file can be used to configure the environment variables on launched applications.

**TIP**

You can convert any of the properties in the [.NET Core YAML template \(page 191\)](#) to environment variables.

- To change the agent's logging level (`agent.logger.level`) to "TRACE", add a setting with key `CONTRAST__AGENT__LOGGER__LEVEL` and value "TRACE".
- To change the agent's server name (`server.name`) to "MyServer", add a setting with key `CONTRAST__SERVER__NAME` and value "MyServer".

Here are some of the most common settings:

Environment variable	Purpose
CONTRAST__APPLICATION_NAME	Specify the application name reported to Contrast.
CONTRAST__APPLICATION_GROUP	Specify the access group for this application. (You must have already created <a href="#">access groups (page 637)</a> .)
CONTRAST__APPLICATION_SESSION_METADATA	Provide metadata which is used to create a new session ID in the Contrast web interface. Vulnerabilities discovered by the agent are associated with this new session.
CONTRAST__SERVER_NAME	Specify the server name reported to Contrast.
CONTRAST__SERVER_ENVIRONMENT	Specify in which environment the application is running (Development, QA and Production).

See the [.NET Core YAML template \(page 191\)](#) for a description of other available properties.

## .NET Core YAML configuration template

Use this template to configure the .NET Core agent using a YAML configuration file. (Learn more about [YAML configuration \(page 33\)](#).)

Place your YAML file in the default location:

- **Windows:** C:/ProgramData/contrast/dotnet-core/contrast\_security.yaml
- **Unix:** /etc/contrast/dotnet-core/contrast\_security.yaml

```
# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

  # ***** REQUIRED *****
  # Set the URL for the Contrast UI.
  url: https://app.contrastsecurity.com/Contrast

  # ***** REQUIRED *****
  # Set the API key needed to communicate with the Contrast UI.
  api_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the service key needed to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  service_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the user name used to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  user_name: NEEDS_TO_BE_SET
```

```

# Set the version of the TLS protocol the agent uses to communicate with the
# Contrast UI. The .NET agent default behavior is (SecurityProtocolType.Tls
# | SecurityProtocolType.Tls11 | SecurityProtocolType.Tls12).
# tls_versions: tls|tls11|tls12

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Determine the location from which the agent loads a client
# certificate. Value options include `File` or `Store`.
# certificate_location: NEEDS_TO_BE_SET

# Set the absolute path to the client certificate's
# .CER file for communication with Contrast UI. The
# `certificate_location` property must be set to `File`.
# cer_file: NEEDS_TO_BE_SET

# Specify the name of certificate store to open. The
# `certificate_location` property must be set to `Store`.
# Value options include `AuthRoot`, `CertificateAuthority`,
# `My`, `Root`, `TrustedPeople`, or `TrustedPublisher`.
# store_name: NEEDS_TO_BE_SET

# Specify the location of the certificate store. The
# `certificate_location` property must be set to `Store`.
# Value options include `CurrentUser` or `LocalMachine`.
# store_location: NEEDS_TO_BE_SET

# Specify the type of value the agent uses to find the certificate
# in the collection of certificates from the certificate store.
# The `certificate_location` property must be set to `Store`.
# Value options include `FindByIssuerDistinguishedName`,
# `FindByIssuerName`, `FindBySerialNumber`,
# `FindBySubjectDistinguishedName`, `FindBySubjectKeyIdentifier`,
# `FindBySubjectName`, or `FindByThumbprint`.
# find_type: NEEDS_TO_BE_SET

# Specify the value the agent uses in combination with
# `find_type` to find a certification in the certificate store.
#
# Note - The agent will use the first certificate from
# the certificate store that matches this search criteria.
#
# find_value: NEEDS_TO_BE_SET

# =====
# api.proxy

```



```

# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate
# with the Contrast web interface over a proxy. Set
# value to `false` if you don't want to use the proxy.
# enable: NEEDS_TO_BE_SET

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# Set the proxy user.
# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

# Set the proxy authentication type. Value
# options are `NTLM`, `Digest`, and `Basic`.
# auth_type: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# Set the roll size for log files in megabytes. The agent will
# attempt to prevent the log file from being larger than this size.
# roll_size: 100

# Set the number of backup files to keep. Set to `0` to disable.
# backups: 10

# =====
# agent.security_logger

```

```
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# Set the connection type used for Syslog messages.
# Value options are `UNENCRYPTED` and `ENCRYPTED`.
# connection_type: UNENCRYPTED
```

```
# =====
# agent.dotnet
# The following properties apply to any .NET agent-wide configurations.
# =====
# dotnet:

# Set a list of application pool names that the agent does not
# instrument or analyze. Names must be formatted as a comma-separated
# list. New after .NET Framework 19.1.3 and .NET Core 4.0.2.
# app_pool_denylist: NEEDS_TO_BE_SET

# Set a list of application pool names that the agent instruments or
# analyzes. If set, other application pools are ignored. Allowlist takes
# precedence over denylist. Names must be formatted as a comma-separated
# list. New after .NET Framework 19.1.3 and .NET Core 4.0.2.
# app_pool_allowlist: NEEDS_TO_BE_SET

# Set a list of application names that the agent does not
# analyze. (The applications are still instrumented).
# Names must be formatted as a comma-separated list.
# New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# application_denylist: NEEDS_TO_BE_SET

# Set a list of application names that the agent analyzes.
# If set, other applications are not analyzed, but are
# still instrumented. Allowlist takes precedence over
# denylist. Names must be formatted as a comma-separated
# list. New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# application_allowlist: NEEDS_TO_BE_SET

# Enable a profiler chaining feature to allow Contrast to
# work alongside other tools that use the CLR Profiling
# API. Defaults to `true`. New after .NET Framework 19.1.3
# (Installed Only) and .NET Core 1.9.3 (Installed Only).
# enable_chaining: true

# Indicate that the agent should allow CLR optimizations
# of JIT-compiled methods. Defaults to `true`. New
# after .NET Framework 19.1.3 and .NET Core 1.0.0.
# enable_instrumentation_optimizations: true

# Indicate that the agent should allow the CLR to inline
# methods that are not instrumented by Contrast. Defaults to
# `true`. New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# enable_jit_inlining: true

# Indicate that the agent should allow the CLR to perform
# transparency checks under full trust. Defaults to `false`.
# New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# enable_transparency_checks: false

# Set to display ASCII art to std::out on agent startup. Defaults
# to `true`. New after .NET Framework 20.6.3 and .NET Core 1.0.0.
# enable_cat: true
```

```

# Sets the maximum amount of time a Protect regular expression
# is allowed to run before being cancelled. Set to -1 to never
# cancel regular expression execution. Defaults to `20_000`.
# New after .NET Framework 20.4.3 and .NET Core 1.5.0.
# protect_searchers_single_pattern_deadline_ms: 20_000

# Sets the maximum amount of time a 'Probe Analysis' Protect
# regular expression is allowed to run before being cancelled. Set
# to -1 to never cancel regular expression execution. Defaults to
# `5_000`. New after .NET Framework 20.7.3 and .NET Core 1.5.11.
# protect_searchers_probe_analysis_single_pattern_deadline_ms: 5_000

# Sets the maximum amount of time a Protect rule is
# allowed to run before being cancelled. Set to -1 to never
# cancel Protect rule execution. Defaults to `60_000`.
# New after .NET Framework 20.4.3 and .NET Core 1.5.0.
# protect_searchers_total_rule_deadline_ms: 60_000

# Sets the maximum amount of time a 'Probe Analysis' Protect
# rule is allowed to run before being cancelled. Set to -1 to
# never cancel Protect rule execution. Defaults to `10_000`.
# New after .NET Framework 20.7.3 and .NET Core 1.5.11.
# protect_searchers_probe_analysis_total_rule_deadline_ms: 10_000

# Sets the maximum duration of time agent log files should be kept
# since last write before being deleted by the agent. Defaults to
# `604_800_000`. New after .NET Framework 20.6.1 and .NET Core 1.5.5.
# log_cleanup_maximum_age_ms: 604_800_000

# Suppresses gathering process-level metrics (process level metrics are
# gathered by default), used to identify performance problems. Metric
# counters may further decrease the stability of already unstable
# systems and can be disabled (set to true) if issues occur. Defaults
# to `false`. New after .NET Framework 20.6.6 and .NET Core 1.5.10.
# suppress_metric_counters: false

# Enable file based application watching. Set to false if
# file watching is causing locking issues. Defaults to `true`.
# New after .NET Framework 20.7.3 and .NET Core 1.5.11.
# enable_file_based_app_watching: true

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#

```

```

# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Control the values captured by Assess vulnerability events. `Full`
# captures most values by calling ToString on objects, which can
# provide more info but causes increased memory usage. `Minimal`
# has better performance as it only captures String type objects
# as strings and uses type name for other object type values.
# event_detail: minimal

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# Value options are `ALL`, `SOME`, or `NONE`.
# stacktraces: ALL

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

```

```

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.sql-injection-semantic-chaining

```

```

# Use the following properties to configure how the
# sql injection semantic analysis chaining rule works.
# =====
# sql-injection-semantic-chaining:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.sql-injection-semantic-dangerous-functions
# Use the following properties to configure how the sql
# injection semantic analysis dangerous functions rule works.
# =====
# sql-injection-semantic-dangerous-functions:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.sql-injection-semantic-suspicious-unions
# Use the following properties to configure how the sql
# injection semantic analysis suspicious unions rule works.
# =====
# sql-injection-semantic-suspicious-unions:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.sql-injection-semantic-tautologies
# Use the following properties to configure how the sql
# injection semantic analysis tautologies rule works.
# =====
# sql-injection-semantic-tautologies:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#

```

```

# mode: off

# Tell the agent to detect when commands come directly
# from input. The agent blocks if blocking is enabled.
# detect_phased_commands: true

# =====
# protect.rules.cmd-injection-semantic-chained-commands
# Use the following properties to configure how the
# 'command injection - chained commands' rule works
# =====
# cmd-injection-semantic-chained-commands:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.cmd-injection-semantic-dangerous-paths
# Use the following properties to configure how the
# 'command injection - dangerous paths' rule works
# =====
# cmd-injection-semantic-dangerous-paths:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.cmd-injection-command-backdoors
# Use the following properties to configure how the
# 'command injection - command backdoors' rule works
# =====
# cmd-injection-command-backdoors:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.path-traversal-semantic-file-security-bypass
# Use the following properties to configure how the
# 'path traversal - file security bypass' rule works
# =====
# path-traversal-semantic-file-security-bypass:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====

```



```

# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.unsafe-file-upload
# Use the following properties to configure
# how the unsafe file upload rule works.
# =====
# unsafe-file-upload:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

```

```
# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.untrusted-deserialization
# Use the following properties to configure
# how the untrusted deserialization rule works.
# =====
# untrusted-deserialization:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET
```

```

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Override the reported server path. New after
# .NET Framework v21.3.1 and .NET Core v1.8.0.
# path: NEEDS_TO_BE_SET

```

```
# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

  # ***** REQUIRED *****
  # Set the URL for the Contrast UI.
  url: https://app.contrastsecurity.com/Contrast

  # ***** REQUIRED *****
  # Set the API key needed to communicate with the Contrast UI.
  api_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the service key needed to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  service_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the user name used to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  user_name: NEEDS_TO_BE_SET

  # Set the version of the TLS protocol the agent uses to communicate with the
  # Contrast UI. The .NET agent default behavior is (SecurityProtocolType.Tls
  # | SecurityProtocolType.Tls11 | SecurityProtocolType.Tls12).
  # tls_versions: tls|tls11|tls12

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

  # If set to `false`, the agent will ignore the
  # certificate configuration in this section.
  # enable: true

  # Determine the location from which the agent loads a client
  # certificate. Value options include `File` or `Store`.
  # certificate_location: NEEDS_TO_BE_SET
```

```
# Set the absolute path to the client certificate's
# .CER file for communication with Contrast UI. The
# `certificate_location` property must be set to `File`.
# cer_file: NEEDS_TO_BE_SET

# Specify the name of certificate store to open. The
# `certificate_location` property must be set to `Store`.
# Value options include `AuthRoot`, `CertificateAuthority`,
# `My`, `Root`, `TrustedPeople`, or `TrustedPublisher`.
# store_name: NEEDS_TO_BE_SET

# Specify the location of the certificate store. The
# `certificate_location` property must be set to `Store`.
# Value options include `CurrentUser` or `LocalMachine`.
# store_location: NEEDS_TO_BE_SET

# Specify the type of value the agent uses to find the certificate
# in the collection of certificates from the certificate store.
# The `certificate_location` property must be set to `Store`.
# Value options include `FindByIssuerDistinguishedName`,
# `FindByIssuerName`, `FindBySerialNumber`,
# `FindBySubjectDistinguishedName`, `FindBySubjectKeyIdentifier`,
# `FindBySubjectName`, or `FindByThumbprint`.
# find_type: NEEDS_TO_BE_SET

# Specify the value the agent uses in combination with
# `find_type` to find a certification in the certificate store.
#
# Note - The agent will use the first certificate from
# the certificate store that matches this search criteria.
#
# find_value: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate
# with the Contrast web interface over a proxy. Set
# value to `false` if you don't want to use the proxy.
# enable: NEEDS_TO_BE_SET

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# Set the proxy user.
# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

# Set the proxy authentication type. Value
```

```

# options are `NTLM`, `Digest`, and `Basic`.
# auth_type: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# Set the roll size for log files in megabytes. The agent will
# attempt to prevent the log file from being larger than this size.
# roll_size: 100

# Set the number of backup files to keep. Set to `0` to disable.
# backups: 10

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

```

```

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# Set the connection type used for Syslog messages.
# Value options are `UNENCRYPTED` and `ENCRYPTED`.
# connection_type: UNENCRYPTED

# =====
# agent.dotnet
# The following properties apply to any .NET agent-wide configurations.
# =====
# dotnet:

# Set a list of application pool names that the agent does not
# instrument or analyze. Names must be formatted as a comma-separated
# list. New after .NET Framework 19.1.3 and .NET Core 4.0.2.
# app_pool_denylist: NEEDS_TO_BE_SET

# Set a list of application pool names that the agent instruments or
# analyzes. If set, other application pools are ignored. Allowlist takes
# precedence over denylist. Names must be formatted as a comma-separated
# list. New after .NET Framework 19.1.3 and .NET Core 4.0.2.
# app_pool_allowlist: NEEDS_TO_BE_SET

# Set a list of application names that the agent does not
# analyze. (The applications are still instrumented).

```

```
# Names must be formatted as a comma-separated list.
# New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# application_denylist: NEEDS_TO_BE_SET

# Set a list of application names that the agent analyzes.
# If set, other applications are not analyzed, but are
# still instrumented. Allowlist takes precedence over
# denylist. Names must be formatted as a comma-separated
# list. New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# application_allowlist: NEEDS_TO_BE_SET

# Enable a profiler chaining feature to allow Contrast to
# work alongside other tools that use the CLR Profiling
# API. Defaults to `true`. New after .NET Framework 19.1.3
# (Installed Only) and .NET Core 1.9.3 (Installed Only).
# enable_chaining: true

# Indicate that the agent should allow CLR optimizations
# of JIT-compiled methods. Defaults to `true`. New
# after .NET Framework 19.1.3 and .NET Core 1.0.0.
# enable_instrumentation_optimizations: true

# Indicate that the agent should allow the CLR to inline
# methods that are not instrumented by Contrast. Defaults to
# `true`. New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# enable_jit_inlining: true

# Indicate that the agent should allow the CLR to perform
# transparency checks under full trust. Defaults to `false`.
# New after .NET Framework 19.1.3 and .NET Core 1.0.0.
# enable_transparency_checks: false

# Set to display ASCII art to std::out on agent startup. Defaults
# to `true`. New after .NET Framework 20.6.3 and .NET Core 1.0.0.
# enable_cat: true

# Sets the maximum amount of time a Protect regular expression
# is allowed to run before being cancelled. Set to -1 to never
# cancel regular expression execution. Defaults to `20_000`.
# New after .NET Framework 20.4.3 and .NET Core 1.5.0.
# protect_searchers_single_pattern_deadline_ms: 20_000

# Sets the maximum amount of time a 'Probe Analysis' Protect
# regular expression is allowed to run before being cancelled. Set
# to -1 to never cancel regular expression execution. Defaults to
# `5_000`. New after .NET Framework 20.7.3 and .NET Core 1.5.11.
# protect_searchers_probe_analysis_single_pattern_deadline_ms: 5_000

# Sets the maximum amount of time a Protect rule is
# allowed to run before being cancelled. Set to -1 to never
# cancel Protect rule execution. Defaults to `60_000`.
# New after .NET Framework 20.4.3 and .NET Core 1.5.0.
# protect_searchers_total_rule_deadline_ms: 60_000

# Sets the maximum amount of time a 'Probe Analysis' Protect
```



```

# rule is allowed to run before being cancelled. Set to -1 to
# never cancel Protect rule execution. Defaults to `10_000`.
# New after .NET Framework 20.7.3 and .NET Core 1.5.11.
# protect_searchers_probe_analysis_total_rule_deadline_ms: 10_000

# Sets the maximum duration of time agent log files should be kept
# since last write before being deleted by the agent. Defaults to
# `604_800_000`. New after .NET Framework 20.6.1 and .NET Core 1.5.5.
# log_cleanup_maximum_age_ms: 604_800_000

# Suppresses gathering process-level metrics (process level metrics are
# gathered by default), used to identify performance problems. Metric
# counters may further decrease the stability of already unstable
# systems and can be disabled (set to true) if issues occur. Defaults
# to `false`. New after .NET Framework 20.6.6 and .NET Core 1.5.10.
# suppress_metric_counters: false

# Enable file based application watching. Set to false if
# file watching is causing locking issues. Defaults to `true`.
# New after .NET Framework 20.7.3 and .NET Core 1.5.11.
# enable_file_based_app_watching: true

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Control the values captured by Assess vulnerability events. `Full`
# captures most values by calling ToString on objects, which can
# provide more info but causes increased memory usage. `Minimal`
# has better performance as it only captures String type objects
# as strings and uses type name for other object type values.
# event_detail: minimal

```

```

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# Value options are `ALL`, `SOME`, or `NONE`.
# stacktraces: ALL

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====

```

```

# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.sql-injection-semantic-chaining
# Use the following properties to configure how the
# sql injection semantic analysis chaining rule works.
# =====
# sql-injection-semantic-chaining:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.sql-injection-semantic-dangerous-functions
# Use the following properties to configure how the sql
# injection semantic analysis dangerous functions rule works.
# =====
# sql-injection-semantic-dangerous-functions:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

```

```

# =====
# protect.rules.sql-injection-semantic-suspicious-unions
# Use the following properties to configure how the sql
# injection semantic analysis suspicious unions rule works.
# =====
# sql-injection-semantic-suspicious-unions:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.sql-injection-semantic-tautologies
# Use the following properties to configure how the sql
# injection semantic analysis tautologies rule works.
# =====
# sql-injection-semantic-tautologies:

# Set the mode of the rule. Value options
# are `monitor`, `block` or `off`.
# mode: off

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Tell the agent to detect when commands come directly
# from input. The agent blocks if blocking is enabled.
# detect_phased_commands: true

# =====
# protect.rules.cmd-injection-semantic-chained-commands
# Use the following properties to configure how the
# 'command injection - chained commands' rule works
# =====
# cmd-injection-semantic-chained-commands:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.cmd-injection-semantic-dangerous-paths
# Use the following properties to configure how the

```

```

# 'command injection - dangerous paths' rule works
# =====
# cmd-injection-semantic-dangerous-paths:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.cmd-injection-command-backdoors
# Use the following properties to configure how the
# 'command injection - command backdoors' rule works
# =====
# cmd-injection-command-backdoors:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.path-traversal-semantic-file-security-bypass
# Use the following properties to configure how the
# 'path traversal - file security bypass' rule works
# =====
# path-traversal-semantic-file-security-bypass:

# Set the mode of the rule. Value options
# are `monitor`, `block`, or `off`.
# mode: off

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#

```

```

# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.unsafe-file-upload
# Use the following properties to configure
# how the unsafe file upload rule works.
# =====
# unsafe-file-upload:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.untrusted-deserialization
# Use the following properties to configure
# how the untrusted deserialization rule works.
# =====

```

```
# untrusted-deserialization:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET
```

```
# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Override the reported server path. New after
# .NET Framework v21.3.1 and .NET Core v1.8.0.
# path: NEEDS_TO_BE_SET
```

### Profiler chaining for the .NET Core agent

You can use profiler chaining to run the .NET Core agent alongside another .NET Core APM profiler.

The Contrast .NET Core agent is tested and proven to be compatible with the following profiling tools, given the combination of runtime, deployment type, and OS:

Profiling tool	Versions tested	.NET Core runtime	Third-party profiler deployment type	OS
AppDynamics	21.8.1	6.0	Nuget Package	Windows
AppDynamics	21.8.1	6.0	Installed	Windows
AppDynamics	21.8.1	6.0	Nuget Package	Windows
Dynatrace One Agent	1.253.245	6.0	Installed	Windows, Ubuntu
New Relic	8.23.107	6.0	NuGet Package	Windows
New Relic	8.23.1076	6.0	NuGet Package	Ubuntu
Riverbed SteelCentral Aternity APM	12.9.0	6.0	Installed	Windows



**NOTE**

The agent is likely compatible with other profiling tools if those tools follow the conventions of the CoreCLR Profiling API and do not make assumptions about the profiling environment.

Chaining is enabled by default and can be disabled by setting `agent.dotnet.enable_chaining` to `false`.

```
agent :
  dotnet :
    enable_chaining: false
```

**Automatic (Windows and IIS)**

When using the .NET Core installer for IIS, the installer configures chaining automatically for all hosted .NET Core applications.

1. Install the third-party agent first (recommended), then the Contrast .NET Core agent.
2. Restart the IIS workers (by default, this is done automatically by the agent installer). On restart, the Contrast .NET Core agent automatically detects the presence of other profiling tools registered with IIS and configures the environment to load both the Contrast .NET Core agent profiler and the third-party profiler.

**Automatic (Linux)**

Under Linux, automatic chaining may be configured by setting the `LD_PRELOAD` environment variable:

```
LD_PRELOAD=<path to the extracted Contrast files>/runtimes/linux-x64/native/ContrastChainLoader.so
```

For example, if the Contrast agent was extracted to `/contrast`, then the following would setup chaining automatically.

```
LD_PRELOAD=/contrast/runtimes/linux-x64/native/ContrastChainLoader.so dotnet ./HelloWorld
```

Some APM profilers already set `LD_PRELOAD` (e.g. Dynatrace). In this case, ensure the Contrast module is loaded first - separate `LD_PRELOAD` are delimited by colons `:`. For example:

```
LD_PRELOAD=/contrast/runtimes/linux-x64/native/ContrastChainLoader.so: /<path to Dynatrace>
```

**NOTE**

When running under Kubernetes, the [Contrast Agent Operator \(page 49\)](#) will automatically setup chaining and is the preferred route to add agents to existing Kubernetes workloads.

**Manual**

Chaining may need to be manually setup, for example, in the following environments:

- Hosted outside of IIS.
- Environments that use the third-party agent's Nuget package (rather than the installed agent).



**NOTE**

Chaining with the Dynatrace agent is only supported using the automatic options above.

1. Replace the CLR environment variables for the profiling tool with CONTRAST\_CCC\_CORECLR versions. Any of these names should be transformed:

Change this	To this
CORECLR_PROFILER	CONTRAST_CCC_CORECLR_PROFILER
CORECLR_PROFILER_PATH	CONTRAST_CCC_CORECLR_PROFILER_PATH
CORECLR_PROFILER_PATH_32	CONTRAST_CCC_CORECLR_PROFILER_PATH_32
CORECLR_PROFILER_PATH_64	CONTRAST_CCC_CORECLR_PROFILER_PATH_64

2. Then add the agent [manually \(page 176\)](#).

**.NET Framework and .NET Core Telemetry**

.NET Framework and .NET Core agents use telemetry to collect usage data. Telemetry is collected when an instrumented application first loads the agent’s sensors and then periodically (every few hours) afterwards.

[Your privacy is important to us \(page 754\)](#). The telemetry feature doesn't collect application data. The data is anonymized before being sent securely to Contrast. Then the aggregated data is stored encrypted and under restricted access control. Any collected data will be deleted after one year.

The telemetry feature collects the following data:

Agent versions	Data	
.NET Framework later than 2020.8.3	Agent version	
.NET Core later than 1.5.15	Operating system and version	
	Whether the agent is running in a container	
	Whether the agent is running in Azure App Service	
	Hashed Media Access Control (MAC) address: a cryptographically (SHA256) anonymous and unique ID for a machine	
	Kernel version	
	Process running time	
	Whether Assess is enabled	
	Whether Protect is enabled	
	.NET Framework later than 2020.8.3	.NET Framework runtime version
	.NET Core later than 1.5.15	.NET Core runtime version
.NET Framework later than 20.9.1	Hosted or on-premises Contrast instance	
.NET Core later than 1.5.17		
.NET Framework later than 20.9.3	CLR Instrumentation Engine (CIE) usage	
.NET Core later than 1.5.19	Application framework	
	Chained profiler vendor	
.NET Framework later than 20.10.1	Process hosting mode	
.NET Core later than 1.5.20	CIE Raw Profiler Hook usage	

Agent versions	Data
.NET Framework later than 20.10.2	Names of configuration settings with non-default values
.NET Core later than 1.5.21	Names of disabled Assess rules
.NET Framework later than 20.12.2	Time elapsed for agent's profiler component to initialize
.NET Core later than 1.7.2	Time elapsed for agent's first request to the Contrast web interface
	Time elapsed for agent's profiler component to initialize
	Time elapsed between agent initialization and end of the first request
.NET Framework later than 21.1.1	Metrics on IIS-hosted applications, including: <ul style="list-style-type: none"> <li>Total application count</li> <li>Application count that will be analyzed (pass application allow list/deny list configuration)</li> <li>Count of apps hosted on CLR4 application pools</li> <li>Count of apps hosted on CLR2 application pools</li> </ul> Metrics on IIS applications pools <ul style="list-style-type: none"> <li>Total count</li> <li>Count with agent attached</li> <li>Count of CLR4</li> <li>Count of CLR2</li> </ul> Minimum number of applications in a single app pool Maximum number of applications in a single app pool Median number of applications across all app pools
.NET Framework later than 21.1.2	Rule mode (i.e. Monitor vs. Block) for each Protect rule
.NET Core later than 1.7.5	
.NET Framework later than 21.4.2	Exceptions thrown and caught within agent sensor code, including log message, exception type, exception message, and stack trace frames for <code>System</code> and <code>Contrast</code> methods.
.NET Core later than 1.8.4	
.NET Framework later than 21.7.1	<ul style="list-style-type: none"> <li>Process Architecture (x86/x64)</li> </ul>
.NET Core later than 1.9.7	OS Architecture (x86/x64)  In Azure App Service, the values of the following environment variables: <ul style="list-style-type: none"> <li>WEBSITE_PHYSICAL_MEMORY_MB</li> <li>WEBSITE_PLATFORM_VERSION</li> <li>WEBSITE_SKU</li> </ul>
.NET Framework later than 21.9.2	Description of location where YAML config file was loaded from (i.e., path specified by environment variable, default location, application directory).
.NET Core later than 2.0.1	

To opt-out of the telemetry feature, set the `CONTRAST_AGENT_TELEMETRY_OPTOUT` environment variable to `1` or `true`.

Telemetry data is securely sent to `telemetry.dotnet.contrastsecurity.com`. You can also opt out of telemetry by blocking communication at the network level.

## Supported Azure functions

### Versions

Runtime version	Language version	Supported	Not supported
1.x	.NET Framework 4.8	<ul style="list-style-type: none"> <li>Windows application: supported with Azure .NET Framework Site Extension</li> </ul>	<ul style="list-style-type: none"> <li>Docker Linux image</li> <li>Linux application</li> </ul>
3.x	.NET 5	<ul style="list-style-type: none"> <li>Windows Application: Supported locally and in Azure with the .NET Core Site Extension</li> <li>Docker Linux Image: Supported locally and in Azure</li> </ul>	<ul style="list-style-type: none"> <li>Linux application</li> </ul>
4.x	.NET 6	<ul style="list-style-type: none"> <li>Windows Application: Supported locally and in Azure with the .NET Core Site Extension</li> <li>Docker Linux Image: Supported locally and in Azure</li> </ul>	<ul style="list-style-type: none"> <li>Linux application</li> </ul>

**NOTE**

For all versions, running the Azure Functions application in isolated mode is not supported by the .NET agent.

**Supported triggers**

- HTTP
- Service Bus

**Configuration**

Azure Functions supports three deployment scenarios: Windows applications, Linux applications, and Docker Linux images. Of those three, only Windows applications and Docker Linux images are compatible with the agent. Linux application deployment is not supported by the .NET agent.

**Windows Application**

The Windows application deployment option is fully supported for Azure Functions versions 1, 3, and 4. Locally, the application can reference the Contrast .NET Core Agent NuGet package. On Azure, you must install the Contrast .NET Core Site Extension. When you deploy the Azure Function application using a tool (for example, Visual Studio or Core Tools), in a CI/CD pipeline or using the Azure Functions portal editor, the site extension will **not** automatically set the required application settings. You must specify the application settings manually.

To do this, set the following application settings (Settings > Configuration > Application settings) to enable the agent to attach:

```
CORECLR_ENABLE_PROFILING=1
CORECLR_PROFILER={8B2CE134-0948-48CA-A4B2-80DDAD9F5791}
CORECLR_PROFILER_PATH_32=C:\home\SiteExtensions\Contrast.NetCore.Azure.SiteExtension\Con
CORECLR_PROFILER_PATH_64=C:\home\SiteExtensions\Contrast.NetCore.Azure.SiteExtension\Con
```

Where <version> is the version of the agent in the form "0.0.0.0".

For example, if the agent version is "2.1.8" the path would

be: C:\home\SiteExtensions\Contrast.NetCore.Azure.SiteExtension\ContrastNetCoreAppService-2.1.8.0\runtimes\win-x64\native\ContrastProfiler.dll.

Connection information for Contrast server can be supplied either using application settings or in a configuration file that is pointed to by an application setting.

**Application settings**

```
CONTRAST__API__USER_NAME=my_username
CONTRAST__API__SERVICE_KEY=my_service_key
CONTRAST__API__API_KEY=my_api_key
CONTRAST__API__URL=my_api_url
```

If Contrast server connection information is supplied via configuration file, the following application setting must be set: `CONTRAST_CONFIG_PATH=C:\home\site\wwwroot\contrast_security.yaml`

**Docker Linux image**

The custom Linux image deployment option is supported for Azure Functions versions 3 and 4. A custom Linux image is required and it must contain the application and the Contrast .NET Core Agent

NuGet package. Note that Linux applications, when not run from a custom Linux image, are not supported by the .NET agent.

The following application settings must be set in order for the agent to attach. These can either be in the image itself (as environment variables) or set as application settings (Settings > Configuration > Application settings).

```
CORECLR_ENABLE_PROFILING=1
CORECLR_PROFILER={8B2CE134-0948-48CA-A4B2-80DDAD9F5791}
CORECLR_PROFILER_PATH=/home/site/wwwroot/contrast/runtimes/linux-x64/native/ContrastProf
CORECLR_PROFILER_PATH_64=/home/site/wwwroot/contrast/runtimes/linux-x64/native/ContrastP
CONTRAST_CORECLR_INSTALL_DIRECTORY=/home/site/wwwroot/bin/contrast/
```

Connection information for Contrast server can be supplied either using application settings/environment variables or in a configuration file that is pointed to by an application setting/environment variable.

Application setting/environment variables:

```
CONTRAST__API__USER_NAME=my_username
CONTRAST__API__SERVICE_KEY=my_service_key
CONTRAST__API__API_KEY=my_api_key
CONTRAST__API__URL=my_api_url
```

If the Contrast server connection information is supplied via configuration file, the following application setting/environment variable must be set: `CONTRAST_CONFIG_PATH=/home/site/wwwroot/contrast_security.yaml`

## Node.js agent

The Contrast Node.js agent analyzes the behavior of Node.js web applications using established techniques, such as source-to-source compilation, to add Contrast sensors to an application prior to execution.

The Contrast Node.js agent follows semantic versioning (major.minor.patch). The agent works best with these [supported technologies \(page 222\)](#) and these [system requirements \(page 223\)](#).

The Node.js agent rewrites the application code prior to startup using the Babel compiler. After start up the agent patches the required functions for the [supported frameworks and modules \(page 222\)](#).

Once you [install the Node.js agent \(page 224\)](#), there are two primary source code transformations that it uses to monitor the behavior of your application:

- **AST transformation** is the process by which the agent creates an abstract syntax tree of a body of code, manipulates the tree and then creates new source code based on this syntax tree. The agent goes through this process to handle scenarios in which function hooks won't work. For example, rewrites allow Contrast to add operator overloading to JavaScript so that it can properly track the flow of untrusted data.
- **Function hooks** take over the execution of a given function like, `child_process.exec`, to collect data about its arguments and its return value, and send this data to the parts of the agent responsible for analysis. As a result, the agent enables certain functions to be self reporting.

## Contrast service

The [Contrast service \(page 415\)](#) is an executable which is packaged within the Node.js agent, and runs in a separate process. With versions 4.X.X of the agent the Contrast service starts up automatically with the agent.

The service enables communication between the Node.js agent and Contrast. Like the agent, it can be [configured \(page 416\)](#) with [environment variables \(page 49\)](#) or a [YAML configuration file \(page 33\)](#). The

Contrast service uses port 30555 as the default for HTTP communication between the agent and the service.

You can configure the port and communication protocol between the agent and service. Available protocols include: HTTP, linux socket (file descriptor), and gRPC. The service can be deployed one-for-one with the agent, or shared across a group of agents on a single server hosting multiple containers.

## Supported technologies for Node.js

This page reflects the supported technologies and capabilities of the latest version available on [npmjs.com](https://npmjs.com) unless otherwise specified in the notes.



### NOTE

The Contrast Node.js agent may not function with versions of modules tagged as deprecated on [npmjs.com](https://npmjs.com). Deprecated modules present a high security risk and may negatively impact the function of the agent.

It also does not support applications that use bundlers like `webpack`, `parcel`, or `esbuild` to package or compress the server-side JavaScript code.

<b>Language version</b>	
<ul style="list-style-type: none"> <li>JavaScript ECMAScript 5</li> <li>JavaScript ECMAScript 6</li> <li>ECMAScript modules (ESM)</li> <li>TypeScript</li> </ul>	<p><b>Notes</b></p> <p>Contrast supports even numbered Node.js versions in "active LTS" or "maintenance" status.</p> <p>The Node.js LTS versions support <a href="#">these features for JavaScript ECMAScript5 and 6</a>.</p> <p>The Contrast Node.js agent provides limited support for working with user apps that use ESM.</p> <p>TypeScript is only supported if the agent is configured to point to the compiled entry point for your application.</p>
<b>Node.js Long-Term Support (LTS)</b>	
<p>All versions in Active and Maintenance LTS status, currently:</p> <ul style="list-style-type: none"> <li>12* and 14</li> <li>16 (only for agent version 4.5.0 and later)</li> <li>18 (only for agent version 4.25.0 and later)</li> </ul>	<p><b>Notes</b></p> <p>You should always use Node.js LTS versions that are active or in maintenance status.</p> <p>*Although Contrast continues to support version 12 LTS, it reached EOL at the end of April 2022. This EOL version presents a security risk. Also, note that version 5.X.X of the agent requires a minimum Node.js version of 14.15.0.</p> <p>The Node.js agent doesn't guarantee support for Node.js features classified as Experimental (Stability: 1). It also doesn't instrument the native <code>net</code> module. It only provides functionality for <code>HTTP(S)</code> application servers built using the supported application frameworks in this table.</p> <p><code>HTTP/2</code> is supported for the Node.js agent when using the Node.js core <code>HTTP/2</code> or <code>spdy</code> library.</p> <p>For customer applications using <code>HTTP/2</code> with Contrast Node.js agent, you must configure the agent to use <code>assess.enable_lazy_tracking: false</code>.</p> <p>Node.js version status is shown in <a href="#">Node.js Long-Term Support Release Schedule</a>.</p>
<b>Node package manager (npm)</b>	
<p>npm versions:</p> <ul style="list-style-type: none"> <li>&gt;=6.13.7</li> <li>&gt;=7.11.0</li> <li>&gt;= 8.5.5</li> </ul>	<p>The Node.js agent requires access to one of these npm versions to reliably report libraries to the Contrast UI. Versions 6 or 8 are preferred over version 7.</p>

<b>Application frameworks</b>	
<ul style="list-style-type: none"> <li>Express 4</li> <li>hapi 16*, 17*, 18*, 19*, 20</li> <li>Fastify 3</li> <li>Koa 2.3 and later</li> <li>Kraken 2.2.0 and 2.3.0</li> <li>LoopBack 3*, 4</li> <li>Restify 8</li> <li>Sails 1.2.3 and later</li> </ul>	<p><b>Notes</b></p> <p>*Deprecated by the maintainer, these libraries could present a security risk.</p>
<b>Database drivers and object-relational mapping (ORM)</b>	
<ul style="list-style-type: none"> <li>DynamoDB (Assess only) AWS SDK for JavaScript: 2.X and 3.X</li> <li>MongoDB 2.2.36*, 3.3.0 and later, 4.X. Compatible with database versions 3.6, 4.X, 5.X)</li> <li>MySQL2 2.0.0 and later. Compatible with MySQL database versions 5.6.51, 5.7.X and 8.0.X.</li> <li>Mongoose 5.X, 6.X</li> <li>MSSQL 6.4.0 and later</li> <li>Postgres driver 7.5.0 and later, 8.X</li> <li>RethinkDB driver version 2.4.0 and later</li> <li>Sequelize 5.X and 6.X</li> <li>SQLite3 driver 4.X. Compatible with database versions 3.26.0 and later).</li> </ul>	<p><b>Notes</b></p> <p>*Deprecated by the maintainer, the agent will still function but these libraries/versions present a security risk.</p>
<b>Validation modules</b>	
<ul style="list-style-type: none"> <li>Joi 17 and later</li> <li>Validator 13 and later</li> <li>Class-validator 0.13.0 and later</li> </ul>	
<b>Templating engines</b>	
<ul style="list-style-type: none"> <li>Handlebars 4</li> <li>Pug 3</li> <li>EJS 2.6.2, 3.0.1</li> <li>Mustache 4.x and later</li> </ul>	
<b>Other technologies</b>	
<ul style="list-style-type: none"> <li>Express-session 1.15.6 , 1.16.0 and later</li> </ul>	
<b>Test suite</b>	
Node Test Benches	When changes are made to the Node.js agent, Contrast runs this battery of automated tests to ensure that it detects findings in supported technologies across all supported versions of Node. The Node Test Benches include tests that exercise the agent with all of our supported frameworks. Each framework within the monorepo is updated as Contrast adds more third-party library support to the agent.

## System requirements for the Node.js agent



### IMPORTANT

The Node.js agent now has limited support for running on Macs with the M1/M2 chip. One limitation is the Node.js agent does not yet support running Alpine based docker containers on the Apple M1/M2 (ARM64). Running slim based Docker images is supported.

This page reflects the system requirements and capabilities of the latest version available on [npmjs.com](https://npmjs.com) unless otherwise specified in the notes.

Before installing the Node.js agent confirm you can meet the following requirements:

- There is a deployed application with a `package.json` file to be analyzed, and the web application technology is supported by Contrast.
- The agent has network connectivity with the Contrast server.

Using the Node.js agent requires increasing the application's available CPU and memory due to the increased processing and analysis of inbound information. Using the Node.js agent will use more resources than your application on its own. CPU load will also increase but this is heavily influenced by the specific application architecture and existing CPU usage profile.

If you are using Assess, you should double the available memory in each container compared to what you would normally use without the Contrast Node.js agent.

<p><b>Operating systems</b></p> <ul style="list-style-type: none"> <li>• CentOS/RHEL 7.9, 8 and later</li> <li>• Ubuntu 14.04 LTS, 16.04 LTS, 18.04 LTS, 20.04 LTS, 22.04 LTS</li> <li>• Debian 9, 10, 11</li> <li>• Windows</li> <li>• macOS</li> </ul>
<p><b>Process managers</b></p> <ul style="list-style-type: none"> <li>• PM2: 4.5.0 and later and 5.1.0 and later</li> <li>• The Contrast Node.js agent supports running in both fork and cluster mode.</li> <li>• The start command used when running the Contrast Node.js agent must include the full path to the installed <code>@contrast/agent</code> module. For example:</li> </ul> <pre>node -r /Users/michael/Dev/my-app/node_modules/@contrast/agent app.js</pre>
<p><b>Containers</b></p> <ul style="list-style-type: none"> <li>• Distroless containers <ul style="list-style-type: none"> <li>• The Contrast Node.js agent requires access to <code>npm</code> and <code>/bin/sh</code> to function correctly. The agent's functionality will be degraded and may not report findings or libraries when installed in an application that runs on a distroless container image that does not include those programs/packages.</li> </ul> </li> </ul>
<p><b>CPU</b></p> <ul style="list-style-type: none"> <li>• AMD 64, x86_64 and compatible</li> <li>• Apple M1/M2 ARM64 (limited support)</li> </ul>

## Install the Node.js agent

There are several ways to install the agent depending on your situation, but generally, this is the process:

1. Get the Node.js agent from `npm`.
2. Set [authentication keys \(page 32\)](#).
3. Add a command to the `package.json` file to enable your application to run with the agent.
4. Run your application with the agent.
5. Use your application as you normally would and verify that Contrast sees the application.

To avoid errors, follow these specific instructions depending on how your application is deployed:

- [Install manually \(page 224\)](#)
- [Install in a container \(page 225\)](#)
- [Install with IBM Cloud \(page 227\)](#)

## Install Node.js agent manually

To install or update the agent manually:

1. Install the latest version of the agent from `npm` by running this command from the application's root directory:

```
npm install @contrast/agent
```

Alternatively, if you use `yarn`, run this command to install the agent:



```
yarn add @contrast/agent
```

**NOTE**

If you don't want to install optional dependencies included with the Node.js agent, append the `--no-optional` CLI flag to your install command or add `optional=false` to your NPMRC file.

2. Set [authentication keys \(page 32\)](#) with [environment variables \(page 49\)](#). Make sure your Node.js application has access to the environment variables at runtime. Alternatively, set the configuration with [YAML configuration \(page 33\)](#) using this [template \(page 231\)](#). Make sure the `contrast_security.yaml` is in the applications root directory.
3. Add this command to the scripts section of your application's `package.json` file:

```
"scripts": {  
  "contrast": "node -r @contrast/agent <app-main>.js",  
  "start": "...",  
  "test": ...  
}
```

4. Run your application with the agent:

```
npm run contrast
```

**TIP**

You can change this npm script to include, [other runtime configurations \(page 230\)](#) such as an alternate configuration file location.

5. Exercise your application by performing either manual or automated testing to ensure your application is functioning correctly with the agent installed.
6. Verify that your server is registered in Contrast and reports an instance of your application.

## Install the Node.js agent using a container

### Before you begin

This topic provides general guidance for installing the Contrast Node.js agent in a containerized application, with Docker as an example.

You should have a basic understanding of how containers and related software work. You may need to adjust the instructions to meet your specific circumstances.

### Install the agent

Install the Node.js agent using one of these options:

- **Add the agent to the application during development.** (recommended)  
This way, the agent will be included with your application's `package.json`.  
Use this command to populate the agent into your pipelines and container images.

```
npm install @contrast/agent --no-optional
```

- **Add the agent to the Dockerfile.**  
Add the agent at container build time if you prefer to maintain separate images for the application (with and without the Contrast agent).  
Use this command to add the agent into your existing Dockerfile or into a new Dockerfile that uses your application's image as a base image.

```
npm install @contrast/agent --no-optional
```

## Configure the agent

Follow these instructions when configuring the Node.js agent for an application deployed into a container like Docker (otherwise, see more general information on [configuring the Node.js agent \(page 230\)](#)). Configuration for the Node.js agent follows this [order of precedence \(page 31\)](#).

1. Create a YAML configuration file.

Your `contrast_security.yaml` file should reside in your application's directory so it is copied to the container file system.

In the YAML file:

- Replace `<YourURL>`, `<YourUserName>`, `<YourAPIKey>` and `<YourServiceKey>` with your values. [Find your agent keys here \(page 32\)](#).

A typical YAML file for a container installation might look like this:

```
api:
  url: <URLtoContrast>
  user_name: <YourUserName>
  api_key: <YourAPIKey>
  service_key: <YourServiceKey>
agent:
  service:
    grpc: true
assess:
  enable_lazy_tracking: false
```

2. Copy the YAML file into the base image using this command (in this example, `/app/contrast_security.yaml` is the base directory for your application in the image).

```
COPY WORKSPACE/contrast_security.yaml /app/contrast_security.yaml
```

3. Use environment variables to set application-specific configuration. These can be ENV statements in the Dockerfile or they can be passed to the Docker run command with the `-e` option. See a [list of environment variables \(page 230\)](#) commonly used to set application-specific values.

## Run and verify

1. If you want to use the Node.js agent rewriter CLI (available in version 4.X and later), add a RUN instruction and provide the command to invoke the `contrast-transpile` executable. Then provide your application's entry point.

```
RUN npx -p @contrast/agent --no contrast-transpile index.js
```

It is important to use the `-p @contrast/agent --no` options to ensure the `npm` command is the one from Contrast Security and not from a nefarious person attempting a supply chain attack.

`-p` is the shorthand for `--package`, which tells `npm` to only use the command in the `@contrast/agent` package.

`--no` is the new option name for the deprecated `--no-install` option that tells `npm` to not attempt an install from npm if the command binary is not found.

The expectation is that the Contrast agent has already been correctly installed along with the `npm` binaries before attempting to run the `npm` command.

2. You must preload the Contrast agent when you launch your application. Normally, you do this in the Dockerfile's CMD statement, but you can also use an npm script defined in the `package.json`. For example, if you normally start your application with:

```
CMD [ "node", "app" ]
```

Then you can use this command to run the application with Contrast:

```
CMD ["node", "-r", "@contrast/agent", "app"]
```

- When the agent starts, it will try to connect to Contrast with [authentication keys \(page 32\)](#) in the YAML configuration file.



**TIP**

To protect the agent credentials, use the Docker secret and pass them as environment variables during deployment time. For example:

```
docker run -e CONTRAST__API_ -e CONTRAST__API__API_KEY=<value> -e CONTRAST__
```

- Verify that Contrast is running by checking the activity in the container log. For example, log activity might look like this:

```
@contrast/agent 2.16.8-----
2020-07-20T19:05:14.407Z INFO contrast-service: BUILD {"progrname": "Contrast Service"}
2020-07-20T19:05:14.407Z INFO Building timer for orphan request cleanup {"progrname": "Contrast Service"}
2020-07-20T19:05:14.408Z INFO Building timer for orphan app cleanup {"progrname": "Contrast Service"}
2020-07-20T19:05:14.450Z INFO Creating New Application Server {"progrname": "Contrast Service"}
2020-07-20T19:05:14.450Z WARN Failed to initialize secure client, falling back to insecure
2020-07-20T19:05:15.473Z INFO setting new server features for context{"progrname": "Contrast Service"}
2020-07-20T19:05:15.474Z ERROR Error setting up CEF syslog {"progrname": "Contrast Service"}
2020-07-20T19:05:15.475Z INFO starting event scanner {"progrname": "Contrast Service"}
2020-07-20T19:05:15.486Z INFO Creating new application {"progrname": "Contrast Service"}
2020-07-20T19:05:15.486Z INFO AppCreate: creating and initializing new application {"progrname": "Contrast Service"}
2020-07-20T19:05:15.921Z INFO setting new application settings {"progrname": "Contrast Service"}
2020-07-20T19:05:15.922Z INFO Setting session id on app context: {"progrname": "Contrast Service"}
Entering main at /juice-shop/appinfo: All dependencies in ./package.json are satisfied
```

**See also**

Contrast Support Portal [Node.js agent with Kubernetes](#)

Contrast Support Portal [AWS Fargate and Contrast agents](#)

**Install Node.js with IBM Cloud**

- Install the latest LTS (Long Term Support) version of Node.js.
- To install from npm, run this command from the app root directory:

```
npm install @contrast/agent
```

Alternatively, if you use yarn, run this command to install the agent:

```
yarn add @contrast/agent
```

- Configure the Node.js (page 230) using a YAML configuration file to set the [authentication keys \(page 32\)](#) and any application-specific configuration.

You can use this sample *contrast\_security.yaml* file, but replace <URL>, <UserName>, <APIKey> and <ServiceKey> with your values, and set <ServerName> to the name of the IBM cloud server to which this application will report. (This way you will be able to identify the server when you view it in Contrast.)

```
contrast:
  url: <URL>
  user_name: <UserName>
  api_key: <APIKey>
  service_key: <ServiceKey>
```

```
server:
  name: <ServerName>
```

4. Create a folder named *contrast* in your application's root directory. and move the *node-contrast-.tgz* and the *contrast\_security.yaml* files into the *contrast* folder.
5. Add this command to the "scripts": section of your application's *package.json* file:

```
"ibmcloud-with-contrast": "npm install @contrast/agent && node -r @contrast/agent inc
```

6. Since IBM Cloud runs the start script by default, you must change the start command to point to the *ibmcloud-with-contrast* line given in the previous step. Run the agent using:

```
"start": "npm run ibmcloud-with-contrast"
```

Now the scripts section of the *package.json* should look like the following:

```
"scripts": {
  "bluemix-with-contrast": "npm install @contrast/agent && node -r @contrast/agent inde
  "start": "npm run bluemix-with-contrast"
},
```

7. Push the application to IBM Cloud using:

```
cf push <application-name> -t 180
```

8. Run the agent with:

```
npm start contrast
```

9. Exercise your application by performing either manual or automated testing to ensure your application is functioning correctly with the agent installed.
10. Verify that your server is registered in Contrast and reports an instance of your application.

## Update the Node.js agent

The most reliable and effective way to automatically update the Contrast Node.js agent is to use the Node.js npm package manager to install and download the latest version available.

Because npm manages all dependencies for your Node.js application, it should already be available and part of your build environment. How frequently you update the Contrast Node.js agent and where you get updates depends on your organization's preferences and your Contrast implementation: hosted (SaaS) or on-premises (EOP).

You can either update the agent automatically or manually.

### Before you begin

Before you begin, you should have:

- Some familiarity with DevOps practices and Node's npm package manager.
- Access to the npm repository for the Contrast agent.
- Confirmed that your Node.js application runs properly without the Contrast Node.js agent.
- Previously successfully installed the Contrast Node.js agent.
- Defined a policy for how and when to update the agent, based on your change management policy and the environment where you deploy agents.



### IMPORTANT

Unless Contrast Support advises you to do so, do not use a version of the Contrast Node.js agent that is ahead of the version available from your Contrast instance.

## Steps

1. You will install the Node.js agent from the npm public (or private) repository. Depending on your Contrast installation, you can use one or both sources to get the latest Contrast Node.js agent:
  - **Hosted (SaaS) installations:** You can get the latest version of the agent from npm. If your organization prefers to validate agents before using them, you can also use a private npm repository with approved versions only.
  - **On-premises (EOP) installations:** Many organizations that use on-premises installations do not immediately update core software or agents when Contrast releases new software. Public repositories (like npm) typically host new versions of the agent that are not designed or tested to work with older versions of Contrast. On-premises users should source agent updates from a private npm repository where you only store versions of the agent that match your on-premises Contrast installation.
2. Install the agent and use scripts for automatic updates using the best method for you:
  - **Use `package.json`:** This file specifies which dependencies will automatically resolve every time your Node.js application builds with artifacts from npm (public or private). Include the Contrast Node.js agent here to easily keep every new build of your application aligned with the latest version of the agent. For example:

```
{
  "name": "sample_application",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "start": "nodemon",
    "contrast": "node -r @contrast/agent index.js"
  },
  "keywords": [],
  "author": "",
  "license": "ISC",
  "dependencies": {
    "express": "^4.17.1",
    "@contrast/agent": "latest",
  },
  "devDependencies": {
    "nodemon": "^1.19.2"
  }
}
```

Then use the `$ npm update` command whenever you build your application. This will automatically download, and add or update, the Contrast Node.js agent from npm to the Node.js application.

- **Install and update manually using command line:** For some organizations, the `package.json` file must be consistent across environments, or they do not plan to install the Contrast Node.js agent into all environments. In these cases, install the agent manually. You can manually update agents as part of a Node.js build process. Use this command to manually retrieve and add or update the Contrast Node.js agent from npm (public or private) to the Node.js application:

```
$ npm install @contrast/agent --no-optional
```

3. After installing with either method, you will see output like this:

```
$ npm install @contrast/agent
```

```
> grpc@1.24.4 install /Users/<aUserName>/Documents/test-apps/juice-shop/node_modules/
```

```
node-pre-gyp WARN Using request for node-pre-gyp https download[grpc] Success: "/User
+ @contrast/agent@3.4.0added 19 packages from 43 contributors, updated 5 packages and
  run `npm audit fix` to fix them, or `npm audit` for details
```

4. To check whether the installation/update succeeded, run the following command and look for this output:

```
$ npm list | grep contrast
@contrast/agent@3.4.0
  @contrast/distinguish-prebuilt@2.0.0
  @contrast/escodegen@1.16.0
  @contrast/esprima@4.1.1
  @contrast/estraverse@5.1.0
  @contrast/flat@4.2.0
  @contrast/fn-inspect@2.3.0
  @contrast/heapdump@1.0.0
  @contrast/protobuf-api@2.2.3
  @contrast/require-hook@1.1.2
  @contrast/synchronous-source-maps@1.1.0
```

## See also

- [Node.js supported technologies \(page 222\)](#)
- [Install Node.js \(page 224\)](#)

## Configure the Node.js agent

The [standard configuration \(page 30\)](#) for all agents uses this [order of precedence \(page 31\)](#).

There are several ways to configure the Node.js agent, but generally, you should:

- Use a YAML configuration file to set configuration values that are common for all applications in an organization or container (for example, to redirect logging or proxy configuration). This [template \(page 231\)](#) shows all valid configuration options for the Node.js agent. Learn more about [YAML configuration \(page 33\)](#) in general.
- Use [environment variables \(page 230\)](#) for agent authentication keys and application-specific configuration values. Learn more about [environment variables in general \(page 49\)](#).



### TIP

Use the [Contrast agent configuration editor \(page 34\)](#) to create or upload a YAML configuration file, validate YAML, and get setting recommendations. The editor also provides the correct environment variables, if desired.

## Environment variables

Use environment variables for application-specific configuration values (like configuring server environment, application names or agent logging). You can also use environment variables to set any other valid properties for the Node.js agent.

You can see a full list of valid properties in the [Node.js YAML template \(page 231\)](#), but here are some common examples as environment variables:

Environment variable	Description
CONTRAST__API__SERVICE_KEY	Set the service key needed to communicate with Contrast.
CONTRAST__API__API_KEY	Set the API key needed to communicate with Contrast.
CONTRAST__API__USER_NAME	Set the user name needed to communicate with Contrast.
CONTRAST__API__URL	Set the URL for the Contrast web interface.
CONTRAST__APPLICATION__NAME	Override the reported application name.
CONTRAST_CONFIG_PATH	When set, supersedes the default location of the YAML configuration file. (Unlike other environment variables, this one cannot be set as a YAML property, and contains only single underscores.)
CONTRAST__SERVER__PATH	Override the reported server path.
CONTRAST__SERVER__NAME	Provides a consistent server name for cases where containerized apps generate many server records. This could be the microservice name or app name.
CONTRAST__AGENT__DIAGNOSTICS__ENABLE	Creates configuration and system files at startup to help track diagnostic and troubleshooting information. Default is <code>true</code> .
CONTRAST__AGENT__LOGGER__APPEND	When set to <code>false</code> , creates a new log file on startup instead of appending and rolling daily. Default is <code>true</code> .
CONTRAST__AGENT__LOGGER__LEVEL	Logging level: <code>FATAL</code> , <code>ERROR</code> , <code>WARN</code> , <code>INFO</code> , <code>DEBUG</code> or <code>TRACE</code> . Default is <code>ERROR</code> .
CONTRAST__AGENT__LOGGER__PATH	Where Contrast will put its debug log. Default is <code>node-contrast.log</code> .
CONTRAST__AGENT__LOGGER__STDOUT	When set to <code>false</code> , suppresses output to <code>stdout</code> . Default is <code>true</code> .



**NOTE**

For the Node.js agent you must manually configure `DEBUG.INFO`-level statements aren't logged to the console unless the environment variable `DEBUG` is set to include the Contrast namespace: `DEBUG=contrast:*`. This could be useful in environments where you don't have access to the file system (like Docker or ECS).

If you want to redirect logging for the Node.js, see more examples on the [npm site](#) or [contact Support](#) for assistance.

**Node.js YAML template**

Use this template to configure the Node.js agent using a YAML configuration file. (Learn more about [YAML configuration \(page 33\)](#).)

Place your YAML file in the default location: `/etc/contrast/contrast_security.yaml`

```
# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
```

```
# =====
api:

# ***** REQUIRED *****
# Set the URL for the Contrast UI.
url: https://app.contrastsecurity.com/Contrast

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

# Set the default request timeout.
# timeout_ms: NEEDS_TO_BE_SET

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Certificate
# PEM file for communication with the Contrast UI.
# cert_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Key PEM
# file for communication with the Contrast UI.
# key_file: NEEDS_TO_BE_SET

# If the Key file requires a password, it can be set here or in
# the matching ENV value (`CONTRAST__CERTIFICATE__KEY_PASSWORD`).
# key_password: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
```



```

# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid **contrast.proxy.host**
# and **contrast.proxy.port** will enable the proxy.
# enable: NEEDS_TO_BE_SET

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# Set to limit the length of Error stack traces to a specified number.
# stack_trace_limit: 10

# =====
# agent.diagnostics
# Use the properties in this section to specify
# whether diagnostic files should be created or not
#
# =====
# diagnostics:

# Creates config and system info files
# at startup if true. True by default.
#
# The same thing can be achieved by setting the
# CONTRAST__AGENT__DIAGNOSTICS__ENABLE=[true/false] env variable.
#
# enable: true

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.

```

```
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `false` for the agent to always create a
# new log file instead of appending and rolling.
# append: true

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# Set the roll size for log files in megabytes. The agent will
# attempt to prevent the log file from being larger than this size.
# This feature is only available in agent version >=4.0.0
# roll_size: 100M

# Set the number of backup files to keep. Set to `0` to disable.
# This feature is only available in agent version >=4.0.0
# backups: 10

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
```

```
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# =====
# agent.service
# The following properties are used by the Contrast Service.
# =====
# service:

# Set to `false` to disallow the service to be started, and
# effectively disable the agent, if read by the service. If the
# agent reads this property, it disallows service auto-start.
# enable: true

# Set to `true` to enable listening for gRPC connections.
# The `socket`, `host` and `port` fields will be used for
# configuring the gRPC server in place of the legacy RPC server.
# grpc: false

# If this property is defined, the service is
# listening on a Unix socket at the defined path.
# socket: /tmp/service.sock

# ***** REQUIRED *****
# Set the the hostname or IP address of the Contrast
# service to which the Contrast agent should report.
host: localhost

# ***** REQUIRED *****
# Set the the port of the Contrast service
# to which the Contrast agent should report.
port: 30555
```

```
# =====
# agent.service.teamserver_retry
# The following properties are used by the Teamserver HTTP client
# to configure failed request retrying in the Contrast service.
# =====
# teamserver_retry:

# Enable retrying HTTP requests to the Teamserver endpoint.
# enable: true

# How long to wait between retries in milliseconds.
# interval_ms: 5000

# How many times to retry HTTP requests to Teamserver before giving up.
# max_attempts: 3

# =====
# agent.service.logger
# The following properties are used by the logger in the
# Contrast service. If the properties are not defined, the
# service uses the logging values from the Contrast UI.
# =====
# logger:

# Set the location to which the Contrast service saves log output.
# If no log file exists at this location, the service creates one.
#
# Example - `/opt/Contrast/contrast_service.log` will
# create a log in the `/opt/Contrast` directory.
#
# path: ./contrast_service.log

# Set the the log output level. Options are `OFF`, `FATAL`,
# `ERROR`, `WARN`, `INFO`, `DEBUG`, `TRACE`, and `ALL`.
# level: ERROR

# Override the name of the process used in logs.
# progname: Contrast Service

# Set to `true` to send log output to `stdout`.
# stdout: false

# =====
# agent.heap_dump
# The following properties are used to trigger heap dumps from within
# the agent to snapshot the behavior of instrumented applications.
# =====
# heap_dump:

# Set to `true` for the agent to automatically
# take heap dumps of the instrumented application.
# enable: false

# Set the location to which to save the heap dump files. If relative,
```

```

# the path is determined based on the process' working directory.
# path: contrast_heap_dumps

# Set the amount of time to wait, in milliseconds,
# after agent startup to begin taking heap dumps.
# delay_ms: 10_000

# Set the amount of time to wait, in milliseconds, between each heap dump.
# window_ms: 10_000

# Set the number of heap dumps to take before disabling this feature.
# count: 5

# =====
# agent.node
# The following properties apply to any Node configurations.
# =====
# node:

# Set the location of the application's `package.json` file.
# app_root: NEEDS_TO_BE_SET

# =====
# agent.node.rewrite_cache
# Use the following properties to set up rewrite caching in the agent.
# =====
# rewrite_cache:

# Set to `true` to enable rewrite caching.
# enable: false

# Set the location of the rewrite cache source.
# path: NEEDS_TO_BE_SET

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.

```

```

# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# Set to `true` to trust incoming strings when they pass
# custom validators (Mongoose, Joi, validator, fastify-static)
# This feature is only available in agent version 4.10.0 and later
# trust_custom_validators: false

# When set to `true`, string tracking will occur lazily as user-controlled
# values are accessed by application code. When `false`, tracking will
# occur at the time of input parsing and will be limited to 250 values.
# This feature is only available in agent version 4.18.0 and later
# enable_lazy_tracking: true

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.probe_analysis
# Use the settings in this section to
# control the behavior of probe analysis.
# Support for this option is limited to Node agent versions >= 5
# =====
# probe_analysis:

# Set to `false` to disable probe analysis.
# enable: true

# =====

```

```
# protect.rules
# Use the following properties to set simple
# rule configurations for the Node protect agent.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.cmd-injection-semantic-chained-commands
# Use the following properties to configure how the
# 'command injection - chained commands' rule works
# =====
# cmd-injection-semantic-chained-commands:
```

```

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.cmd-injection-semantic-dangerous-paths
# Use the following properties to configure how the
# 'command injection - dangerous paths' rule works
# =====
# cmd-injection-semantic-dangerous-paths:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.cmd-injection-command-backdoors
# Use the following properties to configure how the
# 'command injection - command backdoors' rule works
# =====
# cmd-injection-command-backdoors:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.path-traversal-semantic-file-security-bypass
# Use the following properties to configure how the
# 'path traversal - file security bypass' rule works
# =====
# path-traversal-semantic-file-security-bypass:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====

```



```

# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.unsafe-file-upload
# Use the following properties to configure
# how the unsafe file upload rule works.
# =====
# unsafe-file-upload:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",

```

```

# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.untrusted-deserialization
# Use the following properties to configure
# how the untrusted deserialization rule works.
# =====
# untrusted-deserialization:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.ssjs-injection
# Use the following properties to configure
# how the SSJS Injection rule works.
# =====
# ssjs-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.nosql-injection
# Use the following properties to configure
# how the NOSQL Injection rule works.
# =====
# nosql-injection:

```

```

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.nosql-injection-mongo
# Use the following properties to configure
# how the NOSQL Injection rule works.
# =====
# nosql-injection-mongo:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Pass arguments to the underlying application.
# args: NEEDS_TO_BE_SET

```

```

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#

```

```

# tags: NEEDS_TO_BE_SET

# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

# ***** REQUIRED *****
# Set the URL for the Contrast UI.
url: https://app.contrastsecurity.com/Contrast

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

# Set the default request timeout.
# timeout_ms: NEEDS_TO_BE_SET

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

```

```

# Set the absolute or relative path to the Certificate
# PEM file for communication with the Contrast UI.
# cert_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Key PEM
# file for communication with the Contrast UI.
# key_file: NEEDS_TO_BE_SET

# If the Key file requires a password, it can be set here or in
# the matching ENV value (`CONTRAST__CERTIFICATE__KEY_PASSWORD`).
# key_password: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid **contrast.proxy.host**
# and **contrast.proxy.port** will enable the proxy.
# enable: NEEDS_TO_BE_SET

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# Set to limit the length of Error stack traces to a specified number.
# stack_trace_limit: 10

# =====
# agent.diagnostics
# Use the properties in this section to specify
# whether diagnostic files should be created or not
#
# =====
# diagnostics:

# Creates config and system info files
# at startup if true. True by default.
#
# The same thing can be achieved by setting the
# CONTRAST__AGENT__DIAGNOSTICS__ENABLE=[true/false] env variable.
#
# enable: true

```

```

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `false` for the agent to always create a
# new log file instead of appending and rolling.
# append: true

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# Set the roll size for log files in megabytes. The agent will
# attempt to prevent the log file from being larger than this size.
# This feature is only available in agent version >=4.0.0
# roll_size: 100M

# Set the number of backup files to keep. Set to `0` to disable.
# This feature is only available in agent version >=4.0.0
# backups: 10

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

```

```

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# =====
# agent.service
# The following properties are used by the Contrast Service.
# =====
# service:

# Set to `false` to disallow the service to be started, and
# effectively disable the agent, if read by the service. If the
# agent reads this property, it disallows service auto-start.
# enable: true

# Set to `true` to enable listening for gRPC connections.
# The `socket`, `host` and `port` fields will be used for

```



```

# configuring the gRPC server in place of the legacy RPC server.
# grpc: false

# If this property is defined, the service is
# listening on a Unix socket at the defined path.
# socket: /tmp/service.sock

# ***** REQUIRED *****
# Set the the hostname or IP address of the Contrast
# service to which the Contrast agent should report.
host: localhost

# ***** REQUIRED *****
# Set the the port of the Contrast service
# to which the Contrast agent should report.
port: 30555

# =====
# agent.service.teamserver_retry
# The following properties are used by the Teamserver HTTP client
# to configure failed request retrying in the Contrast service.
# =====
# teamserver_retry:

# Enable retrying HTTP requests to the Teamserver endpoint.
# enable: true

# How long to wait between retries in milliseconds.
# interval_ms: 5000

# How many times to retry HTTP requests to Teamserver before giving up.
# max_attempts: 3

# =====
# agent.service.logger
# The following properties are used by the logger in the
# Contrast service. If the properties are not defined, the
# service uses the logging values from the Contrast UI.
# =====
# logger:

# Set the location to which the Contrast service saves log output.
# If no log file exists at this location, the service creates one.
#
# Example - `/opt/Contrast/contrast_service.log` will
# create a log in the `/opt/Contrast` directory.
#
# path: ./contrast_service.log

# Set the the log output level. Options are `OFF`, `FATAL`,
# `ERROR`, `WARN`, `INFO`, `DEBUG`, `TRACE`, and `ALL`.
# level: ERROR

# Override the name of the process used in logs.
# progname: Contrast Service

```

```

# Set to `true` to send log output to `stdout`.
# stdout: false

# =====
# agent.heap_dump
# The following properties are used to trigger heap dumps from within
# the agent to snapshot the behavior of instrumented applications.
# =====
# heap_dump:

# Set to `true` for the agent to automatically
# take heap dumps of the instrumented application.
# enable: false

# Set the location to which to save the heap dump files. If relative,
# the path is determined based on the process' working directory.
# path: contrast_heap_dumps

# Set the amount of time to wait, in milliseconds,
# after agent startup to begin taking heap dumps.
# delay_ms: 10_000

# Set the amount of time to wait, in milliseconds, between each heap dump.
# window_ms: 10_000

# Set the number of heap dumps to take before disabling this feature.
# count: 5

# =====
# agent.node
# The following properties apply to any Node configurations.
# =====
# node:

# Set the location of the application's `package.json` file.
# app_root: NEEDS_TO_BE_SET

# =====
# agent.node.rewrite_cache
# Use the following properties to set up rewrite caching in the agent.
# =====
# rewrite_cache:

# Set to `true` to enable rewrite caching.
# enable: false

# Set the location of the rewrite cache source.
# path: NEEDS_TO_BE_SET

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

```

```

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# Set to `true` to trust incoming strings when they pass
# custom validators (Mongoose, Joi, validator, fastify-static)
# This feature is only available in agent version 4.10.0 and later
# trust_custom_validators: false

# When set to `true`, string tracking will occur lazily as user-controlled
# values are accessed by application code. When `false`, tracking will
# occur at the time of input parsing and will be limited to 250 values.
# This feature is only available in agent version 4.18.0 and later
# enable_lazy_tracking: true

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the

```

```

# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.probe_analysis
# Use the settings in this section to
# control the behavior of probe analysis.
# Support for this option is limited to Node agent versions >= 5
# =====
# probe_analysis:

# Set to `false` to disable probe analysis.
# enable: true

# =====
# protect.rules
# Use the following properties to set simple
# rule configurations for the Node protect agent.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====

```

```
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.cmd-injection-semantic-chained-commands
# Use the following properties to configure how the
# 'command injection - chained commands' rule works
# =====
# cmd-injection-semantic-chained-commands:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.cmd-injection-semantic-dangerous-paths
# Use the following properties to configure how the
# 'command injection - dangerous paths' rule works
# =====
# cmd-injection-semantic-dangerous-paths:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.cmd-injection-command-backdoors
# Use the following properties to configure how the
# 'command injection - command backdoors' rule works
# =====
# cmd-injection-command-backdoors:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off
```

```

# =====
# protect.rules.path-traversal-semantic-file-security-bypass
# Use the following properties to configure how the
# 'path traversal - file security bypass' rule works
# =====
# path-traversal-semantic-file-security-bypass:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#

```

```

# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.unsafe-file-upload
# Use the following properties to configure
# how the unsafe file upload rule works.
# =====
# unsafe-file-upload:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.untrusted-deserialization
# Use the following properties to configure
# how the untrusted deserialization rule works.
# =====
# untrusted-deserialization:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.ssjs-injection
# Use the following properties to configure
# how the SSJS Injection rule works.
# =====

```

```

# ssjs-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.nosql-injection
# Use the following properties to configure
# how the NOSQL Injection rule works.
# =====
# nosql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.nosql-injection-mongo
# Use the following properties to configure
# how the NOSQL Injection rule works.
# =====
# nosql-injection-mongo:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

```



```

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Pass arguments to the underlying application.
# args: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.

```

```
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET
```

## Node.js agent rewriter CLI

When you start your instrumented application, Contrast applies source transformations to both your application and the dependency code your application loads. This code rewriting increases startup time when running applications with the agent.

Starting with version 4.X, the Node.js agent includes a command line utility you can use to pre-compile applications before starting them. When started with Contrast, the pre-compiled application loads the rewritten files from disk and significantly improves startup time.

## Use the rewriter

1. In the Node.js agent's configuration file (`contrast_security.yaml`):
  - Enable rewrite caching and specify the path of the cache location.
  - Specify the logging level.



### NOTE

You can override the YAML configuration settings by invoking the rewriter with the [CLI arguments or environment variables \(page 230\)](#). For example, to prevent any logging to stdout or to disk you could use these overrides:

```
npx -p @contrast/agent --no contrast-transpile index.js --agent.logger.st
```

It is important to use the `-p @contrast/agent --no` options to ensure the **npm** command is the one from Contrast Security and not from a nefarious person attempting a supply chain attack.

- `-p` is the shorthand for `--package`, which tells **npm** to only use the command in the `@contrast/agent` package.
- `--no` is the new option name for the deprecated `--no-install` option that tells **npm** to not attempt an install from npm if the command binary is not found.

The expectation is that the Contrast agent has already been correctly installed along with the **npm** binaries before attempting to run the **npm** command.

- You must also explicitly enable Protect or Assess.

For example:

```

agent:
  logger:
    level: info
    path: ./node-contrast
  node:
    rewrite_cache:
      enable: true
      path: ./rewrite_cache
  assess:
    enable: true
  protect:
    enable: false

```

2. Invoke the executable and provide it with your application's entry point (for example, `index.js`). For example:

```

npx -p @contrast/agent --no contrast-transpile index.js --agent.logger.level trace;
...
trace: 2021-07-12T18:31:15.128Z 2934603 contrast:rewrite - successfully rewrote code
trace: 2021-07-12T18:31:15.186Z 2934603 contrast:rewrite - successfully rewrote code
trace: 2021-07-12T18:31:15.251Z 2934603 contrast:rewrite - successfully rewrote code
trace: 2021-07-12T18:31:15.314Z 2934603 contrast:rewrite - successfully rewrote code
...
info: 2021-07-12T18:31:41.608Z 2946030 contrast:cli-rewriter - rewriting complete [20

```



#### NOTE

The Node.js agent rewriter CLI currently only supports pre-compiling applications to run with Assess enabled. The agent transpiles code differently depending on whether Protect or Assess are enabled. Protect requires fewer source transformations than Assess and does not cause the same startup delays.

3. Once rewriting completes, start your application with Contrast as you usually would. (for example, `node -r @contrast/agent index.js`).

## Use the Node.js agent with ESM

The Contrast Node.js agent provides limited support for using ECMAScript modules (ESM) in Node.js server-side applications. ESM is the [official standard format](#) to package JavaScript client-side code and now Node.js provides support for ESM.

There are two ways to run the Contrast Node.js agent if you are using ESM server-side applications.

- To explicitly assert that the code you're running is ESM and should be run as such, use the MJS file extension. Learn more about [determining a module system wiith file extensions](#) in the Node.js documentation. When you use an MJS extension, Node.js knows that you've written ESM and will parse your JavaScript as such. The same is true for CJS; Node.js knows that a CJS file extension should run as CommonJS, and will parse your JavaScript as CommonJS.
- Otherwise, you can get your Node.js applications to run as ESM rather than CommonJS by including `"type": "module"` in your `package.json`, like this:

```

"main": "index.js",
"type": "module",

```

This specifically tells Node.js to parse your JS files under this `package.json` as ESM. Otherwise, by default (or when you use `"type": "commonjs"`), Node.js will parse your JS files as CommonJS.

**NOTE**

The Contrast Node.js agent does not support ESM Conditional Exports.

ECMAScript instrumentation is experimental and Contrast requires at least Node.js version 14.15.0 for support.

When instrumenting an application that uses ESM (or a combination of both ESM and CJS), start the application like this:

```
Usage: node --experimental-loader @contrast/agent/esm.mjs
app-main.mjs [agent arguments] -- [app arguments]
```

## Transpilers, compilers, source maps and the Node.js agent

The Node.js agent supports applications written in languages that compile to JavaScript, such TypeScript. Although the Node.js agent only instruments JavaScript, you can also use TypeScript if you configure the transpiler to compile your application into JavaScript.

**NOTE**

The source may not correspond directly with the resulting JavaScript. As a result, reported metadata (like `vulnerability line-of-code` and `filename`) references the compiled result, not the original source.

Some languages, like TypeScript, require you to precompile your code before runtime. In these cases, the Node.js agent must point to the compiled entrypoint for your application.

To do this, set up the Node.js agent using the `-r` option:

```
scripts: {
  "test": "...",
  "start": "...",
  "contrast": "node -r @contrast/agent /path/to/transpiled/entrypoint.js"
}
```

## Source maps

With a source map, you can see the corresponding line numbers between the TypeScript source and the transpiled JavaScript.

To use source maps, you must enable the Babel rewriter and rewrite caching in your YAML configuration:

```
agent:
  node:
    rewrite_cache:
      enable: true
      path: ./cache
    enable_babel: true
```

When enabled, the agent looks for source maps (MAP files) in the same directory as the source that's being loaded (for example, if the file `/home/app/index.js` is loaded, then Contrast looks for `/home/app/index.js.map`).

If you do not already have source maps then it needs to be recompiled using the necessary flags to produce source maps. This is different for every transpiler, so check the options for your transpiler. For example, for TypeScript, append the `--source-map` flag to the TypeScript compiler (tsc) or add the `"sourceMap": true` entry to the `"compilerOptions"` section in `tsconfig.json`.

## Node.js telemetry

The Node.js agent uses telemetry to collect usage data. Telemetry is collected when an instrumented application first loads the agent's sensors. Currently, data is only sent at startup. In the future, the agent will be able to send errors and metrics when the instrumented app is running and being exercised.

[Your privacy is important to us \(page 754\)](#). The telemetry feature does not collect application data. The data is anonymized before being sent securely to Contrast. Then the aggregated data is stored encrypted and under restricted access control. Any collected data will be deleted after one year.

The telemetry feature collects the following data:

Agent versions	Data
@contrast/agent 4.12.0 and later	Agent version
	Operating system and version
	Node.js version
	Is the app running in a container (Y/N)

To opt-out of the telemetry feature, set the `CONTRAST_AGENT_TELEMETRY_OPTOUT` environment variable to `1` or `true`.

Telemetry data is securely sent to <http://telemetry.nodejs.contrastsecurity.com>. You can also opt-out of telemetry by blocking communication at the network level.

## PHP agent

The Contrast PHP agent analyzes PHP web applications at runtime for library usage and vulnerability detection. The PHP agent is implemented as a PHP extension.



### NOTE

The PHP agent currently supports Assess and SCA only.

As a next step, you can:

- [Install the PHP agent \(page 262\)](#)
- [View PHP agent system requirements \(page 262\)](#)
- [View PHP agent supported technologies \(page 261\)](#)

## PHP agent supported technologies

We support the following technologies for this agent.

Technology	Supported versions	Notes
Language version	• 7.4, 8.0, 8.1 (NTS)	The agent depends on the <code>mbstring</code> and <code>curl</code> extensions.

Technology	Supported versions	Notes
Operating systems	<ul style="list-style-type: none"> <li>Debian</li> <li>RHEL/CentOS</li> </ul>	
Application frameworks	<ul style="list-style-type: none"> <li>Laravel</li> <li>Symfony</li> <li>Drupal 8, 9</li> </ul>	
Processor architecture	<ul style="list-style-type: none"> <li>AMD64</li> </ul>	
Servers	<ul style="list-style-type: none"> <li>Apache</li> </ul>	Other servers using <code>mod_php</code> or <code>php-fpm</code> may work but are not currently supported.
Package manager	<ul style="list-style-type: none"> <li>Composer</li> </ul>	Supported by SCA analysis.

## PHP agent system requirements

Before installing the PHP agent, your system must meet the following requirements:

Requirement	Version	Notes
Runtime system	<ul style="list-style-type: none"> <li>64-bit Linux</li> </ul>	

## Install the PHP agent

A basic installation of the PHP agent looks like this:

1. Install the agent package.
2. Download the `contrast_security.yaml` and place it in the proper path.
3. Configure the PHP interpreter to enable the Contrast agent extension.
4. Exercise and test your application.
5. Verify that Contrast sees your application.

For specific installation instructions, select one of the following options:

- [Install PHP with Debian \(page 262\)](#)
- [Install PHP with RPM \(page 263\)](#)

## Install PHP agent with Debian

### Steps

To install the PHP agent:

1. Install the agent package from `https://pkg.contrastsecurity.com`. This command registers our package repository in your system:

```
curl \
  https://pkg.contrastsecurity.com/api/gpg/key/public | sudo apt-key add -

echo "deb https://pkg.contrastsecurity.com/debian-public/ $(sed -rne 's/^VERSION_CODE'
  | sudo tee /etc/apt/sources.list.d/contrast.list

echo "deb https://pkg.contrastsecurity.com/debian-public/ all contrast" \
  | sudo tee -a /etc/apt/sources.list.d/contrast.list
```

2. Once complete, use this command to install the agent:

```
sudo apt-get update && sudo apt-get install contrast-php-agent
```

**NOTE**

Once PHP is configured to use the extension, it will be used whenever the interpreter is executed. This step should be delayed until immediately before the application itself is run. This will prevent any unexpected behavior when running artisan or other PHP commands.

3. Locate the PHP configuration file, called `php.ini` and on many systems it can be found under `/usr/local/etc/php/`.

If the `php-config` command is available, it can be used to find the configuration file path using `php-config --ini-path`. If no configuration file yet exists under that path, it will need to be created.

4. Edit your PHP configuration file:

```
echo "extension=/usr/local/lib/contrast/php/contrast.so" >> `php-config --ini-path`/php.ini
```

5. [Configure the PHP agent \(page 264\)](#) using the [PHP YAML template \(page 265\)](#) or environment variables.
6. Start your application in the normal way.
7. Exercise and test your application.
8. Verify that the PHP agent is running by checking the Contrast UI and/or looking for PHP agent log output (depending on configuration).

**Notes**

- It is possible to use the agent with the PHP CLI by adding a flag to the command line:

```
php -d extension=/usr/local/lib/contrast/php/contrast.so
```

- Library analysis and route discovery is currently performed on the first request to the application. For this reason we expect the first request to be considerably slower than subsequent requests.
- The agent has not been tested with third-party PHP extensions. The behavior of the agent when any other third-party extensions (including xdebug, APMs, etc.) is undefined.
- The agent may not work properly when preloading is enabled. Disabling preloading when using the agent is recommended.
- By default the agent assumes that the server's working directory when it runs the PHP application is the same as the top level directory of the application source tree. The agent uses this path to perform library analysis and route discovery. If this is not the case, you will need to use the `application.path` setting in the configuration to set the top-level working directory of your application.

**Install PHP agent with Red Hat Package Manager (RPM)****Steps**

To install the PHP agent:

1. Install the agent package from <https://pkg.contrastsecurity.com>. Use this script in your shell to configure your RPM-based system for our package repository. You may need `sudo` permissions.

```
tee /etc/yum.repos.d/contrast.repo <<-"EOF"
[contrast]
name=Contrast centos-$releasever repo
baseurl=https://pkg.contrastsecurity.com/rpm-public/centos-$releasever/
gpgcheck=0
enabled=1
EOF
```

2. Once complete, use this command to install the agent and service:

```
sudo yum install contrast-php-agent
```



#### NOTE

Once PHP is configured to use the extension, it will be used whenever the interpreter is executed. This step should be delayed until immediately before the application itself is run. This will prevent any unexpected behavior when running artisan or other PHP commands.

3. Locate the PHP configuration file, called `php.ini` and on many systems it can be found under `/usr/local/etc/php/`.

If the `php-config` command is available, it can be used to find the configuration file path using `php-config --ini-path`. If no configuration file yet exists under that path, it will need to be created.

4. Edit your PHP configuration file:

```
echo "extension=/usr/local/lib/contrast/php/contrast.so" >> `php-config --ini-path`/php.ini
```

5. [Configure the PHP agent \(page 264\)](#) using the [PHP YAML template \(page 265\)](#) or environment variables.
6. Start your application in the normal way.
7. Exercise and test your application.
8. Verify that the PHP agent is running by checking the Contrast UI and/or looking for PHP agent log output (depending on configuration).

#### Notes

- It is possible to use the agent with the PHP CLI by adding a flag to the command line:

```
php -d extension=/usr/local/lib/contrast/php/contrast.so
```

- Library analysis and route discovery is currently performed on the first request to the application. For this reason we expect the first request to be considerably slower than subsequent requests.
- The agent has not been tested with third-party PHP extensions. The behavior of the agent when any other third-party extensions (including xdebug, APMs, etc.) is undefined.
- The agent may not work properly when preloading is enabled. Disabling preloading when using the agent is recommended.
- By default the agent assumes that the server's working directory when it runs the PHP application is the same as the top level directory of the application source tree. The agent uses this path to perform library analysis and route discovery. If this is not the case, you will need to use the `application.path` setting in the configuration to set the top-level working directory of your application.

#### Configure the PHP agent

The [standard configuration \(page 30\)](#) for all agents uses this [order of precedence \(page 31\)](#).

You may use a YAML configuration file or environment variables to configure the agent when running your application:

- You can create your own YAML configuration file or use this [YAML template \(page 265\)](#) that contains all valid properties for the PHP agent,
- or you can use [environment variables \(page 49\)](#) to configure your build.



#### TIP

Use the [Contrast agent configuration editor \(page 34\)](#) to create or upload a YAML configuration file, validate YAML and get setting recommendations.



## PHP YAML template

Use this template to configure the PHP agent using a YAML configuration file. (Learn more about [YAML configuration \(page 33\)](#).)

Place your YAML file in the working directory of your application or in the default location: `/etc/contrast/contrast_security.yaml`

```
# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

  # ***** REQUIRED *****
  # Set the URL for the Contrast UI.
  url: https://app.contrastsecurity.com/Contrast

  # ***** REQUIRED *****
  # Set the API key needed to communicate with the Contrast UI.
  api_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the service key needed to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  service_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the user name used to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  user_name: NEEDS_TO_BE_SET

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

  # If set to `false`, the agent will ignore the
  # certificate configuration in this section.
  # enable: true

  # Set the absolute or relative path to a CA for communication
  # with the Contrast UI using a self-signed certificate.
  # ca_file: NEEDS_TO_BE_SET
```

```

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate
# with the Contrast web interface over a proxy. Set
# value to `false` if you don't want to use the proxy.
# enable: NEEDS_TO_BE_SET

# Set the proxy host. It must be set with port and scheme.
# host: localhost

# Set the proxy port. It must be set with host and scheme.
# port: 1234

# Set the proxy scheme (e.g., `http` or
# `https`). It must be set with host and port.
# scheme: http

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# Set the proxy user.
# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.

```

```

#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====
# agent.service
# The following properties are used by the Contrast Service.
# =====
service:

# Set to `false` to disallow the service to be started, and
# effectively disable the agent, if read by the service. If the
# agent reads this property, it disallows service auto-start.
# enable: true

# Set to `true` to enable listening for gRPC connections.
# The `socket`, `host` and `port` fields will be used for
# configuring the gRPC server in place of the legacy RPC server.
# grpc: false

# If this property is defined, the service is
# listening on a Unix socket at the defined path.
# socket: /tmp/service.sock

# ***** REQUIRED *****
# Set the the hostname or IP address of the Contrast
# service to which the Contrast agent should report.
host: localhost

# ***** REQUIRED *****
# Set the the port of the Contrast service
# to which the Contrast agent should report.
port: 30555

```

```

# ***** REQUIRED *****
# Timeout (in milliseconds) that the agent-init
# should wait for the contrast-service
timeout_ms: 30000

# Set to `true` to enable direct communication with Teamsserver.
# bypass: false

# =====
# agent.service.logger
# The following properties are used by the logger in the
# Contrast service. If the properties are not defined, the
# service uses the logging values from the Contrast UI.
# =====
# logger:

# Set the location to which the Contrast service saves log output.
# If no log file exists at this location, the service creates one.
#
# Example - `/opt/Contrast/contrast_service.log` will
# create a log in the `/opt/Contrast` directory.
#
# path: ./contrast_service.log

# Set the the log output level. Options are `OFF`, `FATAL`,
# `ERROR`, `WARN`, `INFO`, `DEBUG`, `TRACE`, and `ALL`.
# level: ERROR

# Override the name of the process used in logs.
# progname: Contrast Service

# Set to `true` to send log output to `stdout`.
# stdout: false

# =====
# agent.go
# The following properties apply to any Go agent-wide configurations.
# =====
# go:

# Enable opt-in Go agent features.
# preview: NEEDS_TO_BE_SET

# Enable Go agent self-profiling features.
# profile: NEEDS_TO_BE_SET

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

```

```

# Set to `false` to disable library analysis.
# analyze_libraries: true

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#

```

```

# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====

```

```

# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

# ***** REQUIRED *****
# Set the URL for the Contrast UI.
url: https://app.contrastsecurity.com/Contrast

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

```

```

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate
# with the Contrast web interface over a proxy. Set
# value to `false` if you don't want to use the proxy.
# enable: NEEDS_TO_BE_SET

# Set the proxy host. It must be set with port and scheme.
# host: localhost

# Set the proxy port. It must be set with host and scheme.
# port: 1234

# Set the proxy scheme (e.g., `http` or
# `https`). It must be set with host and port.
# scheme: http

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# Set the proxy user.
# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# =====

```



```

# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====
# agent.service
# The following properties are used by the Contrast Service.
# =====
service:

# Set to `false` to disallow the service to be started, and
# effectively disable the agent, if read by the service. If the
# agent reads this property, it disallows service auto-start.
# enable: true

# Set to `true` to enable listening for gRPC connections.
# The `socket`, `host` and `port` fields will be used for
# configuring the gRPC server in place of the legacy RPC server.

```

```

# grpc: false

# If this property is defined, the service is
# listening on a Unix socket at the defined path.
# socket: /tmp/service.sock

# ***** REQUIRED *****
# Set the the hostname or IP address of the Contrast
# service to which the Contrast agent should report.
host: localhost

# ***** REQUIRED *****
# Set the the port of the Contrast service
# to which the Contrast agent should report.
port: 30555

# ***** REQUIRED *****
# Timeout (in milliseconds) that the agent-init
# should wait for the contrast-service
timeout_ms: 30000

# Set to `true` to enable direct communication with Teamsserver.
# bypass: false

# =====
# agent.service.logger
# The following properties are used by the logger in the
# Contrast service. If the properties are not defined, the
# service uses the logging values from the Contrast UI.
# =====
# logger:

# Set the location to which the Contrast service saves log output.
# If no log file exists at this location, the service creates one.
#
# Example - `/opt/Contrast/contrast_service.log` will
# create a log in the `/opt/Contrast` directory.
#
# path: ./contrast_service.log

# Set the the log output level. Options are `OFF`, `FATAL`,
# `ERROR`, `WARN`, `INFO`, `DEBUG`, `TRACE`, and `ALL`.
# level: ERROR

# Override the name of the process used in logs.
# progname: Contrast Service

# Set to `true` to send log output to `stdout`.
# stdout: false

# =====
# agent.go
# The following properties apply to any Go agent-wide configurations.
# =====
# go:

```

```

# Enable opt-in Go agent features.
# preview: NEEDS_TO_BE_SET

# Enable Go agent self-profiling features.
# profile: NEEDS_TO_BE_SET

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Set to `false` to disable library analysis.
# analyze_libraries: true

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

```

```
# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
```

```

# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

```

### PHP YAML template

Use this template to configure the PHP agent using a YAML configuration file. (Learn more about [YAML configuration \(page 33\)](#).)

Place your YAML file in the working directory of your application or in the default location: `/etc/contrast/contrast_security.yaml`

```

# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====

```

```

# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

# ***** REQUIRED *****
# Set the URL for the Contrast UI.
url: https://app.contrastsecurity.com/Contrast

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate
# with the Contrast web interface over a proxy. Set
# value to `false` if you don't want to use the proxy.
# enable: NEEDS_TO_BE_SET

# Set the proxy host. It must be set with port and scheme.
# host: localhost

# Set the proxy port. It must be set with host and scheme.
# port: 1234

```

```

# Set the proxy scheme (e.g., `http` or
# `https`). It must be set with host and port.
# scheme: http

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# Set the proxy user.
# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

```

```

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====
# agent.service
# The following properties are used by the Contrast Service.
# =====
service:

# Set to `false` to disallow the service to be started, and
# effectively disable the agent, if read by the service. If the
# agent reads this property, it disallows service auto-start.
# enable: true

# Set to `true` to enable listening for gRPC connections.
# The `socket`, `host` and `port` fields will be used for
# configuring the gRPC server in place of the legacy RPC server.
# grpc: false

# If this property is defined, the service is
# listening on a Unix socket at the defined path.
# socket: /tmp/service.sock

# ***** REQUIRED *****
# Set the the hostname or IP address of the Contrast
# service to which the Contrast agent should report.
host: localhost

# ***** REQUIRED *****
# Set the the port of the Contrast service
# to which the Contrast agent should report.
port: 30555

# ***** REQUIRED *****
# Timeout (in milliseconds) that the agent-init
# should wait for the contrast-service
timeout_ms: 30000

# Set to `true` to enable direct communication with Teamserver.
# bypass: false

# =====
# agent.service.logger
# The following properties are used by the logger in the
# Contrast service. If the properties are not defined, the
# service uses the logging values from the Contrast UI.
# =====
# logger:

# Set the location to which the Contrast service saves log output.

```



```

# If no log file exists at this location, the service creates one.
#
# Example - `/opt/Contrast/contrast_service.log` will
# create a log in the `/opt/Contrast` directory.
#
# path: ./contrast_service.log

# Set the the log output level. Options are `OFF`, `FATAL`,
# `ERROR`, `WARN`, `INFO`, `DEBUG`, `TRACE`, and `ALL`.
# level: ERROR

# Override the name of the process used in logs.
# progname: Contrast Service

# Set to `true` to send log output to `stdout`.
# stdout: false

# =====
# agent.go
# The following properties apply to any Go agent-wide configurations.
# =====
# go:

# Enable opt-in Go agent features.
# preview: NEEDS_TO_BE_SET

# Enable Go agent self-profiling features.
# profile: NEEDS_TO_BE_SET

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Set to `false` to disable library analysis.
# analyze_libraries: true

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`

```

```

#
# tags: NEEDS_TO_BE_SET

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

```

```
# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
```

```

#
# tags: NEEDS_TO_BE_SET

# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

  # ***** REQUIRED *****
  # Set the URL for the Contrast UI.
  url: https://app.contrastsecurity.com/Contrast

  # ***** REQUIRED *****
  # Set the API key needed to communicate with the Contrast UI.
  api_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the service key needed to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  service_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the user name used to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  user_name: NEEDS_TO_BE_SET

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

  # If set to `false`, the agent will ignore the
  # certificate configuration in this section.
  # enable: true

  # Set the absolute or relative path to a CA for communication
  # with the Contrast UI using a self-signed certificate.
  # ca_file: NEEDS_TO_BE_SET

# =====
# api.proxy

```

```

# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate
# with the Contrast web interface over a proxy. Set
# value to `false` if you don't want to use the proxy.
# enable: NEEDS_TO_BE_SET

# Set the proxy host. It must be set with port and scheme.
# host: localhost

# Set the proxy port. It must be set with host and scheme.
# port: 1234

# Set the proxy scheme (e.g., `http` or
# `https`). It must be set with host and port.
# scheme: http

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# Set the proxy user.
# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

```

```

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====
# agent.service
# The following properties are used by the Contrast Service.
# =====
service:

# Set to `false` to disallow the service to be started, and
# effectively disable the agent, if read by the service. If the
# agent reads this property, it disallows service auto-start.
# enable: true

# Set to `true` to enable listening for gRPC connections.
# The `socket`, `host` and `port` fields will be used for
# configuring the gRPC server in place of the legacy RPC server.
# grpc: false

# If this property is defined, the service is
# listening on a Unix socket at the defined path.
# socket: /tmp/service.sock

# ***** REQUIRED *****
# Set the the hostname or IP address of the Contrast
# service to which the Contrast agent should report.
host: localhost

# ***** REQUIRED *****
# Set the the port of the Contrast service
# to which the Contrast agent should report.
port: 30555

# ***** REQUIRED *****
# Timeout (in milliseconds) that the agent-init

```

```

# should wait for the contrast-service
timeout_ms: 30000

# Set to `true` to enable direct communication with Teamsserver.
# bypass: false

# =====
# agent.service.logger
# The following properties are used by the logger in the
# Contrast service. If the properties are not defined, the
# service uses the logging values from the Contrast UI.
# =====
# logger:

# Set the location to which the Contrast service saves log output.
# If no log file exists at this location, the service creates one.
#
# Example - `/opt/Contrast/contrast_service.log` will
# create a log in the `/opt/Contrast` directory.
#
# path: ./contrast_service.log

# Set the the log output level. Options are `OFF`, `FATAL`,
# `ERROR`, `WARN`, `INFO`, `DEBUG`, `TRACE`, and `ALL`.
# level: ERROR

# Override the name of the process used in logs.
# progname: Contrast Service

# Set to `true` to send log output to `stdout`.
# stdout: false

# =====
# agent.go
# The following properties apply to any Go agent-wide configurations.
# =====
# go:

# Enable opt-in Go agent features.
# preview: NEEDS_TO_BE_SET

# Enable Go agent self-profiling features.
# profile: NEEDS_TO_BE_SET

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Set to `false` to disable library analysis.
# analyze_libraries: true

```

```

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.

```



```

#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.

```

```
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET
```

## Python agent

The Python agent is a WSGI- and framework-specific middleware that's compatible with the most popular web application frameworks. The agent's goal is to be fully WSGI compatible, along with other web frameworks, and to provide applications built on WSGI or those frameworks with interactive application security testing (IAST) and runtime application self-protection (RASP) capabilities.

In Assess, the agent identifies vulnerable dataflow paths and other issues during the normal execution of your application. It reports these findings to your organization in Contrast; you can then remediate the vulnerabilities before deploying the application in a live environment.

In Protect, the Python agent inspects HTTP requests to identify potentially harmful input vectors. During the request, the agent inspects database queries, file writes and other potentially damaging actions resulting from the request. At the end of the request, the agent inspects the rendered output for successful attacks and can block a successful attack from being forwarded to the application user. The service sends the details of the attack to the Contrast application, which then sends you an alert and displays attack details in the interface.



### NOTE

The Python agent supports Assess, Protect, and SCA.

As a next step, you can:

- [Install the agent \(page 292\)](#)
- [View supported technologies for the Python agent \(page 291\)](#)

## System requirements for the Python agent



### WARNING

The Python agent does not currently support running on Macs with the M1 chip.

Before installing the Python agent, your system must meet the following requirements:

- There is a deployed application to be analyzed, and the web application technology is supported by Contrast.
- The application can be restarted.
- The web server has network connectivity with Contrast.
- The web server has network connectivity with PyPI or the agent manually installed.
- The server meets the minimum requirements shown in this table.

Requirement	Versions	Notes
Operating system	<ul style="list-style-type: none"> <li>• 64-bit OSX</li> <li>• 64-bit Linux</li> </ul>	<p>Starting with version 2.3.0 of the agent, the package installation step requires the compilation of C extensions. This process is automatic, but it requires that certain software is installed in the target environment:</p> <ul style="list-style-type: none"> <li>• Required: <code>gcc</code>, <code>make</code>, <code>automake</code> and <code>autoconf</code>. The package names may be different on different platforms. Installing your platform's version of <code>build-essential</code> or installing system headers may be necessary. If running an agent on Alpine OS, <code>libtool</code> is required.</li> </ul>
Python packages	<ul style="list-style-type: none"> <li>• <code>protobuf</code>: 3.12 and later</li> <li>• <code>psutil</code>: 5.7 and later</li> <li>• <code>pip</code>: 6 and later</li> </ul>	

## Supported technologies for the Python agent

We support the following technologies for this agent.

Technology	Supported versions	Notes
Language version	<ul style="list-style-type: none"> <li>• 3.11.X: First supported agent was 5.19.0</li> <li>• 3.10.X: First supported agent was 5.2.0</li> <li>• 3.9.X: First supported agent was 4.2.0</li> <li>• 3.8.X: First supported agent was 2.8.0</li> <li>• 3.7.X: First supported agent was 1.5.0</li> </ul>	<p>Contrast supports Python Long-Term Support (LTS) versions in <b>bugfix</b> and <b>security</b> status. Support for Python versions is shifted as the working group <a href="#">shifts its LTS window</a>.</p> <p><b>Not supported:</b></p> <ul style="list-style-type: none"> <li>• 3.6.X, 3.5X and 2.7.X: Last supported agent was 4.14.3</li> </ul>
Application frameworks	<ul style="list-style-type: none"> <li>• <code>Aiohttp</code> 3.7 and later</li> <li>• <code>Bottle</code>: 0.11, 0.12</li> <li>• <code>Django</code>: 1.11, 2.X, 3.X and 4.X</li> <li>• <code>Django Rest Framework</code>: 3.12 and later</li> <li>• <code>Falcon (ASGI)</code>: 3.0, 3.1</li> <li>• <code>Falcon (WSGI)</code> 2.X and 3.X</li> <li>• <code>FastAPI</code>: 0.68* - 0.95*</li> <li>• <code>Flask</code>: 1.X, 2.X</li> <li>• <code>Pyramid</code>: 1.10 and 2.X</li> <li>• <code>Quart</code>: 0.15 and later</li> </ul>	<p>The Python agent is meant to be WSGI compatible. It may be compatible to other WSGI applications as long as the guidelines are followed.</p> <p>The Agent is also ASGI compatible for the FastAPI framework only.</p> <p>* FastAPI and Starlette (on which FastAPI depends) are relatively new libraries that are undergoing continuous development changes which may break Contrast support. FastAPI states that <a href="#">development moves quickly</a>. Contrast will maintain support up to the stated version and update documentation when new support is released.</p>
Processor architecture	The agent is tested on <code>x86_64</code>	It may work on other architectures but it isn't officially supported.
Web servers	<ul style="list-style-type: none"> <li>• <code>Gunicorn</code> 0.16.1 –20.1.X</li> <li>• <code>uWSGI</code> 2.0.14 - 2.0.X</li> <li>• <code>Uvicorn</code>: 0.14* - 0.17*</li> </ul>	
Databases	<ul style="list-style-type: none"> <li>• <code>Mongo</code> (<code>pymongo</code>)</li> <li>• <code>MySQL</code> (<code>PyMySQL</code> and <code>mysql-connector</code>)</li> <li>• <code>PostgreSQL</code> (<code>psycopg2</code>)</li> <li>• <code>SQLite3</code> (<code>sqlite3</code> and <code>pysqlite2</code>)</li> </ul>	
Object-relational mapping databases (ORM)	<ul style="list-style-type: none"> <li>• <code>Flask-SQLAlchemy</code></li> <li>• <code>SQLAlchemy</code></li> </ul>	

## Install the Python agent

The Python agent is installed as a standard Python package.

In earlier versions (before version 5.19.0), the Python Agent uses the Contrast Service to communicate its results. By default, the service is started automatically when your application starts. It is also possible to configure the agent to communicate with a standalone [Contrast service \(page 415\)](#) that runs independently.

In version 5.19.0 and later, the Python Agent does not use the Contrast Service.

[Install the agent with PyPi \(page 292\)](#) or [update the Python agent \(page 292\)](#).



### WARNING

The Python agent does not currently support running on Macs with the M1 chip.

## Install the Python agent with PyPI

To install the Python agent with [PyPI](#):

1. Install the agent using pip.

```
pip install contrast-agent
```



### TIP

If you have a `requirements.txt` file, you can add `contrast-agent` to that file, and install with `pip install -r requirements.txt`.

2. [Configure middleware. \(page 315\)](#)
3. [Configure the agent. \(page 293\)](#)
4. Verify that `autoconf` is installed on the system where you will run the agent.
5. Start and exercise your application as normal.
6. Verify that your server is registered in Contrast and that it reports an instance of your application.

## Python update agent

The most reliable and effective way to automatically update the Contrast Python agent is to use the Python `pip` package installer to install and download the latest version available. Because `pip` manages all dependencies for your Python application, it should already be available and part of your build environment. How frequently you update the Contrast Python agent and where you get updates depends on your organization's preferences and your Contrast implementation: hosted or on-premises.

The main steps are:

1. Choose a source for the Contrast Python agent.
2. Install the agent.
3. Use scripts for automatic updates.

## Before you begin

- Access to the PyPI repository for the Contrast agent.
- Confirmed that your Python application runs properly without the Contrast Python agent.

- Previously successfully installed the Contrast Python agent.
- Defined a policy for how and when to update the agent, based on your change management policy and the environment where you deploy agents.

## Install the agent and use scripts for automatic updates

1. Choose a source for the Python agent:
  - PyPI public (or private) repository
2. Specify the Contrast Python agent as a dependency in `requirements.txt`.  
`requirements.txt` is the file where you specify which dependencies you want to automatically resolve every time your Python application builds with artifacts from PyPI (public or private). Include the Contrast Python agent here to easily keep every new build of your application aligned with the latest version of the agent. Do not specify a version for `contrast-agent`, and it will retrieve the latest version.
3. After you update `requirements.txt`, use the following command when you build your application. This will automatically download and add or update the Contrast Python agent from PyPI to the Python application:

```
$ pip install -U -r requirements.txt
```

## Install and update manually

For some organizations, the `requirements.txt` file must be consistent across environments, or they do not plan to install the Contrast Python agent into all environments. In these cases, install the agent manually. You can manually update agents as part of a Python build process.

1. Choose a source for the Python agent:
  - PyPI public (or private) repository
2. Use the following command to manually retrieve and add or update the Contrast Python agent from PyPI (public or private) to the Python application:

```
$ pip install -U contrast-agent
```

## See also

- [Python supported technologies \(page 291\)](#)
- [Install Python \(page 292\)](#)

## Configure the Python agent

The [standard configuration \(page 30\)](#) for all agents uses this [order of precedence \(page 31\)](#).

Additionally, you must [configure middleware \(page 315\)](#) and configure the Python agent with a YAML configuration file.

## Contrast Service Configuration (before version 5.19.0 only)

In earlier versions (before version 5.19.0), the Python agent launches an executable on startup that also needs access to the configuration files. Since the service is generally launched by the Python agent process, it has access to the same configuration file as the agent. However, if the service is started independently, it will attempt to use the same [order of precedence \(page 31\)](#) for its configuration file.

In other words, the service can share the application's configuration file, if (as is usually the case) the service's working directory is also the base directory of the application. Both the agent and the service use the `/etc/contrast/contrast_security.yaml` path.



**TIP**

Use the [Contrast agent configuration editor \(page 34\)](#) to create or upload a YAML configuration file, validate YAML, and get setting recommendations.

**Python YAML template**

Use this template to configure the Python agent using a YAML configuration file. (Learn more about [YAML configuration \(page 33\)](#).)

Place your YAML file in the default location: `/etc/contrast/contrast_security.yaml`

```
# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

  # ***** REQUIRED *****
  # Set the URL for the Contrast UI.
  url: https://app.contrastsecurity.com/Contrast

  # ***** REQUIRED *****
  # Set the API key needed to communicate with the Contrast UI.
  api_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the service key needed to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  service_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the user name used to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  user_name: NEEDS_TO_BE_SET

  # Set the path to which the agent should store the
  # currently used configuration from the Contrast UI.
  # last_config_path: ./tmp/config

# =====
# api.certificate
# Use the following properties for communication
```

```

# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Certificate
# PEM file for communication with the Contrast UI.
# cert_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Key PEM
# file for communication with the Contrast UI.
# key_file: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid contrast.proxy.host
# and contrast.proxy.port will enable the proxy.
# enable: NEEDS_TO_BE_SET

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here

```

```

# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Override the name of the process the agents uses in logs.
# progname: Contrast Agent

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# Change the Contrast security logger from a file-sized based rolling
# scheme to a date-based rolling scheme. At midnight server time,
# the log from the previous day is renamed to *file_name.yyyy-MM-dd*.
# Note - this scheme does not have a size limit; manual log
# pruning will be required. This flag must be set to use the
# backups and size flags. Value options are `true` or `false`.
# roll_daily: NEEDS_TO_BE_SET

# Specify the file size cap (in MB) of each log file.
# roll_size: NEEDS_TO_BE_SET

# Specify the number of backup logs that the agent will create before
# Contrast cleans up the oldest file. A value of `0` means that no backups
# are created, and the log is truncated when it reaches its size cap.
#
# Note - this property must be used with
# `agent.security_logger.roll_daily=false`; otherwise,
# Contrast continues to log daily and disregard this limit.
#
# backups: NEEDS_TO_BE_SET

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.

```



```

# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# =====
# agent.service
# The following properties are used by the Contrast Service.
# =====
service:

# Set to `false` to disallow the service to be started, and
# effectively disable the agent, if read by the service. If the
# agent reads this property, it disallows service auto-start.
# enable: true

# If this property is defined, the service is
# listening on a Unix socket at the defined path.
# socket: /tmp/service.sock

# ***** REQUIRED *****
# Set the the hostname or IP address of the Contrast

```

```

# service to which the Contrast agent should report.
host: localhost

# ***** REQUIRED *****
# Set the the port of the Contrast service
# to which the Contrast agent should report.
port: 30555

# =====
# agent.service.teamserver_retry
# The following properties are used by the Teamserver HTTP client
# to configure failed request retrying in the Contrast service.
# =====
# teamserver_retry:

# Enable retrying HTTP requests to the Teamserver endpoint.
# enable: true

# How long to wait between retries in milliseconds.
# interval_ms: 5000

# How many times to retry HTTP requests to Teamserver before giving up.
# max_attempts: 3

# =====
# agent.service.logger
# The following properties are used by the logger in the
# Contrast service. If the properties are not defined, the
# service uses the logging values from the Contrast UI.
# =====
# logger:

# Set the location to which the Contrast service saves log output.
# If no log file exists at this location, the service creates one.
#
# Example - `/opt/Contrast/contrast_service.log` will
# create a log in the `/opt/Contrast` directory.
#
# path: ./contrast_service.log

# Set the the log output level. Options are `OFF`, `FATAL`,
# `ERROR`, `WARN`, `INFO`, `DEBUG`, `TRACE`, and `ALL`.
# level: ERROR

# Override the name of the process used in logs.
# progname: Contrast Service

# Set to `true` to send log output to `stdout`.
# stdout: false

# =====
# agent.python
# The following properties apply to any Python agent-wide configurations.
# =====
# python:

```

```

# Allow the agent to dump `cProfile` data to file for each request.
# enable_profiler: false

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Set to `false` to disable library analysis.
# analyze_libraries: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# Value options are `ALL`, `SOME`, or `NONE`.
# stacktraces: ALL

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

```

```

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.

```

```

# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Tell the agent to detect when semantic analysis of the query
# reveals tautologies used in exfiltration attacks (e.g., "or
# 1=1" or "or 2<>3"). The agent blocks if blocking is enabled.
# detect_tautologies: true

# Tell the agent to detect when semantic analysis of the query
# reveals the invocation of dangerous functions typically used in
# weaponized exploits. The agent blocks if blocking is enabled.
# detect_dangerous_functions: true

# Tell the agent to detect when semantic analysis of the query
# reveals chained queries, which is uncommon in normal usage but
# common in exploit. The agent blocks if blocking is enabled.
# detect_chained_queries: true

# Tell the agent to detect when semantic analysis of the query
# reveals database queries are being made for system tables and
# sensitive information. The agent blocks if blocking is enabled.
# detect_suspicious_unions: true

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.

```

```

#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Detect when custom code attempts to access sensitive
# system files. The agent blocks if blocking is enabled.
# detect_custom_code_accessing_system_files: true

# Detect when users attempt to bypass filters by
# using "::$DATA" channels or null bytes in file
# names. The agent blocks if blocking is enabled.
# detect_common_file_exploits: true

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#

```

```
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
```

```

# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

# ***** REQUIRED *****
# Set the URL for the Contrast UI.
url: https://app.contrastsecurity.com/Contrast

```



```

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

# Set the path to which the agent should store the
# currently used configuration from the Contrast UI.
# last_config_path: ./tmp/config

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Certificate
# PEM file for communication with the Contrast UI.
# cert_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Key PEM
# file for communication with the Contrast UI.
# key_file: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid **contrast.proxy.host**
# and **contrast.proxy.port** will enable the proxy.
# enable: NEEDS_TO_BE_SET

```

```

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Override the name of the process the agents uses in logs.
# progname: Contrast Agent

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# Change the Contrast security logger from a file-sized based rolling
# scheme to a date-based rolling scheme. At midnight server time,
# the log from the previous day is renamed to *file_name.yyyy-MM-dd*.

```

```

# Note - this scheme does not have a size limit; manual log
# pruning will be required. This flag must be set to use the
# backups and size flags. Value options are `true` or `false`.
# roll_daily: NEEDS_TO_BE_SET

# Specify the file size cap (in MB) of each log file.
# roll_size: NEEDS_TO_BE_SET

# Specify the number of backup logs that the agent will create before
# Contrast cleans up the oldest file. A value of `0` means that no backups
# are created, and the log is truncated when it reaches its size cap.
#
# Note - this property must be used with
# `agent.security_logger.roll_daily=false`; otherwise,
# Contrast continues to log daily and disregard this limit.
#
# backups: NEEDS_TO_BE_SET

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

```

```

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# =====
# agent.service
# The following properties are used by the Contrast Service.
# =====
service:

# Set to `false` to disallow the service to be started, and
# effectively disable the agent, if read by the service. If the
# agent reads this property, it disallows service auto-start.
# enable: true

# If this property is defined, the service is
# listening on a Unix socket at the defined path.
# socket: /tmp/service.sock

# ***** REQUIRED *****
# Set the the hostname or IP address of the Contrast
# service to which the Contrast agent should report.
host: localhost

# ***** REQUIRED *****
# Set the the port of the Contrast service
# to which the Contrast agent should report.
port: 30555

# =====
# agent.service.teamserver_retry
# The following properties are used by the Teamserver HTTP client
# to configure failed request retrying in the Contrast service.
# =====
# teamserver_retry:

# Enable retrying HTTP requests to the Teamserver endpoint.
# enable: true

# How long to wait between retries in milliseconds.
# interval_ms: 5000

# How many times to retry HTTP requests to Teamserver before giving up.
# max_attempts: 3

# =====
# agent.service.logger
# The following properties are used by the logger in the
# Contrast service. If the properties are not defined, the
# service uses the logging values from the Contrast UI.
# =====
# logger:

# Set the location to which the Contrast service saves log output.

```

```

# If no log file exists at this location, the service creates one.
#
# Example - `/opt/Contrast/contrast_service.log` will
# create a log in the `/opt/Contrast` directory.
#
# path: ./contrast_service.log

# Set the the log output level. Options are `OFF`, `FATAL`,
# `ERROR`, `WARN`, `INFO`, `DEBUG`, `TRACE`, and `ALL`.
# level: ERROR

# Override the name of the process used in logs.
# progname: Contrast Service

# Set to `true` to send log output to `stdout`.
# stdout: false

# =====
# agent.python
# The following properties apply to any Python agent-wide configurations.
# =====
# python:

# Allow the agent to dump `cProfile` data to file for each request.
# enable_profiler: false

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Set to `false` to disable library analysis.
# analyze_libraries: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

```

```

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# Value options are `ALL`, `SOME`, or `NONE`.
# stacktraces: ALL

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====

```

```

# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Tell the agent to detect when semantic analysis of the query
# reveals tautologies used in exfiltration attacks (e.g., "or
# 1=1" or "or 2<>3"). The agent blocks if blocking is enabled.
# detect_tautologies: true

# Tell the agent to detect when semantic analysis of the query
# reveals the invocation of dangerous functions typically used in
# weaponized exploits. The agent blocks if blocking is enabled.
# detect_dangerous_functions: true

# Tell the agent to detect when semantic analysis of the query
# reveals chained queries, which is uncommon in normal usage but
# common in exploit. The agent blocks if blocking is enabled.
# detect_chained_queries: true

# Tell the agent to detect when semantic analysis of the query
# reveals database queries are being made for system tables and
# sensitive information. The agent blocks if blocking is enabled.
# detect_suspicious_unions: true

# =====
# protect.rules.cmd-injection

```

```

# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Detect when custom code attempts to access sensitive
# system files. The agent blocks if blocking is enabled.
# detect_custom_code_accessing_system_files: true

# Detect when users attempt to bypass filters by
# using "::$DATA" channels or null bytes in file
# names. The agent blocks if blocking is enabled.
# detect_common_file_exploits: true

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how

```



```
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET
```

```

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#

```

```
# tags: NEEDS_TO_BE_SET
```

## Validate the Python agent configuration

The Python agent includes a script for validating and testing your agent configuration.

### Steps to run the script

1. Install `contrast-agent` version 5.1.0 or later using `pip`.
2. Prepare your Contrast configuration using a [YAML file \(page 294\)](#), [environment variables \(page 49\)](#), or both.
3. Run the command `contrast-validate-config`. This script validates your current configuration and tests your ability to communicate with Contrast.

### See also

- [Configure the Python agent \(page 293\)](#)

## Configure middleware

Middleware is a software component that's part of a web application, and is capable of reading and modifying inbound requests and outbound responses.

The Python agent is implemented as a middleware for all of the frameworks that Contrast supports. To use the Python agent, you must configure the middleware for the framework that your application uses:

### AIOHTTP

AIOHTTP middleware is a class-based middleware that should be passed into the `aiohttp web.Application` constructor as an argument. The following example shows a sample AIOHTTP application that uses the Contrast middleware class:

```
from aiohttp import web
from contrast.aiohttp import ContrastMiddleware

routes = web.RouteTableDef()

@routes.get("/")
def index(request):
    raise web.HTTPFound("/hello")

middlewares = [ContrastMiddleware(app_name="app name")]
app = web.Application(middlewares=middlewares)
app.add_routes(routes)

web.run_app(app)
```

### Bottle

Contrast's Bottle middleware is a WSGI middleware which operates by wrapping the Bottle application instance.

To configure the Python agent for Bottle:

1. Find the Bottle application object in your application codebase. This will be an instance of `bottle.Bottle`.  
A sample Bottle application might look like this, where `app` is your Bottle application object:

```

from bottle import Bottle, run

app = Bottle(__name__)

@app.route("/")
def index():
    return "hello world"

<InstallContrastHere>

run(app)

```

2. Wrap the Bottle application object with Contrast's middleware. In the example above, replace <InstallContrastHere> with:

```

from contrast.bottle import ContrastMiddleware
app = ContrastMiddleware(app)

```



### IMPORTANT

In rare cases, you may be required to pass the original `bottle.Bottle` application instance directly to the `ContrastMiddleware` in addition to your WSGI application object. If the application does not start, find your original Bottle application and pass it to Contrast's middleware. For example:

```

app = ContrastMiddleware(
    app,
    original_bottle_app, # instance of bottle.Bottle
)

```

## Django

### New configuration steps: works with Contrast Python agent versions 4.6.0 and later

Contrast's Django middleware is a WSGI middleware, not a Django-style middleware.

1. Find your WSGI application object. The `WSGI_APPLICATION` Django configuration option points to your project's WSGI app - this is often located in `wsgi.py`. You must set the `WSGI_APPLICATION` config option if it is not already set.

A sample `wsgi.py` might look like this, where `application` is your WSGI application object:

```

from django.core.wsgi import get_wsgi_application
application = get_wsgi_application()

```

<InstallContrastHere>

2. Wrap the WSGI application object with Contrast's middleware. In the example above, replace <InstallContrastHere> with:

```

from contrast.django import ContrastMiddleware
application = ContrastMiddleware(application)

```

### Old configuration steps: will not work with Contrast Python agent versions 5.0.0 and later

Django middleware is configured in the `settings.py` file.

1. **Find the `settings.py` file.** This file isn't found in the same location for all applications, but it's generally near the top of the application source tree. Common locations include:
  - `/settings.py`
  - `config/settings.py`
  - `app/settings.py`

**NOTE**

When searching the source tree to find the `settings.py`, make sure to exclude any directories that correspond to Python virtual environments.

Some applications have multiple `settings.py` files, which may correspond to different configurations of the application (for example, prod or test). In these cases, add the Contrast agent middleware to any and all of the configurations where it will be used.

2. **Add the Contrast agent module to the list.**

Include the Contrast middleware as early in the list as is possible; although modifying the order may be necessary to get the application working in some circumstances.

- **Django 1.10 and later:** Look for the `MIDDLEWARE` configuration variable, which is an array. Add the Contrast agent module to the list:

```
MIDDLEWARE = [
    'contrast.agent.middlewares.django_middleware.DjangoMiddleware',
    # OTHER MIDDLEWARE,
]
```

- **Django 1.6 to 1.9:** Look for the `MIDDLEWARE_CLASSES` configuration variable in `settings.py` and add the Contrast agent module to the list:

```
MIDDLEWARE_CLASSES = [
    'contrast.agent.middlewares.legacy_django_middleware.DjangoMiddleware',
    # OTHER MIDDLEWARE
]
```

See the [Django documentation](#) for more details on middleware inclusion.

**Falcon (ASGI)**

Falcon (ASGI) middleware is a ASGI middleware which operates by wrapping the Falcon(ASGI) application instance.

The following example shows a sample Falcon(ASGI) application wrapped by the Contrast middleware class.

**NOTE**

If your Falcon (ASGI) application uses other middleware in addition to Contrast, Contrast must be the first middleware initialized in order for certain features to work.

```
import falcon.asgi
from contrast.falcon_asgi import ContrastMiddleware

class Home(object):
    async def on_get(self, req, resp):
```

```

        resp.status = falcon.HTTP_200
        resp.body = "Hello World"

def create():
    # This is where the example app is declared. Look for something similar in your
    # application since this instance needs to be wrapped by Contrast middleware
    _app = falcon.asgi.App()

    # Add routes to your app
    home = Home()
    _app.add_route("/home", home)

    # This line wraps the application instance with the Contrast middleware
    # NOTE: Contrast should be the first middleware if others are used
    _app = ContrastMiddleware(_app)
    return _app

app = create()

```

## Falcon (WSGI)

Contrast's Falcon middleware is a WSGI middleware, not a Falcon-style middleware.

1. Find your Falcon application object. This will be an instance of `falcon.API` or `falcon.App` depending on your version of Falcon.

A sample Falcon application might look like this, where `app` is your Falcon application object:

```

import falcon
from views import Home

app = falcon.API()

home = Home()
app.add_route('/home', home)

```

<InstallContrastHere>

2. Wrap the Falcon application object with Contrast's middleware. In the example above, replace <InstallContrastHere> with:

```

from contrast.falcon import ContrastMiddleware
app = ContrastMiddleware(app)

```



### IMPORTANT

In rare cases, you may be required to pass the original `falcon.App` or `falcon.API` application instance directly to the `ContrastMiddleware` in addition to your WSGI application object. If the application does not start, find your original Falcon application and pass it to Contrast's middleware. For example:

```

app = ContrastMiddleware(
    app,
    original_falcon_app, # instance of falcon.App or falcon.API
)

```

**IMPORTANT**

You must wrap the Falcon instance *after* route registration is complete.

**FastAPI**

FastAPI middleware is a class-based ASGI middleware that relies on `starlette.middleware.BaseHTTPMiddleware`. Check [Python supported technologies \(page 291\)](#) for the latest version of FastAPI supported by Contrast. The following example shows a sample FastAPI application that uses the Contrast middleware class:

```
from fastapi import FastAPI
from contrast.fastapi import ContrastMiddleware

app = FastAPI()
app.add_middleware(ContrastMiddleware, original_app=app)

@app.get("/")
def read_root():
    return RedirectResponse("/home")
```

If your FastAPI application uses other middleware in addition to Contrast, Contrast must be the first middleware initialized in order for certain features to work.

```
from fastapi import FastAPI
from fastapi.middleware.httpsredirect import HTTPSRedirectMiddleware
from contrast.fastapi import ContrastMiddleware

app = FastAPI()

# ContrastMiddleware must be the first middleware
app.add_middleware(ContrastMiddleware, original_app=app)
app.add_middleware(HTTPSRedirectMiddleware)
```

Adding middleware via the `add_middleware` method is the only supported way to add middleware at this time, because certain features require the FastAPI `app` to be passed in as the `original_app` keyword argument. Initializing middlewares by passing them in directly to the FastAPI class initialization is not currently supported by Contrast.

```
# Not currently supported.
app = FastAPI(middleware=[...])
```

**WARNING**

Calling `add_middleware` multiple times is known to **re-initialize all previous middleware**.

**Flask**

Contrast's Flask middleware is a WSGI middleware which operates by wrapping the Flask application instance.

1. Find your Flask application object. This will be an instance of `flask.Flask`.

A sample Flask application might look like this, where `app` is your Flask application object:

```
import Flask

app = Flask(__name__)

<InstallContrastHere>

@app.route('/')
def index():
    return render_template('index.html')

app.run(...)
```

2. Wrap the Flask application object with Contrast's middleware. In the example above, replace `<InstallContrastHere>` with:

```
from contrast.flask import ContrastMiddleware
app.wsgi_app = ContrastMiddleware(app)
```



#### NOTE

Contrast's Flask middleware requires an instance of `flask.Flask` as an argument, rather than `flask.Flask.wsgi_app`.

## Pyramid

**Old configuration steps: will not work with Contrast Python agent versions 5.0.0 and later**

In Pyramid, middlewares are called "tweens".

1. Find the configurator object in your application codebase. It might look like this:

```
from pyramid.config import Configurator
config = Configurator()
```

```
<InstallContrastHere>
```

2. Add Contrast's middleware to your config. In the example above, replace `<InstallContrastHere>` with:

```
config.add_tween('contrast.agent.middlewares.pyramid_middleware.PyramidMiddleware')
```

See the [Pyramid documentation](#) for additional details on tween configuration.

**New configuration steps: works with Contrast Python agent versions 4.6.0 and later**

Contrast's Pyramid middleware is a WSGI middleware, not a Pyramid-style "tween".

1. Find your WSGI application object. This is often created by a call to `Configurator.make_wsgi_app()`.

For example, it might look like this:

```
from pyramid.config import Configurator
```

```
config = Configurator()
app = config.make_wsgi_app()
```

```
<InstallContrastHere>
```



2. Wrap the WSGI application object with Contrast's middleware. In the example above, replace `<InstallContrastHere>` with:

```
from contrast.pyramid import ContrastMiddleware
app = ContrastMiddleware(app)
```



### IMPORTANT

In rare cases, Contrast may require that you pass your application's Registry object to the middleware as well. The registry is commonly available as an attribute of both the Configurator instance and the Pyramid application object.

If the application does not start, find your application Registry and pass it to Contrast's middleware, for example:

```
app = ContrastMiddleware(app, config.registry)
```

### Quart

The Quart middleware should wrap the Quart application object and be assigned to the `asgi_app` attribute. The following example shows a sample quart application that uses the Contrast middleware class:

```
from quart import Quart, redirect
from contrast.quart import ContrastMiddleware

app = Quart(__name__)
app.asgi_app = ContrastMiddleware(app)

@app.route("/")
async def index():
    return redirect("/home")
```

### WSGI

Contrast provides a generic WSGI middleware that includes all core agent functionality. Framework-specific features such as route discovery are not implemented in the generic WSGI middleware.

To instrument any WSGI-compliant application with Contrast:

1. Find the WSGI application object in your application codebase. For example, given a WSGI app created as follows:

```
from example.module import make_app
wsgi_app = make_app()
```

`<InstallContrastHere>`

2. Wrap the WSGI application object with Contrast's middleware. In the example above, replace `<InstallContrastHere>` with:

```
from contrast.wsgi import ContrastMiddleware
wsgi_app = ContrastMiddleware(wsgi_app)
```

See the [WSGI specification](#) for additional details on WSGI middleware.

## Python web servers

The Python agent is tested against several common production web servers. Some servers require certain configuration options in order to work properly with Contrast.

### Gunicorn

You can integrate Gunicorn with popular frameworks like Django, Pyramid, Tornado, or others.

Use the following command to start Gunicorn: `gunicorn app.wsgi_app:application` (where `app` is the folder of your application).

The following configurations are available within your Gunicorn server:

- **Bind:**

```
-b ADDRESS1
gunicorn -b 127.0.0.1:8000
```

- **Timeout:**

```
-t INT or --timeout INT
```

Workers silent for more than this many seconds are killed and restarted.

Value is a positive number or 0. Setting it to 0 has the effect of infinite timeouts by disabling timeouts for all workers entirely.

The default is 30 seconds. Only set this noticeably higher if you're sure of the repercussions for sync workers. For the non sync workers, it means that the worker process is still communicating and is not tied to the length of time required to handle a single request.

### Uvicorn

Uvicorn is an asynchronous web server that can be installed with: `pip install uvicorn[standard]`.

The following are some suggested configurations:

- `--loop=uvloop`

- `--http=httptools`

Both `uvloop` and `httptools` are written in Cython, and offer greater performance but are not compatible with Windows or PyPy.

- `--interface`

You may set this to some of the ASGI protocols. If you are using WSGI, and using `--ws=websockets`, websockets will not be used and defaults to `auto`.

- `--ws`

If you have set `--ws-max-size`, `--ws-ping-interval`, `--ws-ping-timeout`, and `--ws` is not set with websockets, everything will be ignored.

- To use gunicorn as a manager to uvicorn you can do that by the following:

```
gunicorn -k uvicorn.workers.UvicornWorker
```

- The [UvicornWorker implementation](#) uses the `uvloop` and `httptools` implementations. To run under PyPy, you will need to use pure-python implementation instead. You can do this by using the `UvicornH11Worker` class. `gunicorn -k uvicorn.workers.UvicornH11Worker`.

### uWSGI configuration

Contrast requires the following configuration options when running on uWSGI. You can set these on the command line or in your uWSGI configuration (`.ini`) file:

- `--enable-threads`: Contrast's machinery utilizes threads. This option must be enabled so the agent can start background threads.
- `--single-interpreter`: The Python agent applies its instrumentation to the Python process in which it is initialized. This option ensures that Contrast is initialized in the same process that handles requests for your application.

- If using `--master` you must also use `--lazy-apps`: When running in master mode, uWSGI initializes the application in a master process but forks this process into workers which handle requests. To operate correctly, Contrast must be initialized independently in each worker process; `--lazy-apps` achieves this.

## Python YAML template

Use this template to configure the Python agent using a YAML configuration file. (Learn more about [YAML configuration \(page 33\)](#).)

Place your YAML file in the default location: `/etc/contrast/contrast_security.yaml`

```
# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

  # ***** REQUIRED *****
  # Set the URL for the Contrast UI.
  url: https://app.contrastsecurity.com/Contrast

  # ***** REQUIRED *****
  # Set the API key needed to communicate with the Contrast UI.
  api_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the service key needed to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  service_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the user name used to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  user_name: NEEDS_TO_BE_SET

  # Set the path to which the agent should store the
  # currently used configuration from the Contrast UI.
  # last_config_path: ./tmp/config

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:
```

```

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Certificate
# PEM file for communication with the Contrast UI.
# cert_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Key PEM
# file for communication with the Contrast UI.
# key_file: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid **contrast.proxy.host**
# and **contrast.proxy.port** will enable the proxy.
# enable: NEEDS_TO_BE_SET

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#

```

```

# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Override the name of the process the agents uses in logs.
# progname: Contrast Agent

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# Change the Contrast security logger from a file-sized based rolling
# scheme to a date-based rolling scheme. At midnight server time,
# the log from the previous day is renamed to *file_name.yyyy-MM-dd*.
# Note - this scheme does not have a size limit; manual log
# pruning will be required. This flag must be set to use the
# backups and size flags. Value options are `true` or `false`.
# roll_daily: NEEDS_TO_BE_SET

# Specify the file size cap (in MB) of each log file.
# roll_size: NEEDS_TO_BE_SET

# Specify the number of backup logs that the agent will create before
# Contrast cleans up the oldest file. A value of `0` means that no backups
# are created, and the log is truncated when it reaches its size cap.
#
# Note - this property must be used with
# `agent.security_logger.roll_daily=false`; otherwise,
# Contrast continues to log daily and disregard this limit.
#
# backups: NEEDS_TO_BE_SET

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

```

```

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# =====
# agent.service
# The following properties are used by the Contrast Service.
# =====
service:

# Set to `false` to disallow the service to be started, and
# effectively disable the agent, if read by the service. If the
# agent reads this property, it disallows service auto-start.
# enable: true

# If this property is defined, the service is
# listening on a Unix socket at the defined path.
# socket: /tmp/service.sock

# ***** REQUIRED *****
# Set the the hostname or IP address of the Contrast
# service to which the Contrast agent should report.
host: localhost

```

```
# ***** REQUIRED *****
# Set the the port of the Contrast service
# to which the Contrast agent should report.
port: 30555

# =====
# agent.service.teamserver_retry
# The following properties are used by the Teamserver HTTP client
# to configure failed request retrying in the Contrast service.
# =====
# teamserver_retry:

# Enable retrying HTTP requests to the Teamserver endpoint.
# enable: true

# How long to wait between retries in milliseconds.
# interval_ms: 5000

# How many times to retry HTTP requests to Teamserver before giving up.
# max_attempts: 3

# =====
# agent.service.logger
# The following properties are used by the logger in the
# Contrast service. If the properties are not defined, the
# service uses the logging values from the Contrast UI.
# =====
# logger:

# Set the location to which the Contrast service saves log output.
# If no log file exists at this location, the service creates one.
#
# Example - `/opt/Contrast/contrast_service.log` will
# create a log in the `/opt/Contrast` directory.
#
# path: ./contrast_service.log

# Set the the log output level. Options are `OFF`, `FATAL`,
# `ERROR`, `WARN`, `INFO`, `DEBUG`, `TRACE`, and `ALL`.
# level: ERROR

# Override the name of the process used in logs.
# progname: Contrast Service

# Set to `true` to send log output to `stdout`.
# stdout: false

# =====
# agent.python
# The following properties apply to any Python agent-wide configurations.
# =====
# python:

# Allow the agent to dump `cProfile` data to file for each request.
# enable_profiler: false
```

```
# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Set to `false` to disable library analysis.
# analyze_libraries: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# Value options are `ALL`, `SOME`, or `NONE`.
# stacktraces: ALL

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10
```



```

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

```

```

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Tell the agent to detect when semantic analysis of the query
# reveals tautologies used in exfiltration attacks (e.g., "or
# 1=1" or "or 2<>3"). The agent blocks if blocking is enabled.
# detect_tautologies: true

# Tell the agent to detect when semantic analysis of the query
# reveals the invocation of dangerous functions typically used in
# weaponized exploits. The agent blocks if blocking is enabled.
# detect_dangerous_functions: true

# Tell the agent to detect when semantic analysis of the query
# reveals chained queries, which is uncommon in normal usage but
# common in exploit. The agent blocks if blocking is enabled.
# detect_chained_queries: true

# Tell the agent to detect when semantic analysis of the query
# reveals database queries are being made for system tables and
# sensitive information. The agent blocks if blocking is enabled.
# detect_suspicious_unions: true

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.

```

```

#
# mode: off

# Detect when custom code attempts to access sensitive
# system files. The agent blocks if blocking is enabled.
# detect_custom_code_accessing_system_files: true

# Detect when users attempt to bypass filters by
# using "::$DATA" channels or null bytes in file
# names. The agent blocks if blocking is enabled.
# detect_common_file_exploits: true

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#

```

```
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
```

```

# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

# ***** REQUIRED *****
# Set the URL for the Contrast UI.
url: https://app.contrastsecurity.com/Contrast

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.

```

```

api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

# Set the path to which the agent should store the
# currently used configuration from the Contrast UI.
# last_config_path: ./tmp/config

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Certificate
# PEM file for communication with the Contrast UI.
# cert_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Key PEM
# file for communication with the Contrast UI.
# key_file: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid contrast.proxy.host
# and contrast.proxy.port will enable the proxy.
# enable: NEEDS_TO_BE_SET

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

```

```

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Override the name of the process the agents uses in logs.
# progname: Contrast Agent

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# Change the Contrast security logger from a file-sized based rolling
# scheme to a date-based rolling scheme. At midnight server time,
# the log from the previous day is renamed to *file_name.yyyy-MM-dd*.
# Note - this scheme does not have a size limit; manual log
# pruning will be required. This flag must be set to use the
# backups and size flags. Value options are `true` or `false`.

```

```
# roll_daily: NEEDS_TO_BE_SET

# Specify the file size cap (in MB) of each log file.
# roll_size: NEEDS_TO_BE_SET

# Specify the number of backup logs that the agent will create before
# Contrast cleans up the oldest file. A value of `0` means that no backups
# are created, and the log is truncated when it reaches its size cap.
#
# Note - this property must be used with
# `agent.security_logger.roll_daily=false`; otherwise,
# Contrast continues to log daily and disregard this limit.
#
# backups: NEEDS_TO_BE_SET

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
```



```

# severity_suspicious: WARNING

# =====
# agent.service
# The following properties are used by the Contrast Service.
# =====
service:

# Set to `false` to disallow the service to be started, and
# effectively disable the agent, if read by the service. If the
# agent reads this property, it disallows service auto-start.
# enable: true

# If this property is defined, the service is
# listening on a Unix socket at the defined path.
# socket: /tmp/service.sock

# ***** REQUIRED *****
# Set the the hostname or IP address of the Contrast
# service to which the Contrast agent should report.
host: localhost

# ***** REQUIRED *****
# Set the the port of the Contrast service
# to which the Contrast agent should report.
port: 30555

# =====
# agent.service.teamserver_retry
# The following properties are used by the Teamserver HTTP client
# to configure failed request retrying in the Contrast service.
# =====
# teamserver_retry:

# Enable retrying HTTP requests to the Teamserver endpoint.
# enable: true

# How long to wait between retries in milliseconds.
# interval_ms: 5000

# How many times to retry HTTP requests to Teamserver before giving up.
# max_attempts: 3

# =====
# agent.service.logger
# The following properties are used by the logger in the
# Contrast service. If the properties are not defined, the
# service uses the logging values from the Contrast UI.
# =====
# logger:

# Set the location to which the Contrast service saves log output.
# If no log file exists at this location, the service creates one.
#
# Example - `/opt/Contrast/contrast_service.log` will

```

```

# create a log in the `/opt/Contrast` directory.
#
# path: ./contrast_service.log

# Set the the log output level. Options are `OFF`, `FATAL`,
# `ERROR`, `WARN`, `INFO`, `DEBUG`, `TRACE`, and `ALL`.
# level: ERROR

# Override the name of the process used in logs.
# progame: Contrast Service

# Set to `true` to send log output to `stdout`.
# stdout: false

# =====
# agent.python
# The following properties apply to any Python agent-wide configurations.
# =====
# python:

# Allow the agent to dump `cProfile` data to file for each request.
# enable_profiler: false

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Set to `false` to disable library analysis.
# analyze_libraries: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`

```

```

#
# tags: NEEDS_TO_BE_SET

# Value options are `ALL`, `SOME`, or `NONE`.
# stacktraces: ALL

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====

```

```
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Tell the agent to detect when semantic analysis of the query
# reveals tautologies used in exfiltration attacks (e.g., "or
# 1=1" or "or 2<>3"). The agent blocks if blocking is enabled.
# detect_tautologies: true

# Tell the agent to detect when semantic analysis of the query
# reveals the invocation of dangerous functions typically used in
# weaponized exploits. The agent blocks if blocking is enabled.
# detect_dangerous_functions: true

# Tell the agent to detect when semantic analysis of the query
# reveals chained queries, which is uncommon in normal usage but
# common in exploit. The agent blocks if blocking is enabled.
# detect_chained_queries: true

# Tell the agent to detect when semantic analysis of the query
# reveals database queries are being made for system tables and
# sensitive information. The agent blocks if blocking is enabled.
# detect_suspicious_unions: true

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
```

```

# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# Detect when custom code attempts to access sensitive
# system files. The agent blocks if blocking is enabled.
# detect_custom_code_accessing_system_files: true

# Detect when users attempt to bypass filters by
# using "::$DATA" channels or null bytes in file
# names. The agent blocks if blocking is enabled.
# detect_common_file_exploits: true

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

```

```

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`

```

```
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET
```

## Python telemetry

The Python agent use telemetry to collect usage data. Telemetry is collected when an instrumented application first loads the agent's sensors and then periodically (every few hours) afterwards.

[Your privacy is important to us \(page 754\)](#). The telemetry feature does not collect application data. The data is anonymized before being sent securely to Contrast. Then the aggregated data is stored encrypted and under restricted access control. Any collected data will be deleted after one year.

The telemetry feature collects the following data:

Agent versions	Data
Python 4.14.0	Agent version
	Operating system and version
	Python version
	Application framework and version
	Web server and version
	Hosted or on-premises Contrast instance

To opt-out of the telemetry feature, set the `CONTRAST_AGENT_TELEMETRY_OPTOUT` environment variable to `1` or `true`.

Telemetry data is securely sent to `telemetry.python.contrastsecurity.com`. You can also opt out of telemetry by blocking communication at the network level.

## Ruby agent

The Ruby agent is a Rack middleware that's compatible with the most popular web application frameworks. The agent's goal is to be fully Rack compatible and to provide applications built on Rack with interactive application security testing (IAST) and runtime application self-protection (RASP) capabilities.

In Assess, the agent identifies vulnerable dataflow paths and other issues during the normal execution of your application. It reports these findings to your organization in Contrast; you can then remediate the vulnerabilities before deploying the application in a live environment.

In Protect, the Ruby agent inspects HTTP requests to identify potentially harmful input vectors. During the request, the agent inspects database queries, file writes and other potentially damaging actions resulting from the request. At the end of the request, the agent inspects the rendered output for successful attacks and can block a successful attack from being forwarded to the application user. It then sends the details of the attack to the Contrast application, which then sends you an alert and displays attack details in the interface.



### NOTE

The Ruby agent supports Assess, Protect, and SCA.

As a next step, you can:

- [Install the Ruby agent \(page 346\)](#)
- [View Ruby agent supported technologies \(page 345\)](#)

## System requirements for the Ruby agent

Before installing the Ruby agent, your system must meet the following requirements:



- There is a deployed application to be analyzed, and the web application technology is supported by Contrast.
- The application can be restarted.
- The web server has network connectivity with Contrast.
- The web server has network connectivity with RubyGems or the agent manually installed.
- The server meets the minimum requirements shown in this table.

Requirement	Versions	Notes
Operating system	<ul style="list-style-type: none"> <li>• 64-bit Linux (recommended)</li> <li>• 64-bit OSX</li> <li>• 64-bit Alpine</li> </ul>	<p>Starting with agent version 3.0.0, the gem installation step requires the compilation of C extensions. This process is automatic, but you may need to install the following in the target environment:</p> <ul style="list-style-type: none"> <li>• <code>gcc</code>, <code>make</code>, <code>automake</code> and <code>autoconf</code> (Package names may vary. You may install your platform's version of <code>build-essential</code>.)</li> <li>• system headers</li> </ul> <p>The agent runs in the Ruby application layer with some C dependencies so it may need to be installed with the <code>--platform ruby</code> flag to allow for compilation in either <code>glibc</code> or <code>musl libc</code> based systems.</p>
Ruby gems	<ul style="list-style-type: none"> <li>• <code>ougai</code>: <code>~&gt;1.8</code> (1.8 and later, earlier than 2)</li> <li>• <code>parser</code>: <code>~&gt;2.6</code> (2.6 and later, earlier than 3)</li> <li>• <code>protobuf</code>: <code>~&gt;3.10</code> (3.10 and later, earlier than 4)</li> <li>• <code>rack</code>: <code>~&gt;2.0</code> (2.0 and later, earlier than 3)</li> </ul>	

## Supported technologies for the Ruby agent

We support the following technologies for this agent.

Technology	Supported versions	Notes
Language version	<ul style="list-style-type: none"> <li>• 3.2.X: First supported agent was 6.13.0</li> <li>• 3.1.X: First supported agent was 6.0.0</li> <li>• 3.0.X: First supported agent was 4.6.0</li> </ul> <p>See the <a href="#">Ruby Maintenance Branches schedule</a> for specific release dates.</p>	<p>Contrast supports Ruby Long-Term Support (LTS) versions in normal maintenance and security maintenance status. Contrast shifts its support for Ruby versions as the working group shifts its LTS windows.</p> <p><b>Not supported:</b></p> <ul style="list-style-type: none"> <li>• 2.5.X: Last supported agent was 4.14.1</li> <li>• 2.4.X: Last supported agent was 3.9.1</li> <li>• 2.6.X: Last supported agent was 5.3.0</li> <li>• 2.7.X: Last supported agent was 6.15.3</li> </ul>

Technology	Supported versions	Notes
Application frameworks	<ul style="list-style-type: none"> <li>• <a href="#">Rails 6.X - 7.X</a></li> <li>• <a href="#">Grape 1.5.X</a></li> <li>• <a href="#">Sinatra 3.X</a></li> </ul>	<p>While the agent can still run on <a href="#">Rack-based web frameworks</a> that aren't officially supported, Contrast may produce less-specific findings than it does for supported frameworks. Instead of reporting that a vulnerability occurs in your application code, Contrast may report it within the framework code where it interfaces directly with the Rack methods.</p> <p><b>Not supported:</b></p> <ul style="list-style-type: none"> <li>• Rails 3.X: Last supported agent was 3.11.0</li> <li>• Rails 4.X: Last supported agent was 3.11.0</li> <li>• Rails 5.X: Last supported agent was 6.15.3</li> </ul>
Databases	<ul style="list-style-type: none"> <li>• <a href="#">MongoDB</a></li> <li>• <a href="#">Mysql2</a></li> <li>• <a href="#">PG</a></li> <li>• <a href="#">SQLite3</a></li> </ul>	Contrast doesn't support old or deprecated versions of third-party modules.
Testing environments	We test on a matrix of our supported Operating Systems, Application Frameworks, and Web Servers and also run the Ruby Mspec Suite.	When changes are made, Contrast runs a battery of automated tests to ensure that it detects findings in supported technologies across all supported versions of Ruby. In addition to its own testing, Contrast also runs the Ruby Spec Suite against an environment with the agent enabled.
Web servers	<ul style="list-style-type: none"> <li>• <a href="#">Passenger 5.37 and 6.X</a></li> <li>• <a href="#">Puma 3.7 - 5.X</a></li> <li>• <a href="#">Thin 1.7.2 - 1.8.X</a></li> <li>• <a href="#">Unicorn 5.0.X - 6.X</a></li> </ul>	

## Install the Ruby agent

The `contrast-agent.gem` is a standard Ruby library that you can add to the application Gemfile.

Install the Ruby agent [using RubyGems as a gem source \(page 346\)](#) or [update the Ruby agent \(page 347\)](#).

## Install the Ruby agent with RubyGems as a gem source

To download the Ruby agent from RubyGems:

1. Add this to your application's gemfile:

```
gem 'contrast-agent'
```

## 2. Run an install:

```
bundle install
```

or an update:

```
bundle update contrast-agent
```

3. [Configure middleware \(page 348\)](#) (Rails, Sinatra, or Grape).
4. [Configure the agent \(page 348\)](#).
5. Verify that `autoconf` is installed on the system where you will run the agent.
6. Verify that you can see your application in Contrast.



### NOTE

If installing in Alpine, you may need to run the command `bundle config force_ruby_platform true` prior to installation.



### NOTE

If you only want to run with Contrast in certain environments, you can do so using the [Bundler's Group function](#).

## Ruby update agent

The most reliable and effective way to automatically update the Contrast Ruby agent is to use the Ruby Bundler package manager to install and download the latest version available. Because Bundler typically manages all dependencies for your Ruby application, it should already be available and part of your build environment. How frequently you update the Contrast Ruby agent and where you get updates depends on your organization's preferences and your Contrast implementation: Hosted or on-premises.

The main steps are:

1. Choose a source for the Contrast Ruby agent.
2. Install the agent,
3. Use scripts for automatic updates.

### Before you begin

- Some familiarity with Ruby's Bundler package manager.
- Access to the RubyGems repository for the Contrast Ruby agent.
- Confirmed that your Ruby application runs properly without the Contrast Ruby agent.
- Previously successfully installed the Contrast Ruby agent.
- Defined a policy for how and when to update the agent, based on your change management policy and the environment where you deploy agents.

### Install and use scripts automatic updates

1. Choose a source for the Contrast ruby agent:
  - RubyGems public (or private) repository

2. Include the Contrast Ruby agent in the Gemfile to easily keep every new build of your application aligned with the latest version of the agent. Do not specify a version for contrast-agent, and it will retrieve the latest version.

The Gemfile is where you specify which dependencies you want to automatically resolve every time your Ruby application builds with artifacts from RubyGems (public or private).

3. After you update the Gemfile, use the following command when you build your application. This will automatically download and add the Contrast Ruby agent from RubyGems to the Ruby application.

```
$ bundle install
```

4. After you add contrast-agent to your Gemfile, you can use Bundler to update your agent, like this:

```
bundle update contrast-agent
```

### Install the gem manually

You can manually update agents as part of a Ruby build process in two ways. Choose the one that works best for your organization and workflow:

- **Rubygems:** Use the following command to retrieve and install the Contrast Ruby agent from RubyGems (public or private) to the application:

```
$ gem install contrast-agent
```

Add the following line to your Gemfile to manage updates with Bundler, because the previous command only installs the agent locally:

```
gem "contrast-agent"
```

Then to either install or update the agent using bundler run the following:

```
$ bundle install
```

- Add the following line to your Gemfile to manage the updates with Bundler, because the previous command only installs the agent locally:

```
gem "contrast-agent"
```

### See also

- [Ruby supported technologies \(page 345\)](#)
- [Install Ruby \(page 346\)](#)

### Configure the Ruby agent

The [configuration \(page 30\)](#) for all agents uses this [order of precedence \(page 31\)](#). Configure the agent using a YAML configuration file.



#### TIP

Use the [Contrast agent configuration editor \(page 34\)](#) to create or upload a YAML configuration file, validate YAML, and get setting recommendations.

Follow these guidelines to configure your:

- [Frameworks \(page 367\)](#)
  - [Grape \(page 367\)](#)

- [Rails \(page 367\)](#)
- [Sinatra \(page 367\)](#)
- [Web servers \(page 367\)](#)
  - [Passenger \(page 368\)](#)
  - [Puma \(page 371\)](#)
  - [Thin \(page 374\)](#)
  - [Unicorn \(page 374\)](#)

**See also**

- [Ruby supported technologies \(page 345\)](#)

**Ruby YAML template**

Use this template to configure the Ruby agent using a YAML configuration file. (Learn more about [YAML configuration \(page 33\)](#).)

Place your YAML file in the default location: `/etc/contrast/contrast_security.yaml`

```
# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

  # ***** REQUIRED *****
  # Set the URL for the Contrast UI.
  url: https://app.contrastsecurity.com/Contrast

  # ***** REQUIRED *****
  # Set the API key needed to communicate with the Contrast UI.
  api_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the service key needed to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  service_key: NEEDS_TO_BE_SET

  # ***** REQUIRED *****
  # Set the user name used to communicate with the Contrast
  # UI. It is used to calculate the Authorization header.
  user_name: NEEDS_TO_BE_SET

# Set the path to which the agent should store the
# currently used configuration from the Contrast UI.
# last_config_path: ./tmp/config
```

```

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Certificate
# PEM file for communication with the Contrast UI.
# cert_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Key PEM
# file for communication with the Contrast UI.
# key_file: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid contrast.proxy.host
# and contrast.proxy.port will enable the proxy.
# enable: NEEDS_TO_BE_SET

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

```

```

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Override the name of the process the agents uses in logs.
# progname: Contrast Agent

# Set to `true` for the agent to tag
# logs with `!AM!` for the metrics tool.
# metrics: true

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

```

```

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# =====
# agent.heap_dump
# The following properties are used to trigger heap dumps from within
# the agent to snapshot the behavior of instrumented applications.
# =====
# heap_dump:

# Set to `true` for the agent to automatically
# take heap dumps of the instrumented application.
# enable: false

# Set the location to which to save the heap dump files. If relative,
# the path is determined based on the process' working directory.
# path: contrast_heap_dumps

# Set the amount of time to wait, in milliseconds,
# after agent startup to begin taking heap dumps.
# delay_ms: 10_000

# Set the amount of time to wait, in milliseconds, between each heap dump.
# window_ms: 10_000

# Set the number of heap dumps to take before disabling this feature.
# count: 5

# Set to `true` for the agent to trigger garbage collection before
# taking a heap dump to remove temporary objects from the dump.
# clean: false

# =====

```



```

# agent.ruby
# The following properties apply to any Ruby agent-wide configurations.
# =====
# ruby:

# Allow the agent to track frozen Objects returned by
# source methods. This configuration is on by default.
# track_frozen_sources: NEEDS_TO_BE_SET

# Allow the agent to track propagation through interpolated
# Strings. This configuration is on by default.
# interpolate: NEEDS_TO_BE_SET

# Set a comma-separated string of rake tasks
# in which to disable agent operation.
# disabled_agent_rake_tasks: about,assets:clean,assets:clobber,assets:environment,as

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# Value options are `ALL`, `SOME`, or `NONE`.
# stacktraces: ALL

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.

```

```

# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the

```

```
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
```

```

# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

```

```

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

```

```

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

# ***** REQUIRED *****
# Set the URL for the Contrast UI.
url: https://app.contrastsecurity.com/Contrast

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

# Set the path to which the agent should store the
# currently used configuration from the Contrast UI.
# last_config_path: ./tmp/config

```

```

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Certificate
# PEM file for communication with the Contrast UI.
# cert_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Key PEM
# file for communication with the Contrast UI.
# key_file: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid contrast.proxy.host
# and contrast.proxy.port will enable the proxy.
# enable: NEEDS_TO_BE_SET

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

```

```

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Override the name of the process the agents uses in logs.
# progname: Contrast Agent

# Set to `true` for the agent to tag
# logs with `!AM!` for the metrics tool.
# metrics: true

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

```



```

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# =====
# agent.heap_dump
# The following properties are used to trigger heap dumps from within
# the agent to snapshot the behavior of instrumented applications.
# =====
# heap_dump:

# Set to `true` for the agent to automatically
# take heap dumps of the instrumented application.
# enable: false

# Set the location to which to save the heap dump files. If relative,
# the path is determined based on the process' working directory.
# path: contrast_heap_dumps

# Set the amount of time to wait, in milliseconds,
# after agent startup to begin taking heap dumps.
# delay_ms: 10_000

# Set the amount of time to wait, in milliseconds, between each heap dump.
# window_ms: 10_000

# Set the number of heap dumps to take before disabling this feature.
# count: 5

# Set to `true` for the agent to trigger garbage collection before
# taking a heap dump to remove temporary objects from the dump.
# clean: false

# =====
# agent.ruby

```

```

# The following properties apply to any Ruby agent-wide configurations.
# =====
# ruby:

# Allow the agent to track frozen Objects returned by
# source methods. This configuration is on by default.
# track_frozen_sources: NEEDS_TO_BE_SET

# Allow the agent to track propagation through interpolated
# Strings. This configuration is on by default.
# interpolate: NEEDS_TO_BE_SET

# Set a comma-separated string of rake tasks
# in which to disable agent operation.
# disabled_agent_rake_tasks: about,assets:clean,assets:clobber,assets:environment,as

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# Value options are `ALL`, `SOME`, or `NONE`.
# stacktraces: ALL

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====

```

```

# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.

```

```

# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====

```

```

# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

```

```
# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
```

```
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET
```

## Ruby frameworks

Application frameworks are software libraries that provide a fundamental structure to support the development of applications for a specific environment.

Follow these guidelines based on your framework:

### Configure with Grape

If you're using the Grape framework, you must configure your application to use the Ruby agent. A simple application configured to work with the Ruby agent looks like the following example:

```
require 'grape'
require 'contrast-agent'

class App < Grape::API
  use Contrast::Agent::Middleware, true
end
```

### Configure with Rails

If you are using Rails, the Ruby agent functions as a [Railtie](#) so no additional configuration is required.

### Configure with Sinatra

If you're using the Sinatra framework, you must configure your application to use the Ruby agent. A simple application configured to work with the Ruby agent looks like the following example:

```
require 'sinatra'
require 'contrast-agent'

class App < Sinatra::Base
  use Contrast::Agent::Middleware, true
end
```

### See also

- [Configure the Ruby agent \(page 348\)](#)
- [Ruby supported technologies \(page 345\)](#)

## Ruby web servers

Web Servers are technologies that deploy Web Application Frameworks. These servers manage the application processes and receive HTTP requests which they forward to said Web Application Frameworks.

Follow the guidelines based on your web server:

- [Passenger \(page 368\)](#)
- [Puma \(page 371\)](#)
- [Thin \(page 374\)](#)
- [Unicorn \(page 374\)](#)

### See also

- [Configure the Ruby agent \(page 348\)](#)
- [Ruby supported technologies \(page 345\)](#)

### Configure Passenger

Sometimes the Ruby agent pushes the application over the timeout threshold and that prevents the server from startup. This can be prevented by server configuration.

Passenger can be configured in Standalone mode or along side HTTP servers: *Passenger + NGINX* or *Passenger + Apache*.

The standard way of configuration in Standalone mode goes through these three options:

1. Command line options:

```
$ passenger start --start-timeout 100
```

2. Environment variables:

```
$ env PASSENGER_START_TIMEOUT=100 passenger start
```

3. Passengerfile.json (must be located in the application directory):

```
{
  "start_timeout": "100"
}
```

The order of configurations (most to least precedent):

- Command line options
- Environment variables
- Passengerfile.json



#### NOTE

An exception is made for [mass deployment](#), then pre-app configurations are overridden both for command line and environment variables.

Passenger in NGINX or Apache mode is configured via the corresponding Apache or NGINX configuration files. These modes do not consult with `Passengerfile.json`.

# example of an Nginx configuration file which also configures Passenger:

```
server {
    server_name yourserver.com;
    root /var/www/myapp/code/public;
    passenger_enabled on;
    passenger_ruby /usr/bin/ruby2.0;
```



```

    passenger_sticky_sessions on;
}

# example of an Apache configuration file which also configures Passenger:

<VirtualHost *:80>
    ServerName yourserver.com
    DocumentRoot /var/www/myapp/code/public
    PassengerStickySessions on

    <Directory /var/www/myapp/code/public>
        Allow from all
        Options -MultiViews
        Require all granted
    </Directory>
</VirtualHost>

```

## Timeouts

- **Max request time** - The maximum amount of time, in seconds, that an application process may take to process a request. If the request takes longer than this amount of time, then the application process will be forcefully shut down, and possibly restarted upon the next request. A value of 0 means that there is no time limit. This is an enterprise only configuration.

- Default value: 0
- Command line:

```
$ passenger start --max-request-time SECONDS
```

- Environment variables:

- Passengerfile.json:

```
{
  "max_request_time": integer
}
```

- **Max request queue time** - When all concurrent requests are handled and their maximum number is reached, Passenger will queue all incoming requests. This option specifies the maximum time a request may spend in that queue. If a request in the queue reaches this specified limit, then Passenger will send a "504 Gateway Timeout" error for that request. A value of 0 means that the queue time is unbounded. This is an enterprise only configuration.

- Default value: 0
- Command line:

```
$ passenger start --max-request-queue-time NUMBER
```

- Environment variables:

```
PASSENGER_MAX_REQUEST_QUEUE_TIME=integer
```

- Passengerfile.json:

```
{
  "max_request_queue_time": integer
}
```

- **Pool idle time** - Maximum time for idle application process. If an application process hasn't received any traffic after the given number of seconds, then it will be shutdown in order to conserve memory. When this value is set to 0, application processes will not be shutdown unless manual killed or crush occurs. Decreasing this value means that application processes will have to be spawned more often.
- Default value: 300 (5 minutes)

- Command line:

```
$ passenger start --pool-idle-time SECONDS
```

- Environment variables:

```
PASSENGER_POOL_IDLE_TIME=integer
```

- Passengerfile.json:

```
{
  "pool_idle_time": integer
}
```

- **Max preload idle time** - Timeout for automatically shutdown a preloader process if it hasn't done anything for a given period. This option allows you to set the preloader's idle timeout, in seconds. A value of 0 means that it should never idle timeout. Setting a higher value will mean that the preloader is kept around longer, which may slightly increase memory usage. But as long as the preloader server is running, the time to spawn a Ruby application process only takes about 10% of the time that is normally needed.

- Default value: 300 (5 minutes)

- Command line:

```
$ passenger start --max-preloader-idle-time SECONDS
```

- Environment variables:

```
PASSENGER_MAX_PRELOADER_IDLE_TIME=integer
```

- Passengerfile.json:

```
{
  "max_preloader_idle_time": integer
}
```

- **Start timeout** - Timeout for the startup of application. If an application process fails to start within the timeout period then it will be forcefully killed with SIGKILL, and the error will be logged.

- Default value: 90

- Command line:

```
$ passenger start --start-timeout SECONDS;
```

- Environment variables:

```
PASSENGER_START_TIMEOUT=integer
```

- Passengerfile.json:

```
{
  "start_timeout": integer
}
```

## Forking

Passenger is more like a process manager and instead of running application inside its own process space it launches it as external process and handle the management. This includes shut down of unused processes, or restarting them when they crash. An instance of an application is called a process. Passenger takes care of starting and stopping application.

Spawning is when Passenger starts an instance of an application. There are two methods for spawning an application in Passenger:

- **Direct:** new Ruby process with full copy of the application code and the web framework in memory. This approach uses more memory and takes more time to start.
- **Smart:** For Ruby apps this method is default. It begins with 'preloader' process. This process loads the entire application along with the web framework, by loading the file config.ru. The preloader

process doesn't participate in request handling. Whenever new application process is needed the preloader spawns a child process (with the `fork()` system call).

The command used for creating a new fork is:

```
$ bundle exec passenger start --min-instances 2
```

This tells Passenger to keep 2 instances of the application.

- Default value: 1
- Default pool size for instances: 6
- Passengerfile.json:

```
{
  "max_pool_size": 6
}
```

When a request is handled, Passenger will pass it to the process with the least number of requests. If a process is killed, it is restarted automatically. Processes are also dynamically scaled, depending on traffic, spawning new forks up to the maximum pool number.

## See also

- [Configure the Ruby agent \(page 348\)](#)
- [Ruby supported technologies \(page 345\)](#)

## Configure Puma

Sometimes the Ruby agent pushes the application over the timeout threshold and that prevents the server from startup. This can be prevented by server configuration.

Puma can be configured directly through the CLI, in the `config/puma.rb` or `config.ru` files.

## Timeouts

While the agent should work with the default or your custom configuration, it adds overhead to the first request. As such, you may need to increase timeouts, and here's how:



### IMPORTANT

Some of the options are available only in Cluster Mode. All of the available options for the timeouts are listed in the [puma/dsl.rb](#).

- **persistent\_timeout(seconds)** - Define how long persistent connections can be idle before Puma closes them. The seconds are passed as integers.
- **first\_data\_timeout(seconds)** - Define how long the tcp socket stays open, if no data has been received. The seconds are passed as integers.
- **\*force\_shutdown\_after(val=:forever)\*** - How long to wait for threads to stop when shutting them down. You can pass seconds too, but you can pass symbols between `:forever` and `:immediately`.
  - `:forever` - the value is set to -1
  - `:immediately` - the value is set to 0
  - `seconds` - it sets them directly as the timeout

**NOTE**

Puma always waits a couple of seconds before shutdown, even in immediately mode.

The following options are only available in cluster mode:

- **worker\_timeout(seconds)** - Verifies that all workers have checked in to the master process within the given timeout. This timeout is to protect against dead or hung processes. Setting this value will not protect against slow requests. The minimum value is 6 seconds, the default value is 60 seconds.
- **worker\_boot\_timeout(seconds)** - change the default worker timeout for booting. If unspecified - it will default to the value of worker\_timeout.
- **worker\_shutdown\_timeout(seconds)** - Set the timeout for worker shutdown.
- **wait\_for\_less\_busy\_worker(val=0.005)** - attempts to route traffic to less-busy workers by causing them to delay listening on the socket, allowing workers which are not processing any requests to pick up new requests first.

**NOTE**

This setting only works with MRI. For all other interpreters, this setting does nothing.

Puma initially sets two default timeout values:

- **DefaultWorkerTimeout** = 60
- **DefaultWorkerShutdownTimeout** = 30

To apply all of the timeouts settings, Puma must be configured to work in Cluster Mode.

## Forking

Cluster mode is introduced in Puma 5, which allows Puma to fork workers from worker 0, instead of directly from the master process.

Similar to the `preload_app` option, the `fork_worker` option allows your application to be initialized only once for copy-on-write memory savings.

This actual mode has couple of advantages, and the first one is that it's compatible with a phased restart. The master process initially does not preload the application and that's why this mode works with phased restart. When worker 0 reloads as part of a phased restart, it initializes a new copy of your application first, then the other workers reload by forking from this new worker already containing the new preloaded application.

**TIP**

A phased restart replaces all running workers in Puma cluster. It is done by first killing an old worker, then starting a new worker, waiting until the new worker has successfully started before proceeding to the next worker, until it goes through all workers. The master process is not restarted.

This allows a phased restart to complete as quickly as a hot restart while still minimizing downtime by staggering the restart across cluster workers.

The other advantage is that a `refork` command is added for additional copy-on-write improvements in running applications and the idea is that it re-loads all nonzero workers by re-forking them from worker 0.

This command can potentially improve memory utilization in large or complex applications that don't fully pre-initialize on startup, because the re-forked workers can share copy-on-write memory with a worker that has been running for a while and serving requests.

A `refork` will also automatically trigger once, after a certain number of requests have been processed by worker 0 (default 1000). To configure the number of requests before the auto-refork, pass a positive integer argument to `fork_worker` (e.g., `fork_worker 1000`), or 0 to disable.

### Limitations:

- Cluster mode is not compatible with `preload_app`.
- In order to fork new workers cleanly, worker 0 shuts down its server and stops serving requests so there are no open file descriptors or other kinds of shared global state between processes, and to maximize copy-on-write efficiency across the newly-forked workers. This may temporarily reduce total capacity of the cluster during a phased restart / refork.

After going through `fork_worker` and `re-fork` commands, these are other clustered (fork worker) commands:

- **\*workers(count)\*** - How many worker processes to run. Typically this is set to the number of available cores. The default is the value of the environment variable `WEB_CONCURRENCY` if set, otherwise 0.
- **before\_fork(&block)** - code to run immediately before master process forks workers (once on boot). These hooks can block if necessary to wait for background operations unknown to Puma to finish before the process terminates.
- **on\_worker\_boot(&block)** - code to run in a worker when it boots to setup the process before booting the app.
- **on\_worker\_shutdown(&block)** - code to run immediately before a worker shuts down (after it has finished processing HTTP requests)
- **on\_worker\_fork(&block)** - code to run in the master right before a worker is started. The worker's index is passed as an argument.
- **after\_worker\_fork(&block)** - code to run in the master after a worker has been started. The worker's index is passed as an argument.
- **on\_refork(&block)** - When enabled, code to run in Worker 0 before all other workers are re-forked from this process, after the server has temporarily stopped serving requests (once per complete re-fork cycle). This can be used to trigger extra garbage-collection to maximize copy-on-write efficiency, or close any connections to remote servers (database, Redis, ...) that were opened while the server was running.
- **out\_of\_band(&block)** - code to run out-of-band when the worker is idle. These hooks run immediately after a request has finished processing and there are no busy threads on the worker. The worker doesn't accept new requests until this code finishes. This hook is useful for running out-of-band garbage collection or scheduling asynchronous tasks to execute after a response.
- **fork\_worker(after\_request=1000)** - When enabled, workers will be forked from worker 0 instead of from the master process. This option is similar to `preload_app` because the app is preloaded before forking, but it is compatible with phased restart. This option also enables the `refork` command.
- **nakayoshi\_fork(enabled=true)** - This is kind of different, but when enabled, Puma will GC 4 times before forking workers. It will increase time to boot and fork. See your logs for details on how much time this adds to your boot process. For most apps, it will be less than one second. This fork method is based on the work of Koichi Sasada and Aaron Patterson and this option may decrease memory utilization of preload-enabled cluster-mode Pumas.

**NOTE**

If available (Ruby 2.7+), it will also call `GC.compact`.

Not recommended for non-MRI Rubies.

**See also**

- [Configure the Ruby agent \(page 348\)](#)
- [Ruby supported technologies \(page 345\)](#)

**Configure Thin**

Sometimes the Ruby agent pushes the application over the timeout threshold and that prevents the server from startup. This can be prevented by server configuration.

Thin is lightweight web server, supporting clusters and providing options to set timeouts and wait time. Thin accepts CLI commands or adding a `config.yml` file in which you can set all the settings you need.

**Timeouts**

The **wait** option is the maximum wait time for the server to be restarted within a cluster.

The **timeout** option is the maximum number of seconds for incoming data to arrive before the connection is dropped.

**Forking**

Thin supports clusters and you can run several server instances on different ports.

These are the available options:

```
cluster options:
-s, --servers NUM           Number of servers to start
-o, --only NUM             Send command to only one server of the cluster
-C, --config FILE         Load options from config file
-O, --onebyone            Restart the cluster one by one (only works with restart
-w, --wait NUM            Maximum wait time for server to be started in seconds (
```

There is also an experimental tuning option that can be run alongside clusters:

```
--threaded                Call the Rack application in threads [experimental]
```

**See also**

- [Configure the Ruby agent \(page 348\)](#)
- [Ruby supported technologies \(page 345\)](#)

**Configure Unicorn**

Unicorn is single-threaded and multi-processed. It doesn't adjust the number of processes automatically based on traffic. You must use a `unicorrf.conf.rb` or `unicorn.conf.minimal.rb` file, or a script, to configure this.

- Example for `unicorn.conf.rb`:

```
# Define your root directory.
root = "/home/deployer/apps/gifroll/current"
```

```
# Define worker directory for Unicorn.
working_directory "/path/to/app/current"

# Define number of worker processes.
# Each forked OS process consumes additional memory.
worker_processes 4

# Define timeout for hanging workers before they are restarted.
timeout 30

# Location of PID file.
pid "/path/to/app/shared/pids/unicorn.pid"

# Define log paths:

# Allow redirecting $stderr to a given path. Unlike doing this from the shell,
# this allows the Unicorn process to know the path being written to and rotates
# the file if it is used for logging.
stderr_path "#{root}/log/unicorn.log"

# Same as stderr_path, except for $stdout. Not many Rack applications write
# to $stdout, but any that do will have their output written here.
stdout_path "#{root}/log/unicorn.log"

# Loads Rails before forking workers for better worker spawn time.
# Preloading your application reduces the startup time of individual
# Unicorn worker_processes and allows you to manage the external connections
# of each individual worker using the before_fork and after_fork calls.
#
# Please check if other external connections work properly with
# Unicorn forking. Many popular gems (dalli memcache client, Redis) will have
# compatibility confirmation with Unicorn and the process model.
# Check the gem documentation for more information.
preload_app true

# When enabled, Unicorn will check the client connection by writing the
# beginning of the HTTP headers before calling the application. This will
# prevent calling the application for clients who have disconnected while
# their connection was queued.
check_client_connection false

# Enable a local variable to guard against running a hook (before_fork, after_fork)
# multiple times
run_once = true

# For example, use of before_fork and after_fork:
#
# POSIX Signals are a form of interprocess communication, and signal
# events or state changes.
# QUIT: Signals a process to exit, but creates a core dump.
# TERM: Tells a process to terminate, but allows the process
# to clean up after itself.
#
# Unicorn uses the QUIT signal to indicate a graceful shutdown.
# The master process receives it and sends it to all workers, telling them to
```

```
# shutdown after any in-flight request.
before_fork do |server, worker|
  Signal.trap 'TERM' do
    puts 'Unicorn master intercepting TERM and sending myself QUIT instead'
    Process.kill 'QUIT', Process.pid
  end

  # You may want to execute code in the master process, before the forking
  # begins, to deal with operations that causes changes in state.
  # You need them to run once:
  if run_once
    # do_something_once_here ...
    run_once = false # prevent from firing again
  end
end

after_fork do |server, worker|
  Signal.trap 'TERM' do
    puts 'Unicorn worker intercepting TERM and doing nothing. Wait for master to send'
  end
  # ...
end
```

# For more information, check the Unicorn Configurator: <https://msp-greg.github.io/unicorn/>

- **Example for unicorn.conf.minimal.rb:**

```
listen 2007 # by default Unicorn listens on port 8080
worker_processes 2 # this should be >= nr_cpus
pid "/path/to/app/shared/pids/unicorn.pid"
stderr_path "/path/to/app/shared/log/unicorn.log"
stdout_path "/path/to/app/shared/log/unicorn.log"
```

### Configure forking

Unicorn has a multi-process architecture to make better use of available CPU cores. On startup, the Unicorn master process loads the application code and then spawns workers which inherit the application code from their master process. The requests are handled only by the workers and never by the master. The operating system network stack queues incoming requests and distributes them among the workers.

Unicorn is designed to replace crashed workers without dropping user requests. When a worker reaches the request timeout, the master process ends it (with `kill -9`) and replaces it with a new process. You can configure the number of worker processes and the request timeout.

Configurations	Description
<code>worker_processes (nr)</code>	Sets the current number of <code>worker_processes</code> to <code>nr</code> . Each worker process will serve exactly one client at a time. You can increment or decrement this value at runtime by sending signals <code>SIGTTIN</code> or <code>SIGTTOU</code> respectively to the master process without reloading the rest of your Unicorn configuration.  You can read more about signals on <a href="#">Unicorn's site</a> .
<code>Unicorn::Configurator#after_fork</code>	Sets <code>after_fork</code> hook to a given block
<code>Unicorn::Configurator#before_fork</code>	Sets <code>before_fork</code> hook to a given block.
<code>Unicorn::Configurator#preload_app(bool)</code> <code>ObjectEnabling</code>	This preloads an application before forking worker processes. This allows memory savings when using a copy-on-write-friendly GC but can cause bad things to happen when resources like sockets are opened at load time by the master process and shared by multiple children.



## Configure timeouts

Variable	Description	Default value
timeout 30	This sets the timeout of worker processes to 30 seconds, the default value is 60 seconds. The timeout configuration will end workers that exceed this limit. This timeout is enforced by the master process itself and not subject to the scheduling limitations by the worker process.	60 seconds
delay integer	This sets the seconds to wait between successful tries.	0.5 seconds



### TIP

Unicorn works with [nginx for more settings](#).

## Configure APMs

The following APMs support Unicorn:

- [Scout](#) has a [separate class for Unicorn integration](#).
- [New Relic](#)
- [AppDynamics](#)

### See also

- [Configure the Ruby agent \(page 348\)](#)
- [Ruby supported technologies \(page 345\)](#)

## Ruby YAML template

Use this template to configure the Ruby agent using a YAML configuration file. (Learn more about [YAML configuration \(page 33\)](#).)

Place your YAML file in the default location: `/etc/contrast/contrast_security.yaml`

```
# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

  # ***** REQUIRED *****
```

```

# Set the URL for the Contrast UI.
url: https://app.contrastsecurity.com/Contrast

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

# Set the path to which the agent should store the
# currently used configuration from the Contrast UI.
# last_config_path: ./tmp/config

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Certificate
# PEM file for communication with the Contrast UI.
# cert_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Key PEM
# file for communication with the Contrast UI.
# key_file: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid **contrast.proxy.host**

```

```

# and contrast.proxy.port will enable the proxy.
# enable: NEEDS_TO_BE_SET

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Override the name of the process the agents uses in logs.
# progname: Contrast Agent

# Set to `true` for the agent to tag
# logs with `!AM!` for the metrics tool.
# metrics: true

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options

```

```
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# =====
# agent.heap_dump
# The following properties are used to trigger heap dumps from within
# the agent to snapshot the behavior of instrumented applications.
# =====
# heap_dump:

# Set to `true` for the agent to automatically
# take heap dumps of the instrumented application.
# enable: false
```

```

# Set the location to which to save the heap dump files. If relative,
# the path is determined based on the process' working directory.
# path: contrast_heap_dumps

# Set the amount of time to wait, in milliseconds,
# after agent startup to begin taking heap dumps.
# delay_ms: 10_000

# Set the amount of time to wait, in milliseconds, between each heap dump.
# window_ms: 10_000

# Set the number of heap dumps to take before disabling this feature.
# count: 5

# Set to `true` for the agent to trigger garbage collection before
# taking a heap dump to remove temporary objects from the dump.
# clean: false

# =====
# agent.ruby
# The following properties apply to any Ruby agent-wide configurations.
# =====
# ruby:

# Allow the agent to track frozen Objects returned by
# source methods. This configuration is on by default.
# track_frozen_sources: NEEDS_TO_BE_SET

# Allow the agent to track propagation through interpolated
# Strings. This configuration is on by default.
# interpolate: NEEDS_TO_BE_SET

# Set a comma-separated string of rake tasks
# in which to disable agent operation.
# disabled_agent_rake_tasks: about,assets:clean,assets:clobber,assets:environment,as

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.

```

```

# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# Value options are `ALL`, `SOME`, or `NONE`.
# stacktraces: ALL

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====

```

```
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off
```

```

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.

```



```
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
```

```

# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

# ***** REQUIRED *****
# Set the URL for the Contrast UI.

```

```

url: https://app.contrastsecurity.com/Contrast

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

# Set the path to which the agent should store the
# currently used configuration from the Contrast UI.
# last_config_path: ./tmp/config

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Certificate
# PEM file for communication with the Contrast UI.
# cert_file: NEEDS_TO_BE_SET

# Set the absolute or relative path to the Key PEM
# file for communication with the Contrast UI.
# key_file: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate with
# the Contrast web interface over a proxy. Set value to
# `false` if you don't want to use the proxy. If no value is
# indicated, the presence of a valid contrast.proxy.host
# and contrast.proxy.port will enable the proxy.

```

```
# enable: NEEDS_TO_BE_SET

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Override the name of the process the agents uses in logs.
# progname: Contrast Agent

# Set to `true` for the agent to tag
# logs with `!AM!` for the metrics tool.
# metrics: true

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
```

```

# level: ERROR

# =====
# agent.security_logger.syslog
# Define the following properties to set Syslog values. If the properties
# are not defined, the agent uses the Syslog values from the Contrast UI.
# =====
# syslog:

# Set to `true` to enable Syslog logging.
# enable: NEEDS_TO_BE_SET

# Set the IP address of the Syslog server
# to which the agent should send messages.
# ip: NEEDS_TO_BE_SET

# Set the port of the Syslog server to
# which the agent should send messages.
# port: NEEDS_TO_BE_SET

# Set the facility code of the messages the agent sends to Syslog.
# facility: 19

# Set the log level of Exploited attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_exploited: ALERT

# Set the log level of Blocked attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked: NOTICE

# Set the log level of Blocked At Perimeter
# attacks. Value options are `ALERT`, `CRITICAL`,
# `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_blocked_perimeter: NOTICE

# Set the log level of Probed attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_probed: WARNING

# Set the log level of Suspicious attacks. Value options are `ALERT`,
# `CRITICAL`, `ERROR`, `WARNING`, `NOTICE`, `INFO`, and `DEBUG`.
# severity_suspicious: WARNING

# =====
# agent.heap_dump
# The following properties are used to trigger heap dumps from within
# the agent to snapshot the behavior of instrumented applications.
# =====
# heap_dump:

# Set to `true` for the agent to automatically
# take heap dumps of the instrumented application.
# enable: false

```

```

# Set the location to which to save the heap dump files. If relative,
# the path is determined based on the process' working directory.
# path: contrast_heap_dumps

# Set the amount of time to wait, in milliseconds,
# after agent startup to begin taking heap dumps.
# delay_ms: 10_000

# Set the amount of time to wait, in milliseconds, between each heap dump.
# window_ms: 10_000

# Set the number of heap dumps to take before disabling this feature.
# count: 5

# Set to `true` for the agent to trigger garbage collection before
# taking a heap dump to remove temporary objects from the dump.
# clean: false

# =====
# agent.ruby
# The following properties apply to any Ruby agent-wide configurations.
# =====
# ruby:

# Allow the agent to track frozen Objects returned by
# source methods. This configuration is on by default.
# track_frozen_sources: NEEDS_TO_BE_SET

# Allow the agent to track propagation through interpolated
# Strings. This configuration is on by default.
# interpolate: NEEDS_TO_BE_SET

# Set a comma-separated string of rake tasks
# in which to disable agent operation.
# disabled_agent_rake_tasks: about,assets:clean,assets:clobber,assets:environment,as

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Apply a list of labels to libraries. Labels
# must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess
# Use the properties in this section to control Assess.
# =====

```

```

# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# Value options are `ALL`, `SOME`, or `NONE`.
# stacktraces: ALL

# =====
# assess.sampling
# Use the following properties to control sampling in the agent.
# =====
# sampling:

# Set to `true` to enable sampling.
# enable: false

# This property indicates the number of requests
# to analyze in each window before sampling begins.
# baseline: 5

# This property indicates that every *nth*
# request after the baseline is analyzed.
# request_frequency: 10

# This property indicates the duration for which a sample set is valid.
# window_ms: 180_000

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

```

```

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# protect.rules
# Use the following properties to set simple rule configurations.
# =====
# rules:

# Define a list of Protect rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect.rules.bot-blocker
# Use the following selection to configure if the
# agent blocks bots. Set to `true` to enable blocking.
# =====
# bot-blocker:

# Set to `true` for the agent to block known bots.
# enable: false

# =====
# protect.rules.sql-injection
# Use the following settings to configure the sql-injection rule.
# =====
# sql-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or off.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.cmd-injection
# Use the following properties to configure
# how the command injection rule works.
# =====
# cmd-injection:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

```



```

# =====
# protect.rules.path-traversal
# Use the following properties to configure
# how the path traversal rule works.
# =====
# path-traversal:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.method-tampering
# Use the following properties to configure
# how the method tampering rule works.
# =====
# method-tampering:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.reflected-xss
# Use the following properties to configure how
# the reflected cross-site scripting rule works.
# =====
# reflected-xss:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# protect.rules.xxe
# Use the following properties to configure
# how the XML external entity works.
# =====
# xxe:

# Set the mode of the rule. Value options are
# `monitor`, `block`, `block_at_perimeter`, or `off`.
#

```

```
# Note - If a setting says, "if blocking is enabled",
# the setting can be `block` or `block_at_perimeter`.
#
# mode: off

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
```

```
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET
```

## Ruby telemetry

The Ruby agent use telemetry to collect usage data. Telemetry is collected when an instrumented application first loads the agent's sensors and then periodically (every few hours) afterwards.

[Your privacy is important to us \(page 754\)](#). The telemetry feature does not collect application data. The data is anonymized before being sent securely to Contrast. Then the aggregated data is stored encrypted and under restricted access control. Any collected data will be deleted after one year.

The telemetry feature collects the following data:

Agent versions	Data
Ruby 4.13	Agent version
	Operating system and version
	Ruby version
	Application framework and version
	Web server and version
	Hosted or on-premises Contrast instance

To opt-out of the telemetry feature, set the `CONTRAST_AGENT_TELEMETRY_OPTOUT` environment variable to 1 or `true`.

Telemetry data is securely sent to [telemetry.ruby.contrastsecurity.com](https://telemetry.ruby.contrastsecurity.com). You can also opt out of telemetry by blocking communication at the network level.

## Go agent

The Go agent is a source code rewriter that instruments Go web applications for library support and vulnerability reporting. It provides runtime insight into the source code and libraries that make up the application.



### NOTE

As a source code rewriter, installing the Go agent in an application requires access to the application build environment.

The Go agent currently supports Assess and SCA only.

As a next step, you can:

- [Install the Go agent \(page 397\)](#)
- [View Go agent system requirements \(page 396\)](#)
- [Go supported technologies \(page 396\)](#)

## Supported technologies for the Go agent

We support the following technologies for this agent.

Technology	Supported versions	Notes
Language version	<ul style="list-style-type: none"> <li>• 1.18.X</li> <li>• 1.19.x</li> <li>• 1.20.x</li> </ul>	<p>Contrast follows the <a href="#">Go release support policy</a> which consists of the two most recently released major versions. Support for Go language versions is shifted as new major versions are released. The application dependencies must be specified in a <code>go.mod</code> file.</p> <p><b>Not supported:</b></p> <ul style="list-style-type: none"> <li>• 1.17.X: Last supported agent was 3.6.0</li> <li>• 1.16.X: Last supported agent was 3.6.0</li> <li>• 1.15.X: Last supported agent was 1.12.0</li> </ul>
Operating systems	<ul style="list-style-type: none"> <li>• Linux</li> <li>• Darwin</li> </ul>	
Application frameworks	<ul style="list-style-type: none"> <li>• Go standard library</li> <li>• Gin 1.X</li> <li>• Chi 5.X</li> </ul>	Other frameworks may be compatible at runtime with reduced functionality for certain features.
Processor architecture	<ul style="list-style-type: none"> <li>• AMD64</li> <li>• ARM64</li> </ul>	The Go agent rewriter and the generated runtime may work on other architectures but is not officially supported.
Database support	Go standard library	Some third-party database libraries may be compatible but are not supported.
Dependency management system	Go mod	The agent only supports modules as a dependency system: <a href="#">Using Go modules</a> . An application can be initialized with modules by running <code>go mod init</code> .
HTTP request routers	julienschmidt/httprouter	
Non-HTTP sources	gRPC 1.3.0 and later	<a href="https://google.golang.org/grpc">google.golang.org/grpc</a>
Other packages	go-swagger 2.0	<a href="https://github.com/go-swagger/go-swagger">https://github.com/go-swagger/go-swagger</a>

For additional details, see the [Swagger 2.0 website](#).

## Go agent system requirements

Before installing the Go agent, your system must meet the following requirements:

Requirement	Version	Notes
Build system	<ul style="list-style-type: none"><li>64-bit OSX</li><li>64-bit Linux</li></ul>	<b>Required:</b> Go build tools version 1.16 or higher.  The AMD64 and ARM64 architectures are supported for these operating systems.
Runtime system	<ul style="list-style-type: none"><li>64-bit OSX</li><li>64-bit Linux</li></ul>	The AMD64 and ARM64 architectures are supported for these operating systems.

## Install the Go agent

The executable must be built using `contrast-go` to instrument the application with the agent. A basic installation of the Go agent consists of two parts: producing an executable and running the executable. An installation overview looks like this:

1. Download the following and place in the proper path:
  - Go agent
  - `contrast_security.yaml`
2. Set up appropriate permissions.
3. Build the Go application, replacing `go` with `contrast-go` to get a final application artifact which contains the Go agent.
4. Run the executable.
5. Exercise and test your application.
6. Verify that Contrast sees your application.



### TIP

To see a list of available flags with [command line arguments for `contrast-go`](#), type `contrast-go -h`.

For specific installation instructions, select one of the following options:

- [Install with `contrast-go-installer` \(page 397\)](#)
- [Install Go from RPM \(.rpm\) \(page 400\)](#)
- [Install Go from Debian \(.deb\) \(page 400\)](#)
- [Install from direct download \(page 401\)](#)



### NOTE

Before 3.0.0, the Go agent required the Contrast service. Follow the [install the Go agent \(legacy\) \(page 398\)](#) instructions.

## Install the Go agent with `contrast-go-installer`

The `contrast-go-installer` simplifies the installation of the Go agent.

**NOTE**

The `contrast-go-installer` is an open source project. You can review the code and contribute to its development [here](#).

**Steps**

1. Run the `contrast-go-installer` with this command:

```
go run github.com/contrast-security-oss/contrast-go-installer@latest latest
```

2. Build your application with this command:

```
contrast-go build -o output-name-of-application
```

3. [Configure the Go agent \(page 402\)](#) using the [Go YAML template \(page 402\)](#) or environment variables.
4. Run your application using the executable you generated in step 2.
5. Exercise and test your application.
6. In the Contrast web interface, verify that the application is in the Applications list.

**Install the Go agent (legacy)****IMPORTANT**

You can configure the agent to report directly to Contrast by [installing the Go agent without the Contrast service. \(page 397\)](#)

Using the Go agent involves two artifacts. The executable must be built using `contrast-go` to instrument the application with the agent. The application requires `contrast-service` to communicate with the Contrast dashboard at runtime. A basic installation of the Go agent consists of two parts: producing an executable and running the executable. An installation overview looks like this:

1. Download the following and place in the proper path:
  - Go agent
  - [Contrast service \(page 415\)](#)
  - `contrast_security.yaml`Ensure your yaml or environment variables are set to `bypass: false`.

```
agent:
  service:
    bypass: false
```

2. Set up appropriate permissions.
3. Build the Go application, replacing `go` with `contrast-go` to get a final application artifact which contains the Go agent.
4. Run the executable.
5. Exercise and test your application.
6. Verify that Contrast sees your application.

**TIP**

To see a list of available flags with [command line arguments for contrast-go](#), type `contrast-go -h`.

For specific installation instructions, select one of the following options:

- [Install Go from RPM \(.rpm\) \(page 400\)](#)
- [Install Go from Debian \(.deb\) \(page 400\)](#)
- [Install from direct download \(page 401\)](#)

## Install the Go agent using a container

The Go agent has two main components: `contrast-go` (a build tool) and the agent itself (a package injected into your app at build time by `contrast-go`).

You can download `contrast-go` with a `curl` command, or from a repository or package manager. You will also need to configure the agent to connect with Contrast. You can use a YAML configuration file or environment variables. You can download the YAML from Contrast, or create your own from a template.

When installing the Contrast Go agent in a container, you just need to follow these steps in your container image file.

**TIP**

If you would like to explore a sample application using the Go agent in a *separate* container, see the [Go Test Bench open source project](#).

## Before you begin

This topic provides general guidance for installing the Contrast Go agent in a containerized application, with Docker as an example.

You should have a basic understanding of how containers and related software work. You may need to adjust the instructions to meet your specific circumstances.

## Build your application with `contrast-go`

Follow the instructions to install the Go agent.

1. Download the Go agent. Either use the `curl` below, or install with [Debian \(page 400\)](#).

```
RUN curl -L https://pkg.contrastsecurity.com/go-agent-release/latest/linux-amd64/contrast-go
```

2. Ensure the correct permissions are set

```
RUN chmod u+x contrast-go
```

3. Replace your normal `go build` command with `contrast-go build`. This will give you an executable with Contrast embedded in it.

```
RUN ./contrast-go build -o instrumented-app
```

**NOTE**

`-o instrumented-app` names it `instrumented-app` which is used in the below steps. You can change the name or omit the `-o` entirely and a default name is generated based on the package.

**Run your instrumented application**

- Run your application.

```
CMD ./instrumented-app
```

**See also**

- [Kubernetes and Contrast](#)
- [AWS Fargate and Contrast agents](#)

**Install Go agent with Debian**

To install the Go agent:

1. Download the executable files from <https://pkg.contrastsecurity.com>. This command registers our package repository in your system:

```
curl \
  https://pkg.contrastsecurity.com/api/gpg/key/public | sudo apt-key add -

echo "deb https://pkg.contrastsecurity.com/debian-public/ $(sed -rne 's/^VERSION_CODE/' | sudo tee /etc/apt/sources.list.d/contrast.list

echo "deb https://pkg.contrastsecurity.com/debian-public/ all contrast" \
  | sudo tee -a /etc/apt/sources.list.d/contrast.list
```

2. Once complete, use this command to install the agent:

```
sudo apt-get update && sudo apt-get install contrast-go
```

3. Be sure the application has a `go.mod` file to indicate required dependencies. In the application source directory run the following command:

```
go mod init
```

4. Build your application:

```
contrast-go build -o output-name-of-application
```

5. [Configure the Go agent \(page 402\)](#) using the [Go YAML template \(page 402\)](#) or environment variables.
6. Run your application using the executable from the output above.
7. Exercise and test your application.
8. Verify that Contrast sees your application.

**Install Go agent with Red Hat Package Manager (RPM)**

To install the Go agent:

1. Download the executable files from <https://pkg.contrastsecurity.com>. Use this script in your shell to configure your RPM-based system for our package repository. You may need `sudo` permissions.

```
tee /etc/yum.repos.d/contrast.repo <<-"EOF"
[contrast]
```



```
name=Contrast centos-$releasever repo
baseurl=https://pkg.contrastsecurity.com/rpm-public/centos-$releasever/
gpgcheck=0
enabled=1
EOF
```

2. Once complete, use this command to install the agent:

```
sudo yum install contrast-go
```

3. Be sure the application has a `go.mod` file to indicate required dependencies. In the application source directory run the following command:

```
go mod init
```

4. Build your application:

```
contrast-go build -o output-name-of-application
```

5. [Configure the Go agent \(page 402\)](#) using the [Go YAML template \(page 402\)](#) or environment variables.
6. Run your application using the executable with the output from above.
7. Exercise and test your application.
8. Verify that Contrast sees your application.

## Install the Go agent with direct download

To install the Go agent:

1. Download the executable files from <https://pkg.contrastsecurity.com>.  
The `contrast-go` executables can be downloaded directly for Mac and Linux operating systems. You can see available versions in the [go-agent-release](#) user interface. Replace `<version>` with the version number you want, or `latest`.

- **For Mac:**

```
wget https://pkg.contrastsecurity.com/go-agent-release/<version>/darwin-amd64/contrast-go
```

or

```
curl -L https://pkg.contrastsecurity.com/go-agent-release/<version>/darwin-amd64/contrast-go
```

- **For Linux:**

```
wget https://pkg.contrastsecurity.com/go-agent-release/<version>/linux-amd64/contrast-go
```

or

```
curl -L https://pkg.contrastsecurity.com/go-agent-release/<version>/linux-amd64/contrast-go
```

2. After download, verify that the agent is executable. For example:

```
chmod u+x contrast-go
```

3. Be sure the application has a `go.mod` file to indicate required dependencies. In the application source directory run the following command:

```
go mod init
```

4. Build your application:

```
./contrast-go build -o output-name-of-application
```

5. [Configure the Go agent \(page 402\)](#) using the [Go YAML template \(page 402\)](#) or environment variables.
6. Run your application using the executable from the output above.
7. Exercise and test your application.

8. Verify that Contrast sees your application.

### Configure the Go agent

The [standard configuration \(page 30\)](#) for all agents uses this [order of precedence \(page 31\)](#), which also details other ways to configure the agent, such as other valid configuration file locations.

There are different ways to configure the Go agent:

- A YAML configuration file ([learn more \(page 33\)](#)) is required to run your application. It is not needed to run the Go agent. You can create your own YAML configuration file or use this [template \(page 402\)](#) that contains all valid properties for the Go agent.

Place the file in the directory your app will run from ". ." and then [find the agent keys \(page 32\)](#) and set these values:

```
api:
  url:
  api_key:
  service_key:
  user_name:
```

- You can use [environment variables \(page 49\)](#) to configure your build.
- Command line configuration is also available.



**TIP**

Use the [Contrast agent configuration editor \(page 34\)](#) to create or upload a YAML configuration file, validate YAML and get setting recommendations.

### Go YAML template

Use this template to configure the Go agent using a YAML configuration file. (Learn more about [YAML configuration \(page 33\)](#).)

```
# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

  # ***** REQUIRED *****
  # Set the URL for the Contrast UI.
  url: https://app.contrastsecurity.com/Contrast
```

```

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate
# with the Contrast web interface over a proxy. Set
# value to `false` if you don't want to use the proxy.
# enable: NEEDS_TO_BE_SET

# Set the proxy host. It must be set with port and scheme.
# host: localhost

# Set the proxy port. It must be set with host and scheme.
# port: 1234

# Set the proxy scheme (e.g., `http` or
# `https`). It must be set with host and port.
# scheme: http

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# Set the proxy user.

```

```

# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# =====
# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====

```

```

# agent.service
# The following properties are used by the Contrast Service.
# =====
service:

# Set to `false` to disallow the service to be started, and
# effectively disable the agent, if read by the service. If the
# agent reads this property, it disallows service auto-start.
# enable: true

# Set to `true` to enable listening for gRPC connections.
# The `socket`, `host` and `port` fields will be used for
# configuring the gRPC server in place of the legacy RPC server.
# grpc: false

# If this property is defined, the service is
# listening on a Unix socket at the defined path.
# socket: /tmp/service.sock

# ***** REQUIRED *****
# Set the the hostname or IP address of the Contrast
# service to which the Contrast agent should report.
host: localhost

# ***** REQUIRED *****
# Set the the port of the Contrast service
# to which the Contrast agent should report.
port: 30555

# ***** REQUIRED *****
# Timeout (in milliseconds) that the agent-init
# should wait for the contrast-service
timeout_ms: 30000

# Set to `true` to enable direct communication with Teamsserver.
# bypass: false

# =====
# agent.service.logger
# The following properties are used by the logger in the
# Contrast service. If the properties are not defined, the
# service uses the logging values from the Contrast UI.
# =====
# logger:

# Set the location to which the Contrast service saves log output.
# If no log file exists at this location, the service creates one.
#
# Example - `~/opt/Contrast/contrast_service.log` will
# create a log in the `~/opt/Contrast` directory.
#
# path: ./contrast_service.log

# Set the the log output level. Options are `OFF`, `FATAL`,
# `ERROR`, `WARN`, `INFO`, `DEBUG`, `TRACE`, and `ALL`.

```

```

# level: ERROR

# Override the name of the process used in logs.
# progame: Contrast Service

# Set to `true` to send log output to `stdout`.
# stdout: false

# =====
# agent.go
# The following properties apply to any Go agent-wide configurations.
# =====
# go:

# Enable opt-in Go agent features.
# preview: NEEDS_TO_BE_SET

# Enable Go agent self-profiling features.
# profile: NEEDS_TO_BE_SET

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Set to `false` to disable library analysis.
# analyze_libraries: true

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

```

```

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The

```

```

# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# Use the properties in this YAML file to configure a Contrast agent.
# Go to https://docs.contrastsecurity.com/en/order-of-precedence.html
# to determine the order of precedence for configuration values.
# =====

```



```

# Use this setting if you want to temporarily disable a Contrast agent.
# Set to `true` to enable the agent; set to `false` to disable the agent.
# enable: true

# =====
# api
# Use the properties in this section to connect the agent to the Contrast UI.
# =====
api:

# ***** REQUIRED *****
# Set the URL for the Contrast UI.
url: https://app.contrastsecurity.com/Contrast

# ***** REQUIRED *****
# Set the API key needed to communicate with the Contrast UI.
api_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the service key needed to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
service_key: NEEDS_TO_BE_SET

# ***** REQUIRED *****
# Set the user name used to communicate with the Contrast
# UI. It is used to calculate the Authorization header.
user_name: NEEDS_TO_BE_SET

# =====
# api.certificate
# Use the following properties for communication
# with the Contrast UI using certificates.
# =====
# certificate:

# If set to `false`, the agent will ignore the
# certificate configuration in this section.
# enable: true

# Set the absolute or relative path to a CA for communication
# with the Contrast UI using a self-signed certificate.
# ca_file: NEEDS_TO_BE_SET

# =====
# api.proxy
# Use the following properties for communication
# with the Contrast UI over a proxy.
# =====
# proxy:

# Set value to `true` for the agent to communicate
# with the Contrast web interface over a proxy. Set
# value to `false` if you don't want to use the proxy.
# enable: NEEDS_TO_BE_SET

```

```

# Set the proxy host. It must be set with port and scheme.
# host: localhost

# Set the proxy port. It must be set with host and scheme.
# port: 1234

# Set the proxy scheme (e.g., `http` or
# `https`). It must be set with host and port.
# scheme: http

# Set the URL for your Proxy Server. The URL form is `scheme://host:port`.
# url: NEEDS_TO_BE_SET

# Set the proxy user.
# user: NEEDS_TO_BE_SET

# Set the proxy password.
# pass: NEEDS_TO_BE_SET

# =====
# agent
# Use the properties in this section to control the way and frequency
# with which the agent communicates to logs and the Contrast UI.
# =====
# agent:

# =====
# agent.logger
# Define the following properties to set logging values.
# If the following properties are not defined, the
# agent uses the logging values from the Contrast UI.
# =====
# logger:

# Enable diagnostic logging by setting a path to a log file.
# While diagnostic logging hurts performance, it generates
# useful information for debugging Contrast. The value set here
# is the location to which the agent saves log output. If no
# log file exists at this location, the agent creates a file.
#
# Example - `/opt/Contrast/contrast.log` creates a log in the
# `/opt/Contrast` directory, and rotates it automatically as needed.
#
# path: ./contrast_agent.log

# Set the the log output level. Valid options are
# `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: INFO

# Set to `true` to redirect all logs to
# `stdout` instead of the file system.
# stdout: false

# =====

```

```

# agent.security_logger
# Define the following properties to set security
# logging values. If not defined, the agent uses the
# security logging (CEF) values from the Contrast UI.
# =====
# security_logger:

# Set the file to which the agent logs security events.
# path: /.contrast/security.log

# Set the log level for security logging. Valid options
# are `ERROR`, `WARN`, `INFO`, `DEBUG`, and `TRACE`.
# level: ERROR

# =====
# agent.service
# The following properties are used by the Contrast Service.
# =====
service:

# Set to `false` to disallow the service to be started, and
# effectively disable the agent, if read by the service. If the
# agent reads this property, it disallows service auto-start.
# enable: true

# Set to `true` to enable listening for gRPC connections.
# The `socket`, `host` and `port` fields will be used for
# configuring the gRPC server in place of the legacy RPC server.
# grpc: false

# If this property is defined, the service is
# listening on a Unix socket at the defined path.
# socket: /tmp/service.sock

# ***** REQUIRED *****
# Set the the hostname or IP address of the Contrast
# service to which the Contrast agent should report.
host: localhost

# ***** REQUIRED *****
# Set the the port of the Contrast service
# to which the Contrast agent should report.
port: 30555

# ***** REQUIRED *****
# Timeout (in milliseconds) that the agent-init
# should wait for the contrast-service
timeout_ms: 30000

# Set to `true` to enable direct communication with Teamservice.
# bypass: false

# =====
# agent.service.logger
# The following properties are used by the logger in the

```

```

# Contrast service. If the properties are not defined, the
# service uses the logging values from the Contrast UI.
# =====
# logger:

# Set the location to which the Contrast service saves log output.
# If no log file exists at this location, the service creates one.
#
# Example - `/opt/Contrast/contrast_service.log` will
# create a log in the `/opt/Contrast` directory.
#
# path: ./contrast_service.log

# Set the the log output level. Options are `OFF`, `FATAL`,
# `ERROR`, `WARN`, `INFO`, `DEBUG`, `TRACE`, and `ALL`.
# level: ERROR

# Override the name of the process used in logs.
# progname: Contrast Service

# Set to `true` to send log output to `stdout`.
# stdout: false

# =====
# agent.go
# The following properties apply to any Go agent-wide configurations.
# =====
# go:

# Enable opt-in Go agent features.
# preview: NEEDS_TO_BE_SET

# Enable Go agent self-profiling features.
# profile: NEEDS_TO_BE_SET

# =====
# inventory
# Use the properties in this section to override the inventory features.
# =====
# inventory:

# Set to `false` to disable inventory features in the agent.
# enable: true

# Set to `false` to disable library analysis.
# analyze_libraries: true

# =====
# assess
# Use the properties in this section to control Assess.
# =====
# assess:

# Include this property to determine if the Assess
# feature should be enabled. If this property is not

```

```

# present, the decision is delegated to the Contrast UI.
# enable: false

# Apply a list of labels to vulnerabilities and preflight
# messages. Labels must be formatted as a comma-delimited list.
# Example - `label1, label2, label3`
#
# tags: NEEDS_TO_BE_SET

# =====
# assess.rules
# Use the following properties to control simple rule configurations.
# =====
# rules:

# Define a list of Assess rules to disable in the agent.
# The rules must be formatted as a comma-delimited list.
#
# Example - Set `reflected-xss,sql-injection` to disable
# the reflected-xss rule and the sql-injection rule.
#
# disabled_rules: NEEDS_TO_BE_SET

# =====
# protect
# Use the properties in this section to override Protect features.
# =====
# protect:

# Use the properties in this section to determine if the
# Protect feature should be enabled. If this property is not
# present, the decision is delegated to the Contrast UI.
# enable: false

# =====
# application
# Use the properties in this section for
# the application(s) hosting this agent.
# =====
# application:

# Override the reported application name.
#
# Note - On Java systems where multiple, distinct applications may be
# served by a single process, this configuration causes the agent to report
# all discovered applications as one application with the given name.
#
# name: NEEDS_TO_BE_SET

# Override the reported application path.
# path: NEEDS_TO_BE_SET

# Add the name of the application group with which this
# application should be associated in the Contrast UI.
# group: NEEDS_TO_BE_SET

```

```

# Add the application code this application should use in the Contrast UI.
# code: NEEDS_TO_BE_SET

# Override the reported application version.
# version: NEEDS_TO_BE_SET

# Apply labels to an application. Labels must
# be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET

# Define a set of `key=value` pairs (which conforms to RFC 2253) for
# specifying user-defined metadata associated with the application. The
# set must be formatted as a comma-delimited list of `key=value` pairs.
# Example - `business-unit=accounting, office=Baltimore`
#
# metadata: NEEDS_TO_BE_SET

# Provide the ID of a session which already exists in the Contrast
# UI. Vulnerabilities discovered by the agent are associated with
# this session. If an invalid ID is supplied, the agent will be
# disabled. This option and `application.session_metadata` are
# mutually exclusive; if both are set, the agent will be disabled.
# session_id: NEEDS_TO_BE_SET

# Provide metadata which is used to create a new session ID in the
# Contrast UI. Vulnerabilities discovered by the agent are associated with
# this new session. This value should be formatted as `key=value` pairs
# (conforming to RFC 2253). Available key names for this configuration
# are branchName, buildNumber, commitHash, committer, gitTag, repository,
# testRun, and version. This option and `application.session_id` are
# mutually exclusive; if both are set the agent will be disabled.
# session_metadata: NEEDS_TO_BE_SET

# =====
# server
# Use the settings in this section to set metadata for the server
# hosting this agent. Contrast recognizes common, supported server
# names, paths, types and environments. Doing this may require a new
# server or license, and it may affect functionality of some features.
# =====
# server:

# Override the reported server name.
# name: localhost

# Override the reported server path.
# path: NEEDS_TO_BE_SET

# Override the reported server type.
# type: NEEDS_TO_BE_SET

# Override the reported server environment. Valid

```

```
# values include `QA`, `PRODUCTION` and `DEVELOPMENT`.
# environment: development

# Apply a list of labels to the server. Labels
# must be formatted as a comma-delimited list.
# Example - `label1,label2,label3`
#
# tags: NEEDS_TO_BE_SET
```

## Contrast service



### IMPORTANT

The Python agent only uses the Contrast Service in earlier versions (before version 5.19.0).

The Contrast service is a stand-alone executable that enables communication between Contrast and multi-process dynamic language agents (Node.js and Python agents). It passes settings from Contrast to the agent. It also aggregates and sends information from the agent back to Contrast.

It is compiled for various supported architectures:

- Linux 64-bit
- Macintosh 64-bit
- Windows 64-bit

The service is packaged with the Node.js and Python agents and starts automatically when the instrumented application is started. The service is not packaged or started by the Go agent. You must have a service installed, configured and running for the Go agent to function. You may do the same for more control when running the Node.js or Python agents.

### Install the Contrast service

Installation varies depending on your system:

- **Linux:** Install the Contrast service with a system package manager.
- **Debian:** Use the commands to install from the correct Debian repository.

1. Get the `CODENAME` for your Ubuntu release.

```
grep VERSION_CODENAME /etc/os-release
```

2. Update the command below with the `CODENAME`, and run the commands.

```
curl https://pkg.contrastsecurity.com/api/gpg/key/public | sudo apt-key add -
echo "deb https://pkg.contrastsecurity.com/debian-public/ CODENAME contrast" | sudo
```

3. Install the Contrast service:

```
sudo apt-get update && sudo apt-get install contrast-service
```

4. [Configure the Contrast service \(page 416\)](#).

- **Red Hat Package Manager (RPM):** Use these commands to install from Contrast's yum repository.

1. Configure your system to use the repository:

```
OSREL=$(rpmquery -E "%{rhel}")
sudo -E tee /etc/yum.repos.d/contrast.repo << EOF
[contrast]
name=contrast repo
baseurl=https://pkg.contrastsecurity.com/rpm-public/centos-$OSREL/
gpgcheck=0
enabled=1
EOF
```

2. Install the Contrast service:

```
yum install contrast-service
```

3. [Configure the Contrast service. \(page 416\)](#)



### TIP

To remove the `contrast-service` package, run `apt-get remove contrast-service` or `yum remove contrast-service`.

## Configure the Contrast service

The Contrast service is not preconfigured with connection parameters. You must configure the service with a YAML configuration file.

When installed as a system service, the Contrast service is controlled by this YAML configuration file located in the `/etc` directory. Frequently, the service shares the same `contrast_security.yaml` file with any other applications on the same server, to ensure that all connection values (like the socket name or port number) are consistent.

Assuming an application-specific configuration file is not already installed in the application's working directory, the location of the YAML configuration file determines whether it can be shared with the agent on the same server:

- If you **don't** want it to be shared, place the configuration file at `/etc/contrast/webserver/contrast_security.yaml`.
- If you **do** want it to be shared, place the configuration file at `/etc/contrast/contrast_security.yaml`.

A default configuration YAML file is installed with the Contrast service Linux package at `/etc/contrast/webserver/contrast_security.yaml`. This template has placeholders for most necessary items, but you should update the following:

- **api:** Set the API properties. This determines how the Contrast service connects to Contrast.
- **agent:** This is the top-level configuration section for agent-related configuration.
  - **service:** These options affect communication between an agent and the Contrast service. The connection configuration must be identical between the Contrast service and the agent communicating with that service.
    - **socket:** The path to the local unix socket (for example, `/tmp/contrast.sock`)
    - **host and port:** Optionally, instead of socket, the Contrast Service can be configured to connect at a host and port.
    - **grpc:** (applies to Go and Node.js agents only) Set to "true" to use gRPC for agent to service communication. This is optional and may provide a slight performance improvement.

If this configuration has an issue or incorrect values, or the Contrast service fails to connect to Contrast, you can troubleshoot the failed connection result at `/var/log/contrast/service.log`.



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1. Configure your system to use the repository:

```
OSREL=$(rpmquery -E "%{rhel}")
sudo -E tee /etc/yum.repos.d/contrast.repo << EOF
[contrast]
name=contrast repo
baseurl=https://pkg.contrastsecurity.com/rpm-public/centos-$OSREL/
gpgcheck=0
enabled=1
EOF
```

2. Install the Contrast service:

```
yum install contrast-service
```

3. [Configure the Contrast service. \(page 416\)](#)



### TIP

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  - **service**: These options affect communication between an agent and the Contrast service. The connection configuration must be identical between the Contrast service and the agent communicating with that service.
    - **socket**: The path to the local unix socket (for example, `/tmp/contrast.sock`)
    - **host and port**: Optionally, instead of socket, the Contrast Service can be configured to connect at a host and port.
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If this configuration has an issue or incorrect values, or the Contrast service fails to connect to Contrast, you can troubleshoot the failed connection result at `/var/log/contrast/service.log`.

# Use Contrast

The way you interact with Contrast depends on your particular situation, the tools and integrations you use, your roles and permissions, and whether you are accessing Contrast through the web interface, command line tools or the [REST API](#).



## NOTE

All commands used in this guide should be run in a command shell with administrative privileges from the directory in which Contrast was installed.

The majority of Contrast users will likely be assigned an Editor role. (You can see what [permission level you have \(page 422\)](#) under [user settings. \(page 420\)](#))

With Editor permissions you can [instrument an application \(page 30\)](#) and start viewing results in Contrast. You can also interact with the basic components of Contrast (all visible in the header of the web interface):

- [Applications \(page 423\)](#)  
View a searchable list of an organization's applications. License, merge, tag, archive and restore applications.
- [Servers \(page 469\)](#)  
View a searchable list of an organization's servers. Designate server environment, enable Assess and Protect, settings, tagging and deleting.
- [Libraries \(page 474\)](#)  
View a searchable list of libraries being used by all the applications in an organization. Use tags and view statistics for known vulnerabilities present in libraries and high-risk libraries.
- [Vulnerabilities \(page 522\)](#)  
View a searchable list of vulnerabilities discovered. You can view this list for each application in an organization. Mark status, merge, share, tag, and export vulnerabilities. View details of any vulnerability for more information and guidance for fixing it.
- [Attacks \(page 538\)](#)  
View a searchable list of attacks that are occurring or have occurred on all the applications in an organization. View attacks at the highest level or delve into the individual attack events.

You can also use other features and tools to enhance your Contrast experience:

- [Reports \(page 546\)](#)  
Collect data and export as a CSV or PDF to share it outside of Contrast.
- [Integrations \(page 553\)](#)  
Use Contrast in conjunction with other tools like bugtrackers, build tools, application servers, Security Incident Event Management (SIEM), notifications and chat.
- [Contrast CLI \(page 508\)](#)  
Perform software composition analysis (SCA) on your application to show you the dependencies between open-source libraries.

Although most of the configuration for these features requires [system \(page 670\)](#), [organization \(page 630\)](#) or [RulesAdmin \(page 599\)](#) permissions, an Editor can:

- [Instrument an application \(page 30\)](#)
- [Send notifications](#)
- [Customize scoring \(page 648\)](#)

## Manage user settings

To manage user settings in Contrast, open the **user menu** (your name in the top right corner of the Contrast web interface), and select **User settings**. There you can:

- [Change your password \(page 420\)](#)
- [Set up two-step authentication \(page 420\)](#)
- [Edit your profile \(page 421\)](#)
- [Find API keys \(page 421\)](#)
- [Manage notifications \(page 422\)](#)
- [View your permissions \(page 422\)](#)

## Log in to Contrast

To log in to Contrast for the first time, you must accept an email invitation generated by your administrator. Select the link in the email to log in to Contrast.

If your organization is using [single sign-on \(SSO\) \(page 642\)](#), select the checkbox on the login page to disable the password input field. You are only required to enter your email address. Once your email is verified you can log in with your full SSO credentials.

If you are using [two-step authentication \(page 420\)](#), your login process occurs *after* successful SSO authentication.

## Change your password

To change your account password, complete the following steps.

1. Log in to Contrast.
2. In the user menu, select **User settings > Change password**.
3. In the form fields, enter your current password and new password. Retype your new password in the next field to confirm it.



### NOTE

Your new password must adhere to the password policy [set by your administrator \(page 641\)](#). Contrast notifies you of their requirements as you begin typing.

4. Check the box to agree to the [Terms and Conditions](#).
5. Select **Save**.



### NOTE

Customers using single sign-on (SSO) to [log in \(page 420\)](#) don't have the option to change their password.

## Set up two-step authentication

If your administrator has enabled two-step authentication at an [organization \(page 641\)](#) or [system \(page 713\)](#) level, you can add an extra layer of protection beyond your username and password. To set it up:

1. In the user menu, select **User settings > Two-step verification**.
2. Use the toggle to enable two-step authentication.
3. Use the radio buttons to select how you want to receive verification codes:
  - **Email:** You can receive authentication codes in the email you associated with Contrast. To set this up, you will receive an email with a verification code to enter in the configuration page
  - **Google Authenticator:** You will need to download the app to your mobile device, and you can receive authentication codes there. To set this up, scan the QR code provided in Contrast, and follow the instructions to validate your device.
4. Before completing two-step authentication setup, you can download a set of backup codes in the form of a .txt file, which allows you to login if you encounter an error or get locked out of your account. You must download and save these codes in a secure location.
5. If you want to change the way you receive verification codes, you can go back and reconfigure notification settings. Once you change your selection, Contrast automatically issues a new set of backup codes. It is not necessary to save your changes.

**TIP**

If you run into issues using either method, you can use the backup codes provided, [select Can't sign in?](#) or use the [Reset Device](#) link in Google Authenticator.

## Manage your profile

Add or update your name, time, date and language preferences to customize your experience using Contrast.

1. In the user menu, select **User settings > Profile**.
2. Under **General information**, you can enter your basic information, such as your name or time zone.
3. Click on the thumbnail to upload a new profile image.
4. Here you can also [view your organization and personal keys \(page 421\)](#) under **Your keys**.
5. Select **Save**.

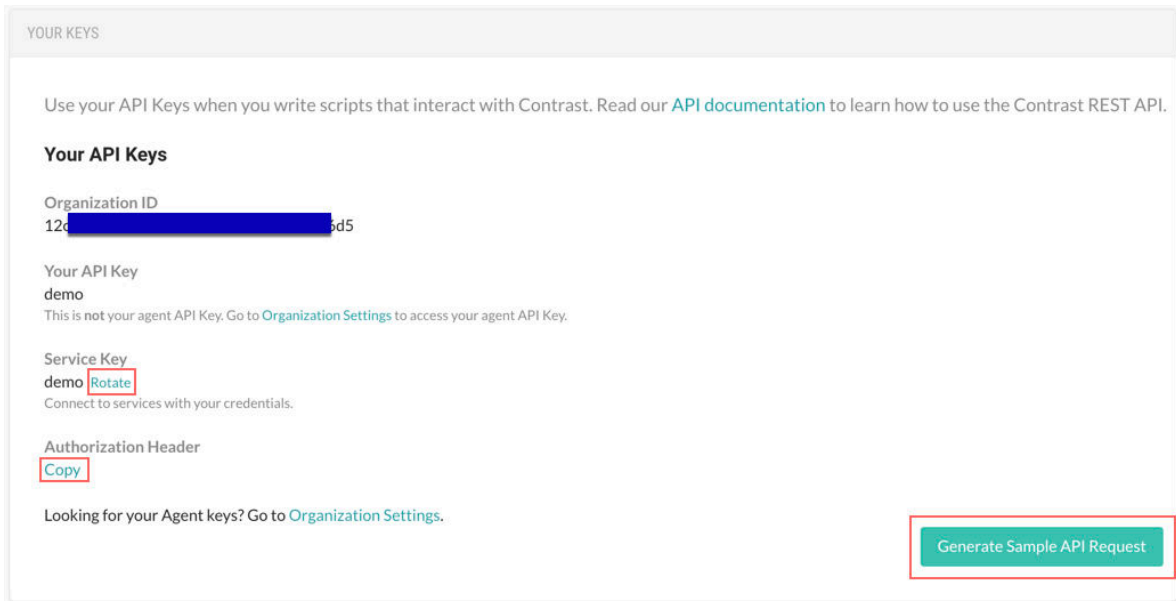
## View your API keys

Use API keys to establish communication between agents or custom scripts and Contrast. The agent and the Contrast API use the keys for these purposes:

- To identify which organization is being accessed.
- To identify you as a valid user.

## Steps

1. Go to **User menu > User settings > Profile**.  
Under **Your keys** you can see the **API keys**, which include the API key and these keys:
  - **Organization ID:** Identifies the organization being accessed.
  - **Service key:** Uses your credentials to connect to Contrast services.
  - **Authorization header:** Identifies you as a valid user.



2. To copy the authorization header, select **Copy**.
3. To rotate the service key, click **Rotate**.  
Rotating the service key affects any integrations using that key. To reconnect, update your credentials in your integrations.
4. To generate a sample API request and copy it to clipboard, select **Generate sample API request**.

## Manage user notifications

To change your notification settings:

1. In the **user menu**, select **User settings > Notifications**.
2. Click in the **Subscriptions** field to choose the application(s) for which you want to receive notifications. The default selection is "All Applications".
3. Use the toggles in the **In Contrast** and **Email** columns to enable or disable the following subscriptions.
  - **Active attack:** There is an active attack on an application with Protect enabled.
  - **New vulnerability:** Contrast has detected a new vulnerability. Click in the field to receive notifications for specific severity levels or "Library"; the default selection is "All".
  - **Vulnerable library:** Get notifications when a new vulnerable library is detected or a new CVE is detected in a library.
  - **Server messages:** Get server messages around reliability issues.
  - **Server offline:** A server can no longer be reached.
  - **New comment:** A team member commented on a finding.
  - **New asset:** A new asset (application or server) to which you have [access \(page 422\)](#) has been added. Click in the field to set this notification for "Application" or "Server"; the default selection is "All".
  - **Nearing expiration:** An application license is about to expire.
  - **Policy violations:** A compliance, library or remediation policy is in violation. Select the box if you want to aggregate policy violation emails into a digest.
  - **Email:** A daily summary of Contrast activities.

## View your permissions

The **Permissions** page provides a detailed view of the assigned permissions for both the organization and the applications to which you have access. To see your permissions:

1. Go to the **User menu > User settings > Permissions**.
2. See your organization listed at the top of the page along with your organization role. The **Application permissions** grid shows your role for each application within the organization.

- Click the help icon next to each role for details on the data access and actions made available by each level.

### See also

- [Application roles \(page 744\)](#)
- [Organization roles \(page 745\)](#)

## Applications

After an [application has been instrumented \(page 30\)](#), you can [view your applications \(page 423\)](#) in Contrast and explore these features:

- [Route coverage \(page 434\)](#)
- [Session metadata \(page 431\)](#)
- [Flow maps \(page 439\)](#)
- [Application scoring \(page 748\)](#)



### NOTE

An Organization or Application Administrator will need to [license your application \(page 635\)](#) for these features to work.

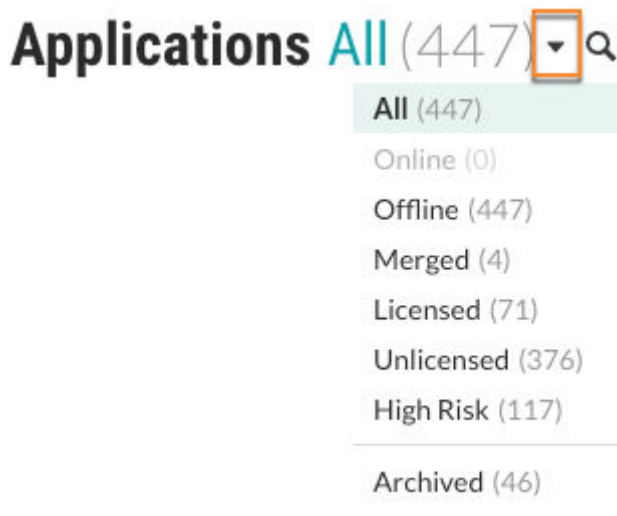
## View applications

There are multiple ways to view application information.

### Steps

- Select **Applications** in the header to view a list of all applications found in your organization.
- Select an application name from the list to view the application's **Overview** tab.
- To filter the list based on application status, select the small triangle at the very top of the applications list.

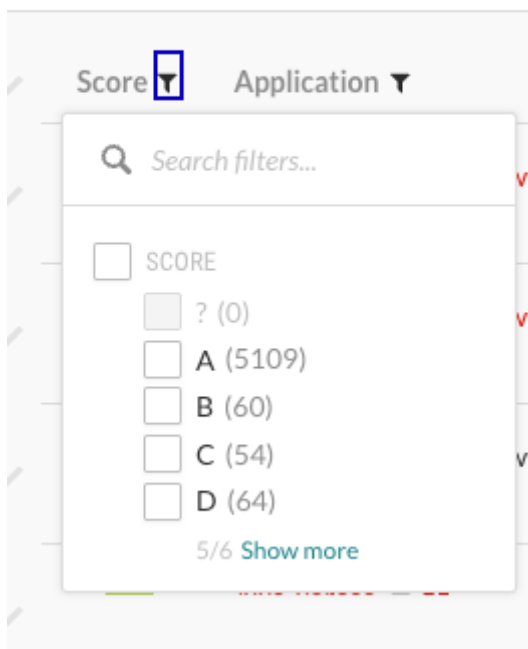
Alternatively, to search for specific application by name, select the **magnifying glass** icon (🔍) to search for them.



The filters include:

- **All:** Applications that you added to Contrast, excluding archived applications.
  - **Online:** Only applications whose agents have contacted Contrast within the last 5 minutes. Excludes archived applications.
  - **Offline:** Only applications whose agents have had no contact with Contrast for more than 5 minutes. Excludes archived applications.
  - **Merged:** Only applications that are part of a merged application (the primary application and its components) Excludes archived applications.
  - **Licensed:** Only applications that have a Contrast license applied to them Excludes archived applications.
  - **Unlicensed:** Only applications that have no Contrast license applied to them Excludes archived applications.
  - **High risk:** Only applications that have a high or critical vulnerability with a status of: Reported, Suspicious, or Confirmed. Excludes archived applications.
  - **Policy violation:** This filter is available when the organization has enabled compliance policies. Only applications that are in violation of a compliance policy. Excludes archived applications.
  - **Archived** Only applications that are visible for historical purposes. The agent for an archived application no longer reports vulnerabilities to Contrast.
4. To filter by application score, select the **filter** icon (▼) next to the Score column header and select one or more scores.  
To remove filters, select **Clear** next to the column header.

## Applications All (53)













5. To filter the list of applications, select the **filter** icon (▼) next to the Application column header. The filters include:
- **Application metadata (if configured):** Custom metadata that you associated with applications.
  - **Application tags (if created):** Tags you assigned to applications.
  - **Languages:** The language that an application uses.




- **Servers:** The servers where applications are running.
- **Open vulnerability severity:** The severity for open vulnerabilities.
- **Technologies:** Technologies that applications use. For example, JSON or jQuery.  
To remove filters, select **Clear** next to the column header.
- **Environments:** The environments associated with applications: Development, QA, and Production.
- **Application importance:** The importance level you set in the application settings.

# Applications All (5301)

Score 	Application 
	<input type="text" value="Search filters..."/>
	<input type="checkbox"/> BUSINESSUNIT <input type="checkbox"/> Death Star Security (1)
	<input type="checkbox"/> TESTNUMERICFIELD <input type="checkbox"/> 421 (1)
	<input type="checkbox"/> TESTPOINTOFCONTACTFIELD <input type="checkbox"/> TK-421 (1)
	<input type="checkbox"/> APPLICATION TAGS <input type="checkbox"/> (3) <input type="checkbox"/> 28052021 (2) <input type="checkbox"/> abc (4) <input type="checkbox"/> abc123 (5) <input type="checkbox"/> app-other-tag (6) 5/1208 <a href="#">Show more</a>
	<input type="checkbox"/> LANGUAGES <input type="checkbox"/> Java (4809) <input type="checkbox"/> .NET Framework (206) <input type="checkbox"/> .NET Core (22) <input type="checkbox"/> Node (115) <input type="checkbox"/> Ruby (39) 5/9 <a href="#">Show more</a>
	<input type="checkbox"/> SERVERS <input type="checkbox"/> 0035f200-f1b6-11ec-8a53... (9) <input type="checkbox"/> 01c8dd20-f1ad-11ec-b32a... (9) <input type="checkbox"/> 023b1f90-f1b0-11ec-b415... (10) <input type="checkbox"/> 023b1f90-f1b0-11ec-b415... (10) <input type="checkbox"/> 028da1d0-f1af-11ec-afa4-... (10) 5/1171 <a href="#">Show more</a>
	<input type="checkbox"/> OPEN VULNERABILITY SEVERITY

## Edit application settings

You may need to access or edit settings for your application:

- **Application names:** Each application in an organization must have a unique name. To change the name, select Applications in the header, then click on the application's name in the grid to go to its **Overview** page. Click on the name at the top of the page to update the text. Alternatively, select the **Settings** icon in the top right of the Overview page and update the name in the **Application defaults** window. SuperAdmins can also edit application names by selecting **SuperAdmin** in the user menu, then **Applications** in the header, then clicking on the name in the grid.
  - **Application ID:** The application ID is the last URI segment in the URL of your browser. To locate an application's ID, select an application from the grid. The segment after `applications/` is the application ID.
  - **Application importance:** This value appears in the application's metadata and may also be used in your organization's integrations settings. To set an application's importance level select an application name to view its **Overview** page and select the **Settings** icon. In the **Application defaults** window, use the **Importance** field to select a level from the dropdown.
1. Select your application from the **Applications** tab. Your selected application overview displays.
  2. Select the settings  icon in your application overview. The **Application Settings** popup displays.
  3. Edit any of the fields as required.
  4. Click **Save** to save your updated application settings.



## Field descriptions

- **Application names:** Each application in an organization must have a unique name. To change the name, select Applications in the header, then click on the application's name in the grid to go to its **Overview** page. Click on the name at the top of the page to update the text. Alternatively, select the **Settings** icon in the top right of the Overview page and update the name in the **Application defaults** window. SuperAdmins can also edit application names by selecting **SuperAdmin** in the user menu, then **Applications** in the header, then clicking on the name in the grid.
- **Application Code:** The identification code or number that's internal to your organization and unique to the application or microservice. Use this field if you want to integrate these applications' unique identifiers into your usage of Contrast. This code can be configured upon application startup, in the application properties section of an agent configuration.
- **Override URL:** This is the url used to replicate a vulnerability.
- **Importance:** This value appears in the application's metadata and may also be used in your organization's integrations settings. To set an application's importance level select an application name to view its **Overview** page and select the **Settings** icon. In the **Application defaults** window, use the **Importance** field to select a level from the dropdown.

## Add tags to applications

Use application tags to better organize applications and improve search functionality.

### Steps

1. Select **Applications** in the header.
2. Add tags:
  - a. To add tags for a single application, hover over the end of the application's row and select the **Tag** icon (). Alternatively, go to the Overview page for the application and select the **Tag** icon () at the top of the list.
  - b. To add tags for multiple applications, select the check mark next to each application and select the **Tag** icon from the action menu at the bottom of the list.



3. In the Tag application window, start typing to view a list of existing tags. Select the tags you want to use or enter a new tag.

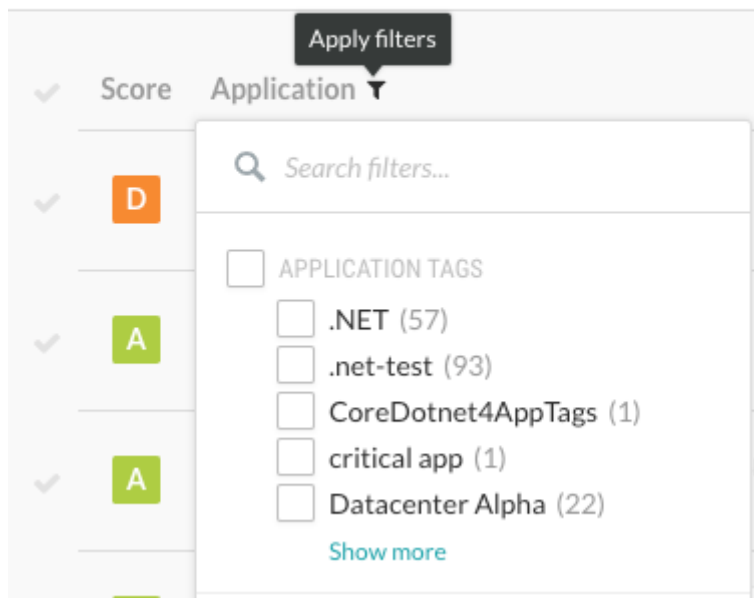
After adding tags, you can see them next to the application name in the Overview tab for the application.

To remove a tag, click **x** in the tag name.



4. To use tags for filtering, select the Filter icon (▼) next to the Applications column and select Application tags.

## Applications All (156) 🔍



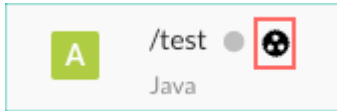
### Merge and unmerge applications

Merging two or more applications creates a single application called a primary application and is a common operation for Organization Administrators responsible for bringing applications online.

The main purpose of merging is to present a single application view for the purposes of scoring, discovered vulnerabilities, and remediation. Applications can be made up of module, which may show up individually in the application list. Merging also allows you to logically organize all of an application's modules into one entity in Contrast.

### Steps

1. Select **Applications** in the header, and use the check marks to select the applications to merge.
2. Select the **Merge** icon (🔗) from the menu at the bottom of the list.
3. In the Merge applications window, use the dropdown to choose one of the merged applications to represent the primary application.
4. Once your applications are merged, you see the primary application icon (🔗) beside the name of the primary application.



- To see the application modules in the merged application as well as details about exercised routes, select the primary application icon in the application's row .

**Application Modules (2)** ✕

*/test* is a LICENSED application that represents 2 modules.

	Grade	Application	Routes Exercised
<input type="checkbox"/>	A	<i>/test</i> <span style="font-size: small;">Java</span>	7 / 7
<input type="checkbox"/>	A	app-01a057e4-5f7a-478c-af13-3b1763fe2ce7 <span style="font-size: small;">Java</span>	4 / 4

Cancel
Unmerge Selected

- To unmerge either all or specific application modules from the primary application, select the primary application icon () in the application's row or Overview page. In the Applications modules window, select any number of the modules, and select **Unmerge selected**.

## Archive and unarchive applications

If an application should no longer collect vulnerabilities, but you want to keep it in your organization for historical purposes, the best solution is to archive the application.

Archiving an application maintains the integrity of past application data, such as vulnerabilities and libraries, but the agent no longer reports vulnerabilities to Contrast.

Archived applications also improve your overall portfolio score, as they don't count against the total score.

An administrator can restore an archived application. After you unarchive an application, it is visible in the default Applications list. All vulnerabilities and issues immediately impact the its score.

## Before you begin

- Archiving an application doesn't free up a license in Contrast. To return a license back to the pool of available licenses is to archive and fully [delete \(page 430\)](#) the application.

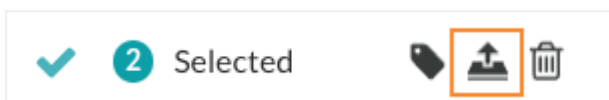
## Steps

- Select **Applications** in the header.
- Find the application you want to archive.

3. Archive the application:
  - a. To archive a single application, hover over the end of the application's row and select the **Archive** icon (📁).
  - b. To archive multiple applications, select the checkmark next to each one and select the **Archive** icon (📁) from the action menu at the bottom of the list.



- c. In the displayed window, select **Archive** to confirm your choice.
4. To unarchive an application::
  - a. Select the small triangle (▾) next to the Applications header at the top of the list.
  - b. Select **Archived**.
  - c. To unarchive a single application, hover over the end of the application's row and select the **Unarchive** icon (📁).
  - d. To unarchive multiple applications, select the checkmark next to each one and select the **Unarchive** icon in the action menu at the bottom of the list.



- e. In the displayed window, select **Unarchive** to confirm your choice.

## Reset an application

Resetting an application purges all the data associated with it, but doesn't remove the application. Resetting applications is useful when you want to clear all history and findings associated with a specific application.

It is common to reset an application before [deleting \(page 430\)](#) it to make sure that all associated vulnerabilities, URLs and components are cleared properly.

## Before you begin

- You can reset only one application at a time.



### CAUTION

If you reset an application, there is no way to restore the purged data.

## Steps

1. Select **Applications** in the header.
2. Hover over the end of the row and select the **Reset** icon (↺),  
Alternatively, in the application's Overview tab, select the **Settings** icon (⚙️) and select **Reset application**.
3. In the Reset Application window, select **Reset**.

## Delete applications






When you delete an application, Contrast permanently removes all of its associated findings, such as vulnerabilities and libraries.

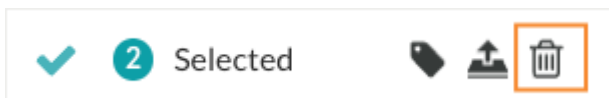
Licenses applied to applications permanently count towards the number of maximum allowable applications. Deleting a licensed application has no effect on the number of licenses you are allowed to apply to applications

## Before you begin

- An Organization Administrator role is required.
- **Optional:** You can [reset the application \(page 430\)](#) before you archive and delete it. Resetting an application purges all of the data associated with it, but doesn't remove the application. Users often reset applications to clear all history and findings associated with a specific application.

## Steps

1. Select **Applications** in the header.
2. Find the application that you want to delete.
3. Archive the application:
  - a. To archive a single application, hover over the end of the application's row and select the **Archive** icon (  ).
  - b. To archive multiple applications, select the check mark next to each one and select the **Archive** icon (  ) in the action menu at the bottom of the list.
  - c. In the displayed window, select **Archive**.
4. Select the **Dropdown** icon (  ) next to the Applications header at the top of the page and select **Archived**.
5. Delete the application:
  - a. To delete a single application, hover over the end of the row of the application you want to delete and select the **Delete** (  ) icon.
  - b. To delete multiple applications, select the check mark next to each one and select the **Delete** icon (  ) in the action menu at the bottom of the list.



- c. In the displayed window, select **Delete**.

## Use session metadata filters

Use session metadata to filter vulnerabilities and route information for a specific branch, build, committer, or repository. When you [add the necessary configuration settings \(page 433\)](#) to your agent configuration file, the agent reports this information along with the rest of your standard vulnerability data to Contrast.



### NOTE

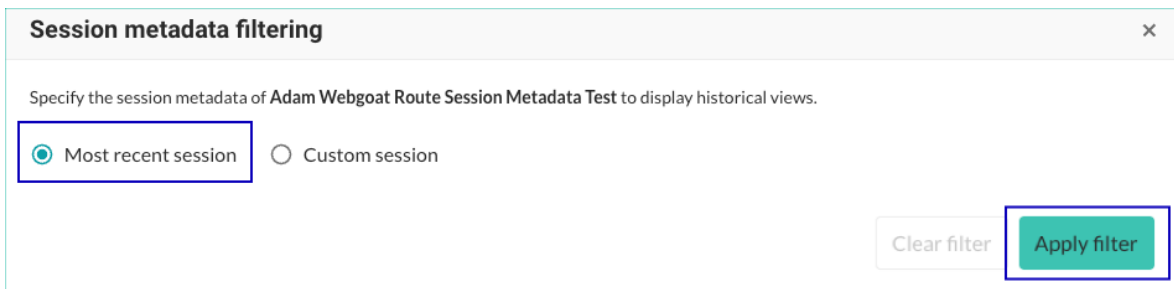
This feature is currently not available to on-premises customers.

A session is the combination of metadata values that you set in the agent configuration file. Depending on the defined values, each agent run could be part of a single session or every agent run could have its own session. If you are integrating Contrast into a CI/CD pipeline, ensure that you send at least one session metadata value that is unique each time you deploy a new version of the application. For example, configure the agent to send the Commit Hash or Build Number metadata because these values are likely to change for each application deployment.

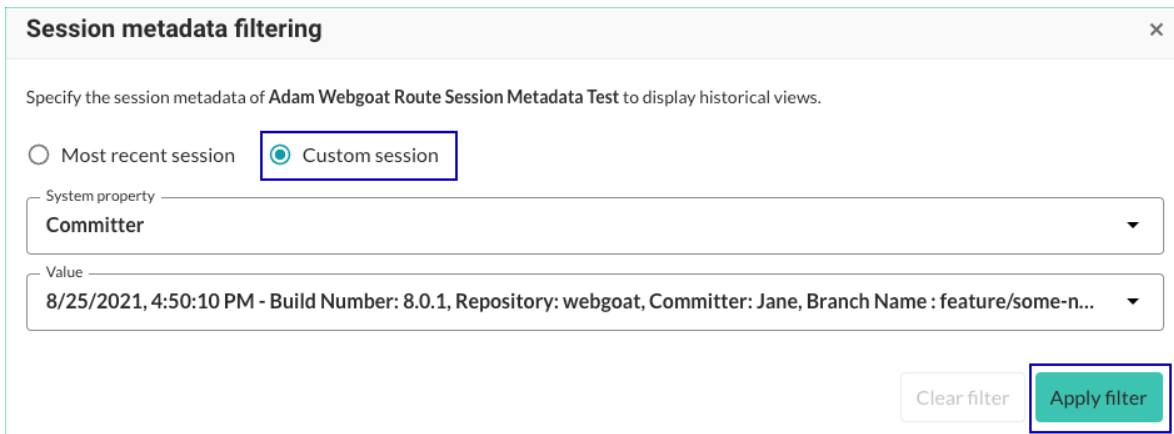
If you don't select a specific session metadata filter, the Session column in the Vulnerability list displays up to 10 of the values specified in the agent configuration file. This limit ensures that the Contrast web interface can display vulnerability and sink group data correctly.

### Steps

1. Select **Applications** in the header.
2. Select an application in the list.
3. Select either the **Vulnerabilities** tab or the **Route coverage** tab.
4. Select the Session metadata icon (📄) at the top of the list.  
The session metadata filters that you apply affect the Vulnerabilities and Route coverage lists.
5. Select the Session metadata icon (📄) at the top of the list.  
In the Vulnerabilities list, the Session column and the View by filter are hidden and the details of the most recent session display above the session metadata icon.

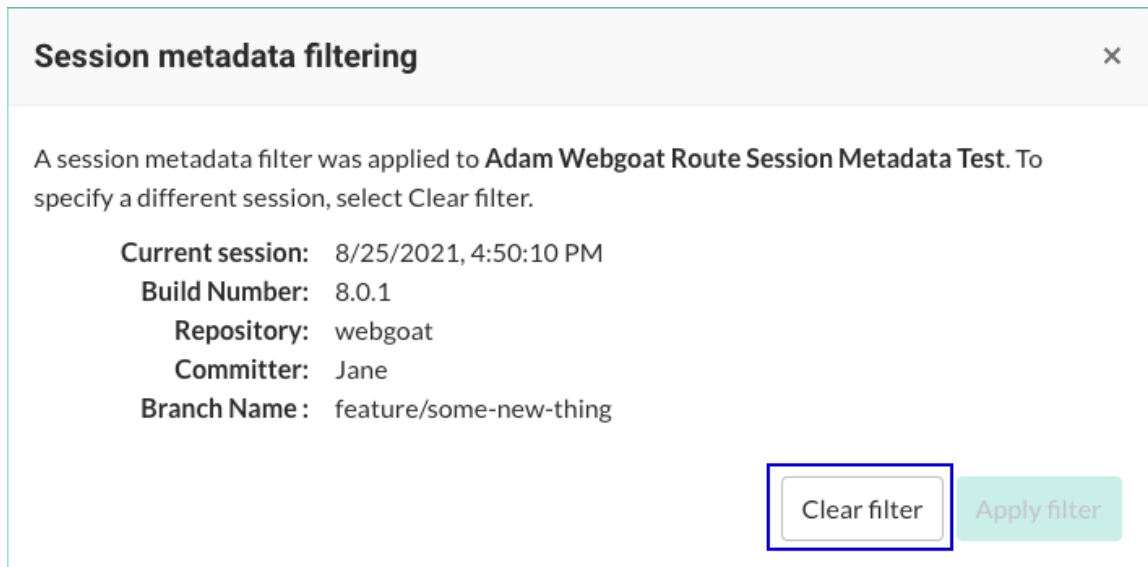


6. In the Vulnerabilities list, the Session column and the View by filter are hidden and the details of the most recent session display above the session metadata icon.
  - a. In **System property**, select one of the displayed properties.
  - b. In **Value**, start typing to find values for the selected system property.

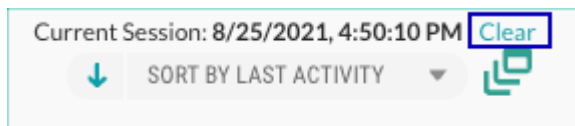


7. To clear a session metadata filter, use one of these methods:
  - Select the Session metadata icon (📄). and select **Clear filter**.





- Select **Clear** next to the displayed metadata above the Session metadata icon (📄).



In the Vulnerabilities list, the Session column displays after you clear the session metadata filter.

## Configure session metadata

To send session metadata for your application to Contrast, you must add the configuration settings to your agent configuration file.

The agent reports the following build properties. You may include all or some of these properties. When you do, the metadata will be available to you as additional information for each vulnerability reported or as a way to filter them.

Supply these settings as system properties, environment settings or properties in a YAML configuration file.

Name	Value
Commit Hash	commitHash
Committer	committer
Branch Name	branchName
Git Tag	gitTag
Repository	repository
Test Run	testRun
Version	version
Build Number	buildNumber

Here are some examples of how you might configure session metadata in the following instances:

- **Java system properties:** Include an additional entry in the line where you add your `javaagent` flag. In this case, you will set the property `contrast.application.session_metadata` to a set of key-value pairs (which conform to RFC 2253) that identify your test run.

```
-Dcontrast.application.session_metadata="branchName=feature/some-new-thing,committer=J
```

- **.NET Framework using *app.config* or *web.config*:** You can add an entry to your configuration to specify this property.

```
<?xml version="1.0"?>
<configuration>
  <connectionStrings />
  <appSettings>
    <add key="contrast.application.session_metadata" value="branchName=feature/some-

```

- **YAML configuration:** You can add an additional entry to your *contrast\_security.yaml* file.

```
application:
  session_metadata: branchName=feature/some-new-thing,committer=Jane,repository=Contrast

```

- **Continuous integration (CI) build scripts:** You can set values using environment variables.

```
-Dcontrast.application.session_metadata="branchName=feature/some-new-thing,committer=Jane,repository=Contrast"
-Dcontrast.application.session_metadata="branchName=$GIT_BRANCH,committer=$GIT_COMMITTER,repository=$GIT_REPO"

```

## Route coverage

For Assess users, route coverage associates vulnerabilities with the originating web request.

With route coverage, you can see detailed information on the components of your application, such as which routes were exercised and which ones were not. This information can help you decide where to focus testing and remediation.

## Web request example

Web requests are the primary interface of web applications. A request may be handled by one function with many subsequent functions coordinating interactions with other services, databases, or files.

During the request handling process, Contrast monitors data flows across the application to identify vulnerabilities. A single web request may be vulnerable to multiple types of attacks. Contrast associates these vulnerabilities with the original request.

This example shows a web request:

```
GET /users?active=true
Host: YourDomain.com
Accept: application/json

```

This example shows how a function might handle the web request:

```
@Controller
public class UserController {
    @GetMapping("/users")
    public String users(@RequestParam(name="active", required=false, defaultValue=true) boolean active) {
        ...
    }
}

```

## How route coverage works

An application route is a combination of three parts:

- An HTTP verb (for example: `GET`)
- The resource path (for example: `/users`)
- The method signature of the controller (for example: `UserController.users(Bool active)`)

When a Contrast agent starts, it instruments functions in the application so that the agent can assess web requests for vulnerabilities while the application is running. If a function implements a framework to handle web requests, Contrast can identify the route before a request is handled. In Contrast, the status for these routes is **Discovered**.

When your application is handling a request, Contrast tracks the activity as an **Exercised** route.

## Frameworks

Contrast supports route discovery for these frameworks:

- **Java:** Jersey 2, Spring MVC 4-5, Struts 1, and Struts 2.  
Additionally, servlet route discovery is supported for: GlassFish 4.1, JBoss AS 4.2-7.1, Jetty 7.X-9.X, Tomcat 5.X-9.X, WebLogic 11g and 12c, WebSphere 8.5 and 9.0 and WildFly 8.1-18.0.
- **Scala:** Play 2.6, 2.7, 2.8
- **.NET Framework:** all [currently supported frameworks \(page 124\)](#)
- **.NET Core:** all [currently supported frameworks \(page 174\)](#)
- **Node.js:** all [currently supported frameworks \(page 222\)](#)
- **Python:** all [currently supported frameworks \(page 291\)](#)
- **Ruby:** all [currently supported frameworks \(page 346\)](#)
- **Go:** all [currently supported frameworks \(page 396\)](#)

If the framework you are using is unsupported, [contact Support](#) . For unsupported frameworks, Contrast will attempt to infer the routes based on observed requests, but you will not see any routes discovered within Contrast.

## Exclusion of built-in routes and applications

Contrast route coverage excludes built-in routes in select web frameworks and applications. For example:

- The Jersey framework for Java applications includes a built-in route for serving a WADL file. Contrast does not include this route in its route coverage. Other web frameworks have similar built-in routes.
- The Contrast Java agent does not report routes from built-in applications such as the Tomcat Manager Application.

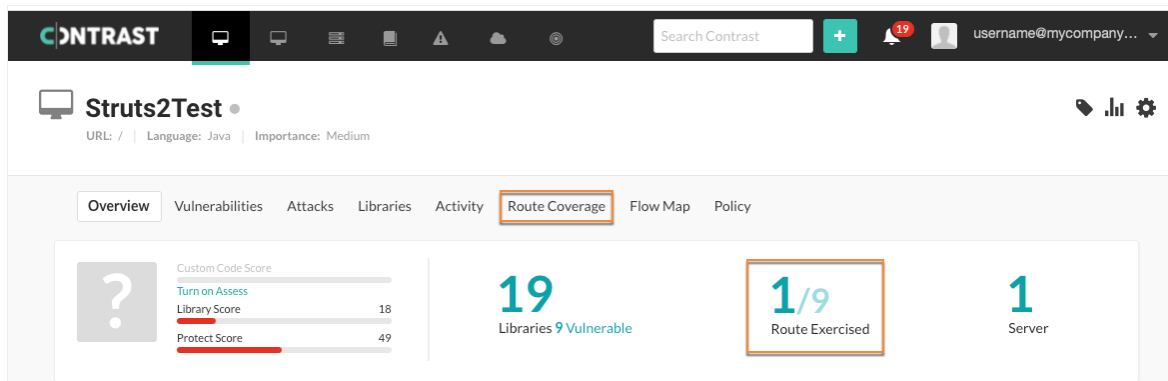
## View route details

[Route coverage \(page 434\)](#) helps you understand how vulnerabilities map to your application's attack surface.

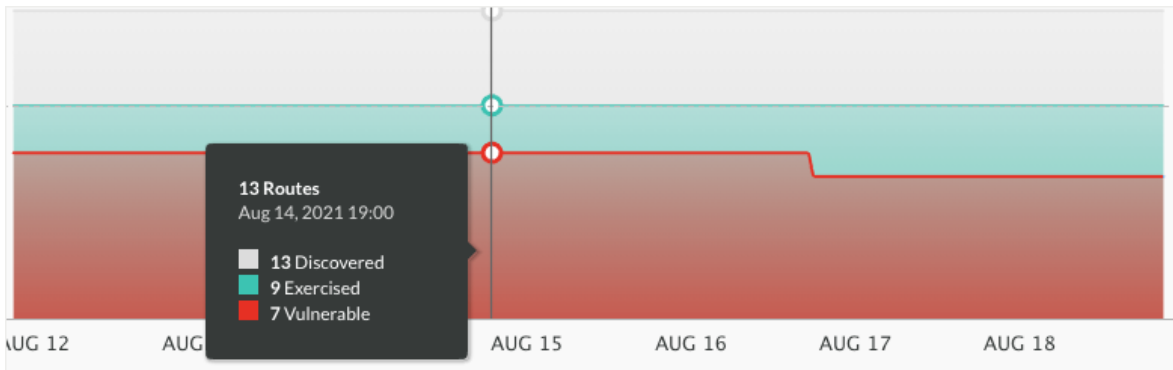
If you remove routes from the Route coverage list (steps 7 and 8) and they still exist when the server restarts or you exercise the application, Contrast includes them in the list again. To permanently exclude routes, select the **Exclude** icon (🗑️) at the end of the route's row.

## Steps

1. Select **Applications** in the header.
2. Select the name of an application.  
The Overview tab shows the number of routes exercised compared to the number of total routes in your application.
3. In the Overview tab, select the number of routes exercised or select the **Route coverage** tab.



4. In the Route coverage tab, hover over the chart to see details about the route during a specified time span.



The chart displays details about routes based on their status:

- Discovered by Contrast (but never exercised with the agent)
- Exercised with the Contrast agent
- Exercised and found to contain vulnerabilities

5. In the list, view additional details about each route.

- **Route:** A route that Contrast identified or is tracking.
- **Environment:** The environment for the server hosting the application: Development, QA, or Production.
- **Server:** The servers where the application is running.

By default, the Server column shows up to three servers. To view a complete list of servers (if more than three are in use), select **Show all**.

Route	Environment	Server	Vulnerabilities	Application	Last Activity	Status
hello.ContactController.contactForm(org.springframework.ui.Model)	Development	CONTRAST-SVR1 CONTRAST-SVR2 CONTRAST-SVR3 <a href="#">Show all (5)</a>	0	8885-test-app	1 minute ago	Exercised



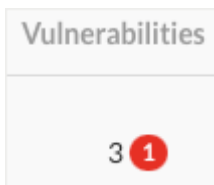
**NOTE**

When you delete a server, Contrast removes it from the list instead of displaying it as greyed out.

- **Vulnerabilities:** The number of vulnerabilities associated with the route.
- **Application:** The application associated with the route.
- **Last activity:** The activity time span for the route.
- **Status:** The route status.

6. Select an option to view details for each route that Contrast has identified in the application:

- a. To view the URL for the route, select a route name.
- b. To view vulnerability details for a specific route, select the number in the Vulnerability column. A red warning mark indicates a critical vulnerability.



- c. To view routes with a specific status only, select the triangle ( ▾ ) at the top of the page and select a filter:
  - **All:** Shows all routes that are not excluded.
  - **Exercised:** Shows only routes that are exercised.

- **Not Exercised:** Shows routes that Contrast discovered but are not exercised.
  - **Vulnerable:** Shows only routes that have a vulnerability associated with them.
  - **Excluded:** Shows only routes that you excluded from the application scoring calculations.
- d. To view routes in specific environments, select the Filter icon (▼) next to the Environment column.
  - e. To view routes for specific modules in a merged application, select the Filter icon (▼) next to the Application column.
  - f. To view routes based on an activity time span, select the Filter icon (▼) next to the Last Activity column.  
Changing the time span also changes the time span for the route coverage chart.  
To clear the filter selection, select **Clear** next to the column heading.
7. To remove a single route from the list:
    - a. Hover over the end of the row and click the **Remove** icon (🗑️).
    - b. To confirm the removal of the route, click **Delete**.
  8. To remove multiple routes from the list:
    - a. Select the check mark next to one or more routes or to select all routes, select the check mark next to **Route**.
    - b. In the batch action menu at the bottom of the page, select the **Remove** icon (🗑️).
    - c. To confirm the removal of the route, click **Delete**.
  9. To view and share route details outside of Contrast:
    - a. Select the check mark next to one or more routes or to select all routes, select the check mark next to **Route**.
    - b. In the batch action menu at the bottom of the page, select the **Export** icon (📄).  
This action exports the details to a CSV file. The file downloads to your default download location.  
The CSV file includes:
      - A list of the application's routes.
      - Details about the server on which they were found.
      - Details of when the routes were last exercised.
      - A list of vulnerabilities, the severity and status of each.

## See also

- [Exclude routes \(page 438\)](#)
- [Include routes \(page 438\)](#)

## Route exclusion and inclusion

In situations where you require a specific percentage of route coverage for security reasons, Contrast provides an option to exclude irrelevant or inaccessible routes from route coverage calculations.

You can choose to re-include any routes that you excluded previously.

Including or excluding routes requires an Admin role.

## Effects of route exclusion

- Contrast collects vulnerability data for excluded routes, but excludes this data from application scoring calculations.
- Excluding a route excludes it from all environments where Contrast discovers it.
- If you defined session metadata to exercise and discover routes in an application, excluding a route also excludes this data.
- The audit log includes an entry for each route that you exclude.

## Effects of route inclusion

- Contrast includes data for the included route in application scoring calculations.
- Including a route includes it in all environments where Contrast discovers it.
- The audit log includes an entry for each route that you include.

## Exclude routes

[Excluding routes \(page 437\)](#) that are irrelevant or inaccessible helps to ensure that route coverage calculations for applications are accurate.

To ensure the route remains excluded, don't remove it after you mark it as excluded. If you exclude a route and then remove it, Contrast includes the route again if its detected when the application server starts or after you exercise the application.

## Before you begin

- An Admin role is required.
- Identify the routes that you want to exclude.

## Steps

1. Select **Applications** from the header.
2. Select an application name.
3. Select the **Route Coverage** tab.
4. Exclude one or more routes:
  - a. To exclude a single route, hover over the end of the row and select the **Exclude** icon (🗑️).
  - b. To exclude multiple routes, use the check marks in the left column to select routes. Then, select the **Exclude** icon from the batch action menu at the bottom of the page.



- c. Confirm the exclusion in the Exclude route window.  
The status for the selected routes changes to **Excluded**.

## Include routes

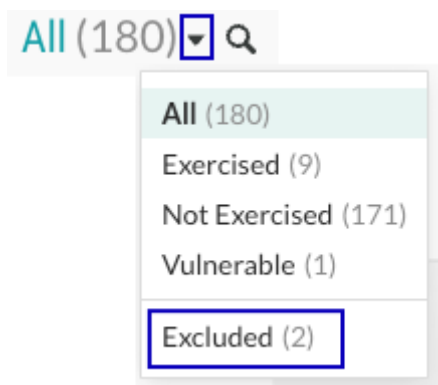
You can [include routes \(page 437\)](#) that you previously excluded. On the Route coverage page, excluded routes have a status of **Excluded**.


## Before you begin

- An Admin role is required.
- Identify the excluded routes that you want to include.

## Steps

1. Select **Applications** in the header.
2. Select an application name.
3. Select the **Route coverage** tab.
4. Display a list of excluded routes by selecting the **triangle** (▾) at the top of the list and select **Excluded**.



5. Include one or more excluded routes:
  - a. To include a single, excluded route, hover over the end of the row and select the **Re-include** icon (  ).
  - b. To select multiple excluded routes, use the check marks in the left column to select routes. Then, select the **Re-include** icon in the batch action menu at the bottom of the page.



- c. Confirm the inclusion in the Re-include route window.  
The status returns to the status the route had before you excluded it.

## Flow maps

The application flow map provides an interactive view of where data and resources are shared within your organization and beyond it.

Every time you exercise an application, Contrast uses data reported from your Contrast agent to create a detailed diagram of your application, the layers of technologies within it and the back-end systems to which it connects. As more applications are exercised within your organization and their back-end systems are identified by the agent, Contrast also identifies which applications are connected to the application you're currently viewing by shared back-end systems.

When you [view a flow map \(page 439\)](#), you can see the entire landscape of systems and resources that are associated with the application. By focusing on connections between individual systems and applications, you can also determine if users and connected applications in your organization have appropriate access to the current application and sensitive data potentially associated with it. Learn more about [understanding flow maps \(page 440\)](#).

The agent performs application matching through string credentials. Other instrumented applications that share common string credentials - for example, REST endpoints, database connection, or other unique host and port combinations - are displayed as connected applications.



### NOTE

Users who [don't have access \(page 637\)](#) to view details for a connected application, won't see that application in the flow map.

## View flow maps

The application flow map provides an interactive view of where data and resources are shared within your organization and beyond it.

To view the flow map for an application:

1. Select **Applications** in the header and select the name of an application.
2. Click on the **Flow map** tab.
3. Here you will see three connected sections: **Application Architecture**, **Back-End Systems** and **Connected Applications**. Learn more about [understanding flow map data \(page 440\)](#).

## Understand flow maps

The application flow map provides an interactive view of where data and resources are shared within your organization and beyond it.

When you [view a flow map \(page 439\)](#) for an application, the information is organized into three connected sections:

- **Application architecture:** This section breaks down the view, presentation and service layers of the application's front end. You can also see foundational information about the application, including the environments in which it's deployed, letter grade, vulnerability statuses and attack status. There are three layers to this section:
  - **View:** This column displays the layer of technologies that determine what a browser sees and processes.
  - **Presentation:** This column displays the layer of libraries that generates the application view.
  - **Service:** This column displays the layer comprised of the database, LDAP driver or back-end code performing the application logic.

Hover on an item in any of the lists to see how many instances of each type of library are used in the application, or click on the library to go to the library's page. If the agent reports any vulnerabilities, a warning icon appears beside the library in which they were found; hover over the icon for links to the vulnerabilities' **Overview** pages.

- **Back-end systems:** These columns display each of the systems to which your application is connected. Hover on the cylinder icon for databases, the globe icon for URLs, or the plug icon for LDAP databases to see more details on each system; click on an icon to highlight its connection to other applications. A solid line with lock indicates that the connection is encrypted; a dashed line shows that the connection is unencrypted or the state of encryption is unknown.
- **Connected applications:** This column lists each of the applications that are connected to the primary application by a back-end system. To see connected applications that meet specific criteria, click the funnel icon to select filters from the dropdown, such as environment, application language and custom tags. The menu also shows session metadata fields for the primary application (not the connected applications), if available. Select **See Flowmap** to go to the **Flow Map** tab for that application.



### NOTE

If the agent isn't currently reporting data for the current application, the **Back-end systems** and **Connected applications** sections are left blank.



### TIP

If the application is being accessed by another user while you're viewing the flow map, the **Browser** tab appears with a list of the browsers on which it's being accessed. Hover over the icons to see more details, such as the browser type and version.



## Scans

In Contrast Scan, you can:

- [Create a scan project \(page 445\)](#)
- [Monitor scans \(page 448\)](#)
- [Analyze scan results \(page 454\)](#)
- [Start a new scan \(page 447\)](#)
- [Cancel a scan \(page 448\)](#)
- [Change scan settings \(page 465\)](#)

### Scan release notes

#### Scan 0.0.56

**Release date:** April 6, 2023

##### New and improved:

- Support for multi-JAR scanning

This release adds the ability to scan multiple JAR files as one artifact. You can add multiple JAR files to a ZIP file and scan it as a single artifact.

To scan a multi-JAR ZIP file, package the JAR files at the top level in a ZIP file and scan it using the Scan local engine, as normal. For example, use a command similar to the following:

```
multiple-jar-artifact.zip
-> artifact1.jar
-> artifact2.jar
-> artifact3.jar
```

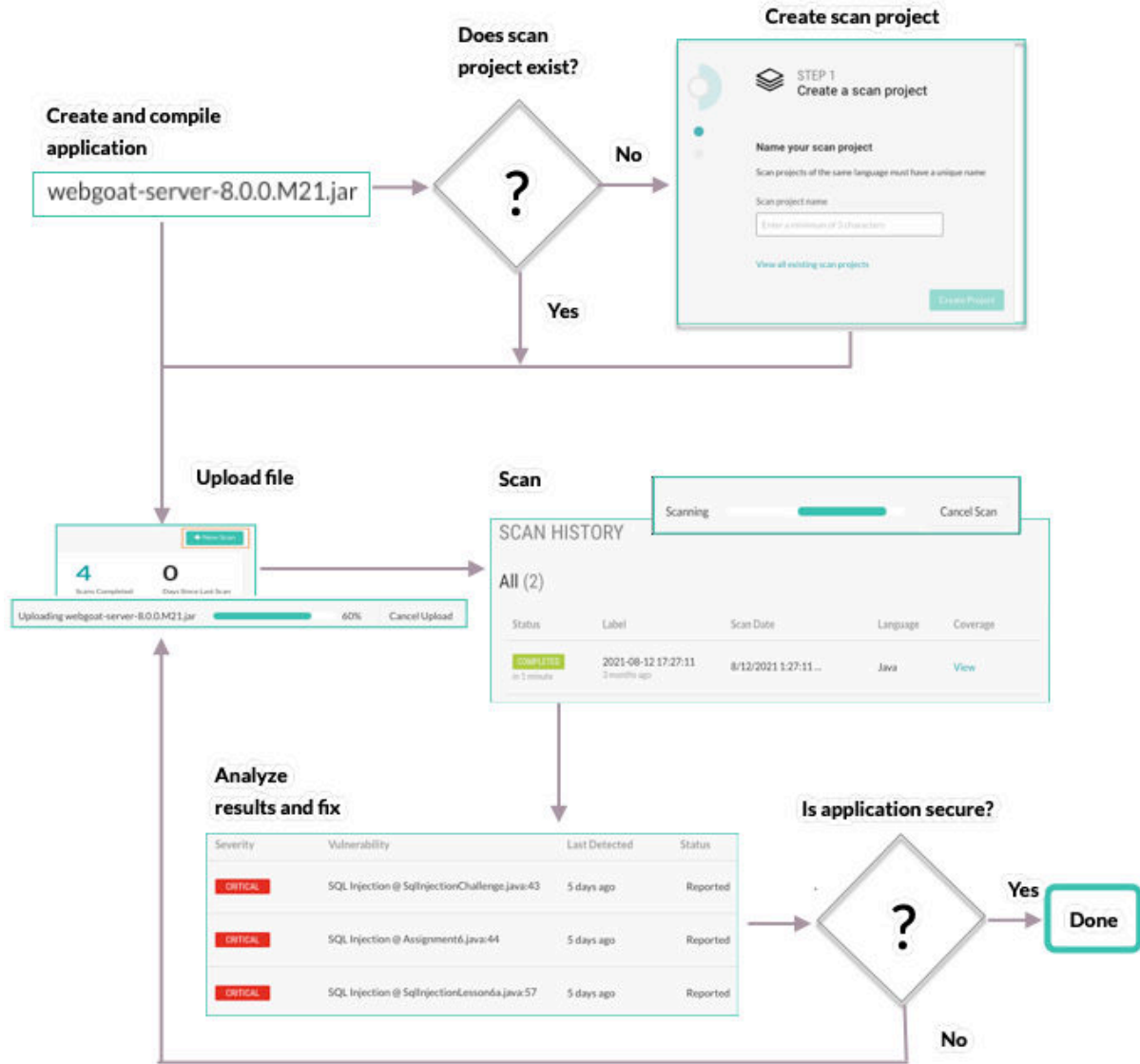
Once completed, the Contrast web interface displays the scan as a single project under the Scans tab.

### Scan process

This section provides details about the workflow for using Contrast Scan as well as the process Scan uses when analyzing your code.

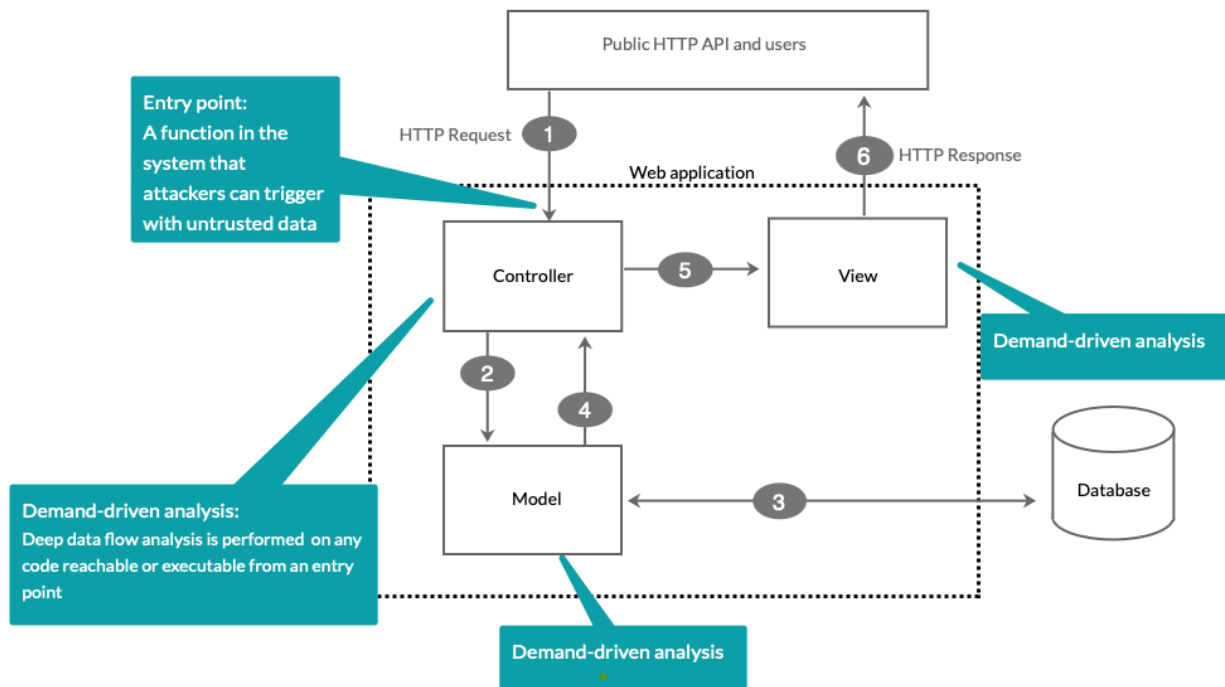
### Scan workflow

This diagram illustrates the Scan workflow that you follow.



## Application view

This diagram shows how Scan views a typical web application for the purpose of data flow analysis.



Scan looks at data entry points to find code to scan. Here are some examples of typical data entry points that Scan examines:

pet Everything about your Pets	
POST	<code>/pet/{petId}/uploadImage</code> uploads an image
POST	<code>/pet</code> Add a new pet to the store
PUT	<code>/pet</code> Update an existing pet
GET	<code>/pet/findByStatus</code> Finds Pets by status
GET	<code>/pet/findByTags</code> Finds Pets by tags
GET	<code>/pet/{petId}</code> Find pet by ID
POST	<code>/pet/{petId}</code> Updates a pet in the store with form data
DELETE	<code>/pet/{petId}</code> Deletes a pet

### Contrast Scan supported languages

Contrast Scan supports these languages:

Language	File types
Java (for example: J2EE, JSP, and Spring MVC)	JAR and WAR files
JavaScript	JS and ZIP files
<ul style="list-style-type: none"><li>• Angular version 8 or later</li><li>• JQuery (all versions)</li><li>• React version 16 or later</li><li>• Vue.JS 2 or later</li><li>• Typescript 4.2 or later</li></ul>	

## Scan package preparation

To get the best results from a scan, consider these best practices before you upload packages.

## Artifact types

- For Java, upload either a WAR or JAR package.
- For JavaScript, upload either a JS or ZIP package.

## Access to class files and dependencies

If you package your files differently than suggested here, Scan has to make assumptions about your code. The results might not be as precise as they could be. They could include false negatives and positives.

When Scan has access to all the appropriate class files and dependencies, the results do not include phantom classes. A phantom class is a referenced class but either scan is unable to find bytecode for it or the scan was unable to decompile the code into intermediate representation (IR).

- Scan needs access to these files:
  - Application class files
  - Application dependency jar or class files
- Organize application and dependencies in WAR files as described in the Oracle Java™ Servlet Specification.
- Organize applications and dependencies in JAR files similar to the way SpringBoot JAR files are organized.  
SpringBoot JAR files place applications and dependencies in well-known areas.
- Including standard JDK files and common servlet container-provided dependencies are not required. Scan provides these dependencies for you.

## Frameworks

To be able to deliver accurate results, Scan needs to understand the web framework that your application uses.

Scan supports these frameworks:

- Angular 8 or later
- J2EE
- Jakarta EE 2.0-3.0
- jQuery
- React 16 or later
- SpringBoot
- Spring MVC
- Vue.JS 2 or later

## Avoid use of thin JAR files

Thin JAR files contain only application byte code. These files require special execution loaders to dynamically access dependencies for loading. If you upload a thin JAR file, Scan does not execute any of your application code. It cannot access the application dependencies for accurate scanning.

## Create a scan project

Scan projects are containers for artifacts that you want to scan.

Creating a scan project starts the first scan for an uploaded file.

## Before you begin

- Identify the artifact that you want to upload for scanning.  
Scan supports different files types for each programming language. For example, for Java,upload a JAR or WAR file.

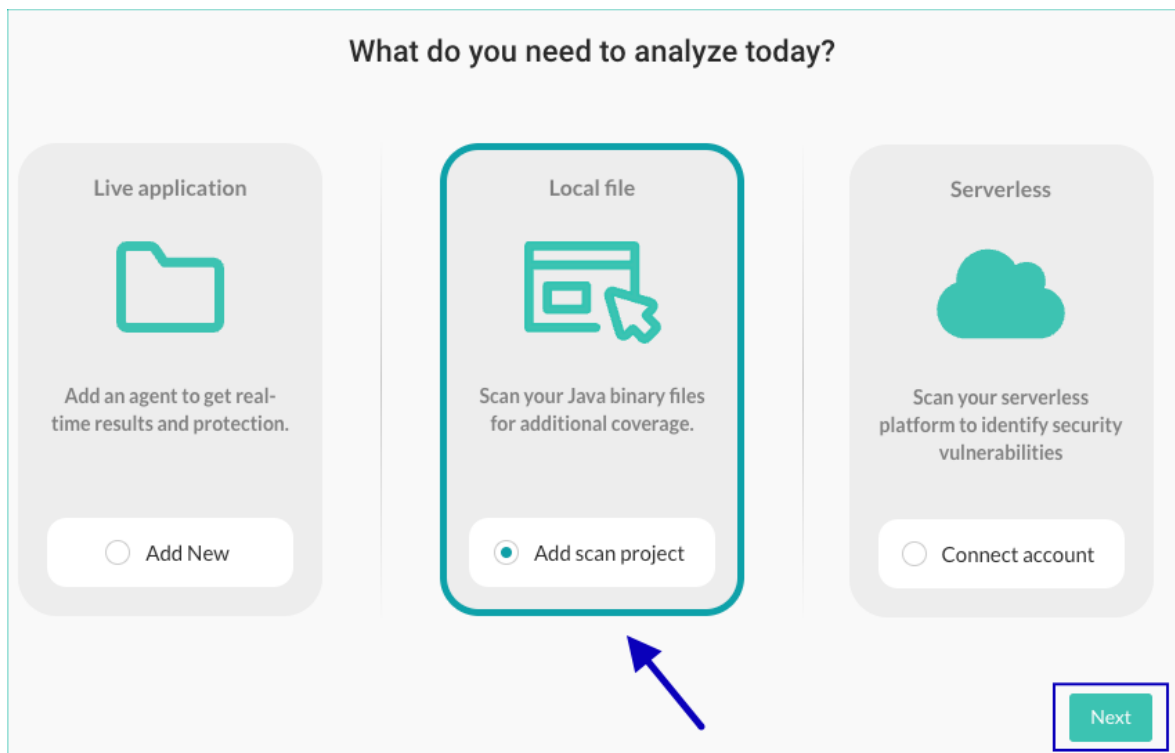
## Steps

- In the Contrast web interface, select **Add New** in the top right corner.



This option is available when Contrast Scan is enabled. If this option is not enabled, [contact Support](#).


- In Local File, select **Add scan project**. Then, select **Next**.



- Specify a name for the project.  
Scan project names must be unique. Specify a name that lets you easily identify the scan project in other Contrast lists.  
As a best practice, consider naming the project to match the name of the artifact. For example, if your artifact is `webgoat.jar`, name your project `webgoat` or `webgoat.jar`.
- Select the language for the files that the project will contain.

## Get started with Contrast

Contrast analyzes your applications, code, and open-source libraries and shows you potential vulnerabilities and security risks. ✕



### STEP 1 Create a scan project

#### Name your scan project

Scan projects of the same language must have a unique name

Scan project name

Scan project language

Java (.war and .jar)

JavaScript (.js and .zip)

.NET (.exe and .zip)

[View all existing scan projects](#)

5. Select **Create project**.

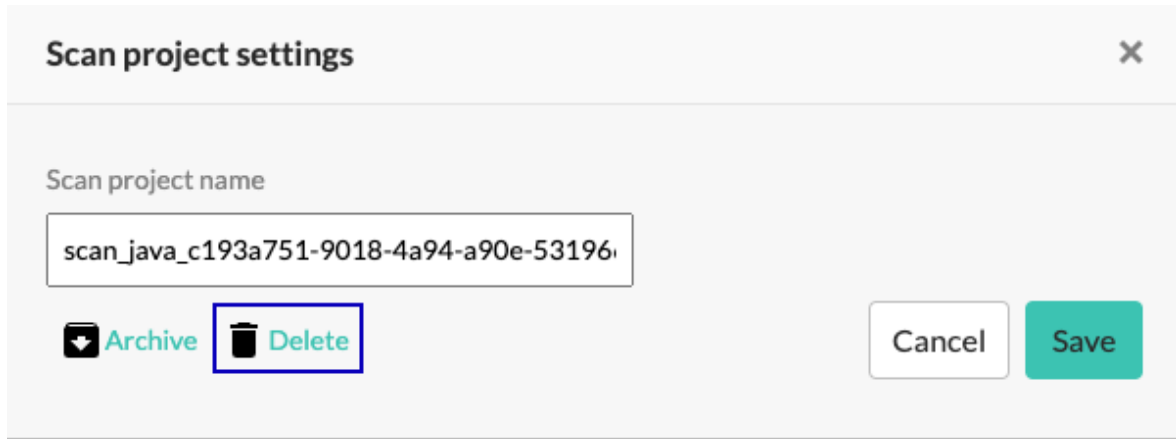
## Delete scan projects

If you want to permanently remove a scan project, you can delete it.. Contrast permanently deletes all the data associated with the project.

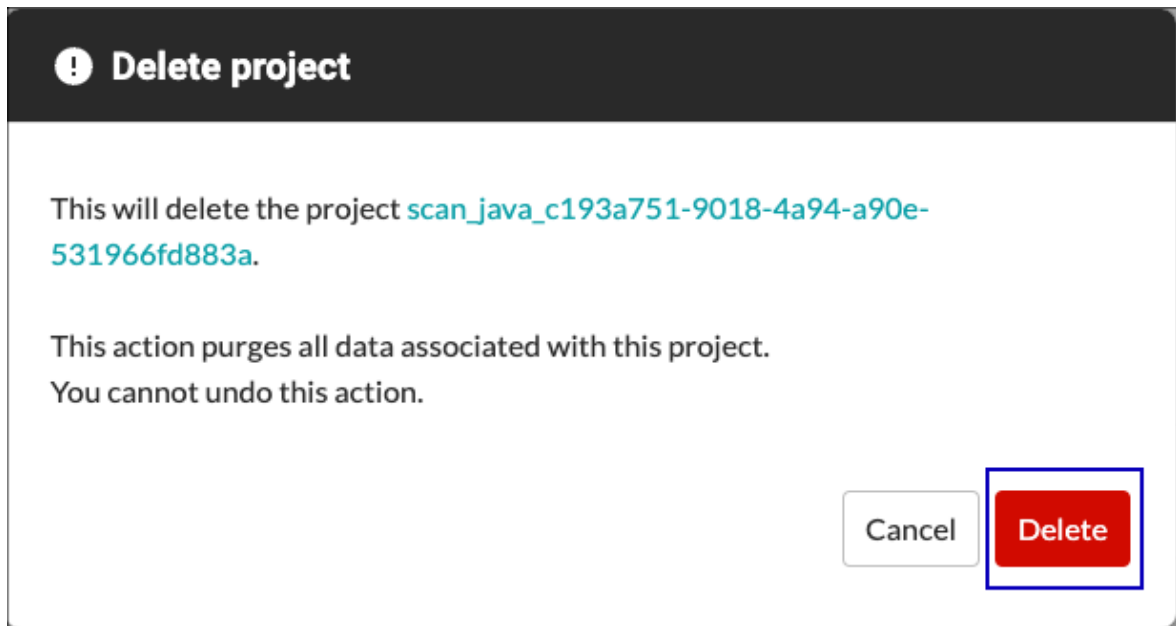
You cannot undo this action.

## Steps

1. Select **Scans** in the header.
2. Select a scan project.
3. Select the Settings icon (⚙️).
4. In the Scans projects settings window, select **Delete**.



5. In the Delete project window, confirm that you want to delete the project by selecting **Delete**.



## Start a scan

Start a scan when you want to do the following tasks:

- Begin analysis of a new application.
- Test code changes you made to fix vulnerabilities on an application you scanned previously.

## Before you begin

- Identify the scan project that contains the file you want to scan again or [create one \(page 445\)](#).

## Steps

1. Select **Scans** in the header.
2. Select a scan project.
3. Select **New Scan**.



4. From the displayed window, select a file to upload and select **Open** or **Upload**.  
If the scan project contains a previous scan, select a new version of the file you previously scanned.

The scan starts automatically after the file upload completes.

5. [Monitor \(page 448\)](#) the scan progress.

### Cancel a scan

You can cancel a scan that is in progress.

After you cancel a scan, its status changes to Cancelled in Scan history.

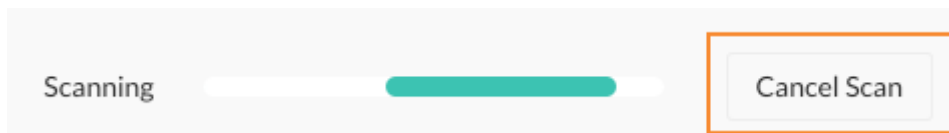
### Before you begin

Find a scan project that contains a scan that's in progress.

### Steps

To cancel a scan:

1. Select **Scans** in the header.
2. Select a scan project that has a scan in progress.
3. In the activity bar, select **Cancel scan**.



The scan stops immediately.

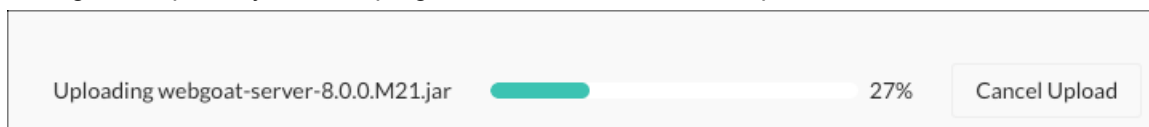
### Monitor scans

After you start a scan, you can monitor the progress of the file upload and the scan from any tab under Scans.

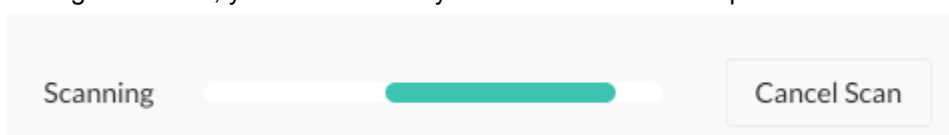
You can view a history of the scans in a selected project under Scan history in the Overview tab.

### Steps

1. Select **Scans** in the header.  
The Scans page shows these scan details:
  - The grade score for each scan project.
  - The names of the scan projects.
  - The number and status of open vulnerabilities.
  - The time the last scan completed.
2. Select a scan project.
3. [Start a scan \(page 447\)](#).
4. While uploading a file or running a scan, you can monitor its progress at the top of a Scans page.
  - During a file upload, you see a progress bar similar to this example:



- During a file scan, you see an activity bar similar to this example:



5. To view a history of the scans in a selected project, under Scans, select the **Overview** tab and view the details under Scan history.



SCAN HISTORY				
All (3)				
Vulnerabilities	Label	Scan Date	Language	Coverage
34 <span style="color: red;">7</span>	2022-03-10 20:36:32 1 hour ago	3/10/2022 3:36:32 ...	Java	<a href="#">View</a>
34 <span style="color: red;">7</span>	2022-03-10 20:34:33 1 hour ago	3/10/2022 3:34:33 ...	Java	<a href="#">View</a>
34 <span style="color: red;">7</span>	2022-03-10 20:29:43 1 hour ago	3/10/2022 3:29:43 ...	Java	<a href="#">View</a>

1 Results per page 10

- To see additional details about a scan, select a scan label or, under the Coverage. column, select **View**.

### Contrast Scan local engine

The Contrast Scan local engine lets you scan your application using Docker CLI commands or a Java JAR file instead of the Contrast CLI or the Contrast web interface. When a scan completes successfully, the Scan local engine uploads the results to the Contrast platform where you can view them. The uploaded files include:

- Scan results in Static Analysis Results Format (SARIF) in a `JSON` file.
- Output from the scan in a `LOG` file.

This method of scanning is useful if you want to scan files locally without uploading them to the Contrast platform.

### Supported platforms

The Scan local engine is supported for Linux systems and in a Docker container.

### Proxy server settings for local scans

For security purposes, you might want to use a proxy server for communication between the local scan engine and the Contrast platform. Use the following environment variables to enable a proxy server when you [run a local scan \(page 451\)](#):

Variable	Description
CONTRAST_API_PROXY_ENABLE	Enables proxy settings.
CONTRAST_API_PROXY_URL	<b>Required.</b> The URL for the proxy server (for example, <code>http://host:port</code> )
CONTRAST_API_PROXY_TYPE	<b>Required.</b> The proxy server type (for example, BASIC)
CONTRAST_API_PROXY_USERNAME	<b>Optional.</b> Username for the proxy server
CONTRAST_API_PROXY_PASSWORD	<b>Optional.</b> Password for the proxy server

### Scan process

To use the Scan local engine:

- Decide how you want to run the local scan:
  - [Download the Docker container \(page 450\)](#) that contains the local scanner application from Contrast Security.

- [Download the Scan local engine JAR file \(page 450\)](#).
2. Decide if you want to use a proxy server for uploading results.
  3. [Run the scan on a local system \(page 451\)](#).
  4. [View results \(page 454\)](#) in the Contrast web interface.

## Download the Docker container

To get started with using the Contrast local scanner, download the Docker container from the GitHub repository for Contrast.

If you prefer to use a Java JAR file instead of the Docker container, [download the JAR file \(page 450\)](#)

### Before you begin

- [Install the Docker CLI](#).
- Configure Docker to use 12 GB of memory.
- Get a Personal Access Token (PAT) from [Contrast Support](#).

### Steps

1. Configure this variable on your local system:

```
export CONTRAST_PAT=<ContrastProvidedPAT>
```

Replace <ContrastProvidedPAT> with the PAT that Contrast Support gives you

2. Log in and download the Docker container with these commands:

```
docker login ghcr.io/contrast-security-inc -u local-scanner -p $CONTRAST_PAT
docker pull ghcr.io/contrast-security-inc/contrast-sast-scanner-java:latest
```

## Download the Java JAR file

To download the Java JAR file for the Contrast local scan engine, use one of these options:

- Download from Maven.
- Download with a curl command.

### Before you begin

- Get a Personal Access Token (PAT) from [Contrast Support](#).

### Download from Maven

1. Create a Project Object Model (POM) file with this information:

```
<server>
  <username>local-scanner</username>
  <password>ContrastProvidedPAT</password>
  <id>github</id>
</server>

<repository>
  <id>github</id>
  <name>github</name>
  <url>https://maven.pkg.github.com/Contrast-Security-Inc/sast-local-scan-runner</url>
</repository>

<dependency>
```

```
<groupId>com.contrastsecurity</groupId>
<artifactId>sast-local-scan-runner</artifactId>
<version>latest</version>
</dependency>
```

Replace `ContrastProvidedPAT` with the PAT that Contrast Support gives you.

- Right-click the POM file and select **Run As > Maven Install**. or use the `mvn install` command.

### Download with curl commands

- Use this curl command to download the Java JAR file:

```
curl -L -H 'Accept: application/vnd.github.v3.raw' -s https://<ContrastProvidedPAT>@
```

- Replace `<ContrastProvidedPAT>` with the PAT that Contrast Support gives you.
- Replace `<VersionNumber>` with a specific version number or use `latest` to download the latest version. Ask your Contrast representative for available versions, if necessary.

### Local scan engine environment variables

Use these environment variables with the local Scan engine:

Variable	Required?	Description
CONTRAST__API__URL	Yes	The address of the Contrast installation where you want to report scan results. The URL should include <code>/api/sast</code> at the end of the URL.
CONTRAST__API__USER_NAME	Yes	User name for the Contrast user account (in most cases, your login ID)
CONTRAST__API__API_KEY	Yes	Contrast API key
CONTRAST__API__SERVICE_KEY	Yes	Contrast service key
CONTRAST__API__ORGANIZATION	Yes	Contrast organization ID
CONTRAST__API__PROXY__ENABLE	No	Enables proxy settings
CONTRAST__API__PROXY__URL	Yes, if proxy settings are enabled	The URL for the proxy server (for example, <code>http://host:port</code> )
CONTRAST__API__PROXY__TYPE	Yes, if proxy settings are enabled	The proxy server type (for example, BASIC)
CONTRAST__API__PROXY__USERNAME	No	Username for the proxy server
CONTRAST__API__PROXY__PASSWORD	No	Password for the proxy server
UMBRELLA_LAUNCHER_JAVA_PATH	No	Path for the umbrella Java scanner jar (for example, <code>/app/contrast-scan-java-cli.jar</code> )

### Run local scan

The Contrast Scan local engine is available as a Docker container or as a Java JAR file. It requires the location of a build artifact so it can process the scan.

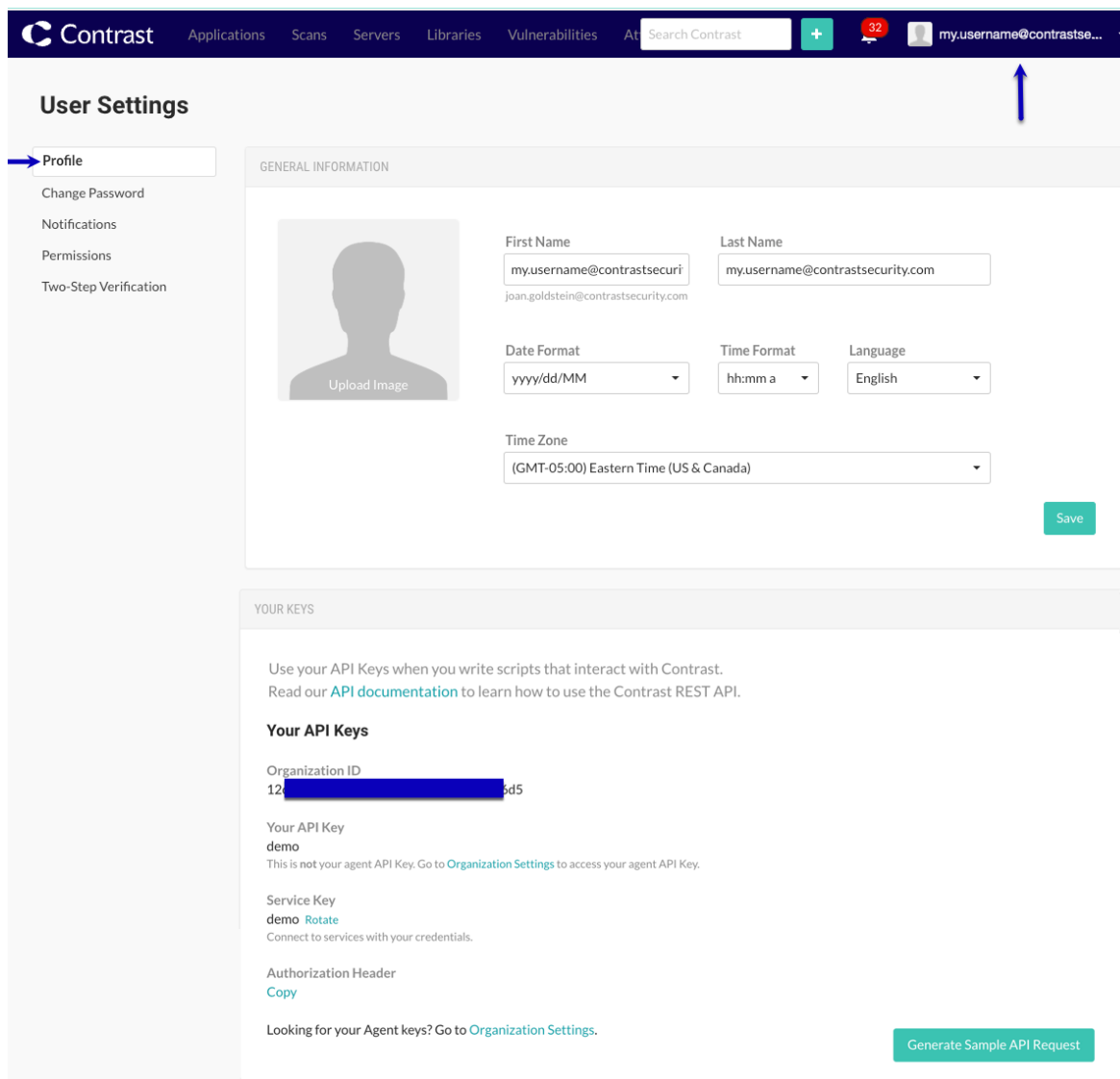
#### Before you begin

- Identify where the build artifacts that you want to scan are located.
- Determine where you want to store scan results on your local system. If you don't specify a path for output results, the Scan local engine writes results to the current working directory in a file named `results.sarif`.
- If you plan to use the Java JAR version of the Scan local engine, ensure that this software is installed on your system:
  - Java 11
  - If you are scanning JavaScript project files, Semgrep App version 0.114.0

- Internet access to let the local scanner upload scan results and scanner output to Contrast.
- Verify that you have 1 CPU available (the Contrast Scan local engine is single threaded) and 12 GB of RAM.

### Steps

1. Log in to the Contrast web interface.
2. Under the user menu, select **User settings**.
3. In Profile, under Your keys, get the following information:
  - Organization ID
  - Your API key
  - Service key
  - Contrast URL



4. Configure the environment variables that let the local scanner communicate with Contrast:

 **NOTE** If you want to use a proxy server for communication between the local scan engine and the Contrast platform, include the [proxy server environment variables](#). (page 449)

```
export CONTRAST__API__URL=<URL>
export CONTRAST__API__USER_NAME=<Username>
export CONTRAST__API__API_KEY=<APIKey>
export CONTRAST__API__SERVICE_KEY=<ServiceKey>
export CONTRAST__API__ORGANIZATION=<OrgId>
export LOCAL_ARTIFACT_LOCATION=<LocalArtifactLocation>
export LOCAL_OUTPUT_LOCATION=<LocalOutputLocation>
```

- Replace <URL> with the address of the Contrast installation where you want to report scan results. The URL should include /api/sast at the end of the URL.
- Replace <Username> with your Contrast user account (in most cases your login ID).
- Replace <APIKey> with the Contrast API key.
- Replace <ServiceKey> with the Contrast service key.
- Replace <OrgID> with the Contrast organization ID.
- Replace <LocalArtifactLocation> with the path to the folder where the file you want to scan is located.  
**Optional:** You can specify the path in the command instead of using a variable.
- Replace <LocalOutputLocation> with the path on the local system where you want to store results files.  
**Optional:** You can specify the path in the command instead of using a variable.

#### 5. Start the scan:

- If you are using the **Docker version** of the Scan local engine, start the scan with a command similar to this one:

```
docker run -v $LOCAL_ARTIFACT_LOCATION:/app/artifacts \
  -v $LOCAL_OUTPUT_LOCATION:/app/results \
  -e CONTRAST__API__URL=${CONTRAST__API__URL} \
  -e CONTRAST__API__USER_NAME=${CONTRAST__API__USER_NAME} \
  -e CONTRAST__API__API_KEY=${CONTRAST__API__API_KEY} \
  -e CONTRAST__API__SERVICE_KEY=${CONTRAST__API__SERVICE_KEY} \
  -e CONTRAST__API__ORGANIZATION=${CONTRAST__API__ORGANIZATION} \
  ghcr.io/contrast-security-inc/contrast-sast-scanner-java:latest \
  --project-name "<ProjectName>-${CONTRAST__API__ORGANIZATION}" \
  --label "<LabelName>" \
  /app/artifacts/<FileName> \
  -o $LOCAL_TARGET_OUTPUT_LOCATION/results.sarif
```

- Replace <ProjectName> with the name of a Scan project.
- Replace <LabelName> with a label for the scan. For example, you could specify a build number as: "build:1.0.1".
- Replace <FileName> with the name of the file that you want to scan. This file must reside in the directory that you specified for the \$LOCAL\_ARTIFACT\_LOCATION.
- If you are using the **Java JAR file** to run the Scan local engine, start the scan with a command similar to this one:

```
java -jar sast-local-scan-runner.jar <ScanArtifact> --project- \
name <ProjectName> --label <LabelName>
```

- Replace <ScanArtifact> with the path of the JAR, WAR, or ZIP file that you want to scan. You can also specify folders.
  - Replace <ProjectName> with a name for a project. For example: "my project name".
  - Replace <LabelName> with a label for the scan. For example, you could specify a build number as: "build:1.0.1".
6. Wait several minutes after the scan completes to view results in the Contrast web application. Results are not immediately viewable due to upload and processing times.

## Command options

Use any of these command options with the Docker container or the Java JAR file:

Option	Description
<code>-o, --output-re-sults</code>	Specifies the location for output results. If you don't specify a location, the local scanner writes the results to the current working directory.
<code>-V, --version</code>	Prints version information
<code>--project-name &lt;ProjectName&gt;</code>	The name of a scan project. If you specify a project name that already exists, the Scan local engine adds the scan to that project. Otherwise, it creates a new project with the specified name. If the project name includes spaces, enclose the name in double quotes (""). For example: "My Scan Project". This option is required if you don't use a project ID.
<code>--project-ID</code>	The ID for an existing project. This option is required if you don't use a project name.
<code>--label &lt;label&gt;</code>	A label for the current scan.

## Exit codes

The Scan local engine returns these exit codes when a scan completes:

Exit code	Description
0	Scan completed successfully and uploaded results to Contrast
1	Input validation error
2	Error connecting to Contrast API server
3	Contrast API error returned
4	Scan local engine returned an error, details are in the log files
5	Unexpected error occurred, details are in the log files

## View local scan results

View details and results of a local scan in the Contrast web interface.

If you specified a location for output results, you can view the SARIF file that the scan created on your local system.

### Steps

1. Log in to the Contrast web application.
2. Select the **Scans** tab.
3. In the scans list, select the scan project for the local scan.
4. To view results from the local scan, explore the Overview, Vulnerabilities, and Policy tabs.  
The Contrast Documentation contains additional information on [analyzing scan results](#).

## Analyze scan results

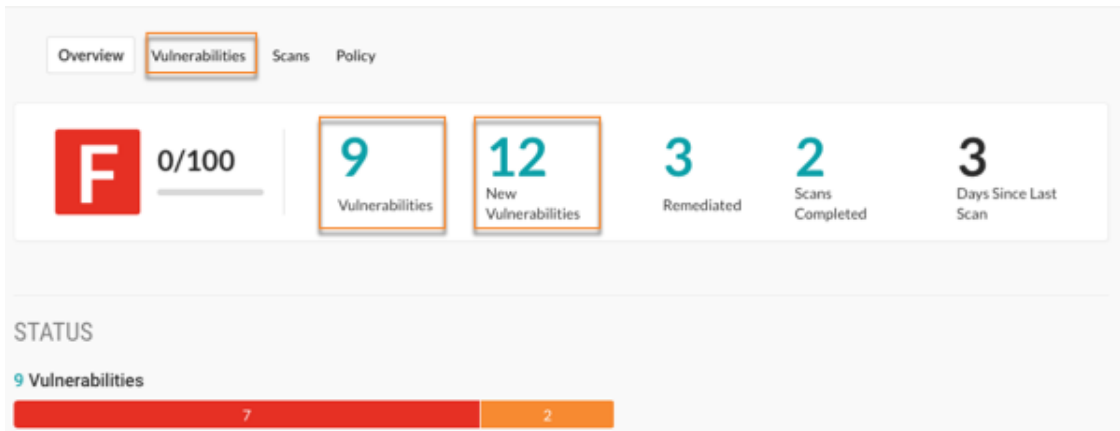
A scan observes the data flow in an application and reports vulnerabilities that it discovers.

After you analyze the results, update your code and run the scan again to verify the vulnerability is fixed.

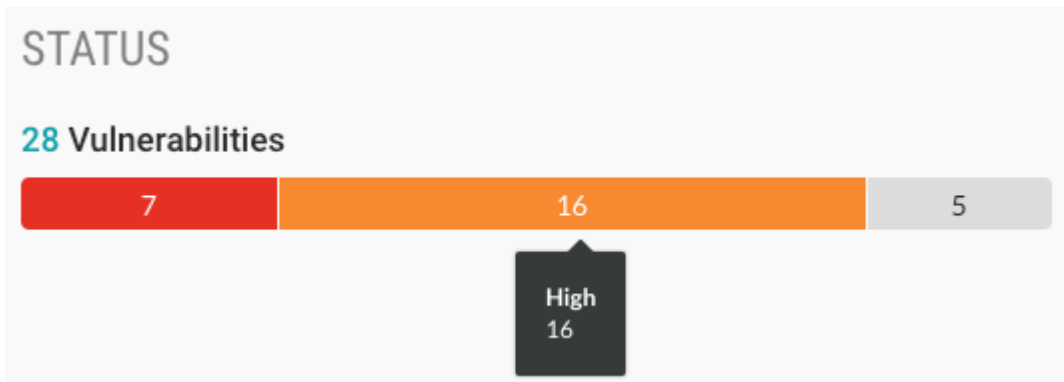
### Steps

To find information on vulnerabilities after a scan completes:

1. Select **Scans** in the header.  
The Scans page shows a list of scan projects.
2. To view a list of discovered vulnerabilities and their severity:
  - a. Select a scan project.
  - b. In the Overview tab, click a vulnerability number or select the **Vulnerabilities** tab.

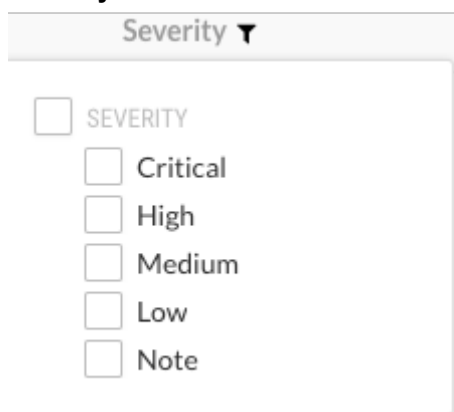


Alternatively, to see vulnerabilities with a specific status, under Status, select a section in the Vulnerability bar.

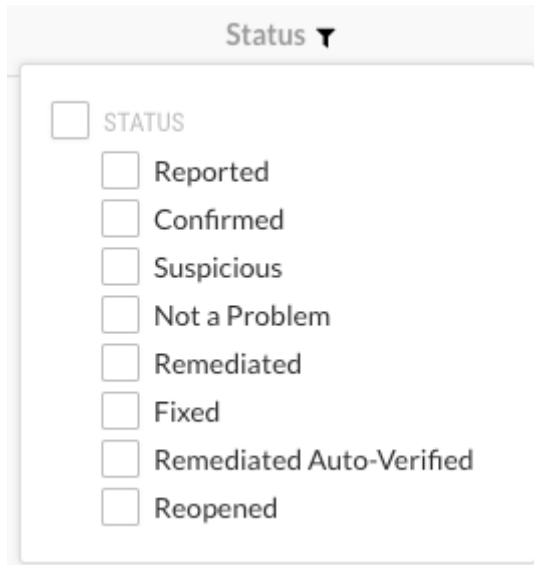


3. On the Vulnerabilities tab, to sort the vulnerabilities by status or severity, select the **Filter** icon (⌵) next to the Severity or Status columns and select one or more statuses.

**Severity filters:**



**Status filters:**



To clear a filter, select **Clear** next to the Severity or Status column.

- To view more information about a specific vulnerability, in the Vulnerabilities tab, select the vulnerability.
  - The Overview tab for the selected vulnerability shows a description of the vulnerability, including what happened in your code and the risk associated with the vulnerability.
- To view the details about the vulnerability and its location in your code, select the **Details** tab:
  - The method where a vulnerability exists.
  - The file where the scan discovered the vulnerability.
  - The first line in the code where the scan discovered the vulnerability.
- To view suggestions for fixing the code, select the **How to fix** tab.
- To view additional details about the vulnerability, select the **Notes** tab:
  - When the vulnerability is detected
  - The code module where Contrast found the vulnerability
  - The type of vulnerability (for example, injection)
  - Severity
  - Risk confidence
  - Security standards that apply to the vulnerability
- To change the status of a vulnerability, in the Status column, select the current status for a vulnerability and select a [vulnerability status \(page 533\)](#).

## View scan details

Scan details include:

- A summary of the scan results
- Scan coverage details

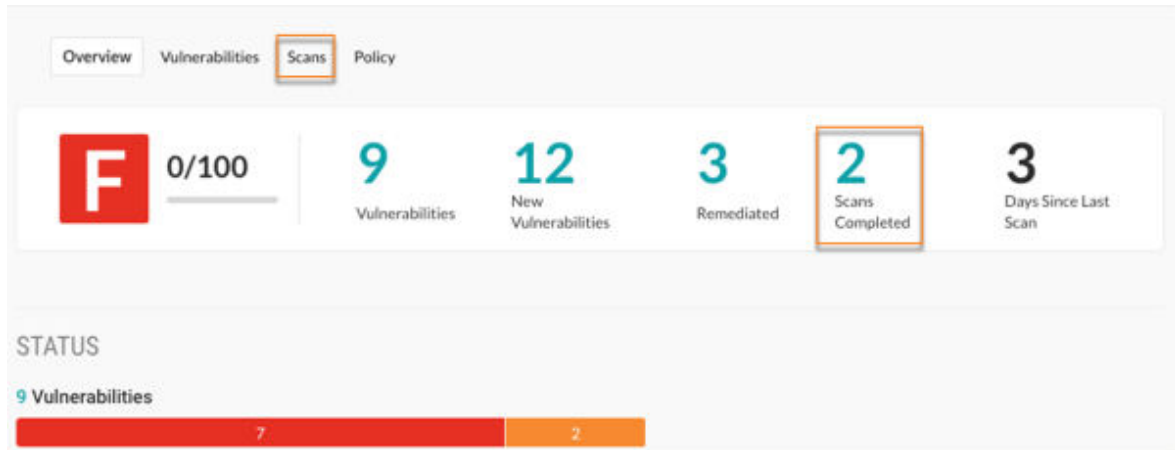
## Before you begin

- Identify the scan project that contains the scan you want to view.

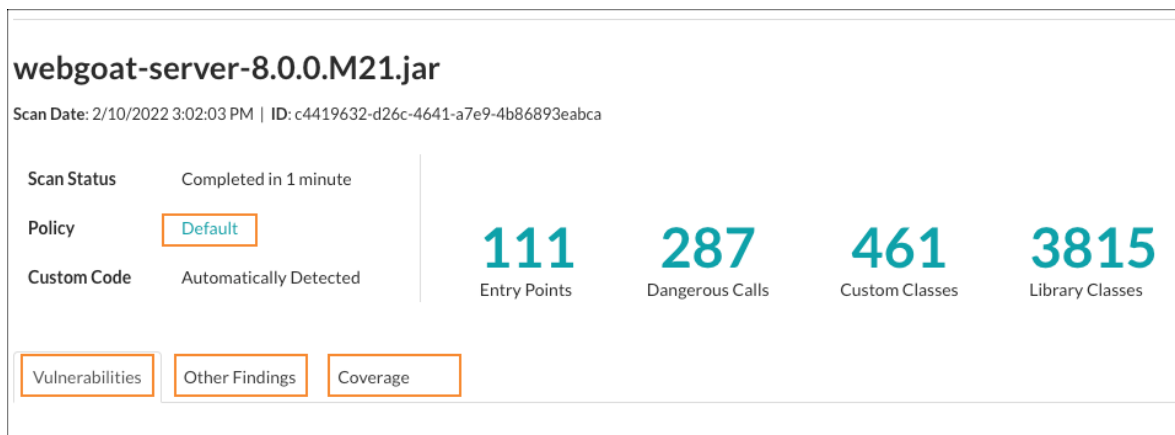
## Steps

- In the header, select **Scans**.
- Select a scan project.
- Select the number for **Scans completed** or select the **Scans** tab.





4. Under Scan history, select a scan or select **View** in the Coverage column.
5. View the details:



- At the top of the list, view a summary of scan details. To view the rules that the scan used, next to Policy, select **Default**.
- In the Vulnerabilities tab, view the vulnerabilities that the scan found. Contrast has high confidence that the vulnerabilities in this list require remediation.
- In the Other Findings tab, view additional vulnerabilities that the scan found. Due to the assumptions the scan made when reporting these vulnerabilities, Contrast has lower confidence that the vulnerabilities in this list require remediation.
- In the Coverage tab, view the classes that the scan included and excluded.

### Download scan results

After a scan completes, you can download the results to a Static Analysis Results Interchange Format (SARIF) file. This type of file is a standard, JSON-based format for the output of static analysis data.

To optimize storage usage, downloads are available for up to five days after the scan completes. No download option is available for older scans.

### Before you begin

- Identify the scan whose results you want to download.

### Steps

1. Select scan in the header.
2. Select a scan project.
3. To download scan results from Scan history, hover over the end of a row for a scan and select the download icon (📄).

4. To download scan results from the scan details page:
  - a. Under Scan history, select a scan or select **View** in the Coverage column for the scan.
  - b. In either the Overview or Vulnerabilities tab, select the download icon (📄).

## SARIF file data

When you download results, Scan writes the data to a SARIF file.

SARIF is a standard data model and serialization format for static analysis results. Understanding the data in the SARIF file can help when you need a deeper understanding of scan results.

The SARIF file includes this type of information:

- Information about the scanner that Contrast uses
- Data on what was scanned and the scan composition
- Data on vulnerability findings
- Errors or notifications that are handled gracefully during the scan
- Scan coverage data

## Scanner data

This example shows data about the scanner that Contrast uses:

```
5     "tool" : {
6         "driver" : {
7             "name" : "Contrast Scan",
8             "organization" : "Contrast Security, Inc.",
9             "version" : "pkg: 2.0.0-SNAPSHOT, engine: 2.0.0-SNAPSHOT, policy: 2.0.0-SNAPSHOT",
10            "informationUri" : "https://www.contrastsecurity.com"
11        }
    }
```

## Vulnerability data

The examples in this section show some of the data for a single vulnerability. The scan shows this data in the `results` section.

### • Single object

This example shows the scan results for a SQL injection vulnerability. The data in the `threadFlows` section show the scanned data from the source to the data sink.

```

13  "artifacts" : [ ],
14  "results" : [ {
15    "ruleId" : "sql-injection",
16    "level" : "error",
17    "message" : {
18      "text" : "sql-injection in User.fetch() reachable from LoginController.login()"
19    },
20    "locations" : [ {
21      "physicalLocation" : {
22        "artifactLocation" : {
23          "uri" : "file:///github/workspace/src/main/java/com/scalesec/vulnado/User.java"
24        },
25        "region" : {
26          "startLine" : 49,
27          "startColumn" : 1,
28          "snippet" : {
29            "text" : "public static User fetch(String un) {\n  ...\n  rs = stmt.executeQuery(query);    // Java line
30              49\n  ...}\n}"
31          }
32        },
33        "contextRegion" : {
34          "snippet" : { }
35        }
36      } ],
37      "partialFingerprints" : {
38        "GITHUB_SOURCECODE_LSH/v1" :
39        "e86a7a0c38715f4a:1-158823731d54d12e:1-6b692237789f9a2a:1-64ed8e6526b79cf4:1-13db8c734146ff90:1"
40      },
41      "codeFlows" : [ {
42        "message" : {
43          "text" : "Untrusted data flow from LoginController.java:19 to User.java:49 via variable `query`"
44        },
45        "threadFlows" : [ {
46          "locations" : [ {
47            "location" : {
48              "physicalLocation" : {
49                "artifactLocation" : {
50                  "uri" : "com/scalesec/vulnado/LoginController.java"
51                },
52                "region" : {
53                  "startLine" : 19,
54                  "snippet" : {
55                    "rendered" : {
56                      "text" : "@CrossOrigin(origins={\"*\"})\n@RequestMapping(value=\"/login\"), method={\"POST\"},
57                        produces={\"application/json\"}, consumes={\"application/json\"})\nLoginResponse login(**@RequestBody
58                          LoginRequest input**) {\n  ...\n}"
59                    }
60                  }
61                },
62                "properties" : {
63                  "ir" : [ "@CrossOrigin(origins={\"*\"})\n@RequestMapping(value=\"/login\"), method={\"POST\"},
64                    produces={\"application/json\"}, consumes={\"application/json\"})\nLoginResponse login(**@RequestBody
65                      LoginRequest input**) {", " ...", "]" ]
66                }
67              }
68            } ]
69          } ]
70        } ]
71      } ]
72    } ]
73  } ]

```

• Sink location

This example shows the sink or problem location for the vulnerability.

```

"locations" : [ {
  "physicalLocation" : {
    "artifactLocation" : {
      "uri" : "file:///github/workspace/src/main/java/com/scalesec/vulnado/User.java"
    },
    "region" : {
      "startLine" : 49,
      "startColumn" : 1,
      "snippet" : {
        "text" : "public static User fetch(String un) {\n  ...\n  rs = stmt.executeQuery(query);    // Java line
          49\n  ...}\n}"
      }
    },
    "contextRegion" : {
      "snippet" : { }
    }
  } ]
} ]

```

• Thread flow steps

This example shows some of the data for one execution step in the data flow:

```

44     "threadFlows" : [ {
45       "locations" : [ {
46         "location" : {
47           "physicalLocation" : {
48             "artifactLocation" : {
49               "uri" : "com/scalesec/vulnado/LoginController.java"
50             },
51             "region" : {
52               "startLine" : 19,
53               "snippet" : {
54                 "rendered" : {
55                   "text" : "@CrossOrigin(origins={\}*")\n@RequestMapping(value={\"/login\"}, method={\"POST\"},
                    produces={\"application/json\"}, consumes={\"application/json\"})\nLoginResponse login(**@RequestBody
                    LoginRequest input**) {\n  ...\n}"
56                 }
57               },
58               "properties" : {
59                 "ir" : [ "@CrossOrigin(origins={\}*")\n@RequestMapping(value={\"/login\"}, method={\"POST\"},
                    produces={\"application/json\"}, consumes={\"application/json\"})\nLoginResponse login(**@RequestBody
                    LoginRequest input**) {\", \" ...\", \"} ]
60               }
61             }
62           },
63           "logicalLocations" : [ {
64             "name" : "LoginController.login()",
65             "fullyQualifiedName" : "com.scalesec.vulnado.LoginController.login(com.scalesec.vulnado.LoginRequest)"
66           } ]
67         }
68       }, {
69         "location" : {
70           "physicalLocation" : {
71             "artifactLocation" : {
72               "uri" : "com/scalesec/vulnado/LoginController.java"
73             },
74             "region" : {
75               "startLine" : 20,
76               "snippet" : {
77                 "rendered" : {
78                   "text" : "@CrossOrigin(origins={\}*")\n@RequestMapping(value={\"/login\"}, method={\"POST\"},
                    produces={\"application/json\"}, consumes={\"application/json\"})\nLoginResponse login(@RequestBody
                    LoginRequest input) {\n  ...\n  $stack0 = input.username; // Java line 20\n  user = User.fetch
                    ($stack0); // Java line 20\n  ...\n}"
79                 }
80               },
81               "properties" : {
82                 "ir" : [ "$stack0 = input.<com.scalesec.vulnado.LoginRequest:java.lang.String username>; // Java
                    line 20\", \"user = staticinvoke <com.scalesec.vulnado.User: com.scalesec.vulnado.User fetch(java.lang.
                    String)>($stack0); // Java line 20\" ]
83               }
84             }
85           },
86           "logicalLocations" : [ {
87             "name" : "LoginController.login()",
88             "fullyQualifiedName" : "com.scalesec.vulnado.LoginController.login(com.scalesec.vulnado.LoginRequest)"
89           } ],
90           "message" : {
91             "text" : "un"
92           }
93         },
94         "state" : {
95           "un" : {
96             "text" : "tainted",
97             "properties" : {
98               "taintTags" : [ "untrusted", "cross-site" ]
99             }
100         }
101       }
102     ]
103   }

```

• **Physical and logical locations of the vulnerability**

This examples shows data for physical and logical locations of a vulnerability:

The data for execution steps in this section includes a code snippet and rendered data from intermediate representation (IR) data (user code is not usually displayed). Contrast uses this data to analyze what the scan sees.

1. This example shows the execution statement from IR.
2. This example shows the general area where an execution step occurs in the application.

```

44     "threadFlows" : [ {
45       "locations" : [ {
46         "location" : {
47           "physicalLocation" : {
48             "artifactLocation" : {
49               "uri" : "com/scalesec/vulnado/LoginController.java"
50             },
51             "region" : {
52               "startLine" : 19,
53               "snippet" : {
54                 "rendered" : {
55                   "text" : "@CrossOrigin(origins={\\\"*\\\"})\\n@RequestMapping(value={\\\"/login\\\"},
method={\\\"POST\\\"}, produces={\\\"application/json\\\"}, consumes={\\\"application/
json\\\"})\\nLoginResponse login(**@RequestBody LoginRequest input**) {\\n ...\\n\"
56                 }
57               },
58               "properties" : {
59                 "ir" : [ "@CrossOrigin(origins={\\\"*\\\"})\\n@RequestMapping(value={\\\"/login\\\"},
method={\\\"POST\\\"}, produces={\\\"application/json\\\"}, consumes={\\\"application/json\\\"}
)\\nLoginResponse login(**@RequestBody LoginRequest input**) {, \" ..\", \"}\" ]
60               }
61             }
62           },
63           "logicalLocations" : [ {
64             "name" : "LoginController.login()",
65             "fullyQualifiedNames" : "com.scalesec.vulnado.LoginController.login(com.scalesec.
vulnado.LoginRequest)"
66           } ]
67         }

```

• **Untrusted data location**

These examples shows scan results for untrusted data.

Scan looks at executions steps from code source to data sink. The scan results include any execution step that touches untrusted data.

If the importance result is essential, check this area of the code for vulnerabilities.

1. This example shows the location of tainted data that the scan is tracking.
2. This example shows the location of the tracked data that the execution step touches. The scan results indicate the importance is essential. This code needs to be checked for vulnerabilities.

```

"location" : {
  "physicalLocation" : {
    "artifactLocation" : {
      "uri" : "com/scalesec/vulnado/User.java"
    },
    "region" : {
      "startLine" : 47,
      "snippet" : {
        "rendered" : {
          "text" : "public static User fetch(String un) {\n  ...\n  $stack0 = new\n  StringBuilder();    // Java line 47\n  $stack1 = \"select * from users where\n  username = '\";    // Java line 47\n  $stack0 = $stack0.append($stack1);    //\n  Java line 47\n  $stack0 = $stack0.append(un);    // Java line 47\n  $stack1 =\n  '\" limit 1\";    // Java line 47\n  $stack0 = $stack0.append($stack1);    //\n  Java line 47\n  query = $stack0.toString();    // Java line 47\n  ...}\n}"
        }
      }
    },
    "message" : {
      "text" : "Propagation event of untrusted data occurred at 'User.java:47' in the\n  method 'User.fetch()' to variable 'query'"
    },
    "properties" : {
      "ir" : [ "$stack0 = new java.lang.StringBuilder;    // Java line 47", "$stack1 =\n  \"select * from users where username = '\";    // Java line 47", "$stack0 =\n  virtualinvoke $stack0.<java.lang.StringBuilder: java.lang.StringBuilder append\n  (java.lang.String)>($stack1);    // Java line 47", "$stack0 = virtualinvoke\n  $stack0.<java.lang.StringBuilder: java.lang.StringBuilder append(java.lang.String)>\n  (un);    // Java line 47", "$stack1 = '\" limit 1\";    // Java line 47", "$stack0\n  = virtualinvoke $stack0.<java.lang.StringBuilder: java.lang.StringBuilder append\n  (java.lang.String)>($stack1);    // Java line 47", "query = virtualinvoke $stack0.\n  <java.lang.StringBuilder: java.lang.String toString>();    // Java line 47" ]
    }
  }
},
"logicalLocations" : [ {
  "name" : "User.fetch()",
  "fullyQualifiedName" : "com.scalesec.vulnado.User.fetch(java.lang.String)"
} ],
"message" : {
  "text" : "query"
}
},
"state" : {
  "query" : {
    "text" : "tainted",
    "properties" : {
      "taintTags" : [ "untrusted", "cross-site" ]
    }
  }
}
},
"importance" : "essential"

```

1

2

### Scan analysis

The examples in this section show how to identify content in the SARIF file that can help you analyze scan results.

- **Classes that scan uses to trace data**  
 These classes affect scan execution time.

```
2344 "scannedData" : {
2345   "scannedBodyClasses" : [ "com.scalesec.vulnado.ServerError",
2346     "com.scalesec.vulnado.LoginResponse",
2347     "org.springframework.lang.UsesSunMisc",
2348     "com.scalesec.vulnado.Postgres",
2349     "com.scalesec.vulnado.LinksController",
2350     "com.scalesec.vulnado.BadRequest",
2351     "com.scalesec.vulnado.Unauthorized",
2352     "com.scalesec.vulnado.Comment",
2353     "org.springframework.lang.NonNullFields",
2354     "org.springframework.lang.NonNull",
2355     "org.springframework.lang.UsesJava7",
2356     "org.springframework.lang.UsesJava8",
2357     "com.scalesec.vulnado.CowController",
2358     "com.scalesec.vulnado.LoginController",
2359     "org.springframework.lang.NonNullApi",
2360     "org.springframework.lang.Nullable",
2361     "org.springframework.lang.UsesSunHttpServer",
2362     "com.scalesec.vulnado.CommentsController",
2363     "com.scalesec.vulnado.Cowsay",
2364     "com.scalesec.vulnado.VulnadoApplication",
2365     "com.scalesec.vulnado.LoginRequest",
2366     "com.scalesec.vulnado.LinkLister",
2367     "com.scalesec.vulnado.User",
2368     "java.util.Optional",
2369     "com.scalesec.vulnado.CommentRequest" ],
```

- **Classes used for type hierarchy resolution**

Scan uses these classes only for type hierarchy resolution.

The library classes are either not relevant to security issues or Contrast has a specific policy for the relevant API.

If a class displayed in this section is related to custom code, it is possible that the scan results contain false negatives.

```

2134 "nonScannedBodyClasses" : [
2135   "java.nio.file.WatchEvent$Modifier",
2136   "java.awt.Color", "java.awt.peer.WindowPeer",
2137   "java.util.function.IntUnaryOperator",
2138   "sun.awt.datatransfer.DataTransferer",
2139   "java.awt.JobAttributes$MultipleDocumentHandlingType",
2140   "java.lang.Integer",
2141   "java.awt.image.SampleModel",
2142   "javax.swing.border.Border",
2143   "java.awt.peer.ScrollbarPeer",
2144   "java.util.Vector",
2145   "java.sql.DriverAction",
2146   "java.sql.SQLType",
2147   "org.springframework.core.ParameterizedTypeReference$1",
2148   "java.nio.file.Path",
2149   "java.nio.channels.Channel",
2150   "org.springframework.core.io.Resource",
2151   "java.awt.peer.ContainerPeer",
2152   "javax.swing.KeyStroke",
2153   "java.lang.CharSequence",
2154   "java.awt.dnd.DropTargetDragEvent",
2155   "java.time.temporal.TemporalField",
2156   "org.springframework.beans.factory.InjectionPoint",
2157   "java.util.logging.ErrorManager",
2158   "java.awt.Scrollbar",
2159   "java.io.Serializable",
2160   "java.util.concurrent.CompletionStage",
2161   "java.lang.LayerInstantiationException",
2162   "org.jsoup.parser.Token$EndTag",
2163   "java.lang.invoke.BoundMethodHandle$Specializer$Factory",
2164   "java.lang.invoke.MemberName",
2165   "java.util.function.ToDoubleFunction",
2166   "java.io.ObjectInputStream$GetField",

```

• **Phantom classes**

Phantom classes are referenced classes but either Scan is unable to find bytecode for them or Scan was unable to decompile the code into IR.

Ideally, the scan results should contain no phantom classes. If the results include phantom classes, Scan was unable to find the data it needed to provide more accurate results. If you see application code or libraries displayed in this section, look at your code to determine if an issue exists.

```

2400 "phantomClasses" : [ "BOOT-INF.classes.com.scalesec.vulnado.LoginController",
2401   "javax.annotation.Nonnull",
2402   "groovy.lang.Closure",
2403   "javax.annotation.meta.TypeQualifierDefault",

```

• **Discovered routes for untrusted data**

This example shows discovered routes where untrusted data enter the application.

Scan only looks at the data flow behavior from the functions displayed in this section. Scan does not analyze other functions related to data flow, such as weak cryptography.



```

2769     "routesDiscovered" : [ {
2770       "routeSignature" : "com.scalesec.vulnado.LoginController.login(com.scalesec.vulnado.
LoginRequest)"
2771     }, {
2772       "routeSignature" : "com.scalesec.vulnado.CowController.cowsay(java.lang.String)"
2773     }, {
2774       "routeSignature" : "com.scalesec.vulnado.CowController.cowsay2(java.lang.String)"
2775     }, {
2776       "routeSignature" : "com.scalesec.vulnado.LinksController.links(java.lang.String)"
2777     }, {
2778       "routeSignature" : "com.scalesec.vulnado.LinksController.linksV2(java.lang.String)"
2779     }, {
2780       "routeSignature" : "com.scalesec.vulnado.CommentsController.comments(java.lang.String)"
2781     }, {
2782       "routeSignature" : "com.scalesec.vulnado.CommentsController.createComment(java.lang.String,com.
scalesec.vulnado.CommentRequest)"
2783     }, {
2784       "routeSignature" : "com.scalesec.vulnado.CommentsController.deleteComment(java.lang.String,
java.lang.String)"
2785     } ]
2786   },
2787   "invocations" : [ {
2788     "commandLine" : "java -XX:MaxRAMPercentage=80 -jar /app/contrast-scan-java-cli.jar
--prescan-metadata /tmp/
cb9757b4-4fdf-4de9-bdf1-7769058307eb_e1a6403d-be7c-46ee-82aa-6b7e47ce97d2_metadata.json -o /tmp/
results.sarif.json /tmp/
cb9757b4-4fdf-4de9-bdf1-7769058307eb_e1a6403d-be7c-46ee-82aa-6b7e47ce97d2_vulnado-0.0.1-SNAPSHOT.
jar",
2789     "toolExecutionNotifications" : [ ],
2790     "executionSuccessful" : true

```

## View scan policies

View policies to see which vulnerabilities Contrast looks for in your code.

At this time, editing or adding polices is not supported.

1. Select **Scans** in the header.
2. Select a scan project.
3. Select **Policy**.  
The policy list displays the policies used for scans.
4. In the Policy tab, search for a specific policy by entering one or more characters in the Find box.

## Change scan settings

Scan settings let you change the name of a scan project.

## Before you begin

- An Admin role is required.

## Steps

1. Select **Scans** in the header.
2. Select a Scan project.
3. Select the **Settings** icon (⚙️) at the top of the list.
4. Enter a new name for the project.
5. Select **Save**.

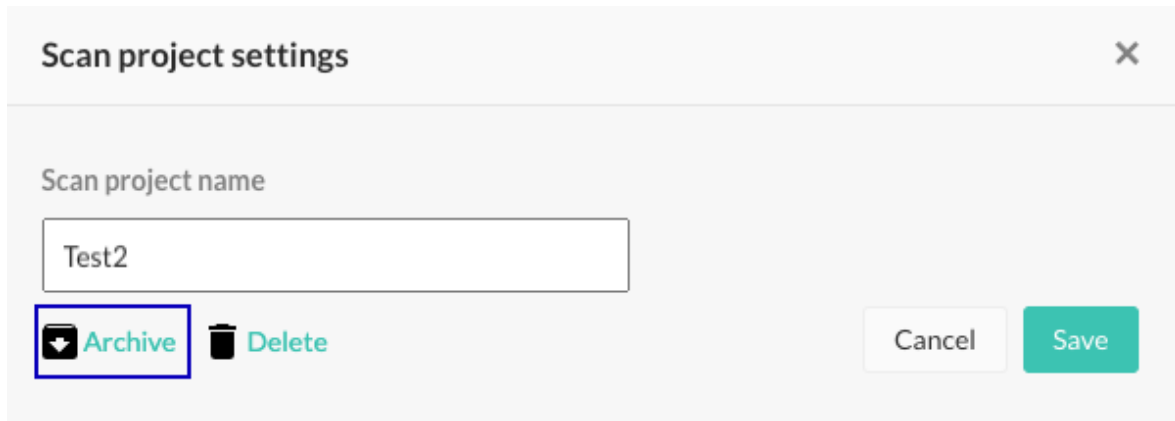
## Archive scan projects

If you want to exclude a specific scan project from the list of scan projects (for example, you are no longer using that project), you can archive it.

Contrast keeps the data associated with the archived project.

## Steps

1. Select **Scans** in the header.
2. Select a scan project.
3. Select the settings icon (⚙️).
4. In the Scan project settings window, select **Archive**.



5. In the Archive project window, select **Archive**.  
The archived project is no longer visible in the list unless you use the Archived filter.

## Unarchive scan projects

To use or view details for an archived scan project, unarchive it.

### Before you begin

- An Organization Admin role is required.

## Steps

1. Select **Scans** in the header.
2. Display archived projects by selecting the small triangle (▾) at the top of the list and then, selecting **Archived**.
3. Hover over the end of a project row and select the **Unarchive** icon (🗑️).
4. In the Unarchive project window, select **Unarchive**.

## Integrate scans with build pipelines

The [Contrast CLI \(page 511\)](#) has commands that let you run a scan without using the Contrast web interface.

This topic provides instructions for using the Contrast CLI to integrate scans into any build pipeline.

You can also use the [Contrast Maven plugin \(page 592\)](#) to integrate Contrast Scan into your project's Maven build,

### Before you begin

- In the Contrast web interface, under **user menu > User settings > Profile**, locate and copy this information:
  - API key
  - Organization ID

- Contrast URL
- Authorization header
- Ensure that a WAR or JAR file is available in an accessible location.

## Steps

1. In your build pipeline workflow, add the command to download the latest version of the Contrast CLI .

```
npm install --location=global @contrast/contrast@2.0.0
```

2. Set environment variables for the API key, the organization ID, the Contrast URL, and the Authorization header.

This example shows how to set the environment variables with GitHub secrets. Use the appropriate method for your environment.

```
CT_API_KEY: ${ secrets.CONTRAST__API__API_KEY }
CT_AUTH_TOKEN: ${ secrets.CONTRAST__API__AUTH_TOKEN }
ORG_ID: ${ secrets.CONTRAST__API__ORGANIZATION_ID }
URL: ${ secrets.CONTRAST__API__URL }
```

3. Add a command similar to the following to start each scan:

```
contrast-cli --scan ../scan-cli-testing/java/apps/param.war \
--api_key $CT_API_KEY \
--authorization $CT_AUTH_TOKEN \
--organization_id $ORG_ID \
--host $URL \
--project_name MY-Project \
--language JAVA --wait_for_scan
```

When this command runs for the first time, Scan creates a project using the name specified in the `--project_name` option.

The output from the command looks similar to this example:

```
project created ID is 788f9734-b933-4f05-b391-c130931baf88
Uploaded file successfully.
Response: {
  id: '5091d134-93ea-4873-8110-8cf99d14606e',
  organizationId: '74f4cd04-6ca9-4eb7-a7a7-78909c2101cc',
  projectId: '788f9734-b933-4f05-b391-c130931baf88',
  filename: 'param.war',
  createTime: '2022-04-04T10:06:16.952+00:00'
}
Timeout set to 5 minutes
Waiting for results...
New Results: 5
Fixed Results: 0
Total Results: 5
```

The next time you run the command for the same project, Scan adds the uploaded files to the original project. The output from the command looks similar to this example:

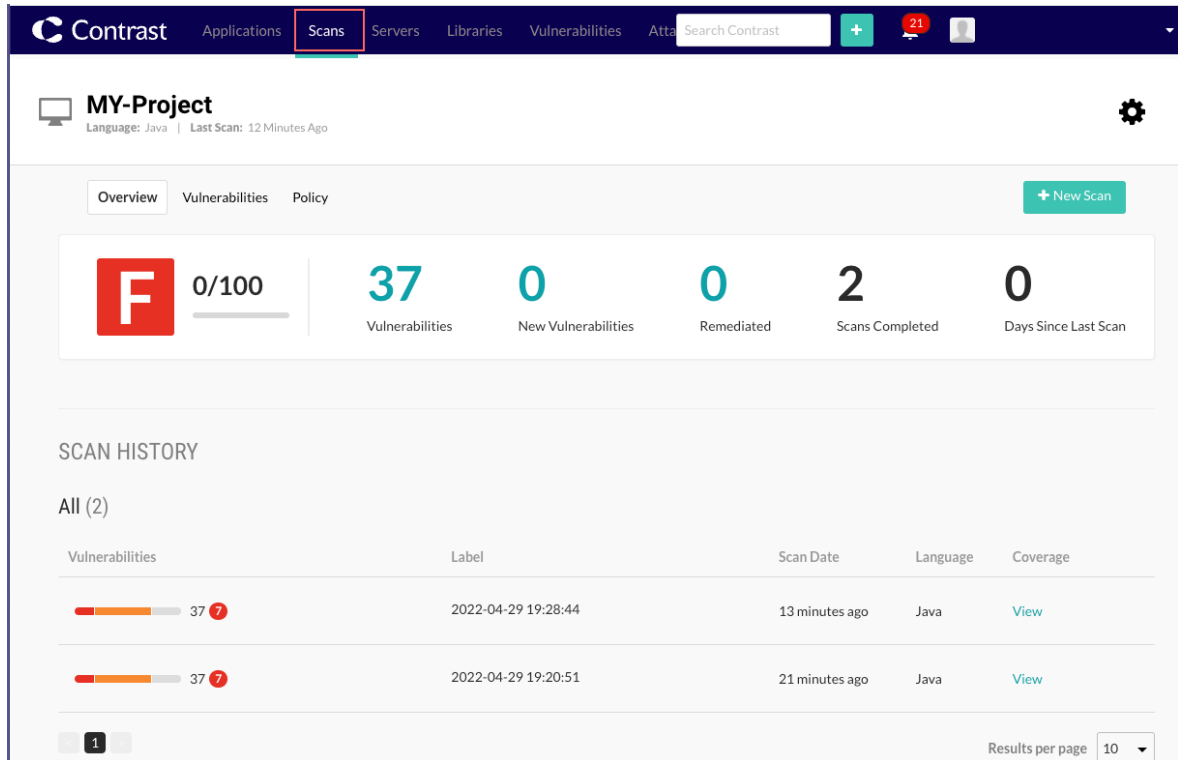
```
project already exists with this name. Getting ID...
project ID is 788f9734-b933-4f05-b391-c130931baf88
Uploaded file successfully.
Response: {
  id: '94b4e065-0e0f-46bb-b1d8-9f85bd03c602',
  organizationId: '74f4cd04-6ca9-4eb7-a7a7-78909c2101cc',
```

```

projectId: '788f9734-b933-4f05-b391-c130931baf88',
filename: 'param.war',
createdTime: '2022-04-04T10:07:01.230+00:00'
}
Timeout set to 5 minutes
Waiting for results...
New Results: 5
Fixed Results: 0
Total Results: 5

```

- After the scan completes, go to the Contrast web interface to view the Scan project details and results.



## Examples

- [Scan integration with GitHub \(page 468\)](#)
- [Scan integration with Jenkins \(page 469\)](#)

### Example: Scan integration with GitHub

Review the [Scan integration steps \(page 466\)](#) before you integrate Contrast Scan with GitHub.

This example shows how to set up a GitHub workflow.

```

- name: Set up contrast-cli
2 run: |
3 npm install --location=global @contrast/contrast@2.0.0
4- name: Scan file
5 env:
6 CT_API_KEY: ${{ secrets.CONTRAST__API__API_KEY }}
7 CT_AUTH_TOKEN: ${{ secrets.CONTRAST__API__AUTH_TOKEN }}
8 ORG_ID: ${{ secrets.CONTRAST__API__ORGANIZATION_ID }}
9 URL: ${{ secrets.CONTRAST__API__URL }}
10 run: |
11 contrast-cli --scan ./target/${{ inputs.SERVICE_NAME }}-${{ steps.build-service.output

```

```
12 --api_key $CT_API_KEY \  
13 --authorization $CT_AUTH_TOKEN \  
14 --organization_id $ORG_ID \  
15 --host $URL \  
16 --project_name MY-Project \  
17 --language JAVA --wait_for_scan
```

## Example: Scan integration with Jenkins

Review the [Scan integration steps \(page 466\)](#) before you integrate Scan with Jenkins.

Contrast Security can share these scripts to integrate scans with a Jenkins pipeline ([contact Support](#) to access these scripts):

- **Jenkins Pipelines script:** The `Jenkins_Script_SCAN` script uses the Contrast Scan local engine JAR file. The project JAR file is expected to be in a GitHub repository.
- **Jenkins pipeline script for use with a Docker container:** The `Jenkins_Script_SCAN_GH_Container_Image` script uses a [Docker container \(page 450\)](#) with the pipeline script.

## Integration setup

This example describes how to set up a Jenkins integration for Scan.

1. Set up a Jenkins instance in your local environment (use the [Jenkins documentation](#)).  
If you already have a Jenkins instance, you can skip this step.
2. Install this software (if not already installed):
  - Java 11
  - Plugins for your environment (for example, the Docker plugin)
3. Create a new pipeline and copy the Contrast script.
4. Set the Contrast credentials as global or environment variables:  
For example: `URL, USER_NAME, API_KEY, SERVER_KEY, ORGANIZATION, CONTRAST_PAT`
  - `CONTRAST_PAT` is the Personal Access Token that Contrast Support gives you. It provides the access to log in to GitHub and download and the Scan local engine file.
  - To add credential to Jenkins, select **Manage Jenkins > Manage Credentials > Add Credentials as Secret Text**.
5. Refer to all credentials and variables in your pipeline scripts.

## Servers

In Contrast, you can see servers and configure how they function in development, test (QA), and production environments. You are then able to compare the differences across environments as code travels. Contrast sets up a shell for you to designate servers. Once that's in place, Contrast can begin to find weaknesses.

## Server settings

Each server entry in Contrast represents a Contrast agent that you installed for an application. Contrast creates a new, unique server entry when you configure these settings for each agent:

To define custom settings for servers, use these entries in the Contrast configuration file:

- **Server name:** The default value is the host name.
- **Server path:** The path from which the agent process is running.
- **Server type:** The type of server hosting your application.

Using custom values for these settings instead of default ones is useful if you want to avoid duplicate server entries.

Configure the server environment with this setting:

- **Server environment:** The environment in which you want to use this server. The valid values are `DEVELOPMENT`, `QA`, and `PRODUCTION`. These values are case-insensitive. The default value is `DEVELOPMENT`.

Contrast agents automatically recognize all supported server types. If the server type is not automatically recognized, it may be due to the agent running with an unsupported technology. Please review the *Supported Technologies* section for the respective [agent \(page 29\)](#). Running in unsupported environments may affect the functionality of some features like route discovery.

## Settings in a configuration file

These are the server settings that you customize in a configuration file.

```
# server
# Use the settings in this section to set
# metadata for the server hosting this agent.

server:

    # Override the reported server name.
    name: localhost

    # Override the reported server path.
    path: NEEDS_TO_BE_SET

    # Override the reported server type.
    type: NEEDS_TO_BE_SET

    # Override the reported server environment.
    # environment: DEVELOPMENT
```

## Agent configuration instructions

When you define custom settings for servers, use the configuration instructions for the agent you are using:

- [.NET Core configuration \(page 189\)](#)
- [.NET Framework configuration \(page 137\)](#)
- [Go configuration \(page 402\)](#)
- [Java configuration \(page 70\)](#)
- [Node.js configuration \(page 230\)](#)
- [Python configuration \(page 293\)](#)
- [Ruby configuration \(page 348\)](#)

## Contrast options

The Contrast web interface provides additional options for server configuration:

- [Configure a server \(page 470\)](#)
- [Output data to syslog \(page 472\)](#)

## Configure server settings

Server settings let you configure how a server functions in each environment (development, test, and production).

## Steps

1. Select **Servers** in the header.

2. Find the server you want to modify using either of these methods:
  - Select the Filter icon (▼) at the top of the Server column.
  - Use the magnifying glass (🔍) to search.
3. Go to Server settings using either of these methods:
  - Hover over the end of the server's row and select the **Settings** icon (⚙️).
  - Select the name of the server and then, select the **Settings** icon (⚙️) at the top of the list.
4. Modify the settings, as needed:
  - Modify the server name.
  - Designate the environment in which the server will be running: Development, QA (test), or Production.
  - In the Server log file, override the existing server log file path by entering the preferred path.

**NOTE**

Server log files are restricted to file types of LOG or TXT only.

- Set the [log level \(page 750\)](#) for the server.
- Set bot blocking.  
Bot blocking blocks traffic from scrapers, attack tools, and other unwanted automation. To view blocked bot activity, under **Attacks > Attack Events**, use the filter options.  
**Supported languages:** Java, .NET Framework, .NET Core, Ruby, and Python.

**NOTE**

You can configure bot blocking in the [YAML files \(page 33\)](#) for Java, .NET Framework, .NET Core, Ruby, and Python.

- Select **Enable sampling for higher performance**.  
This setting is available when Assess is enabled.  
With sampling, Contrast selectively analyzes requests to avoid repeat analysis:
  1. If Contrast sees the same URL being called multiple times, it analyzes the URL based on the the number of times specified in the Baseline setting.
  2. Afterwards, if Contrast continues to see the same URL, it only checks it based on the Frequency setting.
  3. Contrast retains samples for the number of seconds specified for the Window setting. After the time specified for the Window setting elapses, Contrast analyzes the URL again, according to the Baseline setting..

Configure the following settings:

- **Baseline:** The number of times that Contrast analyzes URLs to complete sampling. The default setting is **5**.
- **Frequency:** The number of times that Contrast analyzes URLs after the baseline is achieved. The default setting is **10**.
- **Window:** The number of seconds that Contrast retains samples before reverting to the baseline. The default setting is **180**.

For example:

```
contrast.assess.sampling.request_frequency    25
contrast.assess.sampling.window_ms          360_000
contrast.assess.sampling.baseline            1
```

- Select [Enable output of Protect events to syslog. \(page 472\)](#)  
This setting is available when Protect is enabled.  
Select the syslog message severity levels that the server outputs to syslog. Contrast offers syslog message categories according to the [syslog RFC 3164](#) specification for severity.

## Send output to syslog

Contrast allows you to send security logs to a remote syslog server in addition to the Contrast Security log. Syslog data is in common event format (CEF) and can be parsed by most security incident event management (SIEM) software.



### IMPORTANT

You must apply a Protect license to the server that has syslog output enabled.

You may have to enable remote logging so that your syslog can receive outside messages.

Syslog messages for a server are sent by the agent.

Syslog output isn't supported over TCP.

1. When configuring the [default organization server settings \(page 642\)](#), select the checkbox to **Enable output of Protect events to syslog**, which reveals additional fields, and then enter the appropriate settings.
2. Select **Servers** in the header to enable and configure syslog output to an individual server or multiple servers at one time. If syslog defaults have already been [set at an organization level \(page 642\)](#), the values will be pre-populated for server-level settings.
  - **Individual server:** To enable syslog on an individual server, hover over the grid row, and select the **Server settings** icon.
  - **Multiple servers:** Use the check marks to select multiple servers, and select the **Server Settings** icon in the batch action menu that appears at the bottom of the page.



### NOTE

If one or more of the selected servers is not eligible to have syslog enabled, it will only be enabled on eligible servers.

3. In the **Server settings** window, select the box to **Send output of Protect events to syslog**. (For multiple servers, you will need to select **Edit** next to the checkbox first).



### NOTE

If eligible servers selected are in different environments, you can choose to use the default settings for the applicable servers or manually configure the settings for all servers.



### Bulk Server Settings ✕

This will override settings for all relevant selected servers.

**Environment**

**Log Level**

**Stacktraces**

**Bot Blocking**

 [Edit](#)

Enable sampling for higher performance [?](#) [Edit](#)

Enable output of Protect events to syslog [EDITED](#)

**Syslog Server Host**

**Port**

**Facility**

**Attack Event Result**

EXPLOITED

SUSPICIOUS

BLOCKED

BLOCKED (P)

PROBED

**Syslog Message Severity**

[Undo edits](#)

4. Enter the **Syslog server host**. This can be the full qualified domain name (not just the hostname) or the IP address. For example: *email.mydomainname.com* or 38.124.154.50.
5. Enter the **Port**.

6. Enter the **Facility**.
7. Enter the **Syslog message severity**.
8. **Save** the settings to enable syslog on the server.
9. When syslog is enabled, the server has a gray arrow icon beside its name in the grid. Hover over the icon to see the output location of Protect events.  
To edit server settings, repeat the steps above to update the values in the appropriate configuration form, and save your changes.

## Libraries

The security of the libraries used by an application impacts the security of your application as a whole.

Libraries can be public or private. Public libraries are identified with a [score \(page 483\)](#) (A-F), public libraries are open-source libraries sourced from Maven (Java), NuGet (.NET), npm (Node.js), RubyGems (Ruby), PyPI (Python), pkg.go (Go), Composer (PHP). Private libraries are commercial third-party libraries or custom-built libraries. Private libraries do not have a score assigned in Contrast.

Contrast agents automatically identify open-source libraries included in an application. Contrast identifies any vulnerabilities found in your libraries and also confirms if the library is used at runtime.

To do this, Contrast creates a hash of the library file, which is used to compare the file's content to a database of known library files. If the hash is in the database, Contrast is able to assign a [score \(page 483\)](#) to the library, provide library version information and report on the total vulnerabilities (CVE's) that have been found in the library.



### NOTE

If your library is a custom file, the hash won't be found in the database and the agent reports the library as "unknown" to the Contrast application. This may also happen if the library has recently been released or if you are using an airgap on-premises installation and have not recently [updated library definitions \(page 697\)](#).

For Java clients, WebSphere repackages libraries at runtime, so their SHA-1 hash is different than anything known to Contrast. To preserve the SHA-1 during deployment, set the JVM system property `org.eclipse.jst.j2ee.commonarchivecore.ignore.web.fragment` to "true".

Also, any `wsadmin` calls must have the same parameter:

```
wsadmin -javaoption "-Dorg.eclipse.jst.j2ee.commonarchivecore.ignore.web.fragment"
```

In Contrast, select **Libraries** in the header to see an overview of all libraries across your portfolio and manage them in bulk.

- [View libraries \(page 474\)](#)
- [View open-source licenses \(page 482\)](#)
- [Learn about library scoring \(page 483\)](#)

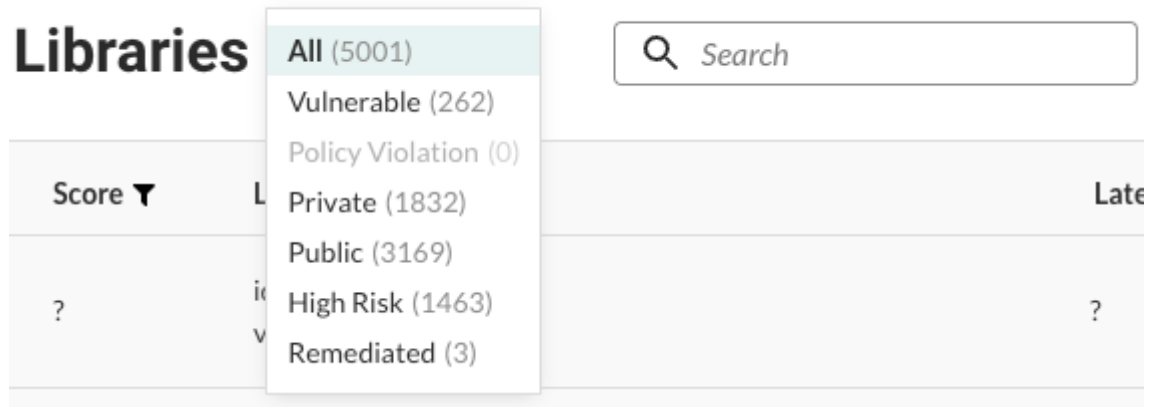
### See also

[CVE search \(page 484\)](#)

### View libraries

There are multiple ways to get library information:

- Select **Libraries** in the header to view a grid list of all libraries used by your organization. Select a library name from that list for more details.
- You can also see library information for an individual application or server:
  - Select **Applications** in the header, then select an application name to see its details page. Select the **Libraries** tab.
  - Select **Servers** in the header, then select a server name to see its details page. Select the **Libraries** tab.
- Select the small triangle at the very top of the libraries grid to filter the libraries view. You can also click on the magnifying glass icon to search for specific libraries.



The filters include:

- **All:** Shows all libraries.
  - **Vulnerable:** Shows only libraries that Contrast identified as containing CVEs.
  - **Policy violation:** Shows only the libraries that violate a library policy.
  - **Private:** Shows only commercial third-party libraries or custom-built libraries that Contrast discovered in your code.
  - **Public:** Shows only the open-source libraries that Contrast discovered in your code.
  - **High risk:** Shows only the libraries with a [score \(page 483\)](#) of C or below.
  - **Remediated:** Shows any libraries marked as remediated.
- Select **Show library stats** above the grid to analyze library data for your organization. Each graphic displays the statistical average as well as breakdowns for each category, including library scores and the number of years by which they are high risk. A library is considered high risk if it has a [score \(page 483\)](#) that is grade C or below.

### Static and runtime tabs

Library information in Contrast is divided into two tabs:

- **Static:** Contains results from a *manifest* (for example, *package.json* or *pom.xml*) analyzed with [Contrast CLI \(page 511\)](#).
- **Runtime:** Contains results for applications analyzed at runtime

Show Library Stats

Libraries All (5001)  Static Runtime SORT BY SCORE

Score	Library	Latest Version	Vulnerabilities	Applications	Usage	Actions
?	idna tagtest1 v2.8	?		django.nV	Unused 0/8	(1) [icon]
F	snakeyaml-1.28.jar tagtest1 v1.28 (Feb 22, 2021)	Feb 26, 2023 v2.0	(7)	agent-metrics-3 protect-perf-baseline-#2	Unused 0/224	(1) [icon]
F	jackson-databind-2.12.5.jar tagtest1 v2.12.5 (Aug 26, 2021)	Jan 28, 2023 v2.14.2	(3)	agent-metrics-3 protect-perf-baseline-#2	352/701	(1) [icon]
F	commons-fileupload-1.3.1.jar tagtest1 v1.3.1 (Feb 6, 2014)	Dec 24, 2018 v1.4	(3)	WebGoat	3/49	(2) [icon]
F	checker-qual-3.5.0.jar tagtest1 v3.5.0 (Jul 1, 2020)	Dec 1, 2022 v3.28.0		PF:1678677931 PF:1678683946 ImperialGoat	Unused 0/321	(1) [icon]
F	snakeyaml-1.29.jar tagtest1 v1.29 (Jun 8, 2021)	Feb 26, 2023 v2.0	(7)	PF:1678677931 pocnonhttpweb PF:1678683946	Unused 0/226	(1) [icon]
F	commons-text-1.9.jar tagtest1 v1.9 (Jul 21, 2020)	Sep 24, 2022 v1.10.0	(1)	ImperialGoat WebGoat WebGoat-Metadatas	14/135	(1) [icon]
F	rack tagtest1 v2.2.3 (Jun 15, 2020)	Mar 13, 2023 v3.0.6.1	(5)	PF-RUBY:1678795327 PF-RUBY:1678795398 PF-RUBY:1678795335	40/65	(1) [icon]
F	sqlite3 tagtest1 v1.4.2 (Dec 18, 2019)	Feb 22, 2023 v1.6.1		RailsEngine	11/23	(1) [icon]
F	slf4j-log4j12-1.7.12.jar tagtest1 v1.7.12 (Mar 26, 2015)	Dec 12, 2022 v2.0.6		WebGoat	3/6	[icon]

Page 1 of 501 Results per page 10 25 50

You can use the column headers with filters in the grid to filter by score, library, severity, and project. The libraries grid shows:

- **Score:** Visible only under the Runtime tab. Shown as a letter grade using this [scoring guide \(page 483\)](#).
- **Severity:** Visible only under the Static tab. This represents the maximum severity level for all vulnerabilities (CVEs) present in the library. Use the filters to locate libraries based on severity level. Note that the **Other** filter option locates any libraries with CVEs whose maximum severity is None (where CVSS score is 0) AND libraries without a CVE AND private or unknown libraries.
- **Library:** Click a library name in the grid to go to its details panel. This is where any known vulnerabilities (CVEs) that Contrast has found within the library will be listed along with a list of the applications and servers where the library appears. Use the filters to narrow the results:
  - **Languages:** Locate vulnerable libraries by a specific language
  - **Licenses:** View libraries by licensed applications
  - **Environments:** Helps to easily locate any vulnerable libraries in production
  - **Servers:** Find vulnerable libraries by server type
- **Latest version:** Most recent library version.



**NOTE**

For **.NET libraries**. The **Latest version** value relates to the package upgrade recommendation. The library version and hash are determined by the file the Contrast agent detects. The hash represents the library file version while the upgrade version represents the package version.

- **Vulnerabilities:** This shows the CVEs found in the library and can help prioritize remediation. Hover over the thermometer section to see the number of CVEs by severity. Click the thermometer to open the details panel.



If vulnerabilities exist, they display in a list and are color-coded by severity. Vulnerabilities with a critical severity status appear at the top of the list and are coded red.

- **Applications:** *Visible only under the Runtime tab.* Lists applications using the library.
- **Usage:** *Visible only under the Runtime tab.* This shows the total number of classes used at runtime out of the total number of classes that are in the library. If none of the classes have been used at runtime, this column shows "Unused." When your application loads a class, the Contrast agent reports usage. If the class has not been used before, the usage decreases. Click the number to [analyze the library usage \(page 480\)](#). There you can see information on classes loaded as well as the risks and policy violations associated with the library.
- **Actions:** *Visible only under the Runtime tab.* This is where you can [tag \(page 478\)](#), [send \(page 479\)](#), or [delete \(page 477\)](#) the library.
- **Status:** *Visible only under the Runtime tab and requires a minimum of the [Edit \(page 745\)](#) organization role to be able to change the status.* (Contact Support to request enabling this column if not visible for your organization). Visible under the **Applications > Application name > Libraries** tab. There are three types to view/apply:
  - **Not a problem:** This library has acknowledged vulnerabilities and the risks are acceptable, or the library is unused.
  - **Remediated:** The vulnerable library has been remediated.
  - **Reported:** When a library with vulnerabilities is detected by Contrast.
- **Projects:** *Visible only under the Static tab.* Lists the projects using the library.

## Discover or delete libraries



### NOTE

Visible under Runtime view only. Not available for libraries statically analyzed.

Libraries are associated with the applications that use them and the servers where these applications are deployed.

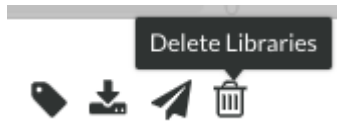
If an agent checks in with a library list that no longer includes a previously reported library, that library will no longer be associated with that server.

A library will be removed from an application once all servers reporting it have either checked in without it or the servers reporting it have been deleted. (Servers check in according to their [settings \(page 642\)](#)).

Libraries can also be manually deleted from an application.

To delete libraries:

1. Select **Libraries** in the header and locate the row in the grid for the library you want to delete.
2. Click the **Delete** icon under the **Actions** column. You can also find the icon in the top right of the library details page.  
To delete multiple libraries at once, use the check marks in the left column to select the libraries you want to delete, then select the **Delete** icon from the batch action bar that appears at the bottom of the page.



3. In the window that appears, select **Delete** to confirm your choice. Once confirmed, the library is removed and no longer appears in your list. If an agent reports a previously deleted library, this will be added to the list of libraries again as this library is included in an application.

## Add tags to libraries



### NOTE

Visible under Runtime view only. Not available for libraries statically analyzed.

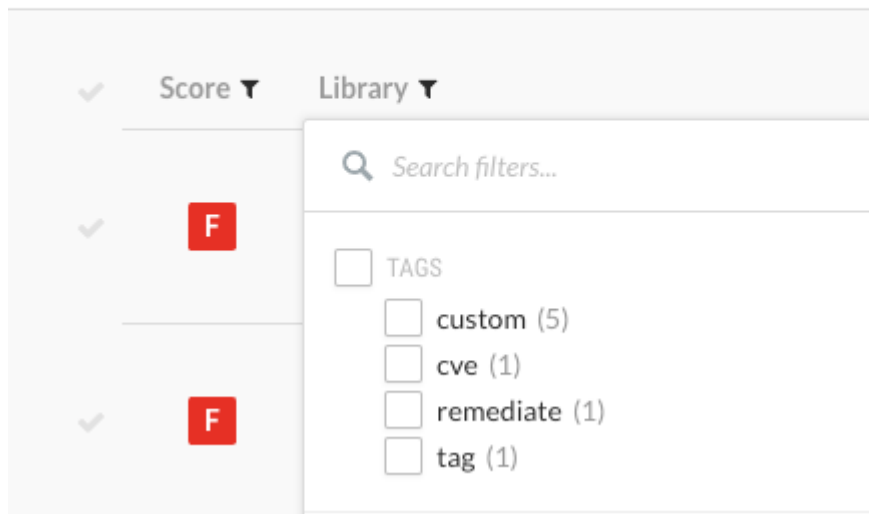
To add tags to libraries:

1. Select **Libraries** in the header and locate the row in the grid for the library you want to tag.
2. Select the **Tag** icon under the **Actions** column. This option is also available from the library details page in the top right corner.

Usage	Actions
Unused 0/8	(1)
5/8	<div style="border: 1px solid black; padding: 2px; display: inline-block;">Tag</div>

3. In the window that appears, begin typing to see a list of tags. Select one or more from the dropdown, and/or type a new tag. To remove tags, select the **X**. Select **Save**.
4. To tag multiple libraries, use the check marks in the left column of the libraries grid to select libraries. In the batch action menu that appears at the bottom of the page, select the **Tag** icon.
5. To filter by tags, select the filter next to the **Library** column of the grid, then select the tags to filter.

## Libraries All (173)



6. You can also see tags next to the library name on the library's details page, and remove them by selecting the **X**.

### Send library information



#### NOTE

Visible under Runtime view only. Not available for libraries statically analyzed.

Send library details to your email address or to an integrated bugtracker service (that creates tickets for your developers) to track vulnerable libraries.

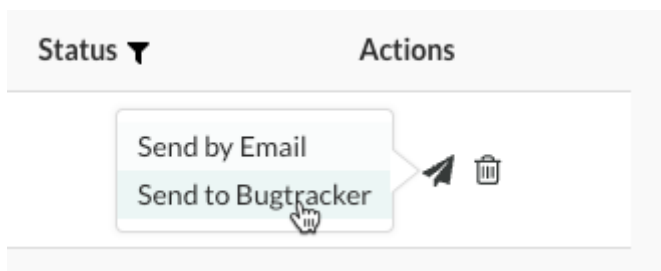
Contrast sends the following data to your email address or integrated bugtracker for each library that you choose.

- Name
- Version
- Vulnerabilities details
- Impacted applications and servers
- Versions behind (compared to the current/latest version)
- Usage (Currently available for Java and .NET only.)
- [Score \(page 483\)](#)

To receive this information for a particular library:

1. Select **Libraries** in the header and locate the row in the grid for the library you want to track.
2. Click the **Send** icon under the **Actions** column and select either **Send by Email** or **Send to Bugtracker**.

This option is also available from the library details page in the top right corner.



3. In the window that appears, select the [integrations \(page 553\)](#) you want to use. Select the options then select **Send** to create the ticket. For email, enter the email address then select **Send** to send the email.
4. To receive information for multiple libraries, use the check marks in the left column of the libraries grid to select libraries. In the batch action menu that appears at the bottom of the page, select the **Send** icon. All libraries selected must have at least one application in common.

### Analyze runtime library usage

Runtime library usage gives insight into which parts of a library are actually used by your applications, which can reduce investigation time for CVEs by showing how much a library impacts your application. This also improves collaboration because security teams can confirm with development teams that an application uses a vulnerable library at runtime.



#### NOTE

Only organizations with a [Contrast SCA license \(page 22\)](#) can see full usage details. To learn more, contact our sales department at [sales@contrastsecurity.com](mailto:sales@contrastsecurity.com).

Select **Libraries** in the header, click **Runtime** and view the **Usage** column to see if, and how much, a library is used at runtime. The usage number represents the number of items used by any instrumented applications, out of the total number of items known to be available in that library.

Libraries All (5001) <input type="text" value="Search"/>							Static <u>Runtime</u>		↑ SORT BY SCORE	
<input type="checkbox"/>	Score ▼	Library ▼	Latest Version	Vulnerabilities	Applications	Usage	Actions			
<input type="checkbox"/>	?	idna tagtest1 v2.8	?		(0) django.nV	Unused 0/8	(1)			
<input type="checkbox"/>	F	snakeyaml-1.28.jar tagtest1 v1.28 (Feb 22, 2021)	Feb 26, 2023 v2.0	(7)	agent-metrics-3 protect-perf-baseline-#2	Unused 0/224	(1)			
<input type="checkbox"/>	F	jackson-databind-2.12.5.jar tagtest1 v2.12.5 (Aug 26, 2021)	Jan 28, 2023 v2.14.2	(3)	agent prote	Usage across all applications for this library 352/701 Max used / max known	(1)			
<input type="checkbox"/>	F	commons-fileupload-1.3.1.jar tagtest1 v1.3.1 (Feb 6, 2014)	Dec 24, 2018 v1.4	(2)	WebGoat	3/49	(2)			

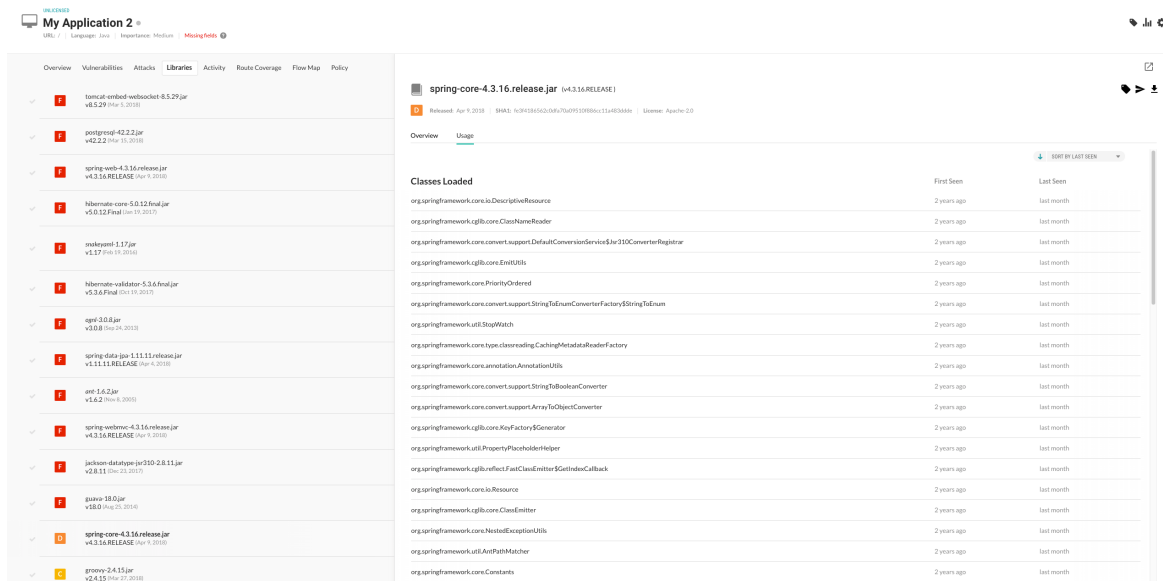
Items loaded may be classes, files, or functions, depending on the languages of the applications using this library. If a primary application contains multiple applications that use the same library, the classes loaded will be representative of each merge application.

When an application uses a library, the Contrast agent reports the items loaded within the library. As the application uses more items within a library, usage counts increase in Contrast.

If you have the appropriate license, you can also view full library usage details for a particular application:



1. Under **Applications**, select a specific application to see the details view.
2. Select the **Libraries** tab for the application.
3. Select the usage counts for a specific library. This opens an overview and usage panel.



4. Click the **Usage** tab to view each class, file, or function used. Click the search icon to search for specific classes. You will also see the first time and last time Contrast observed it in use. [Library exports \(page 481\)](#) will also include full usage data. Click the **Overview** tab to view *What happened* (describes the issue(s)), as well as *What's the risk* (lists the Severity badge, CVSS Score, CVE title, and policy violations).

**NOTE**

For a merged application, Contrast will report when a class was first seen and last seen for all applications it contains within the corresponding **Last Seen** and **First Seen** columns.

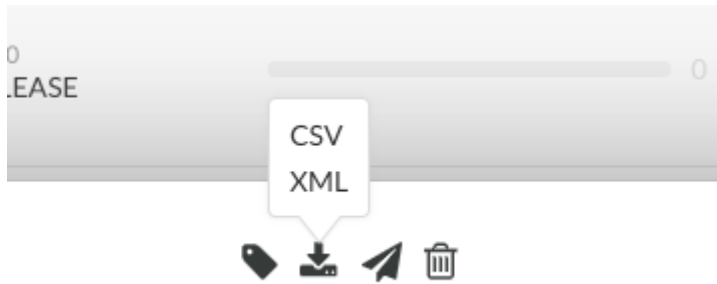
5. You can also [tag \(page 478\)](#) and [send \(page 479\)](#) information about the library.
6. Click the **More** menu (**...**) to view package details, repository location, [delete \(page 477\)](#) the library, or export usage details in CSV format.
7. Select the **X** to close the details panel.

## Export library details

The exported file contains the following data fields for each library:

To export library details:

1. Select **Libraries** in the header, then use the check marks in the left column of the libraries grid to select the library or libraries you want to use for the export.
2. In the batch action menu that appears at the bottom of the page, select the **Export** icon, then select the format you want to use for the export (CSV or XML).



- The export will download to your desktop. Exports contain the following data fields for each library:
  - Library Name
  - Language
  - Version
  - Release Date
  - Latest Version
  - Score
  - SHA1
  - CVE Count
  - Application Count
  - Server Count
  - Number of Classes
  - Number of Used Classes
  - Open source License
  - Policy Violation



### TIP

To create more complex custom software composition analysis reports about your applications, you can use the [Libraries API](#) to access Contrast library data. You might also explore additional details on your libraries by using a manual method.

For example, this curl request retrieves a list of libraries in which each library includes a list of applications that use the library. The jq tool formats the data as CSV for use in a custom report.

```
$ curl -H "Authorization: $(echo -n $username:$servicekey
base64)" -H "API-Key: $apikey" https://app.contrastsecurity.com/Contrast/api/n
jq -r '.libraries[]
{name: .file_name, app_name: .apps[].name}
[.name, .app_name]
@csv'
```

## View open-source licenses



### IMPORTANT

Open-source license display is available to Contrast SCA customers only. Contact your Organization Administrator to enable SCA.

To view license details for your open-source libraries in SPDX format, select **Libraries** in the header. There are multiple ways to view license information:


- To view an individual library's license, hover over the library name in the grid.
- To find libraries with specific licenses, select the **filter** icon next to the **Library** column header and select the licenses you want to filter by.
- If you select a library name you will see details of that library. License information is also at the top of that page.
- Select **Package details** (either from the hover tip on the **Libraries** page, or by selecting the library name, then the information icon in the top right) to see the title, version and creator of that package.
- License details for each library are also included in any CSV or XML files [exported from Contrast \(page 481\)](#).

## View dependency trees




When an open-source library is added to an application, all of the library's dependencies are also inherited. Some of these transitive dependencies may introduce vulnerable code into your applications. The [Contrast CLI \(page 508\)](#) identifies all library dependencies and sends the data to Contrast where you can visualize these libraries as a hierarchical dependency tree.

To display library hierarchy for your application, Contrast must have access to your application code at pre-compile time—a different stage of the software development lifecycle (SDLC) than the Contrast agents collect. To do this, you must have installed and run the [Contrast CLI \(page 508\)](#) for your applications.

To view an application's library dependency tree:

1. Select **Applications** in the navigation bar.
2. Select an application.
3. From the application's **Overview** page, select the **Libraries** tab.
4. Select the **dependency tree** icon  in the upper right to view the analysis of your application.

In this view, Contrast displays the dependency tree for your application's libraries based on the data collected by the [Contrast CLI \(page 508\)](#).

- Use the quick view menu to view only the vulnerabilities. By default, all libraries are displayed. You can use the right arrows to expand individual sections for more information or you can select the Expand All option to view all the information at once.
- Libraries with known vulnerabilities are also identified with a vulnerabilities warning icon . View vulnerability details by clicking the icon.
- Click the search icon  to search for a specific library.
- You can also view a dependency tree's history by choosing a custom date.
- Click the filter icon  to view the dependencies based on developer and/or production libraries. By default, the production option is selected.
- The **Application** dropdown appears for [merged \(page 428\)](#) applications so you can see how vulnerable libraries were introduced for the merged application. You can view the dependency tree by parent and child applications.

## Library scoring guide

Contrast provides letter grades for the security of your application's libraries so that you can use them as a reference point during analysis. The grades map to scores as follows:

- A: 90 - 100
- B: 80 - 89
- C: 70 - 79
- D: 60 - 69

- F: 35 - 59

Scores are based on three penalty factors:

- **Time:** The age of the library is calculated based on the number of full years between the release of the latest version and the version used in the application, multiplied by 2.5.
- **Status:** The status is calculated based on the number of versions that have been released since the current library in your application, multiplied by 10.
- **Security:** The CVE penalty of the library is the highest severity of all known CVEs for this library, multiplied by 10.



#### NOTE

Organization administrators can [adjust the scoring method \(page 648\)](#) to include only security criteria.



#### TIP

For example:

If you're using a library from January 2010 and the latest version came out in September 2013, the number of full years passed is two. So your time penalty would be:

$$2 \times 2.5 = 5$$

If you're using Version 1.1.1, but Versions 1.1.2 and 1.1.3 have been released, your penalty would be:

$$2 \times 10 = 20$$

If you have a library with the scores 2.4 and 2.2, the penalty would be:

$$2.4 \times 10 = 24$$

The final score of the library is calculated by subtracting each of the three penalty values from 100.

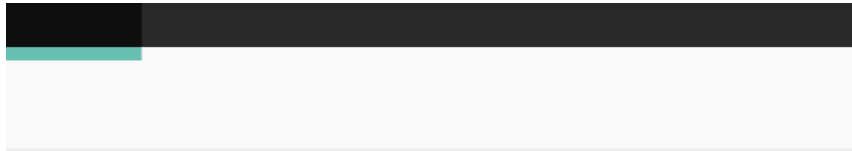
$$100 - 5 - 20 - 24 = 51$$

A score of 51 maps to a letter grade of F.

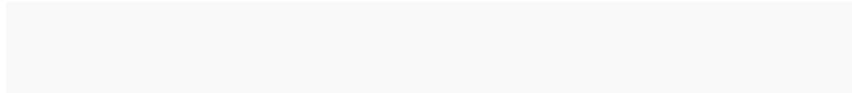
## CVE search

Use the search bar to locate specific CVEs in [libraries \(page 474\)](#).

- Enter a CVE number in the search bar and the search results will auto-populate with the libraries where the CVE is found.



(26) ▼ 🔍 Find libraries by name or CVE



- You can then select the relevant library and the library details will open.
- Search supported in [Organization \(page 628\)](#), [Application \(page 423\)](#), and [Server \(page 469\)](#) libraries.

## Contrast Serverless

Contrast Serverless features dynamic scanning, static scanning, graph visualization, and resource observability that help you maintain awareness of your environments.

With Contrast Serverless you can:

- [Scan functions on demand \(page 492\)](#)
- [View results \(page 493\)](#)
- [Change inventory criteria \(page 497\)](#)
- [Change Serverless scan settings \(page 498\)](#)
- [View function and service relationships \(page 498\)](#)

### See also

- [Integrate Contrast Serverless with JIRA \(page 590\)](#)

## Inventory

When you connect to an AWS account from Contrast, it automatically discovers all Lambda functions and their relationships with different resources (such as S3, API Gateway, and DynamoDB) within the tested environment.

By default, Contrast scans all functions in the inventory unless [you specify otherwise. \(page 497\)](#)

### Inventory criteria

Contrast lets you specify criteria that determine the scope of functions to be scanned, based on these criteria:

- **Tag:** This option lets you include or exclude functions associated with a specified tag and, optionally, a tag value.
- **Name:** This option lets you include or exclude functions with a specific name, prefix, or suffix.

## Contrast Serverless supported languages

The following programming languages are supported for Contrast Serverless.

Language	Runtime version
Java	8.x, 11.x

Language	Runtime version
.NET	.NET 5.x, 6.x .NET Core 3.1
Node.js	12.x, 14.x, 16.x, 18.x
Python	3.6, 3.7, 3.8, 3.9

## Contrast Serverless supported platforms

The following platforms are supported for Contrast Serverless.

- AWS Lambda
- Microsoft Azure

## Scan types and monitoring

Contrast Serverless supports these types of scans and monitoring:

- **Static scans**

This scan automatically scans, in close to real-time, relevant static code and configuration assessments to discover new vulnerabilities in the following categories:

- Least privilege: Discovers IAM vulnerabilities (over permissive functions) within serverless workload prior to deployment and recommends permission remediations.
- Contrast SCA - Provides SCA for open-source libraries using the Contrast SCA engine.

The scan has no permanent effect on your code.

- **Dynamic scans**

This scan type looks at dynamic assessments based on a specific update introduced to the tested environment.

It executes automatically, close to real-time, providing dynamic assessments, based on the specific update introduced to the tested environment. The dynamic scans are based on the interpretation of OWASP Top 10 benchmark. For example:

- SQL injection
- Code injection
- Local file inclusion

During a dynamic scan, Contrast tries to send malicious input to the code and then, exercises the code to discover vulnerabilities.

This action has no effect on your code, however, a scanned function is invoked.

- **Continuous monitoring**

Once you connect to an account from Contrast, Contrast Serverless monitors this account. As you make changes to your functions' code or configurations, Contrast automatically initiates a new scan.

## Get started with Contrast Serverless for AWS

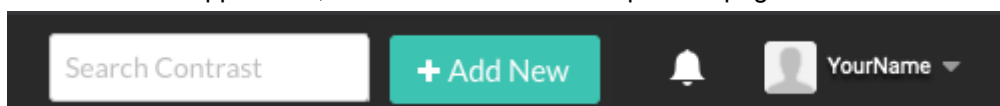
To start using Contrast Serverless, open Contrast and connect to your AWS account to create a new stack.

### Before you begin

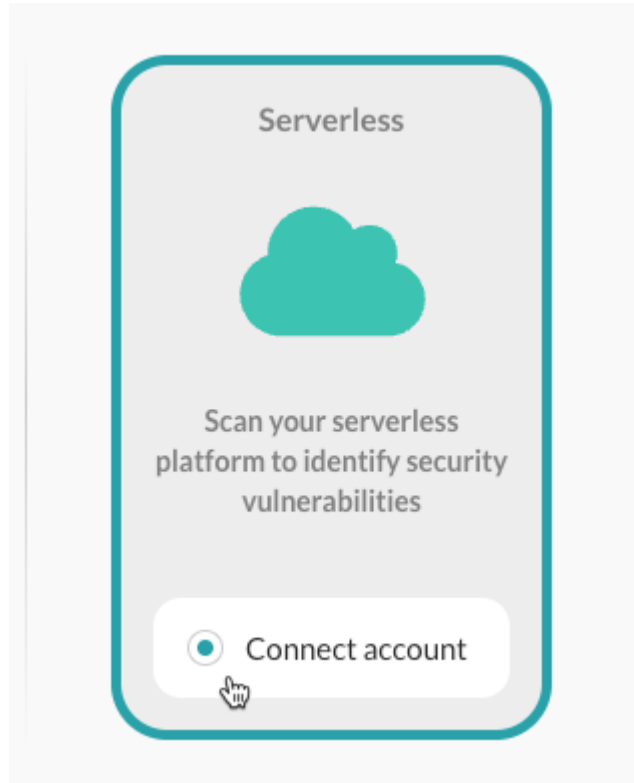
- Have your AWS account information available.
- Minimum [permissions \(page 488\)](#) required to deploy/update/delete a Contrast Serverless stack.

### Steps

1. In the Contrast application, select **Add New** at the top of the page.



2. Select **Connect account** and click **Next**.



3. Select the **AWS** option under the **Cloud provider** section.
4. (Optional) Specify scan settings:
  - **Inventory:** Inventory consists of the functions that you want Contrast to scan. The default value is to scan all functions in your AWS account.
  - **Initial scan:** This setting determines actions that Contrast takes to scan your functions.

Static analysis	Dynamic analysis
<p>Covers:</p> <ul style="list-style-type: none"> <li>• <b>Least Privilege</b>- Detects unused permissions. For Java, .NET Core 6, .NET Core 7, Node.js, and Python.</li> <li>• <b>CVEs</b> - Detects vulnerable dependencies. For Java, .NET Core 6, .NET Core 7, Node.js, and Python.</li> <li>• <b>SAST</b> - Detects custom-code vulnerabilities. For Java.</li> <li>• <b>Malware</b> - Detects malicious files. For Python.</li> </ul>	<p>Covers:</p> <ul style="list-style-type: none"> <li>• The stress testing of an application to detect any possible vulnerabilities.</li> </ul>

- **Deployment:** Deploy with a new stack in AWS or download the CFT to use in your pipeline. You can [change these settings \(page 498\)](#) at any time in the Settings tab.
5. Select **Create new stack**.
  6. On the displayed AWS page, enter your account information and select **Create stack**. Alternatively, you can download a CloudFormation template and use it in your development pipeline. This action connects to the AWS CloudFormation Stacks console for your account and starts the first scan.
  7. Approve the stack deployment in your account. The stack deployment takes approximately two minutes to complete.
  8. Return to the Contrast application and verify that the Account is connected and the Scan started messages are displayed.
  9. To view details about functions and scan results, select **function** in the Account connected message or select the **Serverless** tab.

## Next steps

- [Scan functions on demand \(page 492\)](#)
- [View results \(page 493\)](#)
- [Change inventory criteria \(page 497\)](#)
- [Change scan settings \(page 498\)](#)

## AWS policy and permissions for running Contrast Serverless

This is a sample of how to obtain the policy and permissions for your AWS account with Contrast Serverless.

### Obtain a policy

This is a sample updated policy for an account.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "CustomResources",
      "Effect": "Allow",
      "Action": [
        "sns:Publish"
      ],
      "Resource": "*"
    },
    {
      "Sid": "SNS2",
      "Effect": "Allow",
      "Action": [
        "sns:CreateTopic",
        "sns:GetTopicAttributes",
        "sns>DeleteTopic"
      ],
      "Resource": "*"
    },
    {
      "Sid": "IAM",
      "Effect": "Allow",
      "Action": [
        "iam:AttachRolePolicy",
        "iam:CreatePolicy",
        "iam:CreateRole",
        "iam:CreateServiceLinkedRole",
        "iam>DeletePolicy",
        "iam>DeleteRole",
        "iam>DeleteRolePolicy",
        "iam:DetachRolePolicy",
        "iam:GetPolicy",
        "iam:GetRole",
        "iam:GetRolePolicy",
        "iam:ListPolicyVersions",
        "iam:ListRoleTags",
        "iam:PassRole",
        "iam:PutRolePolicy",
        "iam:TagRole",
        "iam:UntagRole"
      ]
    }
  ]
}
```



```

    ],
    "Resource": "*"
  },
  {
    "Sid": "S3",
    "Effect": "Allow",
    "Action": [
      "s3:CreateBucket",
      "s3:DeleteBucket",
      "s3:DeleteBucketPolicy",
      "s3:GetBucketPolicy",
      "s3:PutBucketPolicy",
      "s3:PutBucketPublicAccessBlock",
      "s3:PutBucketTagging",
      "s3:PutEncryptionConfiguration",
      "s3:PutLifecycleConfiguration"
    ],
    "Resource": "*"
  },
  {
    "Sid": "Lambda",
    "Effect": "Allow",
    "Action": [
      "lambda:GetFunction",
      "lambda:CreateFunction",
      "lambda:DeleteFunctionEventInvokeConfig",
      "lambda:DeleteFunction",
      "lambda:TagResource",
      "lambda:PutFunctionEventInvokeConfig"
    ],
    "Resource": "*"
  },
  {
    "Sid": "S3LambdaCode",
    "Effect": "Allow",
    "Action": [
      "s3:GetObject"
    ],
    "Resource": "*"
  },
  {
    "Sid": "EventsRule",
    "Effect": "Allow",
    "Action": [
      "events:DeleteRule",
      "events:DescribeRule",
      "events:PutRule",
      "events:PutTargets",
      "events:RemoveTargets"
    ],
    "Resource": "*"
  },
  {
    "Sid": "CloudTrail",
    "Effect": "Allow",

```

```

        "Action": [
            "cloudtrail:AddTags",
            "cloudtrail:CreateTrail",
            "cloudtrail>DeleteTrail",
            "cloudtrail:StartLogging",
            "cloudtrail:PutEventSelectors"
        ],
        "Resource": "*"
    }
}
]
}

```

Run the AWS iam create-policy:

```
aws iam create-policy --policy-name Contrast-create-stack --policy-document '{ "Version":
```

And obtain a response:

```

{
  "Policy": { ...
    "PolicyName": "Contrast-serverless-create-stack",
    "PolicyId": "ANPAV3I66HSEE4ILG6XJ3",
    "Arn": "arn:aws:iam::402181209224:policy/Contrast-serverless-create-stack",
    "Path": "/",
    "DefaultVersionId": "v1",
    "AttachmentCount": 0,
    "PermissionsBoundaryUsageCount": 0,
    "IsAttachable": true,
    "CreateDate": "2023-01-24T16:36:49+00:00",
    "UpdateDate": "2023-01-24T16:36:49+00:00"
  }
}
Agentless API ...

```

Then attach a user policy:

```
aws iam attach-user-policy --policy-arn arn:aws:iam::402181209224:policy/Contrast-serverless-create-stack
```

And obtain a response:

```

4ppsec@TMEIAMED-C02DX3Q2ML85:~/cn-mono (*)
> aws iam list-attached-user-policies --user-name xrays --profile xrays
{
  "AttachedPolicies": [
    {
      "PolicyName": "Contrast-serverless-create-stack",
      "PolicyArn": "arn:aws:iam::402181209224:policy/Contrast-serverless-create-stack"
    }
  ]
}

```

You can now run a deployment.

## Get started with Contrast Serverless for Azure

To start using Contrast Serverless with Azure, open Contrast and connect to your Azure account to create a new stack.

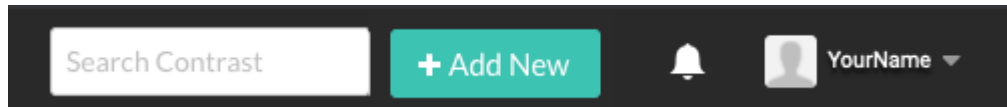
### Before you begin

- Make sure you have an Azure account with an active subscription.
- Make sure you have permission to create an App registration on the Active Directory Tenant.

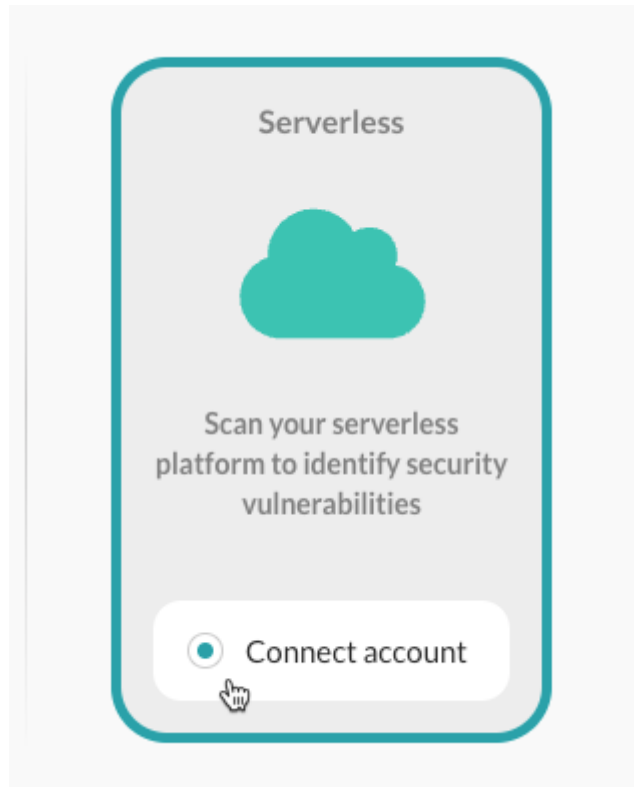
- Make sure you have an *Owner* role in the account. This allows for assigning roles to the App registrations.

## Steps

1. In the Contrast application, select **Add New** at the top of the page.



2. Select **Connect account** and click **Next**.



3. Select the **Azure** option under the **Cloud provider** section.
4. (Optional) Specify scan settings:
  - **Inventory:** Not available for Azure.
  - **Initial scan:** This setting determines actions that Contrast takes to scan your functions.

Static analysis	Dynamic analysis
Covers: <ul style="list-style-type: none"> <li>• <b>Least Privilege</b>- Detects unused permissions. For Java, .NET Core 6, .NET Core 7, Node.js, and Python.</li> <li>• <b>CVEs</b> - Detects vulnerable dependencies. For Java, .NET Core 6, .NET Core 7, Node.js, and Python.</li> <li>• <b>SAST</b> - Detects custom-code vulnerabilities. For Java.</li> <li>• <b>Malware</b> - Detects malicious files. For Python.</li> </ul>	Not available for Azure.

You can [change these settings \(page 498\)](#) at any time in the Settings tab.

5. Continue with the steps under the **Deployment** section.
6. Return to the Contrast application and verify that the Account is connected and Scan started messages are displayed.

## Next steps

- [Scan functions on demand \(page 492\)](#)
- [View results \(page 493\)](#)

## Scan functions on demand

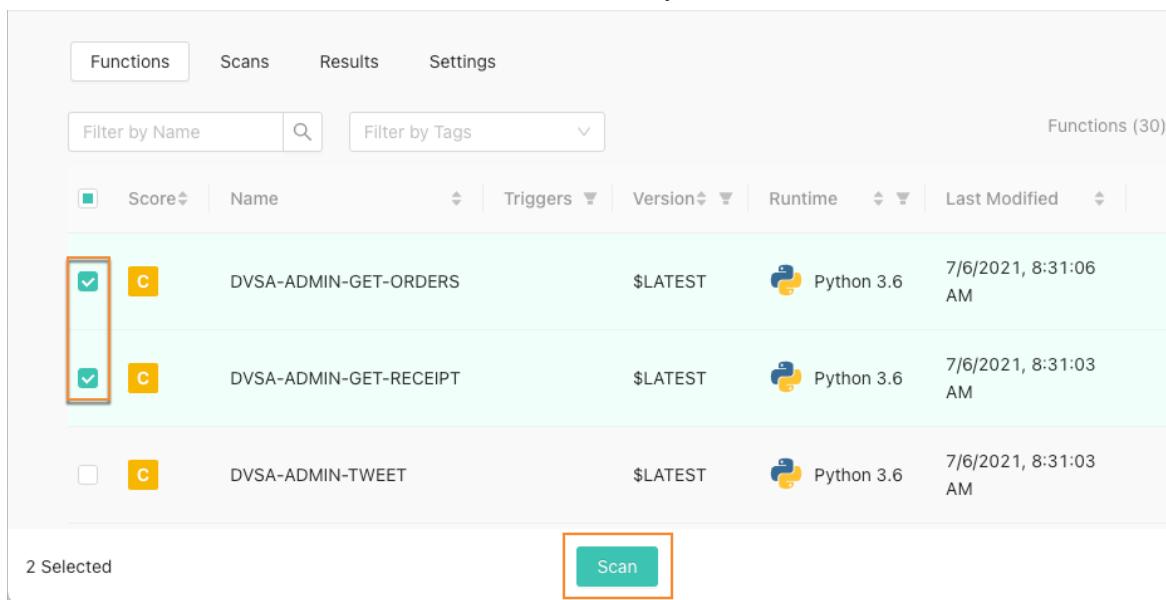
Although scans of all functions in your accounts occur automatically, you can also scan a specific function on demand.

### Before you begin

- Identify the functions that you want to scan.

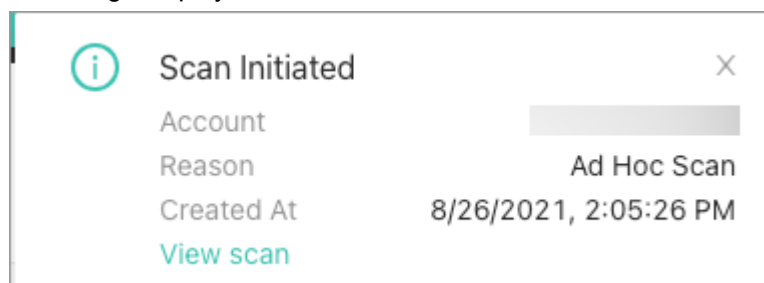
### Steps

1. Select **Serverless** in the header.
2. Select the account from the list.
3. Select the check box next to one or more functions that you want to scan.



4. Select **Scan**.
5. In the Confirm Scan window, verify or change the scan type settings for the selected functions and select **OK**.

The Scan initiated message displays.



6. To view the scan results, select **View scan** in the Scan initiated message to view the scan results. Alternatively, select the **Scan** tab and select an **Ad hoc scan**.

If Contrast detects multiple occurrences of the same vulnerabilities in scanned functions, Contrast updates the existing reported vulnerabilities with new data (for example, timestamp or use), rather than creating new vulnerabilities.


## View results


View results to see details about vulnerabilities for permissions, dependencies, exploits, and CVEs.


### Before you begin

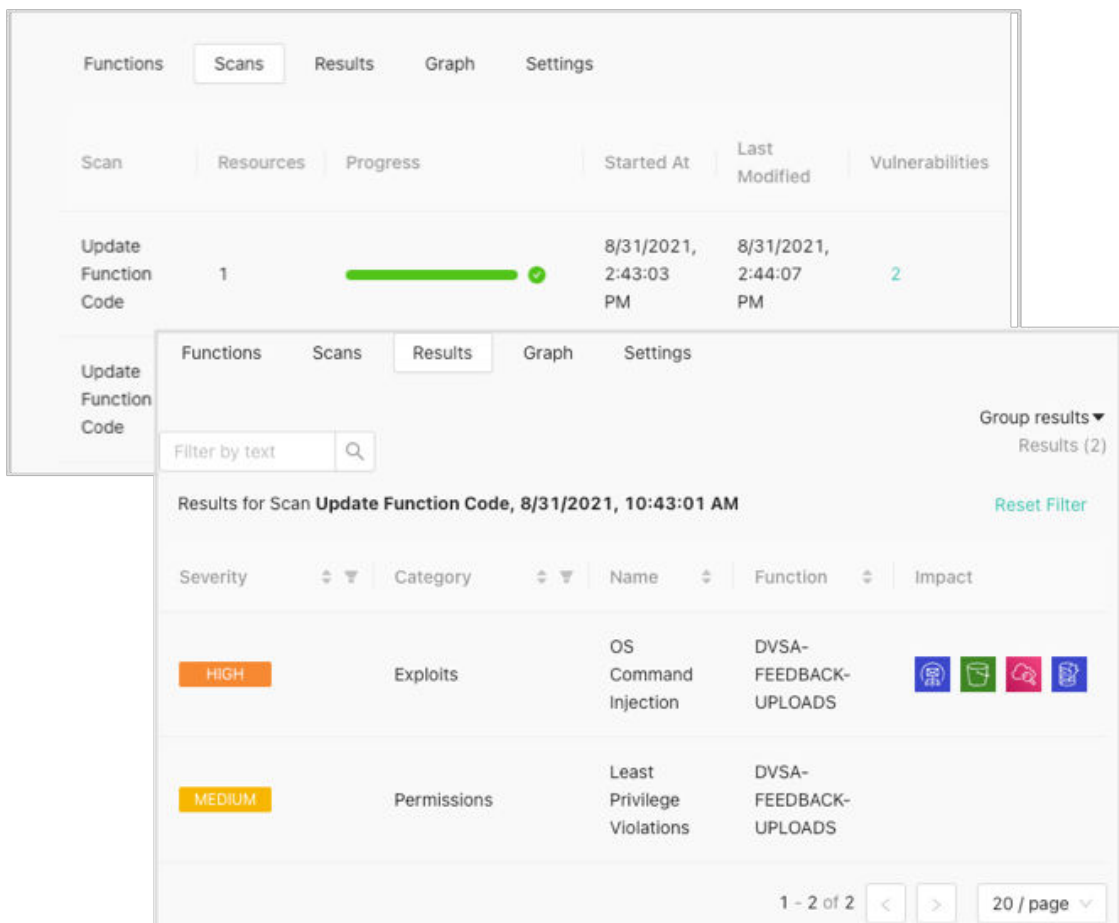
- Ensure that at least one scan is complete.

### Steps

1. Select **Serverless** in the header.
2. To view results for all scans, select **Results**. See [Scan status details \(page 495\)](#) for more information about the meaning of the scan results.
3. To filter results in the Results tab, select the **Filter** icon (  ) next to the column headers.
  - a. The **Severity** is based on vulnerabilities in the application. See the [Application scoring guide \(page 748\)](#) for information about the levels.
  - b. The **Category** is based on vulnerabilities in the type of function.
  - c. Results can also be grouped by **Category** or **Function** by selecting the option under **Group results** on the right-hand side of the screen.

To clear the filters, select the green **Filter** icon (  ) icon next to the column headers and select **Reset** in the filter window.

4. To search for a function in the Results tab, select the **Magnifying glass** icon (  )
5. To view results for a single scan, from the Scans tab, select a scan row. This action shows a scan details page.
6. To view result details for a function:
  - a. From the Results tab, select a row in the list.
  - b. From a scan details page, select a number in the Vulnerabilities column for a function.



The results detail page looks similar to this example:

### Least Privilege Violations X

MEDIUM

Category: **Permissions**

Function: [arn:aws:lambda:us-east-1:733980656228:function:DVSA-ADMIN-GET-ORDERS](#)

---

#### Description

The Attached Role [arn:aws:iam::733980656228:role/DVSA-AdminRole-dev](#) has an over permissive policy that may violate the principle of least privilege. For more information on aws least privilege [docs.aws.amazon.com/IAM/latest/UserGuide/best-practices.html#grant-least-privilege](https://docs.aws.amazon.com/IAM/latest/UserGuide/best-practices.html#grant-least-privilege).

#### What happened

- DVSA-AdminRolePolicy-dev: Permissions for service s3 should be removed
- DVSA-AdminRolePolicy-dev: Use of wildcard in service dynamodb is inadvisable

#### Violating policies

**DVSA-AdminRolePolicy-dev**

> [View violating policy](#)

#### Remediation

Replace the existing policy with one of the following:

JSON

YAML

TERRAFORM

---

```
{
  "PolicyName": "DVSA-AdminRolePolicy-dev",
  "PolicyDocument": {
    "Version": "2012-10-17",
    "Statement": [
      {
        "Sid": "1",
        "Effect": "Allow",
        "Action": [
          "logs:CreateLogGroup",
          "logs:CreateLogStream",
          "logs:PutLogEvents"
        ],
        "Resource": [
          "arn:aws:logs:us-east-1:7XXXXXXXXXX:log-group:/aws/lambda/*:*:*"
        ]
      }
    ]
  }
}
```

## Result details

The results details that you see depend on the category of a vulnerability.

All results include this information:

- **Description:** A description of the vulnerability.
- **What happened:** What occurred when the scan discovered the vulnerability
- **Remediation:** Steps to take to fix the vulnerability.

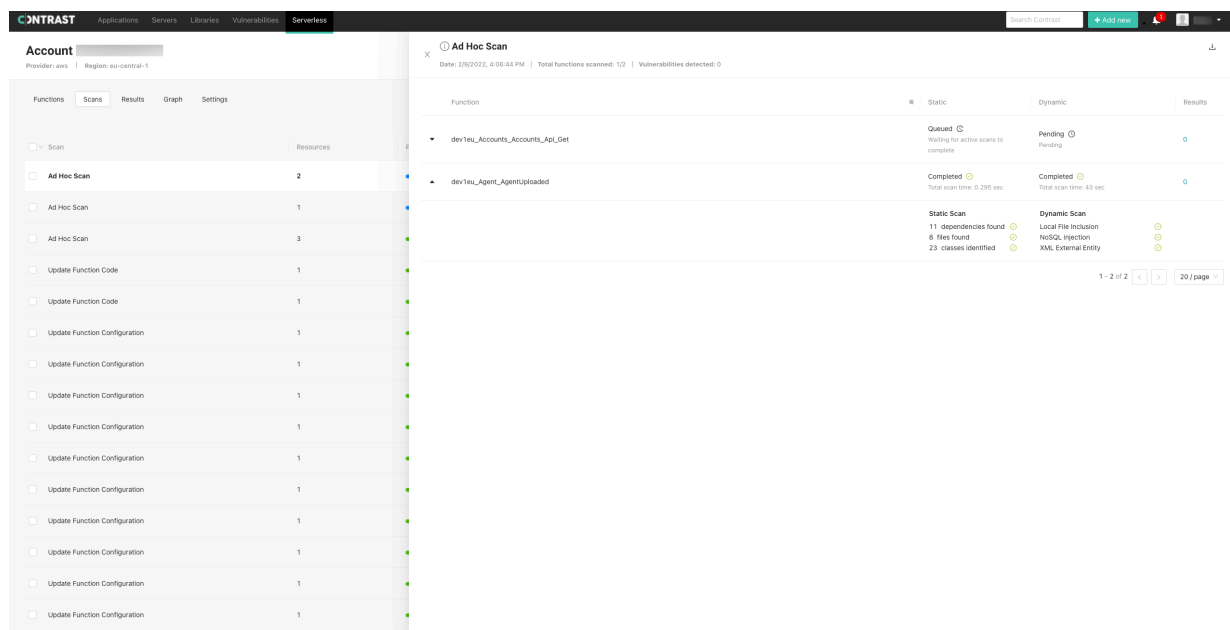
You might also see these details:

- **Violated policies:** Policies that the vulnerability violates.
- **Impact:** The area that the vulnerability affects, for example ses, s3, logs, or dynamodb.
- **Severity and metrics:** A severity score calculated to the vulnerability as well as metrics for the areas that the vulnerability impacts.

## Scan status details

Under the Serverless Scan tab, you can see what the system is scanning as well as the types of scans the functions are tested against.

Once on the **Scan** page, click the scan name to open the scan status details tab.



Here's a list of the static and dynamic scan statuses with their details.

Status	Description
Scanning.....	Scan in progress
Pending	Pending static scan results
Queued	Waiting for X active scans to complete Where X is the number of active scans. Scan is queued and will start soon.
Completed	Scan complete
Unsupported	Unsupported Lambda runtime The function runtime language is unsupported. Unsupported Lambda trigger The function has an unsupported trigger configuration OR no identified trigger configuration.
Excluded	Scan disabled in <a href="#">Settings (page 498)</a> To scan, change the Inventory settings or run an ad-hoc scan on the function.
Canceled	Newer scan initiated A newer version of the function is already in queue. Lambda state inactive

Status	Description
	Lambda reached limit of 5 layers
	Contrast cannot scan functions that already contain the maximum limit of 5 layers.
	Lambda scan already in progress
	Lambda last update status failed
Failed	Unable to verify agent
	Unable to decrypt/encrypt the environment variables
	Agent failure
	Contrast unable to invoke the Cloud Agent function OR scan failed during static analysis.
	Agent modified
	Misconfigured Lambda handler
	Parsing error

- Click the arrow icon to expand the details to view the dependencies, files, and classes found in the scan.
- Click the number under the Results column to open the [Results \(page 493\)](#) tab.

### Download serverless scan results

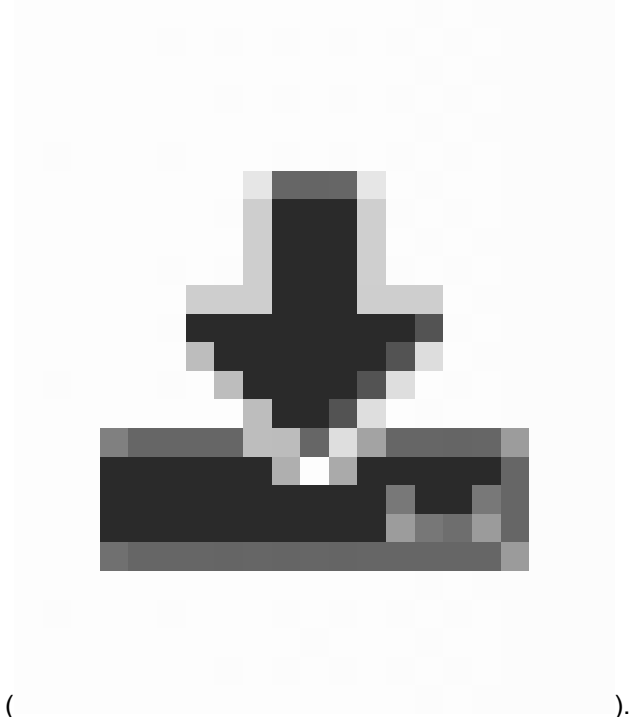
After a scan completes, you can download the results as a CSV file.

#### Before you begin

- Identify the scan with results you want to download.

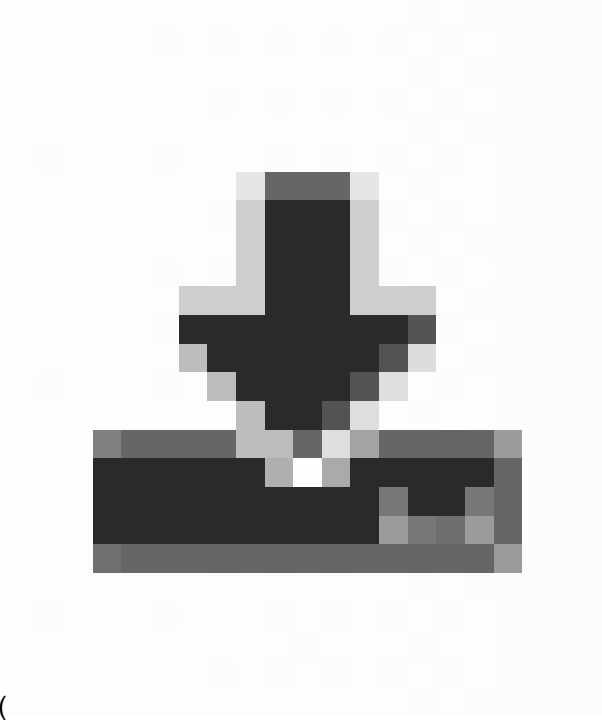
#### Steps

1. Select **Serverless** in the header.
2. Select either the **Scans** tab or the **Results** tab.
3. To download scan results from the **Scans** tab, hover over the end of a row for a scan and select the download icon.
4. To download scan results from the **Results** tab:
  - a. Hover over the end of a row for a scan and select the download icon





- OR
- b. Click the scan row to open the details page and then select the download icon



( ) on the right-hand side.

Results are downloaded as CSV files.

### Change inventory criteria

The inventory criteria that you specify determine the functions scanned by Contrast Serverless. By default, Contrast scans all functions discovered in your AWS account.

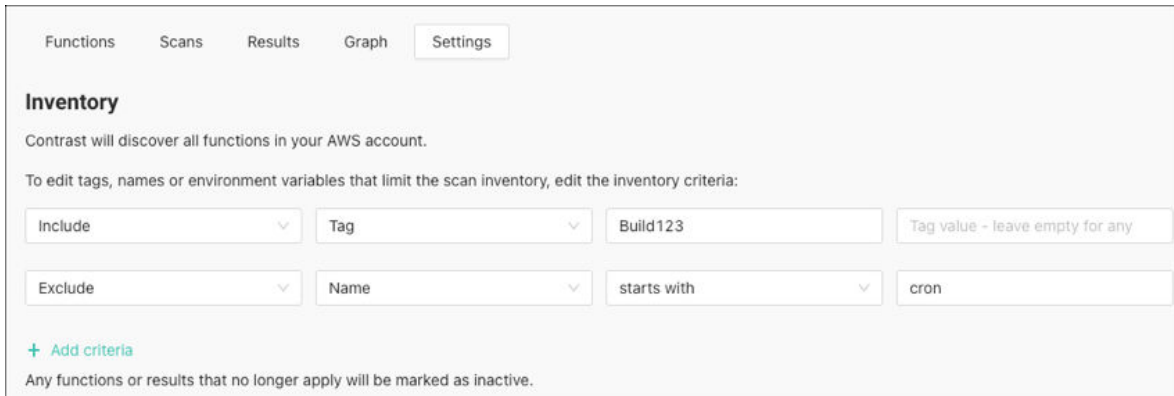
Excluding a function excludes it from the inventory and scan results.

### Before you begin

- Identify the functions you want to include or exclude in scans.
- An Admin role is required to change the inventory criteria.

### Steps

1. Select **Serverless** in the header.
2. Select the **Settings** tab.
3. Under Inventory, specify the criteria:
  - Include or exclude a tag associated with one or more functions. Optionally, specify a value for the tag to further refine the inventory.
  - Include or exclude functions by name. The options are: **Name is**, **Name starts with**, or **Name ends with**.



4. Select **Save and Rescan**.  
Contrast rescans the inventory automatically based on the new criteria.

### Change serverless scan settings

The scan settings affect the type of scan that Contrast Serverless performs on all functions.


You can [change these settings \(page 492\)](#) for a manual scan of selected functions.

### Before you begin

- Determine if you want to use static scans, dynamic scans, or both.
- An Admin role is required.

### Steps

1. Select **Serverless** in the header.
2. Select the **Settings** tab.
3. Under Scan, select the types of scans that you want to use:
  - **Scan for Least Privilege violations and CVEs:** Use this setting for a static scan.  
This scan type looks at relevant static code and configuration assessments to discover new vulnerabilities.  
During a static scan, Contrast adds a Lambda function to your account. Once the scan completes, the function exits.
  - **Scan for custom code vulnerabilities:** Use this setting for a dynamic scan.  
This scan type looks at dynamic assessments, based on the specific update introduced to the tested environment.  
During a dynamic scan, Contrast tries to send malicious input to the code and then exercises the code to discover vulnerabilities.



**IMPORTANT**  
Serverless scans do not change your function code.

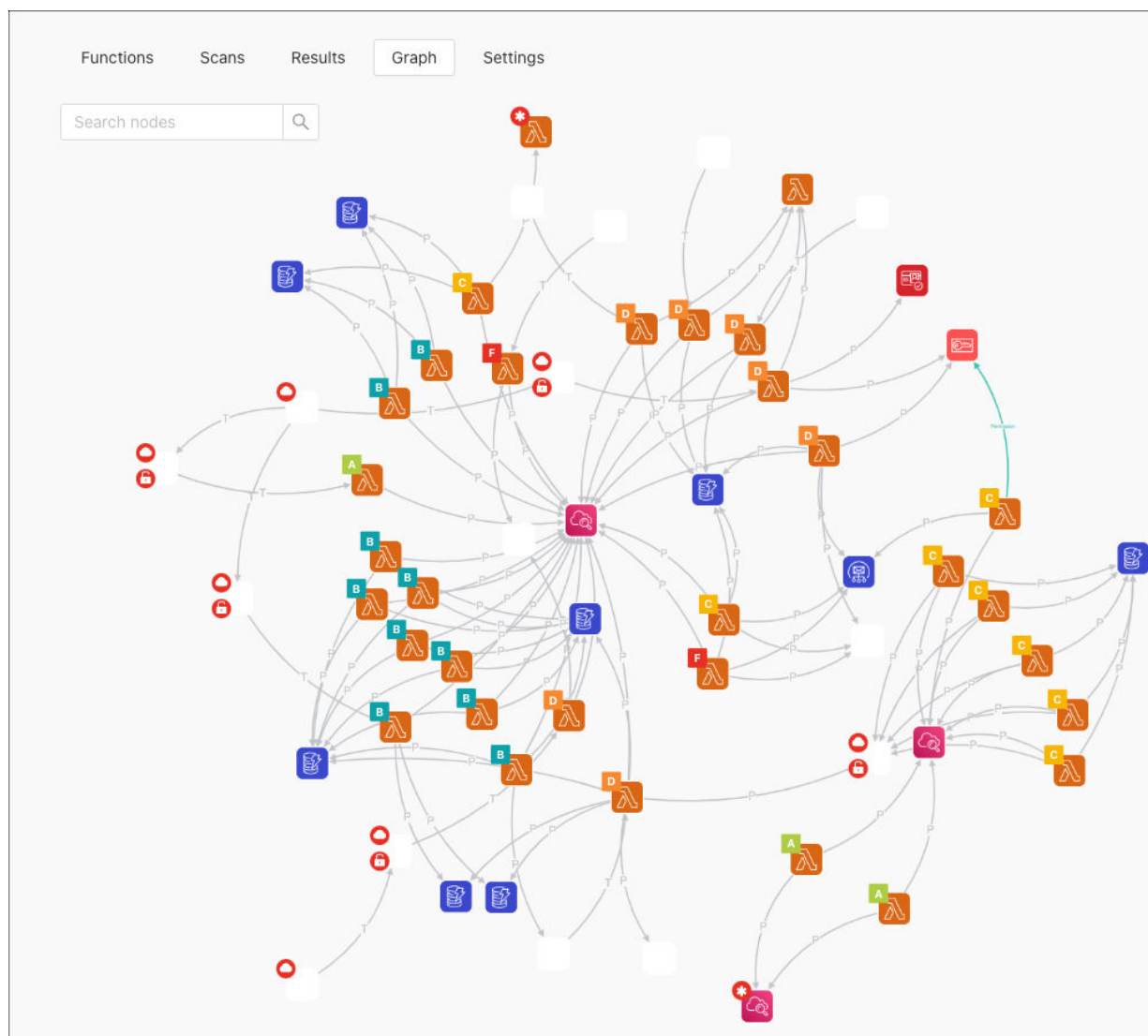
4. Select **Save**.

### View function and service relationships

The Graph tab displays a diagram that shows the relationship between functions and services. You can also view details about each element in the diagram, including:

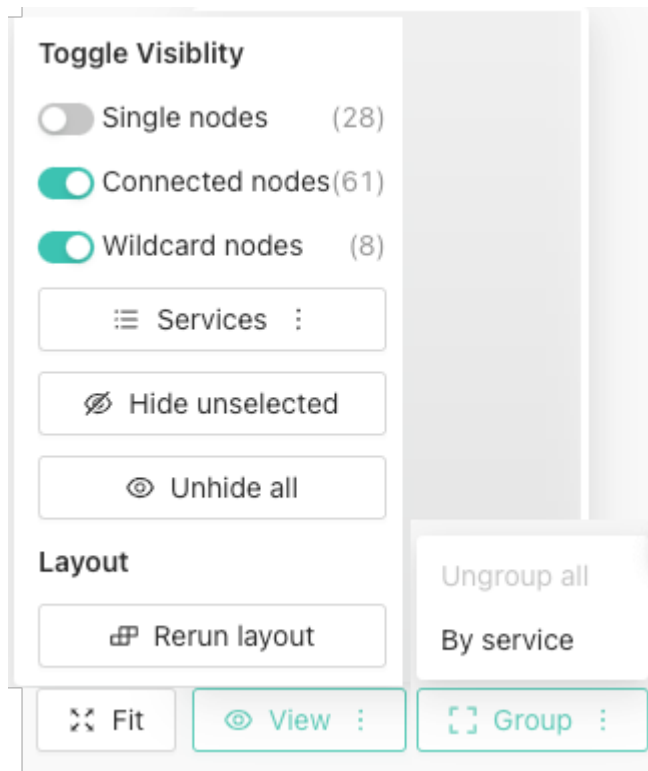
- Tags
- Vulnerability results

- Permissions
- Security posture score  
 The security posture score is based on the function's trigger configuration. Internet-accessible triggers and misconfigurations, such as open buckets and unauthenticated APIs, receive lower scores.

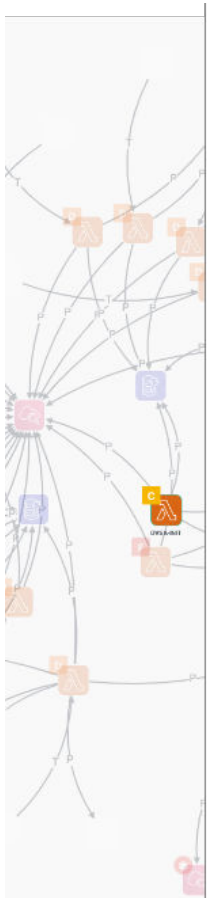


## Steps

1. Select **Serverless** in the header.
2. Select the **Graph** tab.
3. To adjust the view, use the options at the bottom of the graph.



- **Fit:** This allows you to resize the graph to fit your display
  - **View:** This allows you to filter the view by nodes and services. You can also hide or unhide nodes.
  - **Group:** You can group services together
4. Select the element to view details about individual elements.  
 Contrast displays a details window for the selected element. Select the tags to filter the view.



### DVSA-INIT ✕

Runtime: python3.6 | 
 Version: \$LATEST | 
 Last Modified: 8/31/2021, 9:19:21 AM | 
 Account: 7: | 
 Region: us-east-1 | 
 [View in AWS console](#)

#### AWS Tags

KEY	VALUE
aws:cloudformation:logical-id	InitFunctionLambda
aws:cloudformation:stack-id	arn:aws:cloudformation:us-east-1:733980656228:stack/serverlessrepo-DVSA/f546cbd0-76c3-11eb-a1ca-12dc156c2e93
aws:cloudformation:stack-name	serverlessrepo-DVSA
lambda:createdBy	SAM
serverlessrepo:applicationId	arn:aws:serverlessrepo:us-east-1:889485553959:applications/DVSA
serverlessrepo:semanticVersion	1.2.4
STAGE	dev

**1 Result**

MEDIUM
Least Privilege Violations

## Contextual risk scores

Contrast's contextual risk scoring system provides insight into where there are actual risk points and what should be prioritized. The function contextual score helps you gauge the general performance of each function.

<input type="checkbox"/> Score	Name
<input type="checkbox"/> <b>A</b>	DVSA-ORDER-GET
<input type="checkbox"/> <b>B</b>	DVSA-ORDER-BILLING
<input type="checkbox"/> <b>C</b>	DVSA-USER-CREATE
<input type="checkbox"/> <b>D</b>	DVSA-ADMIN-GET-ORDERS
<input type="checkbox"/> <b>F</b>	DVSA-ADMIN-ORDERS-MYSQL

Functions will have a letter grade **A** to **F**, which represents the overall posture of the function, and a numeric score from 35 to 100.

- **A:** 90 -100
- **B:** 80-89
- **C:** 70-79
- **D:** 60-69
- **F:** 35-59

The overall contextual Risk Score is calculated as follows: **Average = (Vulnerability score + Impact score + Likelihood score) / 3.**

### Vulnerability score

The vulnerabilities identified during the function scans (static and dynamic).

- Types of vulnerabilities:
  - Custom code exploits (Static and Dynamic)
  - Dependencies (CVEs)
  - Least Privilege violations
- To calculate the custom code vulnerability score, start with 100 points and subtract penalty points for the number of vulnerabilities found in a function multiplied by a penalty weight for their severity.
  - Critical: Multiply the number of vulnerabilities by 20
  - High: Multiply the number of vulnerabilities by 10
  - Medium: Multiply the number of vulnerabilities by 5
  - Low: Multiply the number of vulnerabilities by 1
  - For example: If the function has 0 Critical, 1 High, 0 Medium and 2 Low vulnerabilities, the score would be:  $100 - (20 \times 0) - (10 \times 1) - (5 \times 0) - (1 \times 2) = 88$

### Impact (access level) score

The permission (IAM roles) given to the function. The more permissions the function has, the higher the risk.

To calculate the impact score, we inspect and score each of the 5 permission categories: List, Read, Write, Tagging, and Permissions Management for each service. Then, we start with 100 points and subtract penalty points for the access level of each service.

For example, given the following IAM policy:

```
{
  "Effect": "Allow" ,
  "Action": [
    "s3:GetObject",
    "sqs:*"
  ],
  "Resource": "*"
}
```

The score for each service access level would be calculated as the following:

```
{
  "s3": {
    "Read": 6,
    "Write": 3,
    "List": 3,
    "Tagging": 1,
    "Permissions management": 12
  },
  "sqs": {
    "Read": 3,
    "Write": 3,
    "List": 1,
    "Tagging": 1,
    "Permissions management": 6
  }
}
```

The overall score would be calculated as follows:

- s3: [6], sqs: [3,3,1,1,6] -->  $100 - (6+3+3+1+1+6) = 80$

## Likelihood (accessibility) score

The likelihood of an attacker reaching the function is based on the function trigger configuration.

Each service has a different score based on the ability of attackers to access the function as well as based on the trigger configuration (for example, authenticated/unauthenticated).

For example:

If the function has an EventBus set as a trigger, the chances for a potential attacker to access the Lambda function would be lower than accessing a Lambda with an API Gateway set as a trigger. Moreover, if the API Gateway is configured without any authentication (i.e., Open), then the function can be accessible by anyone, anywhere.

So the likelihood score for a function:

- with an EventBus as a trigger would be: 90
- with an (authenticated) API Gateway as a trigger would be: 75
- with an unauthenticated API Gateway as a trigger would be: 5 (the lowest possible score)
- without a trigger would be: 100 (the highest possible score)

## Upgrade Contrast Serverless

Contrast Serverless is set to auto-update in most cases. If there is a need to manually upgrade you can follow the steps listed on this page.

## Before you begin

- Create a role/user with the minimum required policies. See [this example \(page 488\)](#) for how to set it up.

## Steps

1. If you have not made any manual changes to the Contrast Serverless stack before your previous deployment, simply [uninstall \(page 508\)](#) the current Contrast Serverless stack. If you made manual changes to the previous Contrast Serverless stack, it is recommended that you [create a stack change-set \(page 505\)](#) and then continue with the following steps.
2. Click **Add New** in the toolbar.
3. Download a new template from Contrast by selecting **Download CFT**.

### Let's get started

Create a new stack based on these defaults, or specify function criteria.

#### Cloud provider

Select the cloud provider that holds your account

AWS  Azure

#### Inventory

Contrast will discover all functions in your AWS account.

To specify tags, names or environment variables that limit the scan inventory, add criteria:

[+ Add Criteria](#)

#### Initial scan

Scan all functions in your account, then continuously scan all changes to identify:

Functions matching inventory criteria

**Static analysis**

- Least privilege** - Detecting unused permissions
- CVEs** - Detecting vulnerable dependencies
- SAST** - Detecting custom-code vulnerabilities
- Malware** - Detecting malicious files

Dynamic analysis - Fuzzing custom-code vulnerabilities (invokes functions)

#### Deployment

Deploy with a new stack in AWS, or download the CFT to use in your pipeline.

4. Select either JSON or YAML.
5. Update the stack.



Update stack

**Prerequisite - Prepare template**

Prepare template  
Every stack is based on a template. A template is a JSON or YAML file that contains configuration information about the AWS resources you want to include in the stack.

Use current template  Replace current template  Edit template in designer

**Specify template**  
A template is a JSON or YAML file that describes your stack's resources and properties.

Template source  
Selecting a template generates an Amazon S3 URL where it will be stored.

Amazon S3 URL  Upload a template file

Upload a template file  
 ContrastCloudNative\_CFT.yaml  
JSON or YAML formatted file

S3 URL: [https://s3.eu-central-1.amazonaws.com/cf-templates-1mtxj8diu6zvc-eu-central-1/2023-01-24T164553.73520xv-ContrastCloudNative\\_CFT.yaml](https://s3.eu-central-1.amazonaws.com/cf-templates-1mtxj8diu6zvc-eu-central-1/2023-01-24T164553.73520xv-ContrastCloudNative_CFT.yaml)

6. Click **Submit** on the resulting screen.

Capabilities

**The following resource(s) require capabilities: [AWS::IAM::ManagedPolicy]**  
This template contains Identity and Access Management (IAM) resources that might provide entities access to make changes to your AWS account. Check that you want to create each of these resources and that they have the minimum required permissions. [Learn more](#)

I acknowledge that AWS CloudFormation might create IAM resources.

## Stack change-set

To create a stack change-set, follow these steps.

### Before you begin

- Identify Contrast Serverless stack on the AWS CloudFormation console.

### Steps

1. Log in to your Contrast dashboard and download a new template from Contrast by selecting **Download CFT**.

## Let's get started

Create a new stack based on these defaults, or specify function criteria.

### Cloud provider

Select the cloud provider that holds your account

AWS Azure

### Inventory

Contrast will discover all functions in your AWS account.

To specify tags, names or environment variables that limit the scan inventory, add criteria:

[+ Add Criteria](#)

### Initial scan

Scan all functions in your account, then continuously scan all changes to identify:

Functions matching inventory criteria

**Static analysis**

- Least privilege** - Detecting unused permissions
- CVEs** - Detecting vulnerable dependencies
- SAST** - Detecting custom-code vulnerabilities
- Malware** - Detecting malicious files

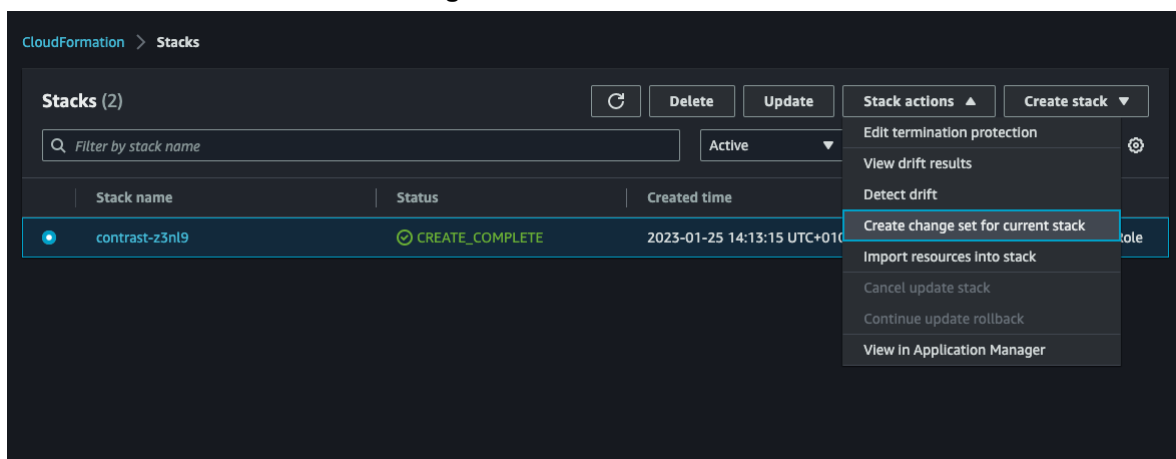
Dynamic analysis - Fuzzing custom-code vulnerabilities (invokes functions)

### Deployment

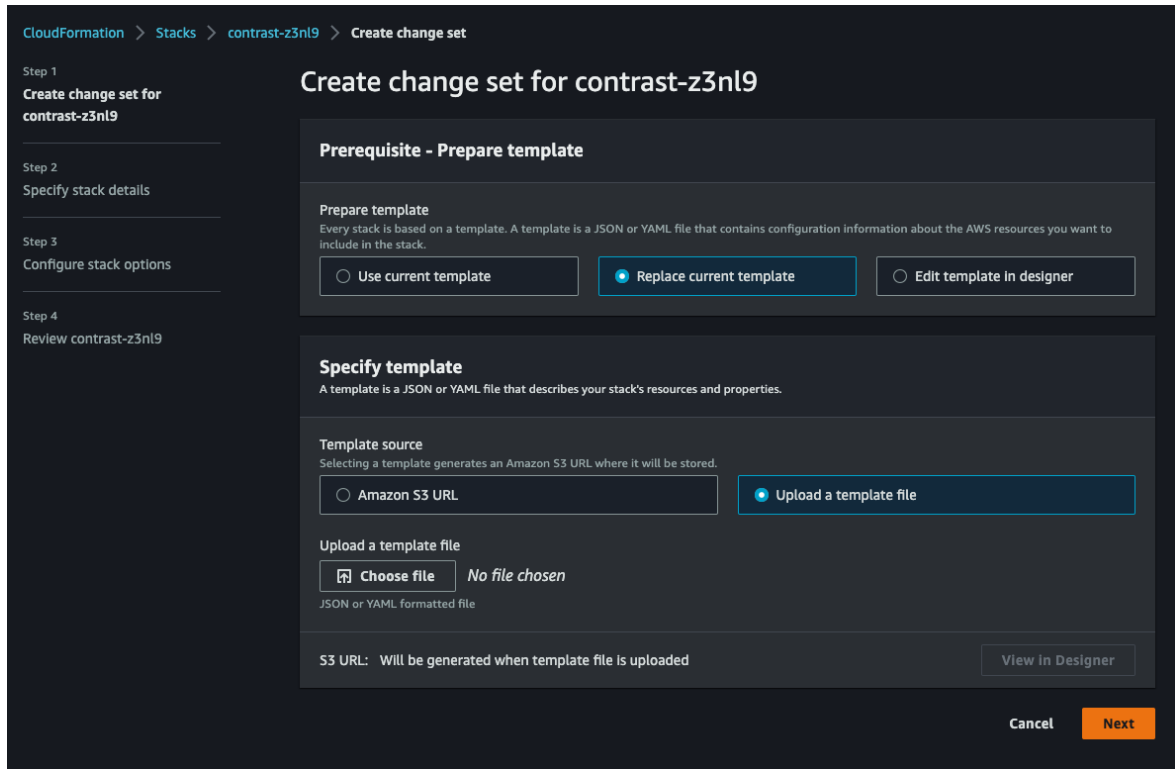
Deploy with a new stack in AWS, or download the CFT to use in your pipeline.

Create new stack [Download CFT](#)

2. Select either JSON or YAML.
3. Log in to your AWS account or use the AWS CLI/API.
4. Select **Contrast Serverless Stack**.
5. Select **Stack actions > Create change set for current stack**.



6. Select **Replace current template > Upload a template file** and upload the template downloaded in step 1.



## Block accounts

You can block all Contrast Serverless activities for an account.

1. Select **Serverless** in the header.
2. Select the **Settings** tab.
3. Scroll to the bottom of the page and click **Block Account**.

This will block all activities including automatic and user-requested scans and function updates.



### NOTE

Contact [Contrast Support](#) to unblock accounts.

## Offboard Contrast Serverless

Offboarding a Contrast Serverless account from Azure requires the use of a script to remove the deployment.

### Before you begin

- Identify the objects that you want to remove

### Steps

1. Select **Serverless** in the header.
2. Select the account to be offboarded.
3. Select the **Settings** tab.
4. Scroll down to the **Offboard Account** section and copy the script.

- Execute in a shell with an authenticated `az` command. For example, `Azure CloudShell` in `Bash` mode.

## Uninstall Contrast Serverless

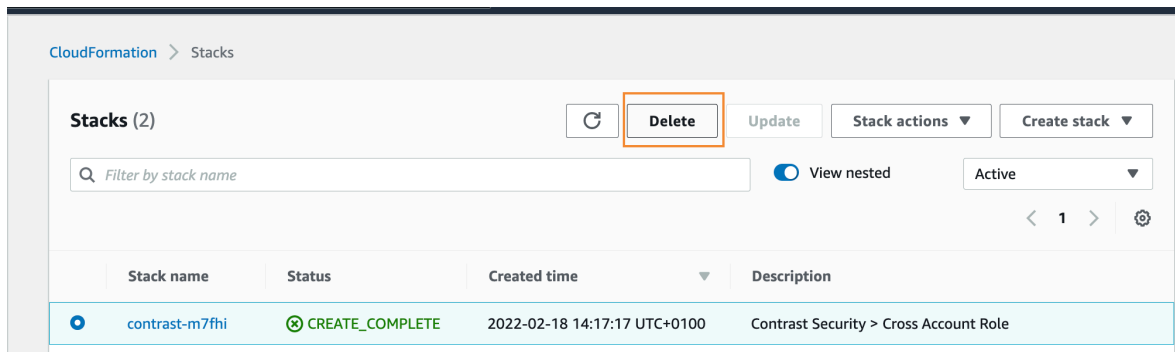
Uninstalling Contrast Serverless requires the deletion of a stack in the AWS console.

### Before you begin

- Identify the objects that you want to remove

### Steps

- Log in to your AWS account or use the AWS CLI/API.
- Continue with the steps for deleting a stack. See [AWS Stack deletion](#).



## Contrast CLI

Contrast CLI delivers SCA, SAST, and serverless capabilities at the command line. Use the CLI locally or automated in your CI/CD pipeline.

### Before you start

A few things to keep in mind:

- CodeSec users start [here](#).
- Enterprise Contrast users can [install \(page 509\)](#) and then start using the Contrast CLI.
- The legacy Contrast CLI will be deprecated as of October 2022.

### About Contrast CLI

Contrast Security brings security testing right to the developer's laptop. Make code and serverless security simple and efficient with quick scan times, market-leading accuracy, actionable results, and seamless integration.

Contrast CLI delivers:

- The fastest and most accurate SAST scanner
- Immediate and actionable results - scan code and serverless environments
- SCA capabilities by showing dependencies between open source libraries, including where vulnerabilities were introduced

[Get started scanning](#) with easy-to-follow steps. If you already have a Contrast account, you can start scanning using [these commands \(page 510\)](#).

### See also

- [Install Contrast CLI \(page 509\)](#)

- [Run Contrast CLI \(page 510\)](#)

## Contrast CLI supported languages and package managers

Contrast CLI supports these languages when using the `audit` command.

Package manager	Language	Files required	Notes
RubyGems	Ruby	<i>gemfile</i> and <i>gemfile.lock</i>	
Composer	PHP	<i>composer.json</i> and <i>composer.lock</i>	
PyPI	Python	<i>pipfile</i> and <i>pipfile.lock</i>	
NuGet	.NET Core	MSBuild 15.0 or greater and <i>packages.lock.json</i> .	If the <i>packages.lock.json</i> file is unavailable it can be generated by setting <code>RestorePackagesWithLockFile</code> to <code>true</code> within each <i>*.csproj</i> file and running <code>dotnet build</code>  .NET is only supported using the <code>--legacy</code> option
	.NET Framework		
Maven Central	Java	<i>pom.xml</i>	Maven build platform including the dependency plugin
		<i>build.gradle</i>	gradlew dependencies or <code>./gradlew dependencies</code>
npm	JavaScript	<i>package.json</i> and a lockfile (either <i>package-lock.json</i> or <i>yarn.lock</i> )  Both V2 and V3 lock files are supported	This includes client-side and server-side JavaScript packages.
Gopm	Go	<i>go.mod</i>	

## Install Contrast CLI

Install Contrast CLI before running a scan.



### NOTE

Contrast CLI V2.0 is available via installation with **npm** only.

## With Homebrew

Install from Contrast's tap with Homebrew by running the following commands.

```
brew tap contrastsecurity/tap
brew install contrast
```

## With NPM/YARN



### NOTE

Currently, only Node.js 16+ is supported.

Install using npm or yarn `@contrast/contrast`.

For CLI V2.0, use this command:

```
npm install --location=global @contrast/contrast@2.0.0
```

For CLI V1.0, use this command:

```
npm install --location=global @contrast/contrast@1
```

## With Binaries

- Go to [artifacts](#).
- Download the latest package.
- You must allow `execute` permissions on the file depending on your OS.

Once installed, continue by [running the Contrast CLI \(page 510\)](#).

## Run Contrast CLI

If you are an Enterprise Contrast user, you can use the Contrast CLI to run scans or find vulnerable libraries and view results in Contrast. If you are a CodeSec user, start [here](#).

## Before you begin

- You must be a current Contrast user.
- You must have the Contrast CLI [installed \(page 509\)](#).
- Familiarize yourself with the [Contrast CLI commands \(page 511\)](#).
- In Contrast, under **user menu > User settings > Profile**, locate and copy this information:
  - API key
  - Organization ID
  - Authorization header
- Get the URL of your Contrast host domain. For example, <https://app.contrastsecurity.com>. (no trailing slash)

## Steps

### 1. Authenticate.

Authenticate to store your credentials before scanning for vulnerabilities. Run the following `auth` command to store your credentials locally:

```
contrast auth
--api-key <your API key>
--authorization <your authorization header>
--host <your host domain>
--organization-id <your organization ID>
```

### 2. Analyze.

#### • Run a SAST scan:

1. In the terminal, type the following code: `contrast scan -f <file name>`.
2. In the results click the link to view the [scan results \(page 454\)](#).

#### • Find vulnerable libraries:

1. In the terminal, type the following code: `contrast audit`.
2. If you used the `--track` flag with the audit command, click the link in the results to open the [library view \(page 474\)](#).

#### • Find vulnerabilities in your AWS lambda functions:

1. In the terminal, type the following code: `contrast lambda--function-name [option]`.

2. In the results, review any recommendations and update policies based on the provided information.

## Contrast CLI commands

The following is a listing of the commands available to basic and advanced users of Contrast CLI.

**Usage:** `contrast [command] [options]`

## Authentication/connectivity

### auth

For CodeSec users, authenticate using your GitHub or Google account. A new browser window will open for login.

- **Usage:** `contrast auth`

If you already have a Contrast account, run the following `auth` command to store your credentials locally.

- **Usage:**

```
contrast auth
--api-key <your API key>
--authorization <your authorization header>
--host <your host domain>
--organization-id <your organization ID>
```

You can then [start scanning \(page 510\)](#) with the commands.

### config

Displays stored credentials.

- **Usage:** `contrast config`
- **Options:**
  - `-c, --clear`  
Removes stored credentials.

### version

Displays Contrast CLI version.

- **Usage:** `contrast version`

## Main functions

### audit

Searches for a dependency configuration file in the working directory to perform a security audit of dependencies and returns the results.

- **Usage:** `contrast audit [option]`
- **Options:**
  - `--fail`  
Fail a build based on the severity of CVEs found. Use with the `--severity` flag. For example, `contrast audit --fail --severity high`. Returns all failures if no severity level is specified. If a failure is detected the CLI will exit with code 2.
  - `--file`

Specify a directory or the file where dependencies are declared. (By default, Contrast CLI will search for project files in the current directory.) If multiple project files are found in the directory, you will be prompted to confirm the file to audit.

**Alias:** `-f`

- `--ignore-dev`

Excludes developer dependencies from the results. All dependencies are included by default.

**Alias:** `-i`

- `--legacy`

Creates an application in Contrast (a legacy workflow). It displays a [dependency tree \(page 483\)](#) for your piece of code and utilizes metadata. Note that this is only available for Contrast CLI V2.0.

- `--name`

Set a custom project name. If the name is already in use, it will replace the results for that project. Avoid special characters.

- `--save`

Generate and save an SBOM (Software Bill of Materials). Valid options are: `--save cyclonedx` and `--save spdx` (CycloneDX is the default format.).

**Alias:** `-s`

- `--severity`

Specify the minimum severity of CVE to fail a build. Use with the `--fail` flag. For example, `contrast audit --fail --severity high`. Severity levels are *critical*, *high*, *medium*, *low*, or *note*.

- `--track`

By default, results are not held or stored, which would allow you to do local checks via your console. Add the `--track` flag to view your projects' SCA results under the **Static** view on the [Libraries \(page 474\)](#) page in the Contrast web interface. Note that this is only available for Contrast CLI V2.0.

- **Advanced options:**

- `--api-key`

Required for Enterprise users. Agent API key provided by Contrast. See [agent keys \(page 32\)](#) to find your keys.

- `--application-id`

The ID of the application cataloged by Contrast.

- `--application-name`

The name of the application cataloged by Contrast.

- `--app-groups`

Assign your application to one or more preexisting groups when onboarding an application. Group lists should be comma separated.

- `--authorization`

Required for Enterprise users. Authorization header provided by Contrast.

- `--code`

The application code the application should use in Contrast.

- `--host`

Required for Enterprise users. The host name. For example, `https://app.contrastsecurity.com/`.

- `--maven-settings-path`

Displays the path to the maven `settings.xml` file.

- `--metadata`

Define a set of key=value pairs (that conforms to RFC 2253) for specifying user-defined metadata associated with the application.

- `--organization-id`

Required for Enterprise users. The ID of your organization in Contrast. See [agent keys \(page 32\)](#) to find the ID.

- `--tags`



Apply labels to an application. Labels must be formatted as a comma-delimited list. For example, label1,label2,label3.

- **Proxy settings:**

- `--cacert`  
Displays the path to the CaCert (certificate authority (CA) certificates) file.
- `--cert`  
Displays the path to the Cert (certificate) file.
- `--cert-self-signed`  
For Contrast on-premises (EOP) users with a local install, will bypass the SSL certificate and recognize a self-signed certificate.
- `--key`  
Displays the path to the Certificate Key.
- `--proxy`  
Allows for connection via a proxy server. If authentication is required, provide the username and password with the protocol, host, and port. For example, "http://username:password@<host>:<port>".

## scan

Performs a security SAST scan.

- **Usage:** `contrast scan [option]`

- **Options:**

- `--fail`  
Fail a build based on the severity of the vulnerability found. Use with the `--severity` flag. For example, **contrast scan --fail --severity high** . Returns all failures if no severity level is specified. If a failure is detected the CLI will exit with code 2.
- `--file`  
Path of the file you want to scan. Contrast searches for a .jar, .war, .js or .zip file in the working directory if a file is not specified.  
Alias: `-f`
- `--host`  
Required for Enterprise users. The host name. For example, `https://app.contrastsecurity.com/`.
- `--language`  
Valid values are JAVA, JAVASCRIPT, and DOTNET.  
Alias: `-l`
- `--name`  
Contrast project name. If not specified, Contrast uses *contrast.settings* to identify the project or creates a project.  
Alias: `-n`
- `--save`  
Download the results to a Static Analysis Results Interchange Format (SARIF) file. The file is downloaded to the current working directory with a default name of *results.sarif*. You can view the file with any text editor.  
Alias: `-s`
- `--severity`  
Specify the minimum severity of a vulnerability to fail a build. Use with the `--fail` flag. For example, **contrast scan --fail --severity high**. Severity levels are *critical*, *high*, *medium*, *low*, or *note*.
- `--timeout`  
Time in seconds to wait for the scan to complete. Default value is 300 seconds.  
Alias: `-t`

- **Advanced options:**

- `--api-key`

Required for Enterprise users. Agent API key provided by Contrast. See [agent keys \(page 32\)](#) to find your keys

- `--authorization`

Required for Enterprise users. Authorization header provided by Contrast.

- `-ff`

Fire and forget. Do not wait for the result of the scan.

- `--host`

Required for Enterprise users. The host name. For example, `https://app.contrastsecurity.com/`.

- `--label`

Adds a label to the scan. Defaults to *Started by CLI tool at [current date]*.

- `--organization-id`

Required for Enterprise users. The ID of your organization in Contrast. See [agent keys \(page 32\)](#) to find the ID.

- `--project-id`

The ID associated with a scan project. To find the ID, select a scan project in Contrast and locate the last number in the URL.

- **Proxy settings:**

- `--cacert`

Displays the path to the CaCert (certificate authority (CA) certificates) file.

- `--cert`

Displays the path to the Cert (certificate) file.

- `--cert-self-signed`

For Contrast on-premises (EOP) users with a local install, will bypass the SSL certificate and recognize a self-signed certificate.

- `--key`

Displays the path to the Certificate Key.

- `--proxy`

Allows for connection via a proxy server. If authentication is required, provide the user-name and password with the protocol, host, and port. For example, "http://username:password@<host>:<port>".

## lambda

Name of AWS lambda function to scan.

- **Usage:** `contrast lambda --function-name <function> [options]`

- **Alias:** `-f`

- **Options:**

- `--endpoint-url`

AWS Endpoint override. Similar to AWS CLI.

Alias: `-e`

- `--region`

Region override. Defaults to `AWS_DEFAULT_REGION`. Similar to AWS CLI.

Alias: `-r`

- `--profile`

AWS configuration profile override. Similar to AWS CLI.

Alias: `-p`

- `--json`

Return response in JSON (versus default human-readable format).

Alias: `-j`

- `--verbose`

Returns extended information to the terminal.

Alias: `-v`

- `--list-functions`  
Lists all available lambda functions to scan.
- `--help`  
Displays usage guide.  
Alias: `-h`
- **Proxy settings:**
  - `--cacert`  
Displays the path to the CaCert (certificate authority (CA) certificates) file.
  - `--cert`  
Displays the path to the Cert (certificate) file.
  - `--cert-self-signed`  
For Contrast on-premises (EOP) users with a local install, will bypass the SSL certificate and recognize a self-signed certificate.
  - `--key`  
Displays the path to the Certificate Key.
  - `--proxy`  
Allows for connection via a proxy server. If authentication is required, provide the username and password with the protocol, host, and port. For example, "http://username:password@<host>:<port>".

## Help and learn

### help

Displays usage guide. To list detailed help for any CLI command, add the `-h` or `--help` flag to the command.

- **Usage:** `contrast scan --help`
- **Alias:** `-h`

### learn

Launch [Contrast's Secure Code Learning Hub](#).

- **Usage:** `contrast learn`

## Legacy Contrast CLI



### IMPORTANT

Legacy Contrast CLI will be deprecated as of October 2022. We encourage you to begin using the [new Contrast CLI \(page 508\)](#).

Use the Contrast command line interface (CLI) to analyze libraries at the earliest stage of the software development life cycle (SDLC).

The Contrast CLI runs on Node.js but can be used on any application to provide composition analysis capabilities at the command line. For details about the supported platforms and languages, see the [Contrast CLI supported languages \(page 516\)](#) page.

With this composition analysis you can:

- Identify vulnerable libraries

- Fail a build based on CVE severity
- View a [dependency tree \(page 483\)](#) to understand the dependencies between libraries and where vulnerabilities have been introduced
- Identify node.js libraries at risk for dependency confusion
- Generate SBOM

Contrast does this by supplementing existing runtime instrumentation from Contrast agents, with data from pre-compile analysis (typically not available at runtime).

Install the [Contrast CLI \(page 516\)](#) so you can [register new applications \(page 517\)](#) and begin analyzing your libraries during the development phase using the [command line options. \(page 519\)](#)

## Legacy Contrast CLI - supported languages

We support the following languages for Contrast CLI:

Language	Requirements	Notes
Java	Maven	A Maven project must be defined with a <code>pom.xml</code> file, and have the <a href="#">Apache Maven Dependency plugin</a> . To test if the CLI works with your project, build a dependency tree by running <code>mvn dependency:tree</code> .
	Gradle (v4.8 or above)	A <code>build.gradle</code> file is required and <b>gradle dependencies</b> or <b>./gradlew dependencies</b> must also be supported.
.NET Framework and .NET Core	MSBuild 15.0 or greater and a <code>packages.lock.json</code> file	If the <code>packages.lock.json</code> file is not present, it can be generated by setting <code>RestorePackagesWithLockFile</code> to <b>true</b> within each <code>csproj</code> and running .NET build.
Node.js	You must have either a <code>package-lock.json</code> or a <code>yarn.lock</code> file present.	Vulnerability reporting is supported for front-end technologies like React or Angular.
PHP	You must have the <code>composer.lock</code> and the <code>composer.json</code> files present.	
Python	The <code>pipfile</code> and <code>pipfile.lock</code> files.	
Ruby	The <code>gemfile</code> and <code>gemfile.lock</code> files.	
Go	The <code>go.mod</code> file.	



### NOTE

Only single language applications are supported at this time.

## Legacy Contrast CLI - Install

To install the [Contrast CLI \(page 515\)](#):

1. [Install Node.js](#). The Contrast CLI is executed as a Node.js package, so this is required. Versions 10, 12, and 14 are currently supported.
2. Instrument your application.



### NOTE

It is also possible to [register an application \(page 517\)](#) that has not yet been instrumented. However, all applications should be instrumented so that your application has a [library score \(page 483\)](#) and the data in the library grid is populated.

3. Use the `cli_proxy` property in your agent configuration to establish communication with Contrast over a proxy.

If authentication is required, provide the username and password with the protocol, host and port. For example:

```
http://username:password@<host>:<port>
```

4. Be sure the source code for target applications is available locally. Follow the requirements for your application's [language \(page 516\)](#).
5. Run the following command:

```
npm install -g @contrast/contrast-cli
```

Alternatively, you can install the CLI with Yarn with the following command:

```
yarn global add @contrast/contrast-cli
```



**NOTE**

The Contrast CLI must be installed globally.

6. Once the installation is complete you can [register an application \(page 517\)](#) to begin analyzing your code.

**Legacy Contrast CLI - Register applications**

Once you [install the Contrast CLI \(page 516\)](#) you must first register applications in order to see the results in Contrast.



**TIP**

You may want to invoke the Contrast CLI as part of your automated build process.

1. Locate your application ID. The application ID is the last URI segment in the Contrast URL in your browser.



2. Locate your [keys \(page 421\)](#). You will need:
  - API key
  - Organization ID
  - Authorization header
  - Server host name from the Contrast URL



**NOTE**

You only need to enter the server host name. For example, if the Contrast URL is *https://app.contrastsecurity.com/file/path/*, just enter:

```
--host app.contrastsecurity.com
```

3. To begin analysis, use one of these options:
  - Replace *<APIKey>*, *<AuthorizationKey>*, *<OrganizationID>*, *<Host>* and *<ApplicationID>* with your API key, authorization header, Organization ID, host name and application ID, then run the CLI.

```
contrast-cli \  
--api_key <APIKey> \  
--authorization <AuthorizationKey> \  
--organization_id <OrganizationId> \  
--host <Host> \  
--application_id <ApplicationId>
```

- Place credentials within a YAML file, using the same replacements:

```
cli:  
  api_key: <APIKey>  
  authorization: <AuthorizationKey>  
  organization_id: <OrganizationId>  
  host: <Host>  
  application_id: <ApplicationId>
```

Replace <path/to/yaml> with your YAML path, and run this command to initiate:

```
contrast-cli --yaml_path <path/to/yaml>
```



#### NOTE

If you need to go through a communication protocol like Transport Layer Security (TLS) for example add the following parameters to the YAML file:

```
key: pathToKey  
cert: pathToCert  
cacert: pathToCaCert
```

4. After you see a success message, you are ready to [view the dependency tree \(page 483\)](#).



**TIP**

It is possible to add a new application to Contrast without instrumenting the application by using the `--catalogue_application` and `--application_name` options. However, it is best to [instrument the application \(page 30\)](#) so that the [library score \(page 483\)](#) and library grid are populated in Contrast.

For example:

```
contrast-cli \
--catalogue_application \
--api_key <YourApiKey> \
--authorization <YourAuthorizationKey> \
--organization_id <YourOrganizationID> \
--host <YourHost> \
--application_name <YourApplicationName> \
--language <YourApplicationLanguage>
```

Replace `<APIKey>` with your API key, `<AuthorizationKey>` with the authorization header, `<OrganizationID>` with your organization ID, `<Host>` with your host name, `<ApplicationName>` with your application name, and `<ApplicationLanguage>` with your application language. Allowable language values are JAVA, DOTNET, NODE, PHP, PYTHON, RUBY, and GO.

You will know the catalogue operation was successful if an application ID is displayed in the console.



**NOTE**

You can also register an application and create an SBOM report at the same time with [a set of CLI commands \(page 519\)](#).

**Legacy Contrast CLI - commands**

The CLI offers a command line help guide with the `-h` or `--help` option. The help guide contains the following commands to help you understand more about Contrast configuration, applications, and vulnerabilities.

In the following examples, replace `<string>` or `<level>` with the string or level value that applies to your particular situation.

**General commands**

Commands for connection and configuration.

Command	Description
<code>--api_key &lt;string&gt;</code>	An agent <a href="#">API key (page 32)</a> provided by Contrast. (required)
<code>--application_id &lt;string&gt;</code>	The ID of the application cataloged by Contrast. (required)
<code>--application_name &lt;string&gt;</code>	The name of the application cataloged by Contrast. (optional)

Command	Description
<code>--authorization &lt;string&gt;</code>	User authorization credentials provided by Contrast. (required)
<code>-h, --help</code>	Displays the help guide.
<code>--host &lt;string&gt;</code>	The name of the host and, optionally, the port expressed as <code>&lt;host&gt;:&lt;port&gt;</code> . Does not include the protocol section of the URL ( <code>https://</code> ). Defaults to <code>app.contrastsecurity.com</code> . (optional)
<code>--language &lt;string&gt;</code>	Valid values are JAVA, DOTNET, NODE, PHP, PYTHON, RUBY, and GO. If there are multiple project configuration files in the <code>project_path</code> , language is required. (required for catalogue)
<code>--organization_id &lt;string&gt;</code>	The ID of your organization (page 32) in Contrast. (required)
<code>--project_path &lt;string&gt;</code>	The directory root of a project/application that you want to analyze. Defaults to the current directory. (optional; required if running on Windows).
<code>--proxy &lt;string&gt;</code>	Allows for connection over a proxy server. If authentication is required, provide the username and password with the protocol, host and port. For example, <code>http://username:password@&lt;host&gt;:&lt;port&gt;</code> . (optional)
<code>--silent</code>	Silences JSON output. (optional)
<code>--sub_project &lt;string&gt;</code>	Specifies the subproject within a Gradle application. (optional)
<code>-v, --version</code>	Displays the CLI version you are currently using.
<code>--yaml_path &lt;string&gt;</code>	The path to display parameters from the YAML file (optional)  If <code>yaml_path</code> is used, the following connection parameters are ignored from the terminal: <ul style="list-style-type: none"> <li><code>yamlOnly:</code></li> <li><code>key:pathToKey</code></li> <li><code>cert:pathToCert</code></li> <li><code>cacert:pathToCaCert</code></li> </ul>



**NOTE**

Parameters in these commands may need to be quoted to avoid issues with special characters. For example:

```
--application_name = "My_app_name_${+=( / \ "
```

**SCA**

Commands related to Contrast SCA examination.

Command	Description
<b>Catalog applications</b>	
<code>--app_groups &lt;string&gt;</code>	Assigns your application to one or more pre-existing groups when using the <code>catalogue</code> command. Group lists should be comma separated. (optional)
<code>--catalogue_application</code>	Catalog an application (required). If the application name does not exist, create the application and send the dependency tree, else append the dependency tree to an existing application.
<code>--code &lt;string&gt;</code>	The application code this application should use in Contrast. (optional)



Command	Description
<code>--metadata &lt;string&gt;</code>	Define a set of key=value pairs (which conforms to RFC 2253) for specifying user-defined metadata associated with the application. (optional)
<code>--tags &lt;string&gt;</code>	Apply labels to an application. Labels must be formatted as a comma-delimited list. Example - label1,label2,label3 (optional)
<b>Snapshot - default command does not have a command on the terminal. Java only.</b>	
<code>--maven_settings_path &lt;PathToFile&gt;</code>	Allows you to specify an alternative location for your maven <code>settings.xml</code> file. Replace <code>&lt;PathToFile&gt;</code> with the full path for the file. Add this path to the full set of keys when you <a href="#">register your application with the CLI (page 517)</a> . (optional)
<b>Register an application</b>	
<code>--cli_api_key &lt;string&gt;</code>	Use this set of commands (values described in the tables above and below) to register an application and get an SBOM report at the same time.
<code>--cli_authorization &lt;string&gt;</code>	
<code>--cli_organization_id &lt;string&gt;</code>	Note: The "cli_" prefix in the parameters will be deprecated in a future release.
<code>--cli_host &lt;string&gt;</code>	
<code>--language &lt;string&gt;</code>	
<code>--application_name &lt;string&gt;</code>	
<code>--sbom</code>	
<b>Reports</b>	
<code>--cve_severity &lt;level&gt;</code>	Combined with <code>--report</code> , allows the user to report libraries with vulnerabilities above a chosen <a href="#">severity level (page 537)</a> . For example, <code>cve_severity medium</code> only reports vulnerabilities at <b>Medium</b> or higher severity.
<code>--cve_threshold &lt;number&gt;</code>	Sets the number of CVEs allowed before a build is failed. If there are more CVEs than the threshold, the build will fail.
<code>--fail</code>	Fails the build if any vulnerabilities are found. Can be used in combination with <code>cve_severity</code> to fail builds with vulnerabilities at severity levels defined by the user.
<code>--report</code>	Shows a report of vulnerabilities in the application from compile time.
<code>--ignore_dev</code>	Combined with the <code>--report</code> command excludes developer dependencies from the vulnerabilities report. By default, all dependencies are included in a report.
<b>SBOM</b>	
<code>--sbom</code>	Generate and download a <a href="#">Software Bill of Materials (SBOM) (page 549)</a> in CycloneDX JSON format



**TIP**

The `--report` command can be used to return details of all vulnerable libraries in the terminal response. Every CVE found will have output like this:

```
org.webjars/jquery-ui/1.11.4 is vulnerable
```

```
CVE-2016-7103 MEDIUM Cross-site scripting (XSS) vulnerability in jQuery UI bef
```

The vulnerable records returned can be restricted by using the `--cve_severity` parameter which sets the minimum threshold for a CVE to be reported.

To prevent an application from being deployed with a library above a severity threshold the `--fail` parameter can be used as part of an automated CI/CD pipeline. For example, you can run the CLI using a YAML file with:

```
contrast-cli --yaml_path path/to/yaml --report --cve_severity high --fail
```

**Scan**

Commands related to Contrast Scan. See also [Integrate scans with builds \(page 466\)](#).

Contrast Scan supports EXE and ZIP files for .NET projects. The language must be set to DOTNET and the ZIP should be a ZIP of the `./bin` folder that contains your dlls.

Command	Description
<code>--project_id &lt;ProjectID&gt;</code>	The ID associated with a scan project. Replace <code>&lt;ProjectID&gt;</code> with the ID for the scan project. To find the ID, select a scan project in Contrast and locate the last number in the URL.  <b>Recommended:</b> For the first scan, use the <code>--project_name</code> command instead of this one. Scan creates the project for you.
<code>--project_name &lt;ProjectName&gt;</code>	The name of the scan project. If the name includes spaces, enclose it in double quotes ("").  If you specify a new name, Scan creates the project. If you specify the name of an existing project, Scan adds the uploaded file to that project.
<code>--save_scan_results</code>	If provided, will save the SARIF file as <code>results.json</code> to the current directory. (optional)
<code>--scan&lt;FileToBeScanned&gt;</code>	Starts a static scan of the specified WAR or JAR file. Replace <code>&lt;FileToBeScanned&gt;</code> with the path of the WAR or JAR file that you want to upload for scanning.
<code>--scan_results_file_name</code>	Must be JSON file format. If provided, will override the default name to save the SARIF file. (optional)
<code>--scan_timeout</code>	Set a specific time span (in seconds) before the function times out. The default timeout is 20 seconds if <code>scan_timeout</code> is not set.
<code>--wait_for_scan</code>	Waits for the result of the scan.

**Vulnerabilities**

Once you [instrument an application \(page 30\)](#), Contrast shows you all the vulnerabilities it's discovered, addressing some of the [most common vulnerabilities](#) and many others.

Contrast agents discover any code flaws that are in your applications, and report them. Contrast then presents and classifies these vulnerabilities with a severity level to help you prioritize and mark the vulnerabilities as needed.

- [View vulnerabilities \(page 523\)](#)
- [View application vulnerabilities \(page 524\)](#)
- [Analyze vulnerabilities \(page 530\)](#)
- [Track vulnerabilities \(page 529\)](#)
- [Fix vulnerabilities \(page 531\)](#)

## View vulnerabilities at an organization level

### Before you begin

- Exercise (browse or use) your application so Contrast can find weaknesses and present results in the Contrast application.
- To see your application's vulnerability data in more detail, configure your Contrast agent to report [session metadata \(page 431\)](#).

### Steps

1. In the header, select **Vulnerabilities**.
2. To display vulnerabilities for licensed applications only, select **Show licensed only** at the top of the vulnerabilities list.
3. To filter by columns, select the **Filter** icon (▼) next to the column headers. These filter options are available if applicable to the selected application:
  - **Severity:** Available filters are: Critical, High, Medium, Low, and Note.
  - **Vulnerability:** Available filters are:
    - **Vulnerability tags:** Vulnerabilities associated with custom tags that you created.
    - **Type:** Types of vulnerabilities.
    - **Servers:** Vulnerabilities for applications associated with selected servers.
    - **Environments:** Vulnerabilities for applications in selected environments: Development, QA, and production.
    - **Sinks:** Vulnerabilities that originate from a common sink.  
A sink is common custom code shared between multiple data-flow vulnerabilities.  
Filtering by sink can help you identify a line of code that is causing multiple vulnerabilities.
    - **URLs:** Vulnerabilities associated with a specific URL.
    - **Compliance policy:** Vulnerabilities associated with a compliance policy
  - **Application:** Available filters are:
    - **Application names:** Names associated with applications.
    - **Custom tags:** Tags you assigned to applications.
    - **Languages:** The languages used for applications.
    - **Technologies:** Technologies that applications use. For example, JSON or jQuery.
    - **Application importance:** The importance level you set in the application settings.
    - **Application metadata:** Custom metadata that you associated with applications.
  - **Last detected:** Available filters are: First or Last detected and Time range. Select **Custom** to enter specific dates and times.
  - **Status:** Available filters are Status and whether Contrast is tracking the vulnerability  
To remove filters, select **Clear** next to the column header.
4. To view vulnerability details, select a name. You can view details for these categories:
  - HTTP information
  - Steps on how to fix this vulnerability
  - Details about the identity, timing and location of the vulnerability including build numbers, reporting servers, category and security standards



## See also

[View application vulnerabilities \(page 524\)](#)

## View application vulnerabilities

From the Applications list, you can view vulnerabilities for a specific application.

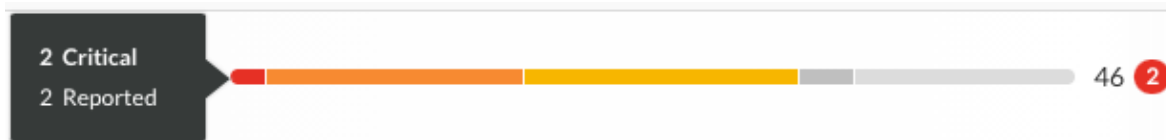
### Before you begin

- Exercise (browse or use) your application so Contrast can find weaknesses and present results in the Contrast application.
- To see your application's vulnerability data in more detail, configure your Contrast agent to report [session metadata \(page 431\)](#).

### Steps

1. Select **Applications** in the header.

The Applications list displays the number of open vulnerabilities for each application. To view details for specific types of vulnerabilities (for example, critical or high), in the Open Vulnerabilities column, select the relevant section of the bar.



An open vulnerability has a status of Reported, Suspicious, or Confirmed.

2. Alternatively, In the Applications list, select an application name and then, select the **Vulnerabilities** tab. You see a list of vulnerabilities for that application.
3. In the Vulnerabilities tab, to filter vulnerabilities, select the small triangle at the very top of the list.



These filter options are available:

- Open
- High confidence
- Policy violation
- Pending review

4. To search for specific vulnerabilities, select the magnifying glass icon (🔍).
5. To view a timeline of the vulnerabilities, select the **trend line** symbol (📈) above the list . Use the buttons above the chart to view data by **Severity** or **Discovery**. Hover over the trend lines to see a breakdown of the data for that point in time (number of vulnerabilities, time stamp, or status).

Any filters you apply in the list also update the data in the chart. Use the filter for the **Last detected** column to update the time span shown in the timeline.

6. To filter by columns , select the Filter icon ▼ next to the column headers. These filters are available, if applicable to the selected application:
  - **Severity:** Available filters are: Critical, High, Medium, Low, and Note.
  - **Vulnerability:** Available filters, if applicable to the selected application, are:
    - **Vulnerability tags** : Custom tags you assigned to vulnerabilities
    - **Bugtrackers:** Whether you are using bugtracking integrations to track vulnerabilities.
    - **Type:** Types of vulnerabilities
    - **Modules:** Application modules associated with a vulnerability, including modules in a merged application.
    - **Servers:** Servers hosting the application.

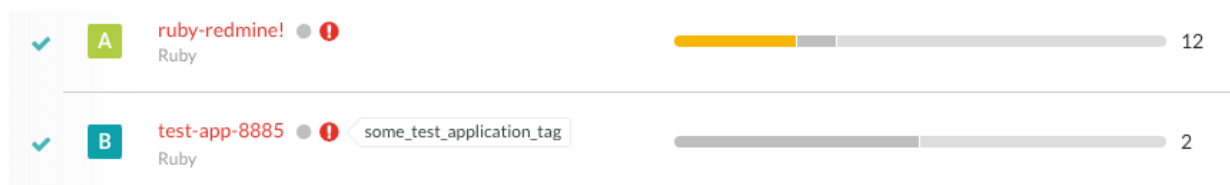
- **Environments:** Development, QA, and production
- **Sinks:** Vulnerabilities that originate from a common sink  
A sink is common custom code shared between multiple data-flow vulnerabilities.  
Filtering by sink can help you identify a line of code that is causing multiple vulnerabilities.
- **URLs:** Vulnerabilities associated with a specific URL.
- **Compliance policy:** Vulnerabilities associated with selected compliance policies
- **Routes:** Vulnerabilities associated with selected routes.
- **Application:** Modules included in the application.  
If you are viewing an unmerged application, this filter shows vulnerabilities for the selected application.  
If you are viewing vulnerabilities for a merged application, this filter shows view vulnerabilities for the modules in the merged application.
- **Last detected:** Available filters are: First or Last detected and Time range. Select **Custom** to enter specific dates and times.
- **Status:** Available filters are Status and whether Contrast is tracking the vulnerability.
- **Session:** This column is visible if you configured session metadata in an agent configuration file but haven't selected a session metadata filter. Use Session column filter to refine the results.  
Use the **View by** menu at the top of the list to filter the data by the session metadata values that you included in your agent configuration file. This filter updates the values shown in the Session column.  
The View by menu is visible if you configured session metadata in an agent configuration file but haven't selected a session metadata filter.

### Open vulnerabilities for merged applications

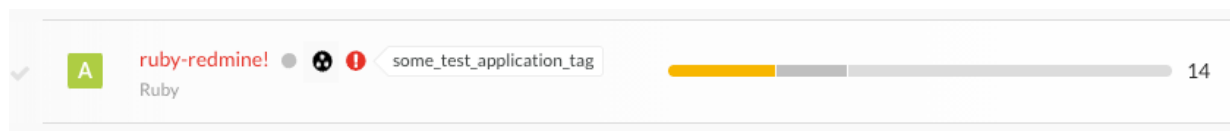
For merged applications, the Open Vulnerabilities column in the Applications list displays the number of vulnerabilities for all application modules in the primary application. The Applications list displays the primary application but not the modules in the primary application.

#### Example:

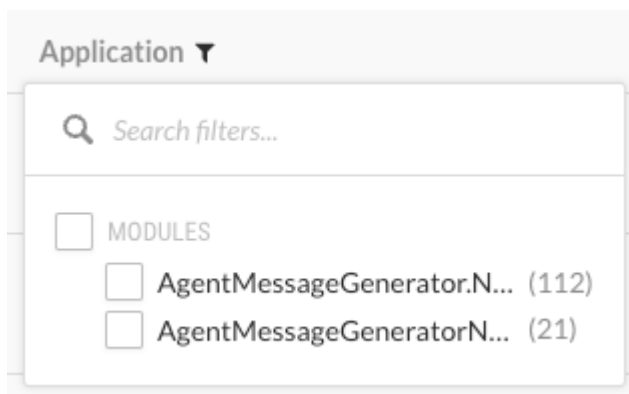
Before you merge applications, the Open Vulnerabilities column looks similar to this:



After you merge applications, the bar in the Open Vulnerabilities column shows vulnerabilities for the primary application and all the merged modules.



When you view the vulnerabilities tab for a merged application, use the filter for the Application column to view the modules where Contrast found the vulnerability.



## See also

[View vulnerabilities at an organization level \(page 523\)](#)

## View vulnerability rates

The chart for open and closed vulnerability rates shows trends for the vulnerabilities for all applications in your organization.

## Steps

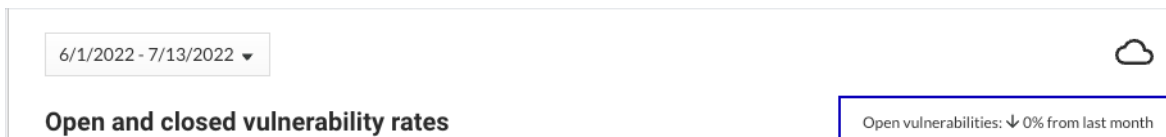
1. Display the new dashboard by selecting **View your new dashboard**.

**View your new dashboard (BETA)**

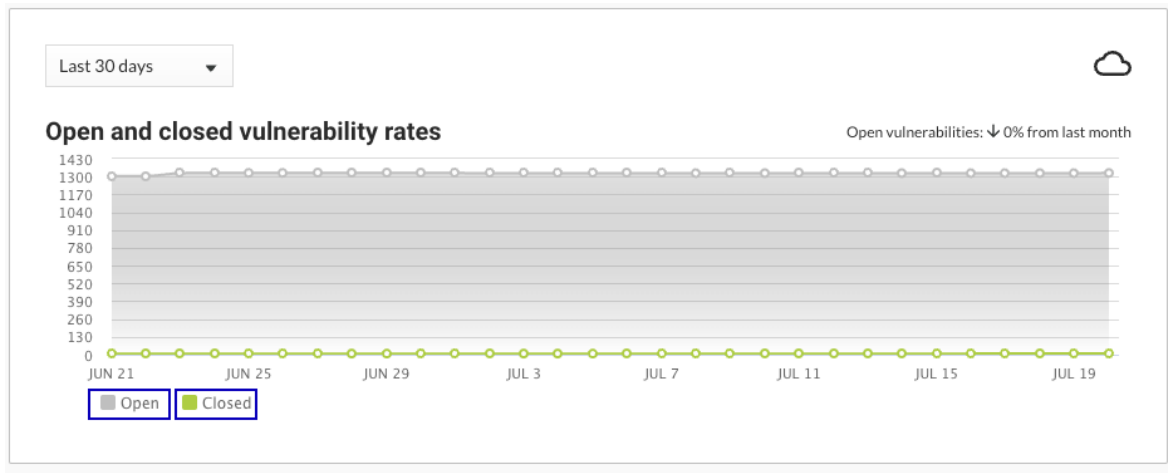
2. In the new dashboard, find the chart for **Open and closed vulnerability rates**.
3. Select a time frame for the chart:
  - **Last 7 days:** Displays vulnerabilities rates for the seven days before the current date. The chart shows data points for each day.
  - **Last 30 days:** Displays vulnerability rates for the 30 days before the current date. The chart shows data points for each day.
  - **Last 12 months:** Displays vulnerability rates for the 12 months before the current date. The chart shows data points for each month.
  - **Custom:** Displays vulnerability rates for a selected time frame. The chart shows data points for each day, each week, or each month, depending on the selected time frame.

If no data exists for part of a selected time frame, the chart displays no data for that part of the time frame. For example, if you selected a time frame of the Last 12 months but started using Contrast only nine months ago, the chart displays no data for the first three months of the time frame.

4. To view the percentage of change during the selected time frame, look at the value at the top of the chart



5. To filter the chart to display only open or only closed vulnerabilities, select the keys at the bottom of the chart. Select the keys again to clear your selection.
  - To view only open vulnerabilities, select the **Closed** key.
  - To view only closed vulnerabilities, select the **Open** key.



### Add and delete vulnerabilities

When you instrument an application, vulnerabilities are automatically detected and they become **visible in Contrast (page 523)**. Depending on your particular security concerns, you can assess the risk of these vulnerabilities, eliminate false positives and prioritize fixes.

You may decide to delete a vulnerability if it is no longer useful.

To do this:

1. Select **Vulnerabilities** in the header.
2. Hover over the grid row with the vulnerability you want to delete and use the **Delete** icon in the right column. You can also find the icon in the top right of the vulnerability details page. To delete multiple vulnerabilities at once, use the check marks in the left column to select the vulnerabilities you want to delete, then select the **Delete** icon from the batch action bar that appears at the bottom of the page.



3. In the window that appears, select **Delete** to confirm your choice. Once confirmed, the vulnerability is removed and no longer appears in your list unless Contrast discovers it again.

### Group vulnerabilities by sink

Grouping vulnerabilities lets you combine vulnerabilities that share the same sink. The vulnerabilities in a group can affect multiple applications.

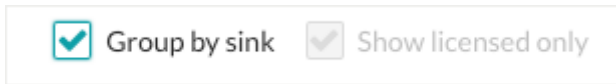
Grouping vulnerabilities reduces the number of entries that the vulnerability list shows. You can still see the data for individual vulnerabilities in a group.

### Before you begin

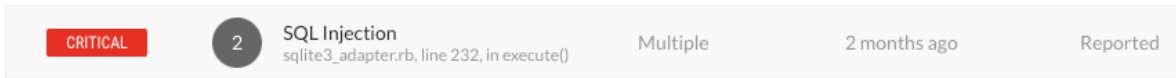
Group by sink applies only to vulnerabilities for applications with an Assess license. If you group by sink, **Show licensed only** is selected automatically.

### Steps

1. Select **Vulnerabilities** in the header.
2. At the top of the list, select **Group by sink**.



Depending on the filters you use for the list, you might need to scroll down to find the groups. A group looks similar to this example:



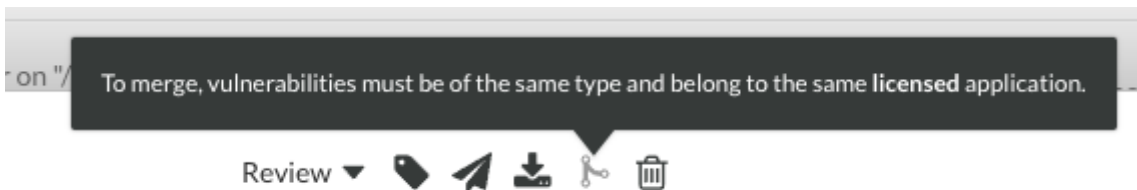
The number indicates the number of vulnerabilities in the group. The values for the Severity, Application, and Status columns change to **Multiple**, if the vulnerabilities in a group have different severities, apply to different applications, or have different statuses.

- To further refine the view, select one or more **Vulnerability** filters.
- To view individual vulnerabilities in a group, select the group. Contrast shows a list of only the vulnerabilities in the group.
- To remove all groups, clear the **Group by sink** checkbox.

### Merge vulnerabilities

If you find vulnerabilities of the same type from the same application, you can merge them to consolidate findings. To do this:

- Select **Vulnerabilities** in the header.
- Use the check marks in the left column to select two or more vulnerabilities you'd like to merge.
- In the batch action bar that appears at the bottom of the page, select the **Merge** icon.

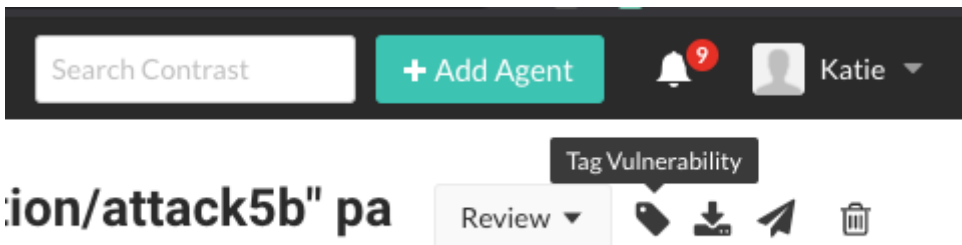


- In the window that appears, select the vulnerability that you want to represent the merge.

### Add a tag to a vulnerability

You can tag vulnerabilities to better organize vulnerabilities and improve search in Contrast. To do this:

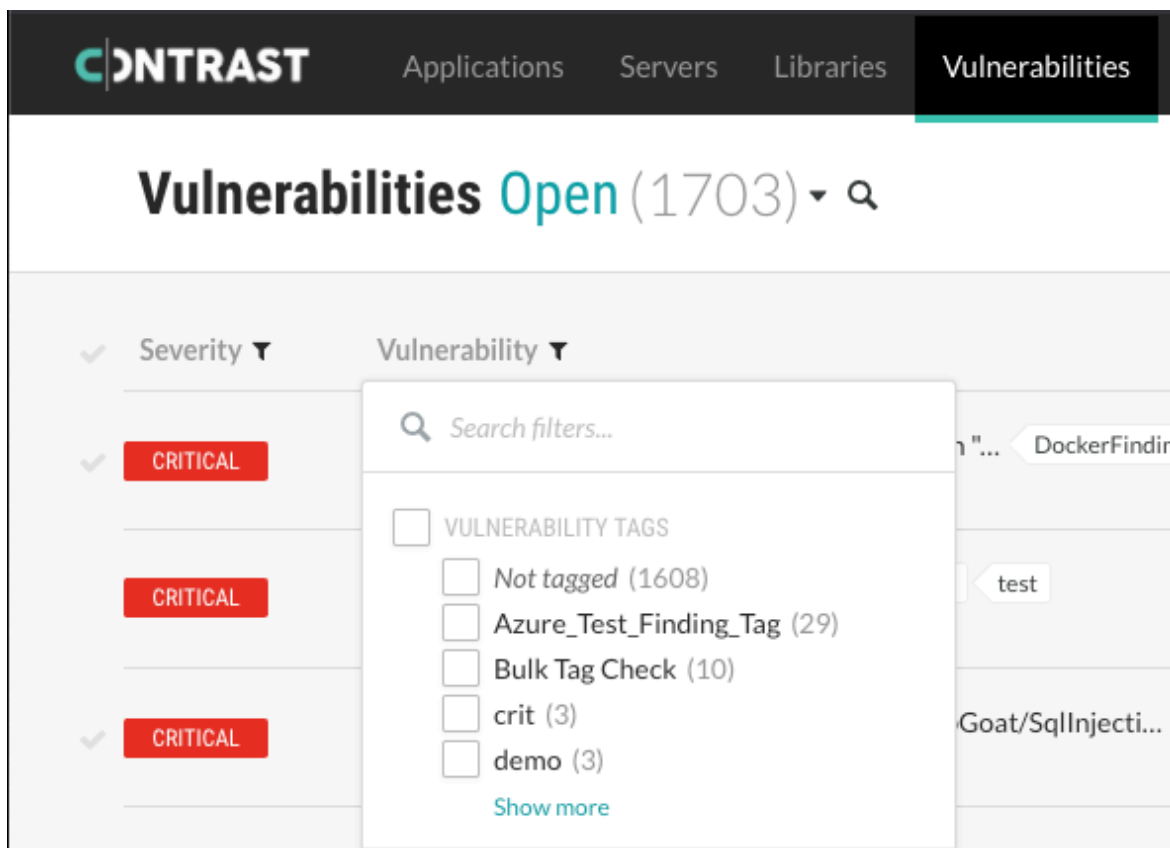
- Select **Vulnerabilities** in the header, then hover over the row in the grid for the vulnerability you want to tag.
- In the far right column, select the **Tag** icon. This option is also available from the vulnerability details page in the top right corner.



To tag multiple vulnerabilities, use the check marks in the left column of the vulnerabilities grid to select the ones you want to tag. In the batch action menu that appears at the bottom of the page, select the **Tag** icon.

- In the window that appears, begin typing to see a list of tags. Select one or more from the dropdown, and/or type a new tag. To remove tags, select the **X**. Select **Save**.
- To filter by tags, select the filter next to the **Vulnerability** column of the grid, then select the tags to filter.





5. You can also see tags next to the vulnerability name on the vulnerability's details page, and remove them by selecting the **X**.

### Track vulnerabilities

If you are using a bugtracker integration, you can track vulnerabilities in multiple ways:

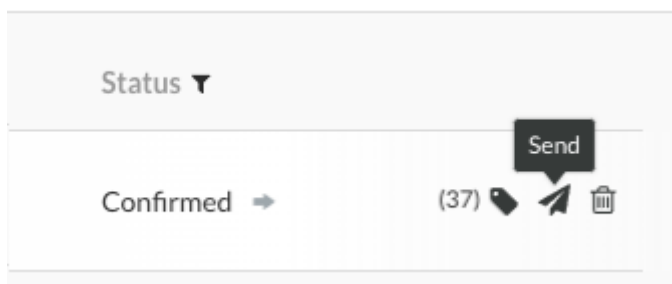
- Send vulnerability data to other members of your organization.
- Plan and maintain timely patching to prevent attacks.
- Streamline workflows by sending vulnerability information directly to your bugtracking tool.
- Receive notifications of any new high or critical vulnerabilities in your application.

### Before you begin

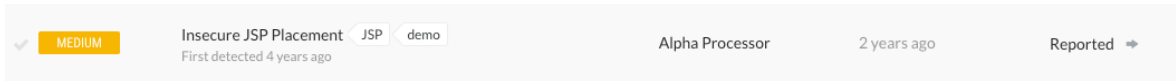
Be sure Contrast is integrated with at least one [bugtracker \(page 553\)](#) tool.

### Steps

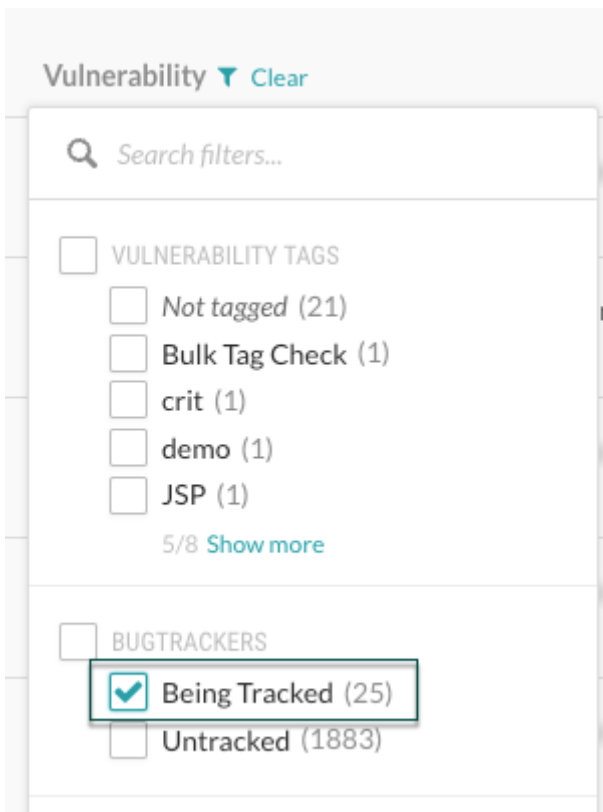
1. Select **Vulnerabilities** in the header.
2. To track a single vulnerability, hover over the end of the row for the vulnerability you want to track.
3. In the far right column, select the **Send** icon.  
This option is also available from the vulnerability details page.



4. To track multiple vulnerabilities:
  - a. Select the check marks next to each vulnerability you want to track.
  - b. In the batch action menu at the bottom of the page, select the **Send Vulnerability** icon (📧).
  - c. Select **Send to bugtracker**.  
You can also choose to send the tracking data by email.
5. In the Send vulnerability window, select the bugtracker tool you want to use from the dropdown (if you are integrated with multiple tools), add any related information, and select **Send**.  
The vulnerability status updates automatically to **Reported** and an arrow icon displays next to the status of the vulnerability. Hover over the arrow for more information, including the bugtracker name and corresponding ticket numbers.



6. To quickly see which vulnerabilities are tracked, use the filter in the **Vulnerability** column and select **Being Tracked**.



**TIP**

You can also [export vulnerability data \(page 532\)](#) to a CSV or XML file for custom processing, or use the API to gather data outside the web interface.

**Analyze vulnerability events**

Contrast provides information on what it observed when navigating your application by using vulnerability events. These events include the exact location where the vulnerability was found in the code and how the code was used. There are several types of events:

- **Source events:** Source events occur at the start of a scope. You can use the file and line number of the source event to see exactly where the call was made, and use the stacktrace in the source to understand how the program invoked the notable method. You can also view all the data related to the method, including the:
  - **Object:** The underlying object instance on which this call is invoked (if not a static call).
  - **Return:** The object returned from this call (or null, if void).
  - **Parameters:** The objects passed into this call.
- **Propagation events:** Each vulnerability may contain one or more propagation events. These events contain the same information as the source event, but they also have a type that indicates how the data was propagated. For example, a P2R propagation event takes the data from one or more of the parameters (the "P" in "P2R") and transfers it into the method return value (the "R" in "P2R").
- **Tag events:** These events add a tag, such as **validated** or **html-encoded**, to a vulnerability. These tags help eliminate false positives and provide clean, reliable results. They also contain the same contextual information as the other types of events. While tag events may occur within a vulnerability, they have nothing to do with the vulnerability discovered.
- **Trigger events:** The trigger is the last event in the vulnerability. The trigger is the call that makes the rule engine in the Contrast JVM Plugin perform its analysis, notice the vulnerability and generate the trace.



## IMPORTANT

Contrast only detects the actual behavior of an application. If a vulnerability doesn't represent a legitimate problem, an administrator [should update the applicable policy \(page 601\)](#) to prevent this issue from occurring again. The most commonly reported false alarm is that the application has a custom control that Contrast doesn't know about.

On-premises users can add a custom method call to the appropriate tag list in the Contrast policy. For example, your custom HTML-encoder method that takes a string and returns an HTML-encoded string should add the **html-encoded** tag to the data.

You can use [Security controls \(page 601\)](#) or [Application exclusions \(page 621\)](#) to remediate false positives.

## Fix vulnerabilities

When a vulnerability arises, you need to assess the risk according to your particular security needs. If you decide to fix this vulnerability:

1. Learn more about the particular vulnerability by selecting the vulnerability name to open the details page. Then select the **How to fix** tab to see suggested steps to resolve the issue.
2. Fix the vulnerability as you see fit.
3. Check a fixed vulnerability. There are three ways to do this:
  - **Replay the request:** If the issue is remediated, you can replay the HTTP request. Select the **HTTP Info** tab to see if the issue is fixed. If it isn't fixed, the issue reappears with a status of Reported.
  - **Check build number:** For each application, you can assign a build version number. Use [session metadata \(page 431\)](#) to learn more about a vulnerability using the build number. Add this property to the `-javaagent` command:

```
-Dcontrast.override.appversion
```

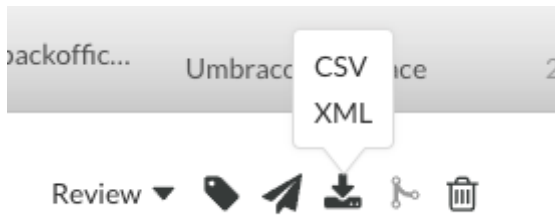
Provided you have set a build number during startup, you can use this as a filter and verify whether the issue still exists for this build version by clicking the Advanced link and the Build Number dropdown.

- **Check by time unit tests:** You can also filter by the time at which your unit tests were run, and set a date range to view your vulnerabilities in the Set Date Range input field above the vulnerabilities grid.

## Export vulnerability findings

To export vulnerability details:

1. Select **Vulnerabilities** in the header, then use the check marks in the left column of the vulnerabilities grid to select the vulnerability or vulnerabilities you want to use for the export.
2. In the batch action menu that appears at the bottom of the page, select the **Export** icon, then select the format you want to use for the export (CSV or XML).



3. The export will download to your desktop. Exports contain the following data fields for each vulnerability:
  - Vulnerability Name
  - Vulnerability ID
  - Category
  - Rule Name
  - Severity
  - Status
  - Number of Events
  - First Seen
  - Last Seen
  - Application Name
  - Application ID
  - Application Code
  - CWE ID
  - Request Method
  - Request Port
  - Request Protocol
  - Request Version
  - Request URI
  - Request Qs
  - Request Body
  - Instance ID



**TIP**

To create more complex custom software composition analysis reports about your applications, you can use the [Application API](#) to access Contrast vulnerability data.

You may also explore additional details on your vulnerabilities using a manual method.

For, example, this curl request retrieves a list of vulnerabilities that also shows a list of the applications in which each vulnerability was found. The jq tool formats the data as CSV for use in a custom report.

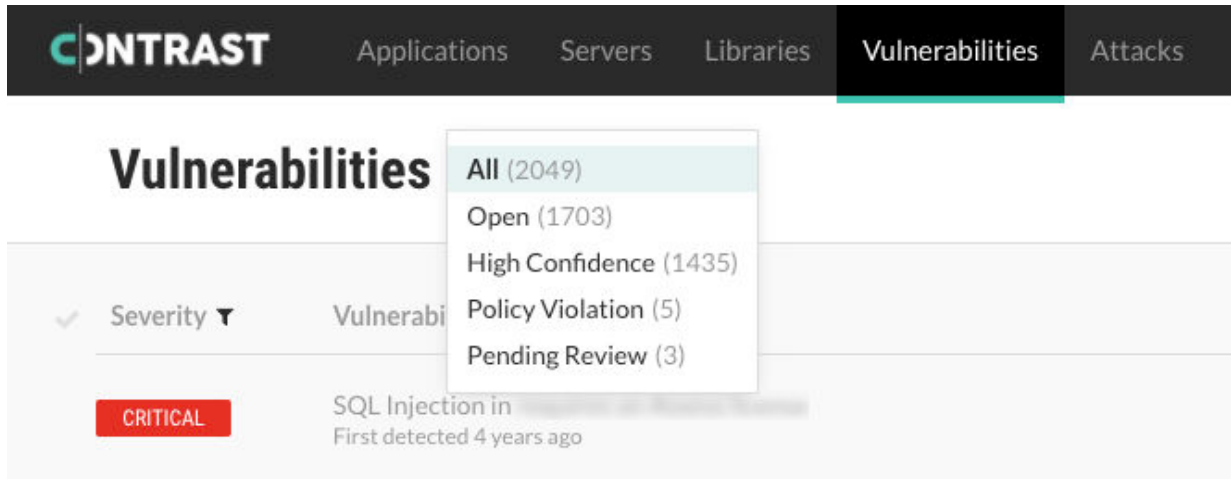
```
curl \
  -H "Authorization: $(echo -n $username:$servicekey | base64)" \
  -H "API-Key: $apikey" \
  https://app.contrastsecurity.com/Contrast/api/ng/$orgid/orgtraces/filter?e
jq -r '.traces[] | {uuid: .uuid, protocol: .request.protocol} | [.uuid, .p
```

### Vulnerability status

Vulnerability status is shown in the vulnerabilities grid and can be any of the statuses shown in this table. You can edit the vulnerability status.

Status	When to set this status
<b>Reported</b>	This is the default status of a vulnerability after it is discovered by Contrast. The vulnerability in this application could possibly be exploited.
<b>Confirmed</b>	Confirm that the vulnerability is a true finding by reviewing the source code or exploiting it.
<b>Suspicious</b>	The vulnerability appears to be a true finding based on the details provided, but requires more investigation to determine its validity.
<b>Not a problem</b>	<p>The vulnerability is being accounted for without any source code changes. To set this status, you must select one of these reasons. Vulnerabilities set to this status will not revert back to <b>Reported</b> if found again.</p> <ul style="list-style-type: none"> <li>• <b>Attack is defended by an external security control:</b> There is another component in the environment, such as a WAF, which will prevent this vulnerability from being exploited.</li> <li>• <b>False positive:</b> This vulnerability was reported incorrectly. <a href="#">Contact Support</a> to figure out why Contrast flagged this trace as a vulnerability.</li> <li>• <b>Goes through an internal security control:</b> There is custom, corrective code inside the application that will prevent this vulnerability from being exploited.</li> <li>• <b>URL is only accessible by trusted power users:</b> This vulnerability may only exist in specific environments, such as test, and may not exist in production environments.</li> <li>• <b>Other:</b> Select this option if there is another reason that no source code changes are required in order to fix this vulnerability. It is possible to <a href="#">replace Other with a custom value (page 535)</a> that explains why the vulnerability is <b>Not a problem</b>.</li> </ul>
<b>Remediated</b>	The vulnerability has been fixed by changing source code or config files within the application.
<b>Fixed</b>	The vulnerability has been fixed by changing the source code or because of a reason given under the <b>Not a problem</b> status. A vulnerability set to this status will not revert back to <b>Reported</b> if found again. (This option is only available to administrators.)
<b>Remediated-Auto-verified</b>	This status can only be automatically set. (It can't be manually set by a user.) If a vulnerability is not reported within the time limit set in the <a href="#">vulnerability policy (page 604)</a> , it will automatically be set to <b>Remediated-auto-verified</b> .

Policies that are set to **Reported**, **Confirmed**, **Suspicious** are considered to be open. Policies that are set to **Not a problem**, **Remediated**, **Fixed**, or **Remediated-Auto-verified** are considered to be closed. You can filter vulnerabilities by **Open** to see only open statuses, or by **All** to see both open and closed statuses.

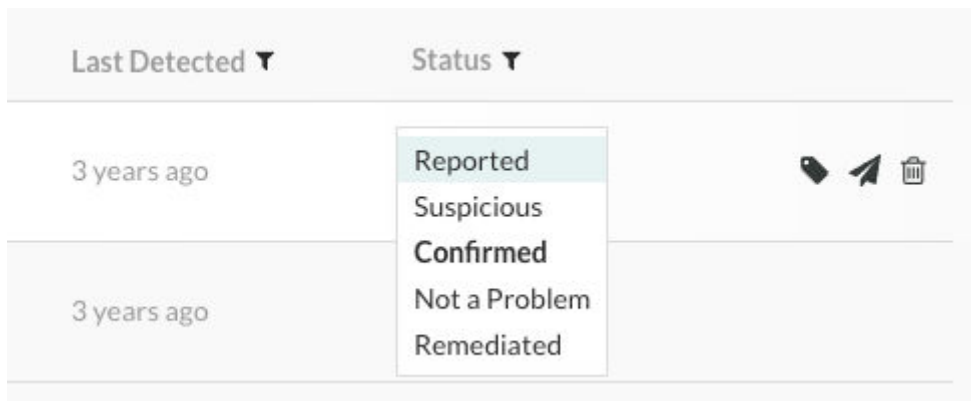


If the agent reports a vulnerability and Contrast has never seen it before, Contrast creates a new entry for the vulnerability. If that vulnerability already exists, Contrast updates the existing entry, issue count and number of days since it was last detected. All vulnerabilities will be reopened with the same pre-existing status, except those that were previously set to **Remediated** or **Remediated-Auto-verified**. Those will be reopened as **Reported**.

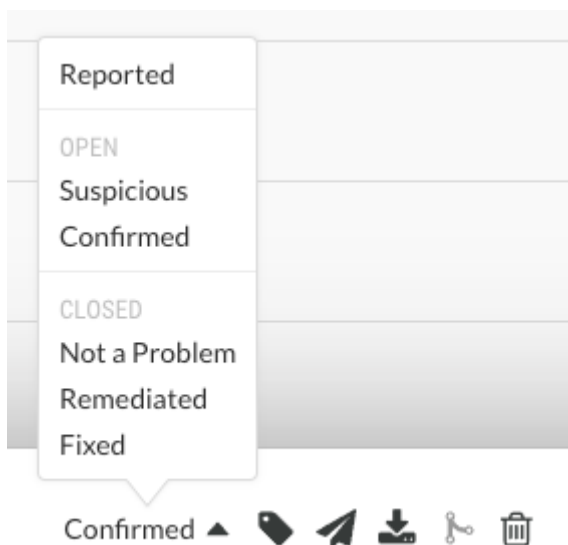
### Edit vulnerability status

To change the status of one or more vulnerabilities:

1. Select **Vulnerabilities** in the header.
2. To edit a single vulnerability status, find the vulnerability you want to edit and select the status in the **Status** column. You can also change the status from a vulnerability's overview page in the top right corner.



To edit multiple vulnerabilities at a time, use the check marks in the left column to select the vulnerabilities you want to edit. In the batch action menu that appears at the bottom of the page, you will see the current status. Click to expand the menu.



3. Select a new status according to [these criteria \(page 533\)](#).

**NOTE**

An Organization Administrator can [require approval \(page 664\)](#) before some vulnerabilities can be closed.

If this is the case, you will be required to submit a reason for your status change, and it will be set to **Pending** until it can be reviewed by an Organization Administrator or a RulesAdmin. Hover over **Pending** in the **Status** column to see the date it was submitted.

Severity	Vulnerability	Application	Last Detected	Status
CRITICAL	SQL Injection from "userid" Parameter on "/WebGoat/Sql... dem <small>First detected 3 years ago</small>	Syd's webgoat-server	last year	Not a Problem PENDING
CRITICAL	SQL Injection from QueryString on "/umbraco/backoffice/Umbra... <small>First detected 2 years ago</small>	UmbracoAppDynamics	2 years ago	Not a Problem PENDING

You may change the status of a pending vulnerability. If approval isn't required for the new status, the vulnerability is no longer marked as **Pending**.

You will receive a notification when your status change request is approved or denied by an administrator. If denied, the vulnerability will go back to its previous state; but, the administrator must provide a reason for the decision. That reason will appear in the vulnerability's **Activity** tab.

4. In the window that appears, select a reason (in the case of **Not a problem**) and enter an explanation for the status change. It is possible to [set a custom reason \(page 535\)](#) that vulnerabilities are **Not a problem**.

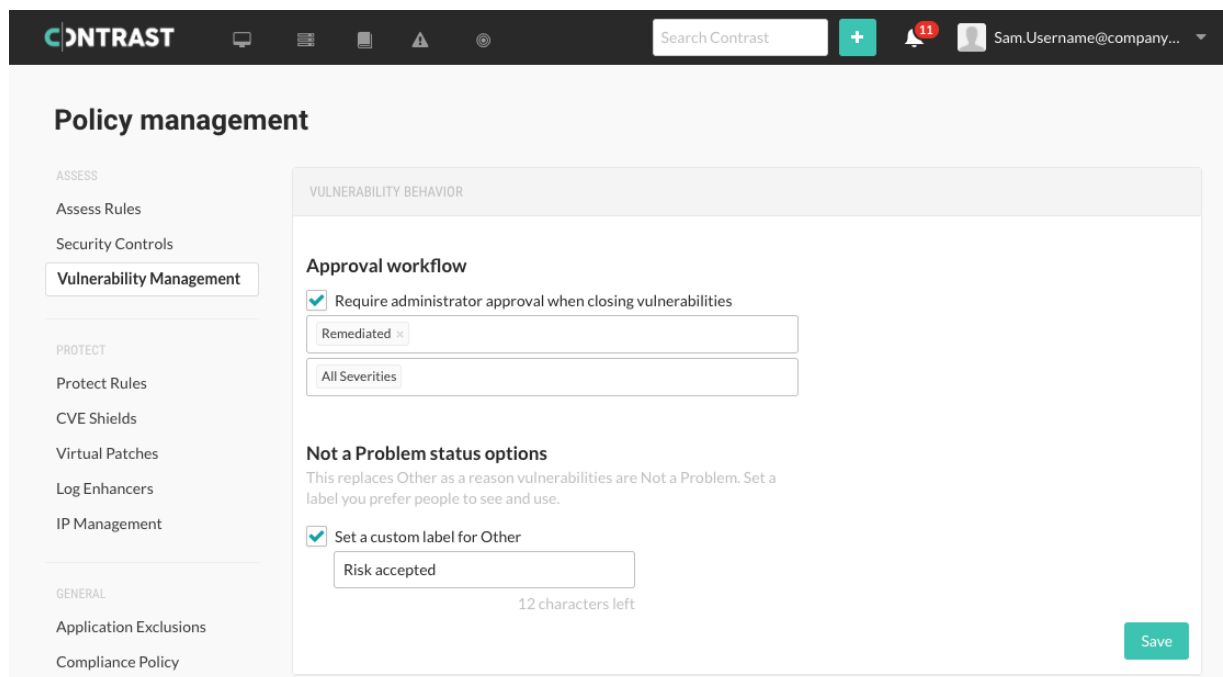
### Set a custom reason that vulnerabilities are Not a problem

Security teams may determine that a specific vulnerability does not need to be remediated with a code change and set the vulnerability status to **Not a problem**. This helps teams focus on fixing vulnerabilities and prevents Contrast from reporting these vulnerabilities again.

When you use **Not a problem** as a vulnerability status, you must select a reason. Contrast provides [standard reasons \(page 533\)](#) as well as an **Other** option.

You can change the label **Other** to a value that is meaningful to your organization. To do this:

1. Go to **Policy management** settings for your organization.
2. Select **Vulnerability management**.
3. Select **Set a custom label for Other**.
4. Enter the reason you prefer. This is limited to 25 characters.
5. **Save** your change.



Now, when marking vulnerabilities as **Not a problem**, the values listed will include the custom reason instead of **Other**.



**NOTE**

When you change **Other** to a custom label or change it back to **Other**, all the vulnerabilities with that label will change to the new label for your organization.

**Review pending vulnerability status changes**

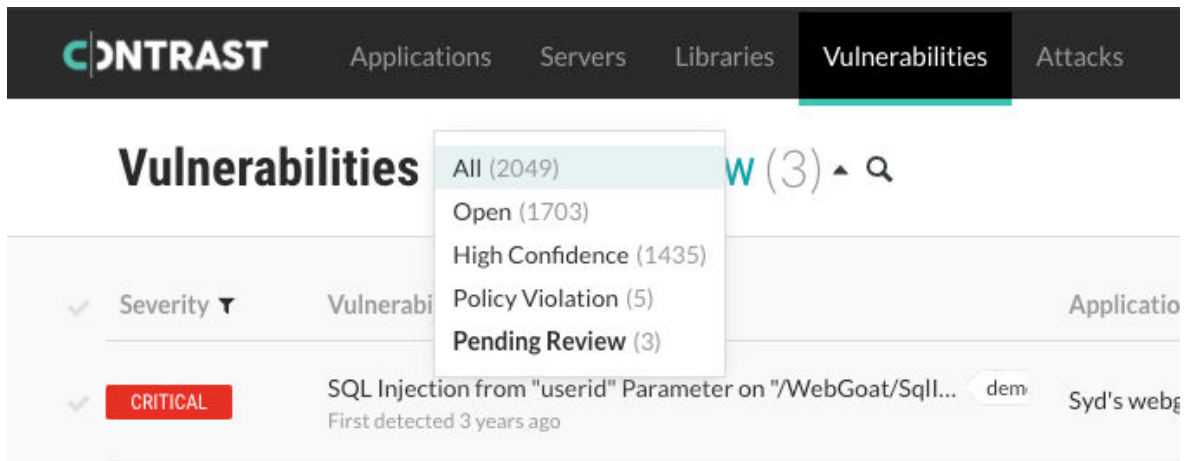
If an Organization Administrator has [required approval for a particular vulnerability \(page 664\)](#), the [status \(page 533\)](#) won't change until it is approved. This can apply to manual vulnerability status changes, two-way bugtracker integrations, as well as auto-verification policies.

You must be an Organization RulesAdmin with RulesAdmin permissions for the target application in order to approve or deny vulnerability closures.

To do this:

1. Select the link in your notification in the Contrast application, or select **Vulnerabilities** in the header, then select the filter at the top of the grid to view all pending reviews.





2. Use the check marks in the left column to select one or more vulnerabilities. In the batch action menu that appears at the bottom of the page, select **Review**. Then select **Approve** or **Deny**. You can also select **Review** in the top right from a vulnerability overview page.
3. If you deny the status change, you must provide a reason. Denied vulnerabilities revert to their previous status. Approved vulnerabilities take the new status and are no longer marked **Pending**. Either way the results of the review will display in the vulnerability's **Activity** tab.

### Edit vulnerability severity

Contrast classifies vulnerabilities in an application into five severity levels. The classifications are based on the likelihood and impact of a vulnerability in the application, from most to least severe:

- Critical
- High
- Medium
- Low
- Notes

To change a vulnerability's severity level:

1. Select **Vulnerabilities** in the header.
2. Select the colored badge in the **Severity** column and choose a new level from the menu. (You cannot update the severity of multiple vulnerabilities at once.)

## Projects











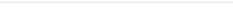

### NOTE

To view results on this page you will need to have the Contrast CLI 2.0 [installed via npm \(page 509\)](#).

After the CLI is run on a *manifest*, you can view the associated projects in Contrast and view the findings. This provides earlier and broader visibility of vulnerabilities in open-source software where instrumentation is not possible or is too late in the software development life cycle (SDLC).

Projects All (24)

Sort by Name

NAME	LAST ACTIVITY DATE	VULNERABLE LIBRARIES
another faisal react project JavaScript	03/13/2023 04:56 PM	 (4)
dougi-0313-crazy-testing-sesh Java	03/13/2023 02:23 PM	 (1)
dougi-0313-crazy-testing-sesh-2 Java	03/13/2023 02:26 PM	 (4)
dougi-0313-crazy-testing-sesh-3 Java	03/13/2023 02:29 PM	 (2)
dougi-0313-crazy-testing-sesh-express-app1 JavaScript	03/13/2023 02:35 PM	 (3)
dougi-0313-crazy-testing-sesh-micronaut Java	03/13/2023 02:42 PM	 (1)
dougi-0313-crazy-testing-sesh-some-random-js-app JavaScript	03/13/2023 02:56 PM	 (4)
dougi-0313-crazy-testing-sesh-webgoater Java	03/13/2023 03:00 PM	 (13)
dougi-0313-spring-boot-saml Java	03/13/2023 03:10 PM	 (11)
dougi-0313-webgoat-again Java	03/13/2023 03:02 PM	 (13)

Page 1 of 3

Results per page 10 25 50

On this page, you'll see:

- **Name:** This is the name of the project containing the manifest stored locally for the CLI, or the GitHub account and repository name
- **Last activity date:** Date of most recent activity
- **Vulnerable libraries:** The libraries in the project with an identified vulnerability (CVE). You can click the vulnerable library to view the library page for more information.

### See also

Supported [languages and package managers \(page 509\)](#) for Contrast CLI.

## Attacks

Attacks are groups of attack events that target applications and servers. There are multiple attack events that Contrast includes in an attack, including, but not limited to:

- SQL injection
- Untrusted deserialization
- Command injection
- Many other common vulnerability types

When Contrast detects multiple attack events from the same IP address within 30 minutes, Contrast groups these events together as an attack. If Contrast sees new events from the same IP address after you fix the code, Contrast shows a new attack.

The displayed dates on the dashboard for attacks seen are based on the time when the Contrast task runs on the server, not your local timezone.

### Event data retention

Contrast keeps attack event data for thirty days before removing it. To keep attack data for a longer amount of time, do the following:

- [Output to syslog \(page 472\)](#)
- [Set up a generic webhook \(page 573\)](#)  
A webhook receives data in a POST request only when a specified event occurs. When the webhook sees the event, it collects the data and sends it to the specified URL.
- Select the arrow at the end of the attack row and then select **Export attack (CSV)** or **(XML)** from the menu.

Source IP	Status	Application	Server	Rule	Start	End	Events	
<input type="checkbox"/> 127.0.0.1	BLOCKED			Command Injection	a day ago	a day ago	1	
<input type="checkbox"/> 1.2.3.5	BLOCKED			Command Injection Command Injection - Command Backdoors	5 days ago	5 days ago		<ul style="list-style-type: none"> <li>Denylist IP</li> <li>Suppress attack</li> <li><b>Export attack (CSV)</b></li> <li>Export attack (XML)</li> </ul>

## Tasks

In Contrast, you can:

- [View attack details \(page 539\)](#) such as which application and server was attacked and the location in the code where the attack occurred.
- [Manage attacks \(page 542\)](#) by taking actions on attacks and attack events. For example, you can configure a Protect rule for specific attack events.
- [Monitor attacks \(page 541\)](#) in an overview of current and past attacks..

## View attacks

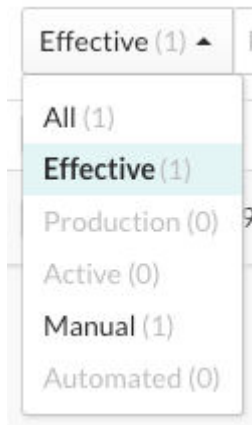
The Attacks list shows all attacks that have occurred in an organization.

Source IP	Status	Application	Server	Rule	Start	End	Events	
<input type="checkbox"/> 127.0.0.1	EXPLOITED	myapplication/new	myserver-local-mycompany	Command Injection Command Injection - Chained Commands Command Injection - Command Backdoors	7 hours ago	7 hours ago	3	
<input type="checkbox"/> 127.0.0.1	BLOCKED	myapplication/new	myserver-local-mycompany	Path Traversal Server-Side JavaScript Injection	a day ago	a day ago	9	
<input type="checkbox"/> 127.0.0.1	BLOCKED	myapplication/new	myserver-local-mycompany	Path Traversal	a day ago	a day ago	9	
<input type="checkbox"/> 127.0.0.1	BLOCKED	myapplication/new	myserver-local-mycompany	Path Traversal	a day ago	a day ago	12	

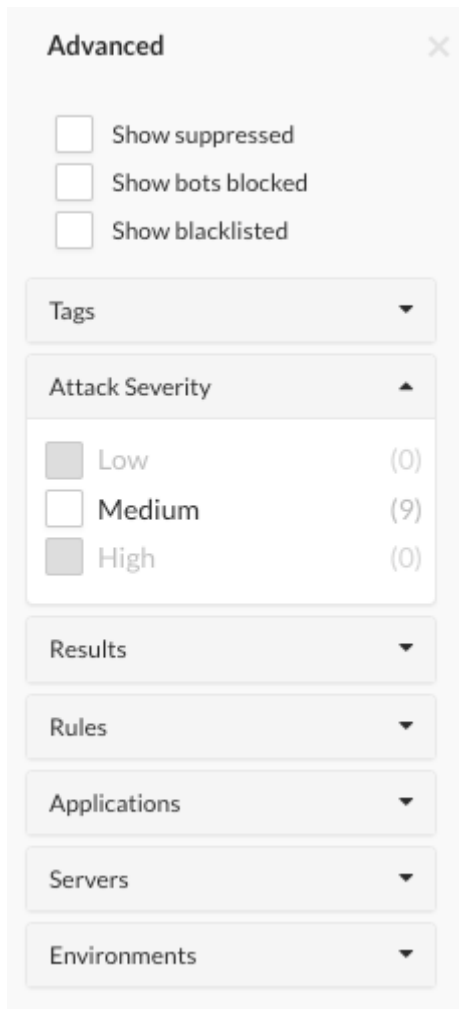
## Steps

1. Select **Attacks** in the header.
2. To view all attacks that occurred in your organization, select the **Attacks** tab.
3. To filter the view, select one of these filters:
  - **All:** Shows all attacks
  - **Effective:** Shows attacks with a status of **Blocked**, **Suspicious**, and **Exploited**.
  - **Production:** Shows attacks that occurred in a production server
  - **Active:** Shows attacks that are currently in progress
  - **Manual:** Shows attacks that have less than 20 requests per second. It could indicate that a human is generating attacks.

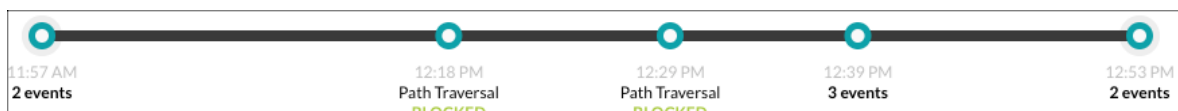
- **Automated:** Shows attacks that have more than 20 requests per second. It could indicate that a malicious bot is generating attacks.



4. To view more details on the attack, select **source name** or **IP address** in the Source IP column.
5. To see each attack event in the attack, select the **Overview** tab.
6. For more filters, select **Advanced** next to the date range and select a filter.



7. To see more details about the attack event, select **Source IP**.
8. To view the time of each event, under **Attack duration**, select **See timeline**.



- To see more details including the rate of events, severity, and attacker, select the **Notes** tab.
- To share or view communications with your team, select the **Discussion** tab.  
Read existing comments or enter a new comment and click **Add Comment**.

## Attack details

The attack data that Contrast displays includes these items:

- **Source IP:** The IP address from which the attack is originating.
- **Status:** The current status of the attack.  
An attack status is determined by the highest severity status of the attack events within the attack. If any event has an **Exploited** status, the attack status will be **Exploited**. If there are no Exploited events, the status will be the next highest severity event's status. The severity order, starting with the highest, is:
  - **Exploited:** If Contrast detects and confirms a definite attack but the mode for the applicable rule is set to **Monitor**, Contrast does not block the request.  
This status only applies to input tracing rules where Contrast is confident that an attack occurred. Confirmed attacks are those that met a high confidence threshold at the perimeter, or those that are watched and verified at the sink.
  - **Suspicious:** If Contrast detects an attack and the applicable rule reports the attack as suspicious, but the mode for the rule is set to **Monitor**, Contrast does not block the request. This status applies to non-input tracing rules, where Contrast is unable to verify that an attack occurred.
  - **Blocked:** If Contrast detects an attack and the mode for the applicable rule is set to **Block**, Contrast blocks the request.
  - **Blocked (P):** This status applies to rules that support both Block At Perimeter and Block modes. If Contrast detects an attack before the application can process the request and the mode for the applicable rule is set to **Block At Perimeter**, Contrast blocks the request. If Contrast detects an attack that is not at the perimeter, it blocks the request and the status is **Blocked**, even if the mode for the rule is set to **Block At Perimeter**.
  - **Probed:** If Contrast detects an attack but cannot confirm it and the mode for the applicable rule is set to **Monitor**, Contrast does not block the attack. Unconfirmed attacks are those that did not meet a high confidence threshold at the perimeter; they are watched but not detected at the sink.
- **Application:** Specific applications that saw attack events from the IP address while the attack was active.
- **Server:** Specific server that saw attack events from the IP address while the attack was active.
- **Rule:** Any attack type identified from the IP address while the attack was active.
- **Start:** The timestamp of the first attack event seen from the IP address during the attack time frame.
- **End:** The timestamp of the last attack event seen from the IP address during the attack time frame.
- **Events:** The number of attack events that comprise the attack.

## Monitor attacks

You can see an overview of current and past attacks, the IP addresses of attackers, attack types, and which applications were exploited.

- Select **Attacks** in the header.
- If an attacker has a [source name \(page 627\)](#), you can hover over it to see a list of associated IP addresses.  
If an attacker doesn't have a source name, their avatar will show a question mark. If an attacker has successfully exploited an application, their avatar will be red.



### NOTE

If the data reported for an attack event matches more than one source name, Contrast applies the most recently updated name.

Click on a IP address or source name to see details for that attacker.

3. To filter attacks you can:
  - Filter attacks by date range and environment.
  - Search to find attacks by a specific attacker IP or source name.
  - Search by affected applications or specific Assess or Protect rules.
  - Check **Show probed** to include information for attack events that resulted in a “Probed” status.
4. Under **Attack events** you can see a list of the types of attacks detected, along with the total number of attack events per type.
5. Under **Target application**, you can see each application targeted by an attack.

## Manage attacks

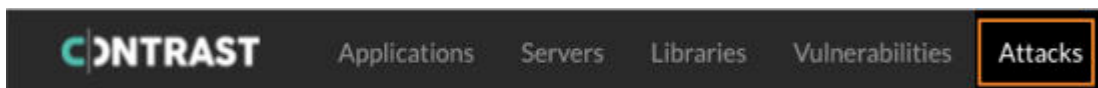
### Before you begin



Ensure that Protect is enabled on the servers that host your applications. The Contrast header displays Attacks only when Protect is enabled.

### Steps

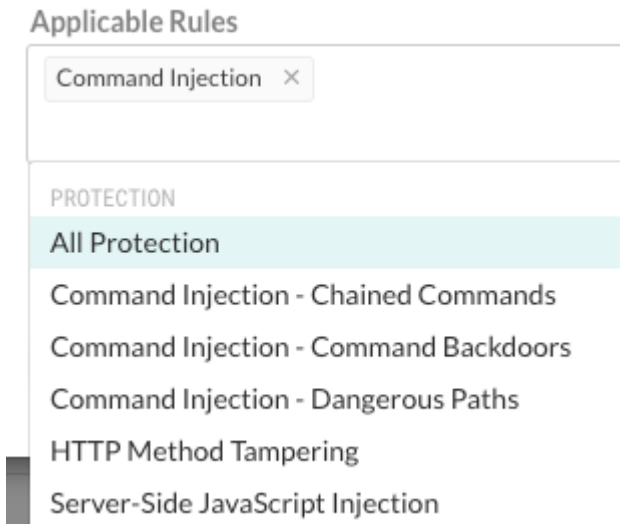
To take action on attacks and attack events, use the following procedures.

1. View attacks or attack events.
  - a. Select **Attacks** in the header.

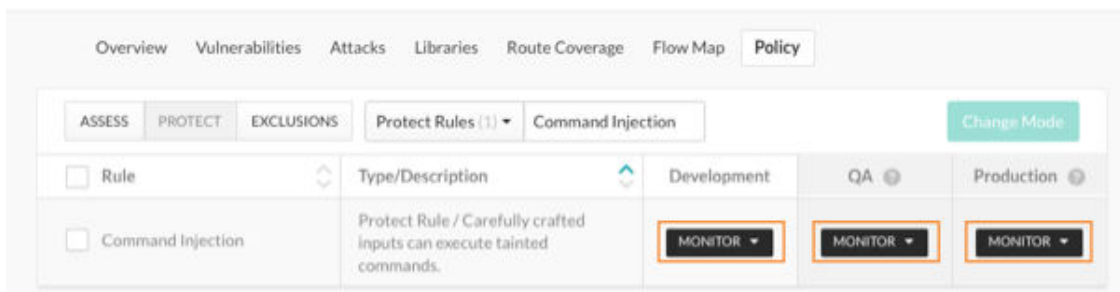


- b. Select the **Attacks** tab or the **Attack Events** tab.
2. (Optional) Tag attacks or attack events.  
Tagging attacks or attack events lets you organize them for better search results.
  - a. Select one or more attacks or attack events.
  - b. Select the tag icon (  ) above the list.
  - c. In the Tag Attacks window, enter a name for one or more tags.
3. Suppress attacks or events.  
Suppressing attacks removes an attack and its related events from view. To suppress an attack or an attack event, use the following procedure:
  - a. On the Attacks or Attacks Events list, select the check box for one or more rows and select the **Suppress Attacks** or **Suppress Events** icon (  ).  
Alternatively, select the arrow at the end of a row and select the **Suppress Attacks** or **Suppress Events** option in the dropdown.
  - b. Click **Suppress**.
4. Block IP addresses  
This option blocks a specified IP address. Blocking an IP address prevents unwanted activity from a specific IP address in the future.  
To [create a Protect rule \(page 610\)](#) that blocks the IP address for a specific attack or attack event, use the following procedure:
  - a. At the end of an attack or attack events row, select the arrow.
  - b. From the menu, select **Denylist IP** .
  - c. Enter a name for the rule that blocks the specified IP address.
  - d. Select a date when the block expires.
  - e. Click **Save**.
5. Add exclusions (attack events)  
[Adding application exclusions \(page 622\)](#) lets you exclude certain applications, or parts of them, from security analysis.  
This option is available if you are using Java, .NET Framework , or .NET Core agents.

- a. In the Attack Events grid, at the end of an attack events row, select the arrow.
- b. Select **Add Exclusion**.
- c. Specify a name for the exclusion.
- d. Select the exclusion type and enter the details for that type.
- e. Select the rules for which the exclusion applies.  
To see a list of rules, click the **Applicable rules** box.



- f. (Optional) Select the checkbox to suppress all events that match the exclusion.
- g. Click **Add**.
6. Create a virtual patch (attack events):  
**Virtual patches** (page 618) are short-term, custom defense rules that defend against specific, newly-discovered vulnerabilities in your code.
  - a. In the Attack Events grid, at the end of an attack events row, select the arrow.
  - b. Select **Create Virtual Patch**.
  - c. In **Add Virtual Patch** (page 618), enter the details for the virtual patch.
  - d. Click **Save**.
7. Configure Protect rules (attack events):  
**Protect rules** (page 610) let you monitor or block specific kinds of cyber-attacks in application environments.
  - a. In the Attack Events list, at the end of an attack events row, select the arrow.
  - b. Select a rule.
  - c. As needed, change the modes configured for each rule by selecting **Change Mode** or the **current mode** or a specific environment.



- d. Select the appropriate modes for each environment.
8. Save attack data:  
Contrast keeps attack event data for thirty days before removing it. You have several options for saving your data:
  - Output the data to **syslog**. (page 472)

- Set up a [generic webhook \(page 573\)](#).  
A generic webhook can receive notifications on any URL that receives POST messages.
- Export the data to a CSV or XML file.  
At the end of an attack row, select the arrow at the end of the row and select **Export attack (CSV)** or **Export Attack (XML)**.



## Add tags to attacks

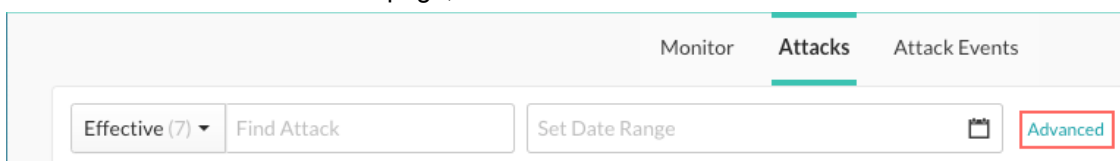
To make it easier to find specific attacks or attack events, use tags.

### Before you begin

- An Organization Editor or Organization Administrator role is required.

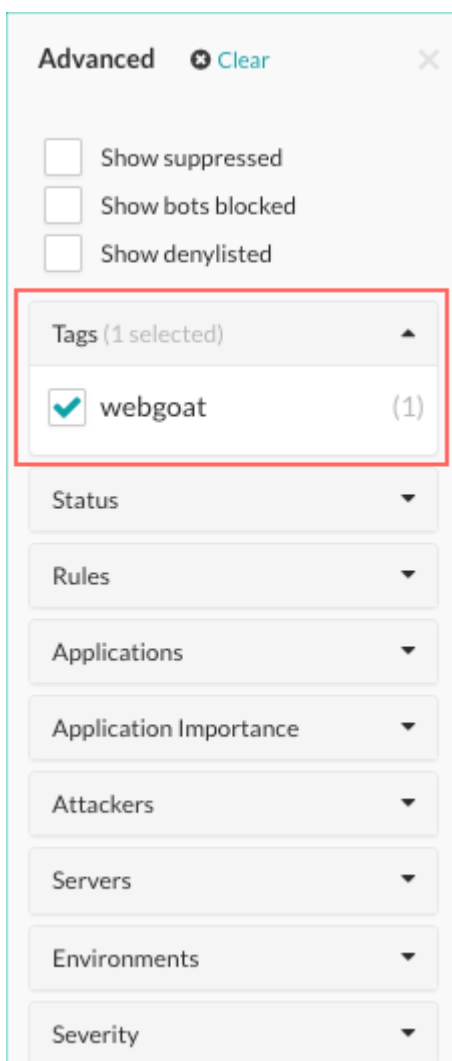
### Steps

1. Add tags to attacks or attack events:
  - a. Select **Attacks** in the header.
  - b. Select **Attacks** or **Attack events**.
  - c. Select the check box next to one or more attacks or attack events and select the tag icon (📌).
  - d. In the Tag attacks or Tag attack event window, select an existing tag or create one.
  - e. Select **Save**.
2. Use tags to find attacks or attack events:
  - a. On the Attacks or Attack events page, select **Advanced** next to the search boxes.



- b. Expand the Tags section.





- c. Select the check box next to one or more tags.  
The display changes to show the attacks or attack events that have the selected tags.

## Run attack scripts

To see how Contrast captures attack data, you can run an attack script using [Nikto](#), an open-source web server scanner.



### NOTE

To run an attack script you must have a [Contrast agent installed \(page 30\)](#) and an application with [Contrast Protect enabled \(page 631\)](#).

To run an attack script:

1. Run `./nikto.pl` in your terminal to make sure Nikto is configured correctly. If it is, you'll see a default help message return.
2. In Contrast, ensure that the IP address of the machine running Nikto isn't denylisted.
3. In the terminal, go to the `program` directory.
4. Initiate a scan by running

```
./nikto.pl -useragent "MyAgent (Demo/1.0)" -h http://www.your-site.com
```

**NOTE**

If your web application has its files under a certain directory, use the `-r` option to prepend a directory.

5. Once the script has finished running, Contrast will alert you about a new attack with an in-app notification and email.
6. Select the alert or go to **Attacks** to see a summary of the attack. To learn more about an individual attack, select **Source IP**.

## Reports

All Contrast reports, with the exception of the Software bill of materials, are delivered as time-stamped PDFs that are downloaded locally.

These reports are available:

- [Attestation reports \(page 546\)](#)
- [Compliance reports \(page 548\)](#)
- [DISA STIG viewer checklists \(page 548\)](#)
- [Software bill of materials \(page 549\)](#)
- [Vulnerability trend report \(page 550\)](#)
- [Organization statistics \(page 551\)](#)

### Attestation reports

Attestation reports provide evidence of vulnerability remediation based on the most current application information. Meet compliance and auditing requirements with these PDF reports.

**NOTE**

This report expires seven days after you create it. Contrast deletes the report after this time.

Attestation reports include:

- An itemized list of the specific filter settings used to run the report
- A summary of the security posture for the application
- Vulnerabilities assessment for both custom code and open-source libraries. Note that critical severities will not be displayed in this section if CVSS 3.1 has not been turned on for existing organizations. To enable this, contact [Contrast Support](#).
- Route coverage as a security assessment metric
- An optional compliance policy assessment and detailed information about open vulnerabilities for the application
- An appendix that describes methodologies and terminologies

### Before you begin

An Attestation report can include a maximum of 1,250 vulnerabilities or a maximum of 16,000 combined routes and vulnerabilities.

If you exceed these limits, an error message displays and the report doesn't generate. If this situation occurs, change your report selections to reduce the amount of information in the report.

### Steps to generate an Attestation report

1. Select **Applications** in the header.
2. Select an application in the Applications grid.
3. Select the **Reports** icon (📄) located at the top-right of the application's page.
4. Select **Generate Attestation Report** from the list.
5. In the Attestation report window, select the **Vulnerabilities**, **Environments**, and additional **Security Standards** that you want to include in the report.

**Attestation Report** ✕

Attestation reports provide evidence of vulnerability remediation based on the most current application information. Meet compliance and auditing requirements with these PDF reports.

**Vulnerabilities**

Include vulnerability details  
 Include route observations

**Environments**

**Security Standards**

Note: Applying security standards will result in the inclusion of an additional security standards section in the generated report.

🔔 Total routes and vulnerabilities: 0 routes and 1 vulnerabilities

The default is to show all vulnerabilities and environments, but you can filter them by selecting the fields and then, selecting filters. Choose an option from **Security Standards** to include an additional Security Standards section in the generated report.

Optionally, you can choose to include detailed information about open vulnerabilities and observed routes.

The following table includes the categories that you can use to create a custom report.

Category	Default	Filter options
Vulnerabilities	All	<ul style="list-style-type: none"> <li>• Status (Reported, Suspicious, Confirmed, Not a Problem, Remediated, Fixed, Remediated - Auto-Verified)</li> <li>• Severity (Note, Low, Medium, High Critical)</li> <li>• Assess Rules</li> </ul>
Vulnerability details	None	Include vulnerability details by selecting the checkbox for it.
Route observations	None	Include details about observed routes by selecting the checkbox for it.
Environments	All	<ul style="list-style-type: none"> <li>• Development</li> <li>• QA</li> <li>• Production</li> </ul>

Category	Default	Filter options
Security Standards	None	<ul style="list-style-type: none"> <li>• DISA ASD STIG</li> <li>• IPA-7.0</li> <li>• OWASP 2013 Top 10</li> <li>• OWASP 2017 Top 10</li> <li>• OWASP 2021 Top 10</li> <li>• OWASP Top 10 API Vulnerabilities 2019</li> <li>• PCI DSS - 2.0</li> <li>• PCI DSS - 3.0</li> <li>• PCI DSS - 3.2.1</li> <li>• PCI DSS - 4.0</li> </ul>

6. Select **Generate**.

After Contrast generates the report, the **Notifications** panel displays a download link for it. Select the link to download the report.

## Compliance reports

Generate timestamped PDF reports of security issues that Contrast has identified while monitoring your application. You can choose from the following report types:


- **DISA ASD STIG:** DISA's Application Security and Development STIG reports the security posture as it relates to policy requirements for security programs and best practices for Information Assurance (IA)-enabled applications.
- **OWASP 2013 Top 10, OWASP 2017 Top 10, and OWASP 2021 Top 10:** The Open Web Application Security Project reports the problems that are “worth fixing” or in the top ten list of flaws.
- **OWASP Top 10 API Vulnerabilities 2019:** The Open Web Application Security Project reports the unique vulnerabilities and security risks with APIs.
- **PCI DSS - 2.0, 3.0 and 3.2.1:** The Payment Card Industry Data Security Standard protects cardholder data in the event of a data breach. To achieve compliance, organizations must identify and remediate all critical vulnerabilities.

Each report includes a summary of the application's security status as well as details on each vulnerability and remediation guidance.

The report shows each vulnerability that's been discovered in your application, along with:

- Technical details
- Risk of an issue
- Remediation guidance
- Industry references
- The application's known vulnerable libraries
- A security scorecard

To run a compliance report:

1. Select **Applications** in the header.
2. Select an application in the Applications grid.
3. Click the **Reports** icon  located at the top-right of the application's page.
4. Select **Generate Security Standards Report** from the list.
5. In the window that appears, choose the **Report Type**, **Vulnerability Status/Severity** and **Vulnerability Tag** that you want to include in the report.
6. Click **Generate**.  
Once generated, the report will automatically download.

## DISA STIG Viewer checklists

DISA's Security Technical Implementation Guide (STIG) is the basis for evaluation of the security of all government applications. The STIG is intended to be used throughout the life cycles of these applica-

tions in order to provide security assurance for these applications. Contrast's compliance reporting can provide a listing of the vulnerabilities found in your application that violate guidelines of multiple STIGs.



### IMPORTANT

An application must have an Assess license to run a DISA STIG report.

Before DISA STIG reports can be run, a SuperAdmin must enable it. Select **SuperAdmin** in the user menu, then select **Organizations** in the header. In the window that appears, select the box to **Enable DISA STIG Checklist reporting** and select **Save**.

STIG Viewer creates custom checklists with multiple STIGs for compliance reporting. You must import your application's checklist to get the DISA STIG report on those vulnerabilities from Contrast.

To run a STIG Viewer checklist:

1. Go to the **Applications** page and select an application.
2. In the application's **Overview** page, click the reporting icon and select **Generate STIG Viewer Checklist**.
3. In the window that appears, import a STIG Viewer checklist (.ckl) file. This file must be a checklist exported from the STIG Viewer application.
4. Click **Generate** to download an updated STIG Viewer checklist (.ckl) file.

### Software bill of materials (SBOM)

A Software Bill of Materials (SBOM) might be required for compliance with government security regulations.

You can generate an SBOM through Contrast, through a simple API, or with a command through the Contrast command line interface (CLI).

The Contrast SBOM meets the specifications of the OWASP's CycloneDX SBOM standard and the international open SPDX standard. It contains information about the software that your application uses including:

- Libraries - Open source and third-party components present in a codebase
- Licenses that govern the software components
- Versions of software components used in the codebase



### NOTE

Currently supports CycloneDX v1.4 and SPDX 2.2.

The Contrast SBOM also meets the requirements of the National Telecommunications and Information Administration (NTIA). It includes the author name, supplier name, component name and version, component relationship, timestamp and other unique identifiers like PURL and package SPDX identifier.


### Before you begin

- A Contrast Assess license is required for export via Contrast

- Supported languages: Java, .NET Framework, .NET Core, Node.js, Python, Ruby, Go, PHP

## Steps

There are three options for generating an SBOM report.

1. **To generate a report with Contrast:**
  - a. Select **Applications** in the header.
  - b. Select the **Reports** icon (  ) located at the top of the application list.
  - c. In the dropdown, select **Generate Software Bill Of Materials (SBOM)** to generate and download a copy of the SBOM. Supports CycloneDx and SPDX standards.
2. **To generate a report with API:**
  - a. For CycloneDX: Make a **GET**<HOST>/Contrast/api/ng/<ORG\_ID>/applications/<APP\_ID>/libraries/sbom/cyclonedx **request**.
  - b. For SPDX: Make a **GET**<HOST>/Contrast/api/ng/<ORG\_ID>/applications/<APP\_ID>/libraries/sbom/spdx **request**.

See [REST API](#) for more information about using APIs.
3. **To generate a report with CLI:**
  - Use the `--save` command. Choose the type with `--save cyclonedx` or `--save spdx`. See [CLI commands \(page 511\)](#) for more information.



### NOTE

- .NET support is currently limited for CLI.
- Use the CLI to generate the SBOM for [static SCA \(page 474\)](#) results.
- The SBOM generated via CLI will provide class usage information of the application the CLI is registered to that has library data.

## Vulnerability trend reports

Use the vulnerability trend reports to recognize the vulnerabilities your applications face and how well they're being managed.

To view vulnerability trend reports:

1. Select **Reports** in the user menu. Select **View** to see the graphs in more detail.
2. Select **New** to see a graph of new vulnerabilities. Select **Total** to see a graph of all reported vulnerabilities compared to all remediated vulnerabilities.
 

Each black data point represents the total number of Suspicious, Confirmed and Reported vulnerabilities for that date. Each green data point represents the total number of vulnerabilities marked as **Not a problem**, **Remediated** or **Fixed**. Hovering over each data point generates a tooltip with status breakdowns.
3. Each report defaults to all applications, servers and rules. Filter vulnerabilities by clicking in the fields above the graph. The following table outlines the categories that you can use to create a custom report.

Field	Default	Filter options
Date	Last 7 days	Last 30 days Last 12 weeks Last 12 months
Applications	All	Importance (Critical, High, Medium, Low, Unimportant) Application Tags Licensed (List of all applications)

Field	Default	Filter options
Servers	All	Environment (development, test, production) Server Tags Servers (List of all servers)
Rules	All	Severity (Critical, High, Medium, Low, Note) Vulnerability Tags Vulnerability Rules (List of all rules)

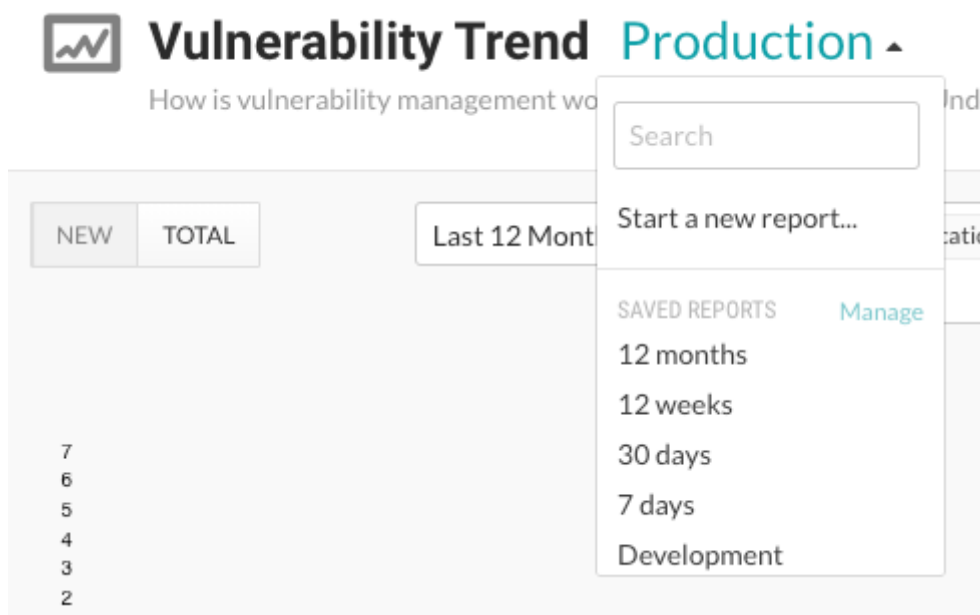
- Select **View**, then select the **Save report** icon in the top right to save this filter criteria to a report. Name the report in the window that appears and select **Save**. Saved reports are unique to the user, so you have your own defined list of saved vulnerability trend reports. You can edit or delete these reports at any time.

If you change filter options while viewing a saved report, the star icon changes to an unsaved state and **Edited** appears next to the report name. You can then use the same icon to **Save existing** or **Save as new**. Choose **Save existing** to update the saved report name with the current filters and remove the **Edited** status. Choose **Save as new** to save the report view with the current filters as a new report under a different name.

Click **Remove** to permanently delete the saved report that you're currently viewing.

To clear unsaved edits to an existing report and start over with the report defaults, choose the **Start a new report** option in the dropdown.

When you've created more than five saved reports, you will see a **Manage** link in the **Saved reports** dropdown. Select **Manage** to open this window. Here you can rename reports (click on the name to edit), search for reports, or use the check boxes next to each report (or use the **Select all** check box) to select which ones you want to remove.



- You can also create a timestamped PDF export of the Vulnerability Trend to capture a snapshot of your vulnerability management. Select the **Export** icon in the upper right hand corner of the page. Contrast downloads the report to your desktop. Each PDF report includes a summary of the variables included in your customized view, the trend graphic, and a table of the metrics and breakdowns of each data point.

### Organization statistics

Select **Reports** in the user menu to find [vulnerability trends \(page 550\)](#), as well as organization level information on:

- **Licenses:** View the number of overall licenses for Assess and Protect, as well as the number of unlicensed applications and servers that exist in your organization.
- **Applications:** The inner ring designates the breakdown by language. Choose the categories you want to compare in the outer ring by selecting **Technology** or **Grade** in the dropdown.
- **Servers:** Select **Container** or **Environment** in the dropdown to choose how the numbers are analyzed.

Use the filters in the dropdowns to choose which data to compare at a glance.

Select **View** for more details including:

- **Licenses:** Under **Activity**, view an activity trend chart of data on license consumption over the past year.  
Hover over a data point on the Assess or Protect trend lines to see how many licenses were used each month. The dotted line shows the number of licenses purchased.  
Click on the vertical bars in the chart to view your hourly usage of Protect licenses for each day. Peak hourly usage is represented by bright green shading at the top of the bars. Select **Back to license activity** to return to your view of license activity data.  
Select **View Protect usage** below the activity chart to see data for the current month and a usage statistics. Use the dropdown to view data for a different month.  
Under **Consumption**, you can see a thermometer chart and a timeline for Assess and Protect. The thermometer chart shows the total number of licenses purchased compared to the number being used. The timeline shows how many licenses are about to expire on given dates.  
The circular charts on the right show breakdowns by fraction and percentage for Assess and Protect. If your organization doesn't own any Protect or Assess licenses, the chart shows the count of unlicensed assets.
- **Applications:** Under **Status** you can see the total number of applications broken down by the number that are licensed, unlicensed and archived, as well as how many licenses are available in your organization.  
The circular Language Breakdown chart shows the number of applications, broken down by language in the inner band, and by technology in the outer band. Hover for more details.  
Under **High risk** and **Expirations** you can see the number of applications with critical open vulnerabilities and expiring licenses.  
Under **Protection coverage** you see the number of applications on production servers that have incomplete coverage. Select **View breakdown** for more details.  
Applications that were added within the last week and applications that reside on an offline server are listed separately in the sidebar.
- **Servers:** Under **Environments**, you can see all deployed servers by environment.  
Under **Container breakdown** you can see the number of deployed servers for each language in a given environment. Use the dropdown to view data for a different environment.  
Under **Snapshots**, you can see the number of servers with Assess and Protect enabled, as well as all servers online compared to the total number of servers in the given environment.  
The right sidebar includes a list of new, offline, deleted and expiring servers.



# Integrations

Documentation is provided for supported integrations that are part of the core, recommended way that Contrast works. Contrast may be compatible with other tools or scenarios developed by the community that are not supported. For specific information on third-party tools and technologies, consult the documentation for that product. Also, there are additional articles in the [Contrast Support Portal](#) around specific use cases or workarounds.





## NOTE




Note that supported integrations are further documented in the left-hand navigation menu. Community integrations are linked to external documentation. Links to documentation in the Contrast Support Portal or third-party sites are indicated by the [external link icon](#).

You must have the organization administrator role in Contrast to view the integrations available to your organization.

## Cloud integrations

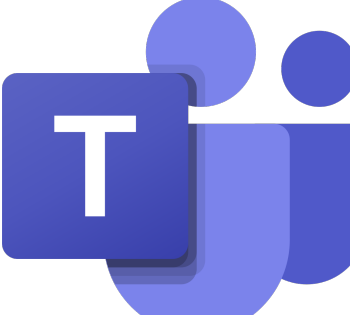

Run your application with Contrast while still deploying on your favorite PaaS.

	<p><b>AWS Elastic Beanstalk</b></p>	<p><a href="#">Java agent with AWS Elastic Beanstalk</a></p>
	<p><b>Google App Engine</b></p>	<p><a href="#">Configure the Java agent for Google App Engine</a></p>

	<p><b>Microsoft Azure</b></p>	<ul style="list-style-type: none"> <li><a href="#">☑.NET and Azure App Service</a></li> <li><a href="#">☑.NET and Azure Arm</a></li> <li><a href="#">☑.NET and Terraform</a></li> </ul>
	<p><b>Red Hat OpenShift</b></p>	<ul style="list-style-type: none"> <li><a href="#">☑Contrast Security containers</a></li> </ul>
	<p><b>VMware Tanzu</b> (formerly Pivotal Cloud Foundry)</p>	<ul style="list-style-type: none"> <li><a href="#">☑Configure Java for VMware Tanzu</a></li> <li><a href="#">☑Configure Node.js for VMware Tanzu</a></li> </ul>








## Chat tools

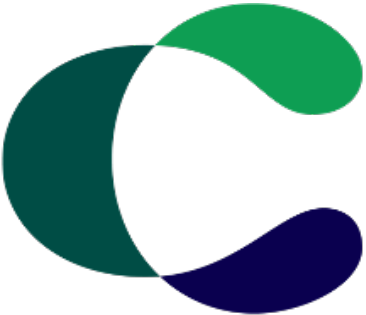

Be the first to know about new vulnerabilities in or active attacks against your application as Contrast discovers these security issues in real-time.

	<p><b>Microsoft Teams</b></p>	<p><a href="#">Teams Integration (page 593)</a></p>
	<p><b>Slack</b></p>	<p><a href="#">Slack Integration (page 594)</a></p>

## Code repository integrations




Add Github actions to your repository.



	<p><b>Contrast Amazon Elastic Kubernetes Service Build Deploy</b></p>	<p> <a href="#">Contrast Amazon EKS Build Deploy</a></p>
	<p><b>Contrast Azure Kubernetes Service Build Deploy</b></p>	<p> <a href="#">Contrast AKS Build Deploy</a></p>
	<p><b>Contrast Azure Spring Cloud Deploy</b></p>	<p> <a href="#">Azure Spring Cloud Deploy</a></p>
	<p><b>Contrast SCA Action</b></p>	<p> <a href="#">Contrast SCA Action</a></p>

	<p><b>Contrast Scan Analyze</b></p>	<p><a href="#">🔄 Contrast Scan Analyze</a></p>
	<p><b>Contrast Verify</b></p>	<p><a href="#">🔗 Contrast Verify</a></p>

## Continuous integration and build tools

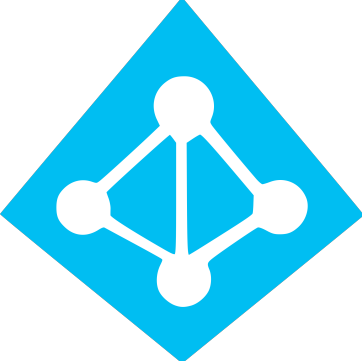



Add application security gates into your automated pipelines to prevent vulnerabilities from getting deployed into production environments.




	<p><b>Azure DevOps</b></p>	<p><a href="#">Azure Pipelines Extension (page 568)</a></p> <p><a href="#">🔗 Azure Pipelines Marketplace</a></p>
	<p><b>Bamboo</b></p>	<p><a href="#">Bamboo Plugin (page 570)</a></p> <p><a href="#">🔗 Contrast Security for Bamboo Marketplace</a></p> <p><a href="#">🔄 Contrast Bamboo Plugin Source Code</a></p>
	<p><b>CircleCI</b></p>	<p><a href="#">🔗 Orb Registry</a></p> <p><a href="#">🔄 Contrast Security Orb for CircleCI</a></p>

	<p><b>GitLab</b></p>	<p><a href="#">How to integrate Contrast in a GitLab pipeline</a></p>
	<p><b>Gradle</b></p>	<p><a href="#">Gradle Plugin (page 578)</a></p> <p><a href="#">Gradle.org and Contrast Plugin</a></p> <p><a href="#">Contrast Gradle Plugin Source Code</a></p> <p><a href="#">Sample Project</a></p>
	<p><b>Jenkins</b></p>	<p><a href="#">Jenkins Plugin (page 580)</a></p> <p><a href="#">Contrast Continuous Application Security</a></p> <p><a href="#">Jenkins Source Code</a></p>
	<p><b>Maven</b></p>	<p><a href="#">Maven Plugin (page 53)</a></p> <p><a href="#">Maven Central Repository</a></p> <p><a href="#">Contrast Maven Plugin Source Code</a></p> <p><a href="#">Sample Project</a></p>

## Enterprise and extensibility integrations


Use Contrast's SDKs and webhooks to build custom services and/or notify them upon the discovery of new vulnerabilities or attacks using webhooks.



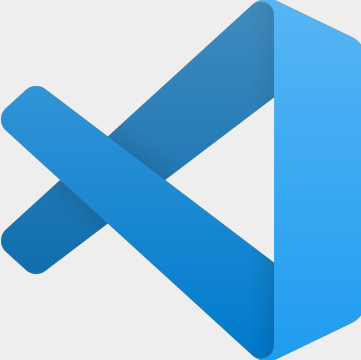
	<b>Azure Active Directory</b>	<a href="#">☑ Azure Active Directory single sign-on (SSO) integration</a>
	<b>Contrast CLI</b>	<a href="#">Contrast CLI (page 508)</a> <a href="#">☑ NPM</a>
	<b>Java SDK</b>	<a href="#">☑ Contrast TeamServer Java SDK</a>
	<b>JavaScript SDK</b>	<a href="#">☑ Contrast SDK Javascript</a> <a href="#">☑ NPM</a>

	<p><b>.NET SDK</b></p>	<p><a href="#">Contrast SDK .NET</a>  <a href="#">nuget</a></p>
	<p><b>Python SDK</b></p>	<p><a href="#">Contrast SDK Python</a></p>
	<p><b>Webhooks</b></p>	<p><a href="#">Generic Webhooks (page 573)</a></p>

## IDE plugins

Learn about your applications' vulnerabilities and receive remediation guidance while in your favorite development environment.



	<p><b>Eclipse</b></p>	<p><a href="#">Contrast Security for Eclipse Marketplace</a></p>
---	-----------------------	--

	<p><b>IntelliJ</b></p>	<p><a href="#">Contrast IntelliJ Plugin (page 579)</a></p> <p><a href="#">☑ Contrast Security for IntelliJ Marketplace</a></p>
	<p><b>Visual Studio</b></p>	<p><a href="#">Visual Studio Plugin (page 595)</a></p> <p><a href="#">☑ Contrast for Visual Studio Marketplace</a></p>
	<p><b>Visual Studio Code</b></p>	<p><a href="#">Visual Studio Code Plugin (page 596)</a></p> <p><a href="#">☑ Contrast Security Plugin Marketplace</a></p>
	<p><b>Visual Studio for Mac</b></p>	<p><a href="#">Visual Studio for Mac Plugin (page 597)</a></p> <p><a href="#">🔄 Extension file</a></p>

## Incident management systems



Be confident that on-call personnel will be equipped to take necessary action against attacks on your application.





	<p><b>PagerDuty</b></p>	<p><a href="#">PagerDuty Integration (page 593)</a></p>
	<p><b>Splunk on-call</b> (formerly VictorOps)</p>	<p><a href="#">VictorOps Integration (page 595)</a></p>



## SIEM tools

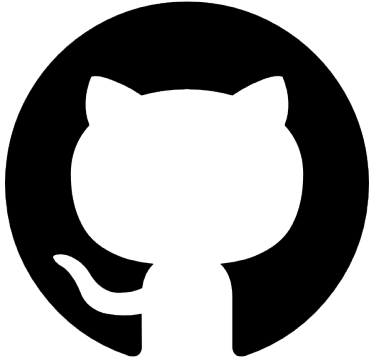





Receive operational insights into application security threats from Contrast's instrumentation activities directly in your security information and event management (SIEM) tool.

	<p><b>Azure Sentinel</b></p>	<p><a href="#">Contrast Protect Azure Sentinel Solution</a></p> <p><a href="#">Azure Sentinel</a></p>
 <p><b>DATADOG</b></p>	<p><b>Datadog</b></p>	<p><a href="#">Source Code</a></p>

	<b>Splunk</b>	<a href="#">How to integrate Contrast with Splunk</a>
	<b>Sumo Logic</b>	<a href="#">Source Code</a>

## Work tracking platforms

	<b>Azure Boards</b>	<a href="#">Azure Boards Integrations (page 563)</a>
	<b>Bugzilla</b>	<a href="#">Bugzilla Integration (page 571)</a>

	<p><b>GitHub</b></p>	<p><a href="#">GitHub Integration (page 577)</a></p>
	<p><b>Jira</b></p>	<p><a href="#">Jira Integration (page 588)</a></p>
	<p><b>Kenna Security</b></p>	<ul style="list-style-type: none"> <li><a href="#">Kenna toolkit</a></li> <li><a href="#">Running Contrast Security tasks</a></li> </ul>
	<p><b>Rally</b> (formerly CA Agile Central)</p>	<p><a href="#">Agile Central Integration (page 566)</a></p>
	<p><b>Solutions Business Manager</b> (formerly Serena)</p>	<p><a href="#">Serena Business Manager Integration (page 594)</a></p>
	<p><b>ThreadFix</b></p>	<ul style="list-style-type: none"> <li><a href="#">Contrast Remote Provider (ThreadFix)</a></li> <li><a href="#">Contrast Remote Provider</a></li> </ul>

## Integrate with Azure Boards

With an Azure Boards integration with Contrast, you can automatically generate tickets for bugtracking, synchronize comments and push notifications for your applications.

You will need:

- Account credentials for Azure Boards or TFS: username and personal access token (PAT).
- Scope to read and write work items with your PAT.
- An Azure Boards or TFS instance, accessible by HTTP to Contrast.
- An instrumented application in Contrast that is also associated to an Azure Boards project.
- For more, see Microsoft's [Azure Boards documentation](#).

## See also

- [Connect with Azure Boards \(page 564\)](#)
- [Automatically create tickets \(page 564\)](#)
- [Two-way integration \(page 565\)](#)
- [Set personal access tokens \(page 566\)](#)

## Connect to Azure Boards

### Steps

1. In Contrast, go to **Organization settings > Integrations**.
2. For the Azure Boards integration, select **Connect**.
3. Enter the following values:
  - **Name:** Label that will display when Contrast sends findings to bugtrackers in Azure Boards.
  - **URL:** Azure Boards or TFS URL. Contrast must be able to access this.
  - **Version:** Contrast uses API v2 to support Azure DevOps Services, TFS 2015 and TFS 2017.
  - **Personal access token:** An alternate password to authenticate to your host.
4. Select **Test connection**. This may take a few minutes, depending on the number of Azure Boards or TFS projects. The test verifies that Contrast can reach the Azure Boards or TFS instance you entered, and it accepts the user's PAT to login.
5. Once Azure Boards is connected, select the Contrast **Applications** you want to make available to this bugtracker.
6. Enter values for **Project**, **Assignee** and **Work Item Type**.
7. Select a **Team**, then select an **Area** within the team. This will send tickets to a specific backlog.
8. Set the **Default priority** for vulnerability severity levels. This prioritizes tickets to fix vulnerabilities for the selected applications, based on severity. At this point, Contrast will make an API call and return a list of Azure Boards or TFS ticket states.
9. You can also set up [two-way integration \(page 565\)](#) (to automatically update vulnerability status in Contrast) or [automatic ticket creation \(page 564\)](#) with Azure Boards.

## See also

- [Automatically create tickets \(page 564\)](#)
- [Two-way integration \(page 565\)](#)
- [Set personal access tokens \(page 566\)](#)

## Automatically create tickets

You can **automatically create tickets** every time Contrast discovers new vulnerabilities.

### Steps

1. In the [Azure Boards integration panel \(page 563\)](#), select **Automatically create tickets for new vulnerabilities discovered**. This displays a multi-select field for **Rules** and **Severity**.
2. Select the rules or severity levels of vulnerabilities that should trigger a new ticket in Azure Boards or TFS. **Critical** and **High** are the default selections.

**NOTE**

This setting only works for new vulnerabilities discovered after you select it.

**See also**

- [Connect with Azure Boards \(page 564\)](#)
- [Two-way integration \(page 565\)](#)
- [Set personal access tokens \(page 566\)](#)

**Two-way integration**

You can use a two-way integration with Azure Boards. This will automatically update the status of a vulnerability in Contrast when you close or reopen an issue in Azure Boards or TFS that links to the vulnerability .

**Steps**

1. In the [Azure Boards integration panel \(page 563\)](#), select **Enable two-way integration**. This displays Vulnerability Status fields.
2. Select the dropdowns to set a vulnerability status for each Azure Boards or TFS ticket state.
3. **Save** the two-way integration. Contrast will populate the vulnerability status in Azure Boards or TFS tickets.
4. When you update the state of a ticket in Azure Boards or TFS, Contrast will automatically generate comments in the **Discussion** tab for that vulnerability. Each comment includes the name of the bugtracker and a link to the ticket.

**NOTE**

If you select the vulnerability status **Not a problem** as a ticket state in Azure Boards or TFS, Contrast also requires you to select a **Reason**. The default value is **Other**.

**CAUTION**

For multiple vulnerabilities sent to Azure Boards or TFS as a single issue, the ticket state applies to all vulnerabilities associated with that ticket. Conversely, when you link multiple tickets to a single vulnerability, you must update all associated tickets before you can update the vulnerability. For example, if you change a ticket state from **New** to **Active**, Contrast updates the vulnerability status only if all tickets related to that vulnerability also have an **Active** state.

**See also**

- [Set personal access tokens \(page 566\)](#)
- [Connect to Azure Boards \(page 564\)](#)
- [Automatically create tickets \(page 564\)](#)

## Set Azure Boards personal access tokens

Personal Access Tokens (PAT's) are used by Contrast to access Azure Boards. PAT's can be set to provide full access or "a la carte" access.

### Steps

1. Navigate to **User Settings** in Azure.
2. Select **Personal access tokens**. Existing personal access tokens are displayed.
3. Click **New Token**. The **Create a new personal access token** modal displays.
4. Enter required fields and scopes for your new PAT in the **Create a new personal access token** modal.



#### NOTE

**Read, write, & manage** under **Work items** must be selected to work with Contrast.

##### Work Items

Work items, queries, backlogs, plans, and metadata



Read



Read & write



Read, write, & manage

5. Click **Create** to finish and save your new personal access token.

### See also

- [Connect with Azure Boards \(page 564\)](#)
- [Automatically create tickets \(page 564\)](#)
- [Two-way integration \(page 565\)](#)

## Integrate with Agile Central

Integrate Agile Central with Contrast to automatically track vulnerabilities in your applications.

Before you start, be sure you have:

- An Agile Central account URL.
- Permission to create issues in the target project.
- A running Agile Central instance accessible via HTTP to Contrast.
- A project to associate the application instrumented by Contrast.

To connect with Agile Central:

1. Go to **Organization settings > Integrations** in the **user menu**.
2. Select **Connect** in the Agile Central row.
3. In the **Connect with Agile Central** form, add the name for the bugtracker entry, as well as the **URL** and **API Key** in the given fields. The Agile Central URL must be accessible from Contrast instance being configured.



#### NOTE

To find your Agile Central API key, log in to the Agile Central Application manager, and select **API Keys**. Contrast saves the username, password and Agile Central URL entered in your configuration as a set of credentials.

- Once you complete the fields, select **Test connection**. The test verifies that Contrast can reach the Agile Central instance and that the specified user can log in.
- Once connected, select the **Applications** that you want to be available to this integration.
- Choose a **Project name** and **Owner** from the dropdowns.
- In the **Default priority** section, use the dropdowns to choose a priority level for each vulnerability severity.
- Choose the **Environment** for which you want to generate tickets.
- Choose a **Defect state**.
- Add a name that the tickets are **Submitted by**.

**NOTE**

While none of these configuration fields are required, Agile Central may populate tickets with their own default values for any fields you leave blank.

- To add another integration once you're connected in Contrast, select **Add Configuration** in the Agile Central row.
- To automatically create tickets for newly discovered vulnerabilities, check the designated box in the configuration form. In the multiselect field that appears, choose the **Rules** and **Severity** levels of the vulnerabilities for which you want to generate tickets.

**NOTE**

This selection doesn't generate tickets retroactively.

## Manage Agile Central credentials

Contrast saves the latest set of credentials that you enter in your Agile Central configurations to help you set up new connections faster. The API key and URL values that you enter in your first configuration become the default credentials for your following configurations.

In subsequent configurations, Contrast will pre-populate the fields with the default credentials, but allow you to modify the values as needed. You can also manage your saved sets of credentials to simultaneously update all of the affected configurations.

To create or edit a configuration with credentials that are different than your default set:

- Select the **Manage credentials** link.
- In the **URL** field, use the dropdown to choose a set of saved credentials; or, manually update the values in the **URL**, **Username** and **Password** fields.
- Once you've updated the fields, select **Test Connection**.
- Select **Save**. If you're using new credentials, you must choose to override the existing set of credentials under the given name, or save the new values as a new credential set under a different name.
- To modify an existing set of saved credentials, select **Rename** if needed. Then select **Test Connection** and **Save**.

**NOTE**

Any updates to a set of credentials will affect all configurations using that set.

## Azure Pipelines extension

Use the Azure Pipeline extension to integrate Contrast with your deployment workflow. The following instructions guide you through the steps to set up and configure the extension for your Contrast instance.

Before you begin to set up the extension, make sure that you have the privileges to install a Microsoft extension. If not, you can [request the extension](#) for a project.

### Install and configure the Azure Pipelines extension

To install and configure the Azure Pipelines extension:

1. Follow the [Microsoft instructions](#) to install the extension **Contrast Integration**.  
Follow the [Microsoft instructions](#) to install the extension **Contrast Integration**.
2. Go to your **Project Settings** at the bottom of the sidebar. You'll need to be part of the Project administration group or have enough permissions to alter the settings.
3. In the **Pipelines** section of the settings menu, select **Service connections**.
4. Select **New Service connection** and then **Contrast Server Connection**.
5. Complete all the fields with required data from your [personal keys \(page 421\)](#).



#### NOTE

Your Contrast URL should not include `/Contrast` at the end; only the host is required.

### Configure a task in the Azure Pipelines extension

To configure a task in your Azure Pipelines extension for a release or a build pipeline:

1. Select the pipeline where you want to add the task then select **Edit**.
2. For release pipelines, select a stage for which you want to add the task.
3. To add the task, click the ellipsis (...) menu and select **Add an agentless job**.
4. Click on the + button next to your agentless job, and add the **Contrast Assess - Application Vulnerability Detection** task.
5. To choose a connection and application, select a **Service Connection** from the **Contrast Service Connection** menu. You can also select **Manage** to go to the **Service connections settings** in your **Project Settings**.
6. Select one of your applications from the **Application** menu.
7. To configure the task, use the **Allowed Status** and **Build Number** fields to filter your results from Contrast. Leave them blank if you don't want to filter results. The values set in these fields will be validated against the conditions you configure in the following fields.
8. Proceed to your severity counters, where you must set the maximum number of vulnerabilities allowed per severity. If your selected application has more vulnerabilities than allowed for that severity level, your task will fail.

For build pipelines only: If you want to prevent the execution of a job if the task fails, you must set the job to depend on the agentless job that includes the Contrast task.

1. Select the job you want to prevent from executing.
2. In the **Dependencies** section, add the **Agentless job**.



**NOTE**

You can only use this task for an agentless job.

## Add a release gate to a pipeline in Azure Pipelines

Release gates offer a safeguard to prevent deployment to environments if vulnerabilities for a given application exceed a certain threshold. To add a release gate with the Azure Pipelines extension:

1. Find the release pipeline where you want to add the gate and select **Edit**.
2. Choose the stage and deployment conditions for the gate. They can either be pre-conditions or post-conditions. You can add multiple gates to the same conditions.
3. Under **Gates**, enable the gate you created.
4. Select **Add** and then **Contrast Assess - Application Vulnerability Detection**.
5. Select **New** next to the service connection dropdown to create a Contrast service connection. Fill in all the fields and select **OK**.  
Select **Refresh list**, then select your newly created connection.
6. Click over the field or select **Refresh** to see a list of applications. Select the one that is most appropriate to the release pipeline.
7. If you want, you can select which vulnerability status or build numbers will be used for filtering when retrieving the data for the gate evaluation.
8. Set the maximum amount of vulnerabilities allowed per severity. If any validations fail when your pipeline reaches this gate, the pipeline will keep requesting samples until it becomes valid, or until the evaluation times out.

Microsoft Documentation offers more information on how to [define a gate for a stage](#) and [how to configure a gate](#).

Microsoft Documentation offers more information on how to [define a gate for a stage](#) and [how to configure a gate](#).

**TIP**

You can customize **Evaluation** options to configure the time between the re-evaluation of gates. For instance, you can set this value to 24 hours so that the gates will evaluate every day. This way you can remediate vulnerabilities and pass the required gate conditions without having to re-initiate the execution of the pipeline from start (or obtain manual approvals if they exist).

## Use Azure Service Fabric with the .NET Framework or .NET Core agent

If you are using a container image, follow the instructions to [install in containers \(page 129\)](#). Otherwise, to add the Contrast .NET Framework or .NET Core agent to an Azure Service Fabric service:

**TIP**

For Standalone Executable services, the `ServiceManifest.xml` file is located in the top-level Azure Service Fabric project (for example, the `sfproj` file).

1. Install the appropriate NuGet package to the main project for the service.
  - **.NET Framework:** Install `Contrast.NET.Azure.AppService`. All files in the `contrastsecurity` folder must have `Copy to Output Directory` set to `Copy if newer`.
  - **.NET Core:** Install `Contrast.SensorsNetCore`. All files in the `contrast` folder have `Copy to Output Directory` set to `Copy if newer`.
2. Set `ServiceManifest/CodePackage/EntryPoint/ExeHost/WorkingDirectory` in `ServiceManifest.xml` to `CodePackage`.

```
<CodePackage Name="Code" Version="1.0.0">
  <EntryPoint>
    <ExeHost>
      <Program>DemoNetFxStatelessService.exe</Program>
      <WorkingFolder>CodePackage</WorkingFolder>
    </ExeHost>
  </EntryPoint>
</CodePackage>
```

3. Set environment variables in `ServiceManifest.xml` to configure the profiler.
  - **.NET Framework:**

```
<CodePackage>
  <EnvironmentVariables>
    <EnvironmentVariable Name="COR_ENABLE_PROFILING" Value="1"/>
    <EnvironmentVariable Name="COR_PROFILER" Value="{EFEB8EE0-6D39-4347-A5F...}>
    <EnvironmentVariable Name="COR_PROFILER_PATH_32" Value=".\\contrastsecur...>
    <EnvironmentVariable Name="COR_PROFILER_PATH_64" Value=".\\contrastsecur...>
    <EnvironmentVariable Name="CONTRAST_CONFIG_PATH" Value="contrast_securi...>
  </EnvironmentVariables>
</CodePackage>
```

- **.NET Core:**

```
<CodePackage>
  <EnvironmentVariables>
    <EnvironmentVariable Name="CORECLR_ENABLE_PROFILING" Value="1"/>
    <EnvironmentVariable Name="CORECLR_PROFILER" Value="{8B2CE134-0948-48CA...}>
    <EnvironmentVariable Name="CORECLR_PROFILER_PATH_32" Value="contrast\\ru...>
    <EnvironmentVariable Name="CORECLR_PROFILER_PATH_64" Value="contrast\\ru...>
    <EnvironmentVariable Name="CONTRAST_CONFIG_PATH" Value="contrast_securi...>
  </EnvironmentVariables>
</CodePackage>
```

4. Configure the agent with either:
  - **A YAML file:** Add it to the main project for the service. Make sure `Copy to Output Directory` for the file is set to `Copy if newer`. Add an environment variable to `ServiceManifest.xml` specifying the location of the file, like this:

```
<CodePackage>
  <EnvironmentVariables>
    <EnvironmentVariable Name="CONTRAST_CONFIG_PATH" Value="contrast_se...>
  </EnvironmentVariables>
</CodePackage>
```

- **Environment variables:** Add them to `ServiceManifest.xml`, like this:

```
<CodePackage>
  <EnvironmentVariables>
    <EnvironmentVariable Name="CONTRAST__API__URL" Value="https://teamservice...>
    <EnvironmentVariable Name="CONTRAST__API__API_KEY" Value="aBcD0123"/>
    <EnvironmentVariable Name="CONTRAST__API__SERVICE_KEY" Value="ABCD0123">
    <EnvironmentVariable Name="CONTRAST__API__USER_NAME" Value="agent_123@T...>
  </EnvironmentVariables>
</CodePackage>
```

5. Deploy the Azure Service Fabric application as usual.

## Contrast - Bamboo plugin

This plugin adds functionality to Bamboo so that you can configure profiles for connecting to Contrast and verify builds against vulnerability thresholds.

### Install and configure

To install and configure the Bamboo plugin:

1. Download the Contrast Bamboo plugin ( *contrast-bamboo-plugin-#.#.#.jar*) from the [Bamboo Marketplace](#).
2. Select **Add-Ons** from the top-left settings menu.
3. Select **Upload add-on**.
4. When prompted to upload a file, select *contrast-bamboo-plugin-#.#.#-SNAPSHOT.jar*.
5. Verify you see the plugin under **User-installed add-ons**.
6. Now that the plugin is installed, configure a profile for Contrast. Select **Contrast Profiles** under **Add-Ons** in the side navigation bar.
7. In the **Profile Configuration** page, select **New Profile** and complete the form.

**NOTE**

If you are a hosted customer, you do not need to enter a Contrast URL.

8. Select **Test Connection** to verify that your settings are correct. A success notification will appear when a connection is established.

## Configure vulnerability thresholds

The Bamboo plugin can be added as a task to build jobs to check for vulnerability conditions that you configure. This checks Contrast for the number and type of vulnerabilities in the applications.

To add a task to a build job:

1. Select **Create a New Build Plan** (you can also use an existing plan).
2. Enter a project name, plan name and link to the repository host. The project key and plan key is auto-generated.
3. Once you create the plan, add a task to the build process by selecting **Add Task**.
4. In the window that appears, find the **Contrast CI for Assess** task and select it.  
The **Tasks** configuration page relies on a Contrast profile, as well as a server name, application name and a **Passive** parameter. The server name isn't required, but should correspond to a server name in Contrast if used. The application name must be on the designated server.  
If you select the **Passive** parameter, the plugin will query all vulnerabilities for the application (not just build-specific vulnerabilities). If you do this, you don't have to run the application with its integration tests before the Contrast post-build action in the Bamboo build.
5. Next, define conditions for when to fail a build:
  - **Threshold Count**: The minimum number of findings required to fail the build.
  - **Threshold Severity**: The minimum severity at which to count a finding towards the threshold count.
  - **Threshold Vulnerability Type**: The type of finding required to count a finding towards a threshold count.

**NOTE**

Using the **Any** option means that any severity or vulnerability type is counted towards the maximum threshold count.

6. Select **Add New Threshold Condition** to configure multiple conditions for each task.
7. Select **Save**.
8. Enable the build plan by selecting the checkbox in the bottom left.

## Integrate with Bugzilla

To integrate with Bugzilla:

1. Go to **Organization settings > Integrations** in the **user menu**.

2. Select **Connect** in the Bugzilla row.
3. In the window that appears, complete the Bugzilla properties fields:

Field	Description
Name	A name for the bugtracker entry. It will be displayed when sending findings to bugtrackers
Username	The username for the account connected with Bugzilla
Password	The password for the username specified
Host	The URL of the Bugzilla instance
Application	The application you would like to map to a Bugzilla product/component
Product	The product in Bugzilla to map to the application
Component	The component in Bugzilla to map to the application
Version	The version in Bugzilla to map to the application
Priority	The priority to use when exporting findings to Bugzilla

4. Select **Test Connection** to verify communication. This ensures that Contrast can communicate and authenticate with the Bugzilla instance, and verifies the existence of the specified **Product**, **Component** and **Version**.

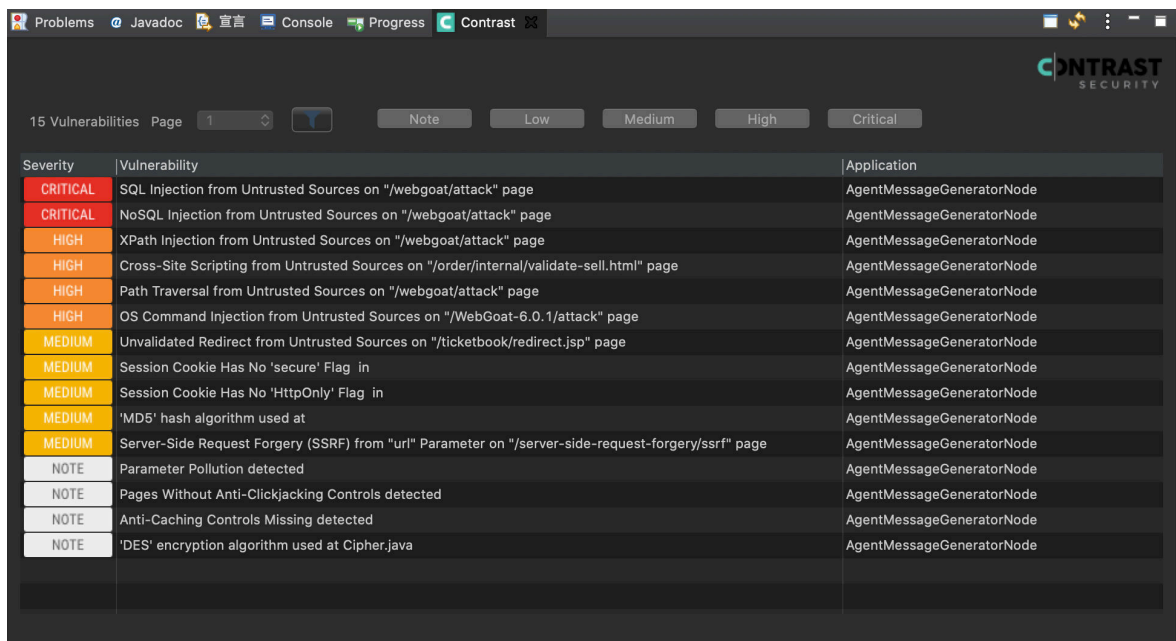
## Eclipse

For applications instrumented with a Contrast agent, you can view vulnerability information directly in the Eclipse IDE during development for faster remediation. You will see affected lines of code and can view more details about the vulnerability in Contrast.

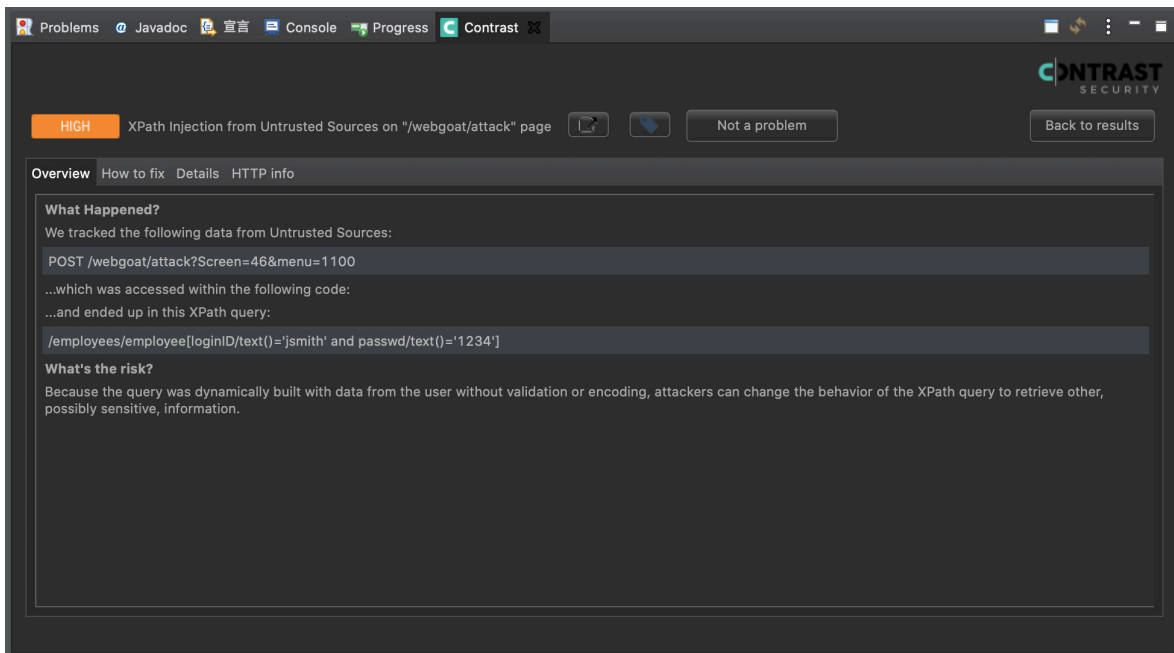
This plugin is available for Mac/OS, Linux, and Windows and supports the latest versions of Eclipse.

To install the Eclipse plugin, visit the [Eclipse marketplace](#) or:

1. In Eclipse, select **Help > Eclipse Marketplace**.
2. Search "Contrast Security".
3. Select **Install**.
4. Configure the plugin at **Window > Show View > Other**.
5. Search "Contrast" and add the view that appears in the search.
6. Enter the **Username**, **API Key**, **Organization ID** and **Service Key** in the configuration page. You can [find these keys \(page 421\)](#) in user settings.
7. Select **Add**.
8. The **Vulnerabilities** view shows a list of all the vulnerabilities from Contrast. You can sort and filter them.



9. Select the vulnerability title for information about that particular vulnerability. From there you can select **How to fix** for remediation instructions to fix the vulnerability. Select **Details** and double-click on the Java stack traces to focus on a particular source code line. You can also change the vulnerability status here.



10. Select the **Go to page** icon to open Contrast and see more vulnerability information.

## Generic webhooks

Contrast supports a generic webhook integration to receive notifications on any URL that receives POST messages. You can add [custom variables \(page 574\)](#) to your payload like `$ApplicationName` and `$ServerId` when a [Contrast event \(page 577\)](#) triggers them.

### Connect

To connect a generic webhook:

1. Retrieve the URL from which you want Contrast to receive notifications.
2. In the user menu, select **Organization settings > Integrations**.
3. In the **Generic webhook** integration option, select **Connect**.
4. Name the webhook, and paste the URL in the designated field.
5. Select the application(s) that you want to filter.
6. In the **Payload** field, enter a [variable \(page 574\)](#). For example:

```
{
  "title": "$Title",
  "message": "$Message"
}
```


7. Select **Add**.

**NOTE**

If this webhook fails to return a successful response after 5 attempts, it will be disconnected. To restore the configuration, you must retest the connection and resave it.

You can configure the integration so that all Organization Administrators are notified in the Contrast application and by email when Contrast disconnects a generic webhook.

To do this, go to the same location: **Organization settings > Integrations > Generic webhook > Show configurations**. Select the name of the connection you want to configure. Then select the **Notify on disconnect** checkbox to receive notifications and click **Save**.

Connect with  **webhook** ×

Name  
Name this webhook

URL ?  
Incoming webhook URL

Applications  
All applications (13)

Payload (Optional) ?

Send as HTML

**Notify on disconnect**  
If this webhook fails to return a successful response after 5 attempts, it will be disconnected. All organization administrators will be notified in Contrast and by email.

Cancel Test URL Add

**Generic webhook variables**

You can customize your [generic webhook \(page 573\)](#) response with data from Contrast events such as `NEW_VULNERABILITY` and `SERVER_OFFLINE`. Each event contains variables you can call in your payload request. Variables are either for general use or for an application, server or vulnerability.

Variables	Description
<b>General variables</b>	
\$EventType	The event type responsible for triggering the webhook For example: SERVER_OFFLINE
\$Message	A message summarizing the event that triggered the webhook
\$OrganizationId	The unique ID Contrast assigns to an organization when it is created
\$OrganizationName	The name of your organization
\$Title	Always returns "Contrast Security"
<b>Application variables</b>	
\$ApplicationChild	Returns true if the application is a child application, false if not
\$ApplicationCode	A secondary shorthand that appears in the title of an application, and is blank by default For example: TEST
\$ApplicationContext-Path	The context path of the application For example: /example/somethingelse
\$ApplicationFirstSeen	When the application was first seen, in Unix time For example: 1572033840000
\$ApplicationHasParentApp	Returns true if the application has a parent, false if not
\$ApplicationImportance	Enumerated value of the application Importance level For example: MEDIUM
\$ApplicationId	The unique ID Contrast assigns to an application when it is created For example: 49fe2978-1833-4441-83db-2b7o486d9413
\$ApplicationImportanceDescription	The importance level assigned to the application For example: Medium
\$ApplicationLanguage	The programming language of the application
\$ApplicationLastSeen	When the application was last seen, in Unix time For example: 1572033840000
\$ApplicationLicenseLevel	Whether or not the application has an Assess license Values: Licensed, Unlicensed
\$ApplicationMaster	Returns true if the application is a primary application, false if not
\$ApplicationName	The name of the application
\$ApplicationParentAppId	The unique ID Contrast assigns to an application when it's created, in this case, the parent application, if it exists For example: 49fe2978-1833-4441-83db-2b7o486d9413
\$ApplicationTags	A comma separated list of the Application tags.
\$ApplicationTotalModules	The number of modules your application has
<b>Server variables</b>	
\$Environment	The environment of the server For example: DEVELOPMENT or PRODUCTION
\$ServerId	The ID of the server involved in the event If more than one server is involved, this is a comma-delimited list of server IDs.
\$ServerName	The name of the server involved in the event If more than one server is involved, this is a comma-delimited list of server names
<b>Vulnerability variables</b>	
\$Severity	If this event is triggered by a vulnerability, this is the severity of the vulnerability
\$Status	If this event is triggered by a vulnerability, this is the status of the vulnerability
\$TraceId	If this event is triggered by a vulnerability, this is the vulnerability ID
\$VulnerabilityAgentLanguage	The application language or framework name of the where the vulnerability was discovered (for example, .Java, .NET, Ruby, and so forth.)
\$VulnerabilityAppVersionTags	The application versions the vulnerability is found in For example: v1.2.3

Variables	Description
\$VulnerabilityAutoRemediatedExpirationPeriod	Auto-remediated expiration period for the vulnerability, in Unix time For example: 1572033840000
\$VulnerabilityBugTrackerTickets	A comma delimited list of tickets created when the vulnerability was sent to bugtracker For example: ticket1, ticket2, ticket3
\$VulnerabilityCategory	The category of vulnerability found For example: Injection
\$VulnerabilityClosedTime	When the vulnerability was closed, in Unix time For example: 1572033840000
\$VulnerabilityConfidence	Confidence of the vulnerability
\$VulnerabilityDefaultSeverity	Default severity of the vulnerability
\$VulnerabilityDiscovered	When the vulnerability was first discovered, in Unix time For example: 1572033840000
\$VulnerabilityEvidence	The evidence of the vulnerability
\$VulnerabilityInstanceId	The unique ID Contrast assigns to a vulnerability instance when it is created For example: R33T-N00B-TGIF-RM6P
\$VulnerabilityFirstTimeSeen	When the vulnerability was first seen, in Unix time For example: 1572033840000
\$VulnerabilityImpact	The impact level of the vulnerability Values: Low, Medium, High
\$VulnerabilityLastTimeSeen	Last time the vulnerability was seen, in Unix time For example: 1572033840000
\$VulnerabilityInstanceLastTimeSeen	Last time the vulnerability was seen, in Unix time For example: 1572033840000
\$VulnerabilityLicenseLevel	License level of the vulnerability
\$VulnerabilityLikelihood	The likelihood of the vulnerability Values: Low, Medium, High
\$VulnerabilityReportedToBugTracker	When the vulnerability was sent to a bugtracker, in Unix time For example: 1572033840000
\$VulnerabilityReportedToBugTrackerTime	Returns true If the vulnerability was sent to a bugtracker
\$VulnerabilityRule	Rule associated with the vulnerability
\$VulnerabilityRuleName	Name of the rule associated to the vulnerability
\$VulnerabilityRuleTitle	Title of the rule associated to the vulnerability
\$VulnerabilitySubStatus	Substatus of the vulnerability
\$VulnerabilityTags	Custom tags associated with the vulnerability For example: my-custom-tag
\$VulnerabilityTitle	Title of the vulnerability
\$VulnerabilitySubStatusKeyCode	Key code of the vulnerability substatus
\$VulnerabilityTotalTracesReceived	Total number of times the vulnerability was received
\$VulnerabilityUuid	The unique ID used to look up a vulnerability
\$VulnerabilityVisible	true if the vulnerability is licensed and visible, false if not
\$VulnerabilityRule	If event is triggered by a vulnerability, this is the rule that the vulnerability violated
\$VulnerabilityTags	If event is triggered by a vulnerability, this is a comma-delimited list of tags associated with the vulnerability



## Events and generic webhook variables

You can customize your [generic webhook \(page 573\)](#) response with data from Contrast events such as `NEW_VULNERABILITY` and `SERVER_OFFLINE`. Each event contains [general \(page 575\)](#), [application \(page 575\)](#), [server \(page 575\)](#) or [vulnerability \(page 575\)](#) variables you can call in your payload request.

Event	Variables
ATTACK_END	<a href="#">General (page 575)</a> , <a href="#">Application (page 574)</a> , <a href="#">Server (page 575)</a>
ATTACK_EVENT_COMMENT	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a> , <a href="#">Server (page 575)</a>
ATTACK_UPDATE	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a> , <a href="#">Server (page 575)</a>
EXPIRING_LICENSE	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a>
NEW_ASSET (if new application)	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a> and <a href="#">Server (page 575)</a> (if new application)
NEW_ATTACK_APPLICATION	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a> , <a href="#">Server (page 575)</a>
NEW_ATTACK_UPDATE	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a> , <a href="#">Server (page 575)</a>
NEW_ATTACK	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a> , <a href="#">Server (page 575)</a>
NEW_VULNERABILITY_COMMENT	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a> , <a href="#">Server (page 575)</a> , <a href="#">Vulnerability (page 575)</a>
NEW_VULNERABILITY	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a> , <a href="#">Server (page 575)</a> , <a href="#">Vulnerability (page 575)</a>
NEW_VULNERABLE_LIBRARY	<a href="#">General (page 574)</a> , <a href="#">Application (page 575)</a>
SERVER_OFFLINE	<a href="#">General (page 575)</a> , <a href="#">Server (page 575)</a>
VULNERABILITY_CHANGESTATUS_CLOSED	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a> , <a href="#">Server (page 575)</a> , <a href="#">Vulnerability (page 575)</a>
VULNERABILITY_CHANGESTATUS_OPEN	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a> , <a href="#">Server (page 575)</a> , <a href="#">Vulnerability (page 575)</a>
VULNERABILITY_DUPLICATE	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a> , <a href="#">Server (page 575)</a> , <a href="#">Vulnerability (page 575)</a>

## Integrate with GitHub

Set up an integration to automatically send issues to GitHub when Contrast finds them in your applications.

Before you start, be sure you have:

- GitHub account credentials (username and personal access token). When you [generate your personal access token](#), be sure to enable the **repo** permissions.
- Access to a GitHub organization and repository for the application.
- Write permission ([push access](#)) to the repository. This is required to set labels, milestones and assignees in the configuration form.
- A running GitHub instance accessible via HTTP to Contrast.

To connect with GitHub:

1. Go to **Organization settings > Integrations** in the **user menu**.
2. Click **Connect** in the row for GitHub.
3. In the **Connect with GitHub** form, add the name for the bugtracker entry, the username for the account connected to GitHub and the password for the specified username in the appropriate fields. The GitHub URL must be accessible from the Contrast instance being configured.
4. Automatically create issues in GitHub for newly discovered vulnerabilities by checking the box at the bottom of the configuration form. In the multiselect field that appears, choose the **Rules** and **Severity** levels of the vulnerabilities for which you want to generate tickets. The default selections are **Critical** and **High**.
5. Once you complete the fields, select **Test connection**. This process may take a few moments depending on the number of your GitHub organizations and repositories. The test verifies that the GitHub instance can be reached by Contrast and that the specified user is able to log in.

- Once a connection is made, select the **Applications** that you want to be available to this bugtracker.
- Select the values for the **GitHub organization** and **Repository** fields using the dropdowns.

**NOTE**

If you change the **GitHub organization** or **Repository** values, you must re-enter the values for optional fields.

- Optionally, add **Labels**, **Assignees** and a **Milestone** for GitHub issues using the given fields.

**NOTE**

For multiple vulnerabilities sent in bulk to GitHub as a single issue, the GitHub ticket status applies to all vulnerabilities associated with that ticket. For multiple issues tied to a single vulnerability, the vulnerability can only be closed when all the tickets are closed.

## Gradle plugin

The Contrast Gradle plugin is used to integrate the *Contrast.jar* with your build. It's capable of authenticating to Contrast, downloading the latest Java agent and verifying your build.

**NOTE**

**Gradle** is a build tool that utilizes `build.gradle` files to configure your applications. It's used to build, package, and test various types of applications.

## Clone a sample web application

The easiest way to set up a project is to clone our sample Gradle-based web application. This application has been migrated from Maven to Gradle and relies on MongoDB.

- Install and set up the database path.

```
git clone https://github.com/Contrast-Security-OSS/Contrast-Sample-Gradle-Application
brew install mongodb
sudo mkdir -p /data/db
brew services start mongodb
```

- An application is ready to run. Open the *Contrast-Sample-Gradle-Application/build.gradle* file. Scroll to find the `contrastConfiguration` extension. You can find all of the values in your [personal keys \(page 421\)](#) except `appName` and `serverName`.

```
contrastConfiguration {
    username = "username"
    apiKey = "apiKey"
    serviceKey = "serviceKey"
    apiUrl = "apiUrl"
    orgUuid = "orgUuid"
    appName = "editLATER"
```

```
serverName = "editLATER"
}
```

3. Install the Contrast JAR file by calling the `contrastInstall` task. This installs the Contrast JAR in the project's build directory.

```
cd path/to/Contrast-Sample-Gradle-Application
gradle build -x test contrastInstall
```

4. Run the application with the Java agent. The server starts.

```
cd path/to/Contrast-Sample-Gradle-Application/build
java -Dcontrast.agent.java.standalone_app_name=mytestapp -Dcontrast.server=mytestserver
```

5. Check that the application is running at `localhost:8080` and that the application shows up in Contrast.
6. In Contrast, verify that the application with the `appName` specified in the command above shows up.
7. In the Contrast-Sample-Gradle-Application project's `build.gradle`, edit the `contrastConfiguration` to specify the `appName` and `serverName` specified as options with the Java agent in the previous step.

```
contrastConfiguration {
    username = "alreadySetup"
    apiKey = "alreadySetup"
    serviceKey = "alreadySetup"
    apiUrl = "alreadySetup"
    orgUuid = "alreadySetup"
    appName = "mytestapp"
    serverName = "mytestserver"
}
```

8. Run the verification task at any time to check for vulnerabilities.

```
gradle build contrastVerify -x test
```

## Use the plugin

The plugin code can be viewed in our [GitHub repository](#). Here you can review the two tasks added by the plugin, `contrastInstall` and `contrastVerify`, and how they work.

The latest version of the plugin can be found on the [Gradle plugin webpage](#).

Task	Description
<code>contrastInstall</code>	<p>Installs a Contrast Java agent to your local project. The plugin edits the <code>org.gradle.jvmargs</code> property in the <code>gradle.properties</code> file to launch the JVM with the Contrast agent. An application version, by which the vulnerabilities are filtered in the <code>contrastVerify</code> task, is generated during this task. The plugin generates the application version in the following order:</p> <ul style="list-style-type: none"> <li>• If your build is running in TravisCI, Contrast uses <code>appName-\$TRAVIS_BUILD_NUMBER</code>.</li> <li>• If your build is running in CircleCI, Contrast uses <code>appName-\$CIRCLE_BUILD_NUM</code>.</li> <li>• If your build is running in neither TravisCI nor CircleCI, Contrast generates one in the format <code>appName-yyyyMMddHHmm</code>. (Where <code>yyyyMMddHHmm</code> is the time of the build generation.)</li> </ul>
<code>contrastVerify</code>	Checks for new vulnerabilities in your web application.

## Contrast IntelliJ plugin

Use the IntelliJ plugin to see vulnerability information for instrumented applications from the IntelliJ IDE.

The plugin directs you to the affected line of code inside IntelliJ, and you can view more details in the Contrast console. This way, developers can get application security feedback at the time of development for faster remediation.

The plugin supports IntelliJ versions 2017.1.5 and later.

## Install, configure, and use the IntelliJ plugin:

1. For Windows, go to **File > Settings > Plugins > Browse Repositories**.  
For OSX, go to **Preferences > Plugins > Search in Repositories**.
2. Search for **Contrast Security**.
3. Select **Install**.
4. For Windows, go to **File > Settings > Contrast**.  
For OSX, go to **Preferences > Other settings > Contrast**.
5. Enter the **Contrast URL**, **Username**, **Service key**, **API key**, and **Organization ID**. You can find these in your [profile \(page 421\)](#).
6. Select **Add** to add a new organization.
7. Select **Refresh** in the Contrast window to update the list of vulnerabilities. The **Vulnerabilities** view in IntelliJ shows a list of all the vulnerabilities from Contrast.  
To sort vulnerabilities, select the column header. Select the funnel icon to use a filter. Select the name of a vulnerability to see more details.

## Configure the Java agent for IntelliJ

To add the Contrast agent to an application using IntelliJ IDE's supported application servers:

1. Click **Run** in the application toolbar, and then click the **Edit Configuration** menu item from the drop-down menu.
2. Select the IntelliJ Server configuration instance.
3. Select the **Server** tab, and enter the Contrast launcher string in **VM Options**: `-java-agent : <YourContrastJarPath>`. Substitute `<YourContrastJarPath>` with the path to your [Contrast JAR \(page 50\)](#).
4. Click **Apply** and then click **OK**.
5. Start the **Server**.  
A Contrast startup message should appear in the **Server** console. (Allow one to two extra minutes for server startup.)
6. Navigate to your application and allow an extra minute for it to start up.

## Contrast Jenkins integration

**Jenkins** is a continuous integration (CI) tool that automates the process of building, testing, deploying, and running applications.

With the Contrast plugin for Jenkins, you can add application security gates to this pipeline. These gates contain criteria that can fail the Jenkins job for a vulnerable application with a build result like "Failure" or "Unstable".



### TIP

You can view the plugin source code in the [Jenkins Github repository](#).

Use these versions to ensure compatibility:

Jenkins	Contrast-Jenkins plugin	Contrast
2.60.3	3.4	3.7.6
2.60.3	3.7	3.7.10

Jenkins	Contrast-Jenkins plugin	Contrast
2.60.3	3.8	3.8.0

## Install and use Jenkins plugin

1. [Define a connection \(page 581\)](#) between Contrast and Jenkins.
2. Depending on your situation, decide how you will use Jenkins:
  - If you are using freestyle jobs, you can define vulnerability security controls at a [system level \(page 582\)](#) or as a [post-build action step \(page 583\)](#).
  - Define vulnerability security controls for [pipeline steps \(page 583\)](#).
  - Optionally, a Contrast Organization Administrator define a [job outcome policy \(page 584\)](#).
3. [Run a build \(page 588\)](#).

## See also

- [Connect with Jenkins \(page 581\)](#)
- [Define security controls \(page 582\)](#)
- [Define a job outcome policy \(page 584\)](#)
- [Run a build \(page 588\)](#)

## Connect

### Before you begin

- All Contrast Security integrations require an [organization admin role \(page 745\)](#) in order to set up the connection.
- [Install Jenkins](#).
- Have already setup a [Jenkins pipeline](#).

### Define a connection

To define a connection to Contrast in Jenkins:

1. Select **Manage Jenkins** in the left sidebar of your Jenkins dashboard.
2. Select **Manage Plugins** under **System Configuration**.
3. Check to enable the **Contrast Continuous Application Security** plugin under the **Installed** tab.
4. Select **Manage Jenkins** again.
5. Select **Configure System** to find the **Contrast Connections** section.
6. Enter your **Contrast username**. Your username is the email address you use for your account in Contrast.
7. Enter the:
  - **Contrast API key**,
  - **Contrast service key**,
  - **Contrast URL** , and
  - **Organization ID**.You can find these in [your profile \(page 421\)](#) under **User settings > Profile > Your keys**.
8. Select a **Result of a vulnerable build** to choose how you want Contrast to mark your Jenkins job when your application is too vulnerable:
  - **Failure**
  - **Unstable**
  - **Success**
  - **Not\_built**
  - **Aborted**

9. Check the box next to **Apply this vulnerable build result to the job when Jenkins encounters an error with Contrast** if you want the Jenkins job to automatically fail whenever your Jenkins instance can't find your application.
10. You can define the criteria that the Contrast plugin will use to determine whether an application is too vulnerable at the Jenkins system level. Check the box next to **Allow global Contrast Vulnerability Threshold Conditions to be overridden in a Job configuration** if you want job level controls to override system level controls. Leave the box unchecked if you want to enforce consistency of criteria across all Jenkins jobs in your instance.

**NOTE**

If you are using a [job outcome policy \(page 584\)](#) to set security controls, those policies will override any policies set at the job level or system level.

11. Click **Test Contrast connection** to make sure that the plugin can authenticate to Contrast and retrieve information about your applications' vulnerabilities.
  - A success message displays when plugin is authenticated.
  - If unsuccessful, check that the URL you received from Jira and the one you posted in Contrast are matching.

**See also**

- [Define security controls \(page 582\)](#)
- [Define a job outcome policy \(page 584\)](#)
- [Run a build \(page 588\)](#)

**Jenkins security controls**

You can define security controls for Jenkins:

- [At a system level \(page 582\)](#),
- [as a post-build action step \(page 583\)](#),
- [or for pipelines. \(page 583\)](#)

**Define security controls at a system level**

After you [define a connection \(page 581\)](#) in Jenkins, define if you are using freestyle jobs, you may want to set Contrast vulnerability security controls at a system level. Alternatively, you can [set security controls at a job level \(page 583\)](#), or if you use a [job outcome policy \(page 584\)](#) those security controls will take precedence.

1. Under **Contrast Connections > Contrast Vulnerability Security Controls**, select a **Connection** you have previously created, from the dropdown.
2. Set the **Number of Allowed Vulnerabilities**. This number is exclusive; if you set it to "5", Jenkins will fail if there are six or more vulnerabilities. This field is required.
3. Choose a **Vulnerability Severity** from the options in the dropdown. (These are the same [vulnerability severity options \(page 537\)](#) in Contrast.) The plugin sets a filter in the API call for all vulnerabilities greater than or equal to this field. This field is not required, but selecting it will narrow your results. So if the number is set to "5" and the severity to **High**, Jenkins will fail if there are six or more critical vulnerabilities.
4. Choose a **Vulnerability Type** (rule name) from the dropdown. The plugin checks for the number of vulnerabilities with the rule type selected and compares it to the number of allowed vulnerabilities for that rule. This field is not required, but selecting it will narrow your results. You can choose one severity and one rule type per security control.
5. Choose from the list of **Vulnerability Statuses**. Statuses aren't required, but can be helpful. For example, select **Confirmed** and **Suspicious** to only return vulnerabilities with an open status. Leave this blank if you don't want to filter vulnerabilities by statuses.

You can add multiple vulnerability security controls, but the plugin will fail the job on the first bad condition. The plugin will set the build result on the first violated vulnerability security control.

### Define security controls as a post-build action step

After you have set security controls at the [system level \(page 582\)](#) in Jenkins, you can also add security controls at a job level for freestyle jobs that are not part of a Jenkins Pipeline. To do this:

1. When defining a job in Jenkins, find the **Post-Build Actions** section.
2. Select a **Connection** you have previously created, from the dropdown.
3. Choose your application. This field is required.
  - If your application has been instrumented, select your application from the **Choose your application** dropdown.
  - If your application has not yet been instrumented, indicate your application using the **Application Name** and **Application Language** fields. You must provide the same application name in Jenkins that you will use when you do instrument your application. Contrast will use that same name and language during the post-build action step after the application has been instrumented.
4. If the connection is configured to [allow the system-level vulnerability security controls to be overridden \(page 582\)](#), you can override that setting by checking the box next to **Override Vulnerability Security Controls at the Jenkins system level**.  
If you do this, you will also need to indicate the **Number of Allowed Vulnerabilities**, **Vulnerability Severity**, **Vulnerability Type**, and **Vulnerability Statuses** for this job.
5. Select how you want to query vulnerabilities by selecting an option under **Query vulnerabilities by**. That way, only those vulnerabilities found from that job will be considered. By default, the plugin uses the first option: `appVersionTag, format: applicationId-buildNumber`.

### Define vulnerability security controls for pipelines in Jenkins

You can use the `contrastAgent` pipeline step to download the Contrast agent, then instrument and exercise your application. You can use the `contrastVerification` pipeline step to verify your application and set parameters for a security control.

#### Download with contrastAgent

A pipeline step with the name `contrastAgent` downloads the latest Contrast agent.

Parameter	Required	Description	Examples
<code>profile</code>	Required	Contrast connection profile used to communicate with Contrast	<code>MyConnection</code>
<code>outputDirectory</code>	Required	This defines where to put the downloaded agent.	<code>env.WORKSPACE</code>
<code>agentType</code>	Required if <code>applicationId</code> is not defined.	Type of agent used to instrument the application (not case sensitive) Options are: Java, .NET, .NET_Core, Node, Ruby, Python	Java

Here is an example of how to add a pipeline step with the name `contrastAgent` :

```

•
node{
  stage('Download Latest Contrast Agent'){
    contrastAgent profile:'MyConnection', outputDirectory: env.WORKSPACE, agentType: '
  }
}

```

#### Verify application with contrastVerification

You can use a pipeline step with the name `contrastVerification` to verify whether an application is vulnerable.

Parameter	Required	Description	Examples
profile	Required	Use <code>profile</code> to specify the connection used to communicate with Contrast.	Contrast Connection
queryBy	Required	Use <code>queryBy</code> to filter build-related vulnerabilities. For options 1, 2 and 4, this value must match the <code>contrast.override.appversion</code> parameter that was passed to the Contrast agent when running your application.  Enter the option number for how you want to query vulnerabilities (defaults to 1):  1. <code>appVersionTag</code> , format: <code>applicationId-\${BUILD_NUMBER}</code> 2. <code>appVersionTag</code> , format: <code>applicationId-\${JOB_NAME}-\${BUILD_NUMBER}</code> 3. <code>startDate</code> (This is the build timestamp. It only looks at vulnerabilities discovered after the build starts.) 4. <code>APPVERSIONTAG</code> (This is the job parameter or environment variable. Select this option if you want to specify your own text, then export <code>APPVERSIONTAG</code> as an environment property within your Jenkins job. Both <code>JOB_NAME</code> and <code>BUILD_NUMBER</code> are already available as Jenkins environment properties.)	1
applicationId	Required, if <code>applicationName</code> and <code>agentType</code> are not defined.	The ID of the application or application module you are trying to verify	cb3ea678-38c8-4487-ba94-692a117e7966
applicationName	Required, if <code>applicationId</code> is not defined	The name of the application you are trying to verify (not case sensitive)	MyApp
count	Optional	The total number of allowed vulnerabilities, defaults to 0	10
rule	Optional	Defaults to <b>All</b>	xss
severity	Optional	Defaults to <b>All</b> . Other options are <b>Critical</b> , <b>High</b> , <b>Medium</b> and <b>Low</b> .	<b>High</b>
appVersionTag	Optional	The value that was passed to the <code>contrast.override.appversion</code> parameter of the Contrast agent	v1.2.3

Here are some examples of how to add a pipeline step with the name `contrastVerification` :

- **Use `queryBy startDate`:**

```
contrastVerification applicationId: '1e6ad9c6-89d4-4f06-bdf6-92c569ec89de', count: 1,
```

- **Use `queryBy custom appVersionTag` parameter:**

```
contrastVerification applicationId: '1e6ad9c6-89d4-4f06-bdf6-92c569ec89de', count: 1,
```

- **Use `applicationName` and `AgentType` to define the application:**

```
contrastVerification applicationName: 'MyApp', agentType: 'Java', count: 1, profile: '1
```

- **Verify an application with a preset or overridden vulnerability security control.**

If you know that the vulnerability security control has been preset in [Contrast \(page 584\)](#), then you only need to define the profile and either the `applicationId` or (`applicationName` and `agentType`):

```
contrastVerification applicationId: '35ae7b89-1c76-414b-b317-c444ce27608b', profile: '1
```

## Define a job outcome policy

Job outcome policies (supported in the Contrast Jenkins integration version 3.3 and later) assign build outcomes to Jenkins jobs that use the Contrast plugin. These policies mark jobs with a build outcome status such as **Failure**, **Unstable**, or **Success** based on criteria you set.



## Before you begin

You must be an Organization Administrator to define a job outcome policy in Contrast.

## Define a policy

To define a job outcome policy:

1. Under [organization settings \(page 633\)](#), select **Integrations** in the left navigation.
2. In the **Jenkins** row, select **Add job outcome policy**.

**Define Jenkins job outcome policy**

Job outcome policies assign a build outcome to Jenkins jobs for the applications you choose and vulnerability properties you define. [Learn more](#)

Name \*

Applications

Application names

All applications (823) ×

**Vulnerability properties**

Environments

All Environments (3) ×

Vulnerability rules and severities ⓘ

All Rules

Number of allowed vulnerabilities ⓘ

vulnerabilities

[+ Add another rule](#)

Vulnerability statuses

Reported × Confirmed × Suspicious ×

Vulnerability first seen

From Application onboarding Until Contrast step runs in Jenkins

Apply the **Query vulnerabilities** by selection from the plugin when filtering vulnerabilities.

**Policy outcome**

If the policy is violated, assign a job outcome of:

Failure  
 Unstable  
 Success

ⓘ For applications with conflicting job outcome policies, the policy with the most severe outcome will apply.

Enable this job outcome policy

3. Define a name for the job outcome policy (required).
4. Under **Applications**, indicate the applications to which the policy should apply. You can identify applications by their name, importance level, or tag. If you select by application name, you can select individual or [merged applications \(page 428\)](#).
5. Under **Vulnerability properties**, define a limit of which vulnerabilities, in which environments will be included in the policy. Use the **Environment**, **Vulnerability status** and **Vulnerability first seen** to filter the vulnerabilities that you want to include in this policy. Use the **Vulnerability rules and severities** to set a threshold for how many of those rules (at a particular severity) will trigger the outcome status change.
  - **Environment(s)**: Select the environment where you want to apply the policy. For example, to block vulnerabilities from moving from test (QA) to production, select **QA**. (However, if you do that, vulnerabilities in the development environment are not considered.

Select **Development** to also include those vulnerabilities. Or select **All environments** if you want vulnerabilities from all environments to be included.)

- **Vulnerability statuses:** Select which statuses will be included. [Statuses \(page 533\)](#) are determined by Contrast.



#### TIP

In most cases, you should only select open statuses like **Reported**, **Confirmed**, and **Suspicious** (rather than closed statuses like **Not a problem**, **Remediated** or **Fixed**). That way, Jenkins jobs won't fail or turn unstable due to vulnerabilities that developers have already remediated.

- **Vulnerability first seen:** Set a time range for the vulnerabilities you'd like to include in this policy according to when they were first seen.

Use **From** and **Until** fields to set the beginning and end of the time range. Select the beginning of the time range to be: the **Job start time**, a predetermined period of time before the Contrast step runs, or the day of **Application onboarding**. Select the end of the time range to be a predetermined number of days before the Contrast step runs, or until the Contrast step runs in Jenkins, or choose an option for a specific amount of time. You can also select **Custom** to choose a specific date for either field.

If vulnerabilities were first found outside of this time range, they will not be included in the policy.



#### TIP

To incentivize developers to remediate vulnerabilities within a time period (for example, a week), define the policy so that only vulnerabilities found more than 7 days ago would be considered for policy violation. To do this, set **From** to **Application onboarding** and **Until** to **Last 7 days**.

- **Vulnerability rules and severities:** Use this section to set a threshold for the number, type and severity of vulnerabilities you want the policy to allow.

For each rule, select the **Severity** or **Assess rule type**, and then the **Number of allowed vulnerabilities**. Select **Add another rule** to add multiple rules.

The **Number of allowed vulnerabilities** determines how many vulnerabilities of this severity will be permitted without affecting this build. If you set it to "0", then a single vulnerability will change the build outcome status. If you set it to "10", then the build outcome status won't change until 11 vulnerabilities of that type are found. If you leave the **Number of allowed vulnerabilities** blank for a specific rule type or severity, it will allow *all vulnerabilities* of that rule type or severity.

For example, if you set this to **All rules** and 1 vulnerability, any single vulnerability would trigger the policy. You could also limit this policy to 5 critical vulnerability rules and 2 cross-site-scripting vulnerability by adding another rule.

- Check the box next to **Apply the "Query vulnerabilities by" selection from the plugin when filtering vulnerabilities**. You can define how to query vulnerabilities in a Jenkins job either using the Contrast Assess [post build step \(page 583\)](#) or [pipeline step \(page 583\)](#). For example, you can use the `AppVersionTag`, or the date when the vulnerability was last seen. If this checkbox is checked, then the query is included when the job outcome policy is evaluated.

This example shows possible rules and settings for a job outcome policy that will change the outcome status in Jenkins if these conditions are met.

## Vulnerability properties

### Environments

QA ×

### Vulnerability rules ?

All rules ▾

Critical ▾

SQL Injection ▾

### Number of allowed vulnerabilities ?

3	vulnerabilities	
0	vulnerabilities	×
-	vulnerabilities	×

+ Add another rule

### Vulnerability statuses

Reported × Confirmed × Suspicious ×

### Vulnerability first seen

From: Application onboarding ▾

Until: The Contrast step runs i... ▾

With this example, the following vulnerabilities will be considered for policy violation:

- All vulnerabilities found on a server designated as a QA environment.
- All vulnerabilities that have a status of **Reported**, **Confirmed** or **Suspicious**.
- Any vulnerability that was first discovered between application onboarding and when the Contrast step runs in Jenkins.

The policy will be violated and the outcome status will change, if at least ONE of these occur:

- There is at least 1 **Critical** vulnerability.
- There are at least a combined total of 4 **High**, **Medium**, **Low** or **Note** severity vulnerabilities of any rule type except SQL injection.



### NOTE

Vulnerabilities are only counted once, with precedence given to the most specific setting (for example, a particular rule type) to the least specific (**All rules**). If vulnerability limits are set for both a rule type and its severity level, the vulnerabilities will be included in the rule type count, but not in the severity's vulnerability count. So in this example, **Critical** vulnerabilities are counted under severity, but **High**, **Medium**, **Low** and **Note** severities are combined under **All rules**.

6. Under **Policy outcome**, select the outcome of the policy. Contrast marks jobs that match the selected criteria as **Failure**, **Unstable**, or **Success**. For applications with multiple job outcome policies, the most severe outcome from all violating policies will apply.
7. At any point, you can use uncheck the box next to **Enable this job outcome policy** to pause Contrast from enforcing policies on Jenkins jobs without having to delete the individual policy.

## Run a build

To run a build for the first time:

1. In Jenkins, select the job or project you want to run.
2. In the menu on the left, select **Build Now**.
3. To see more details, you can view the log output.
4. If you are using a freestyle job, you can view data from the task. Select the run and, in the left menu, select **Vulnerability Report**.



### IMPORTANT

You may also see a chart in the job or project overview, however the chart is not visible if you used a Contrast pipeline step, or if at least one of the applications selected is being overridden by a job outcome policy.

## Integrate with Jira

Integrate Jira with Contrast to automatically generate tickets, synchronize comments and push notifications for your applications.

Before you begin, you must have:

- Jira account credentials. For Jira Cloud, this is username and API key. For on-premises Jira installations, this is username and password.
- Permission to create issues in the target project.
- A running Jira instance accessible via HTTP to Contrast.
- A project to associate with an application that is already instrumented in Contrast.

### See also

- [Connect with Jira \(page 588\)](#)
- [Configure Jira for Assess \(page 589\)](#)
- [Configure Jira for Serverless \(page 590\)](#)
- [Manager Jira credentials \(page 591\)](#)

## Connect to Jira

To integrate Jira with Contrast:

### Setup Contrast for Jira

1. In Contrast, go to the **user menu > Organization settings > Integrations**.
2. Select **Connect** for the Jira integration.
3. In the **Setup Contrast with Jira** section, add a name for the Jira integration, the username and the API key (or password for Jira that is on-premises only). Add the URL for the Jira instance, and be sure that Contrast can access the URL.
  - Enter a **name** for the Jira integration.
  - Add the **URL** for the Jira instance.
  - Select **Assess** or **Serverless**.



### NOTE

Contrast saves the username, API key or password, and the URL for Jira as a set of credentials for this integration.

4. Select **Test connection**. The test may take a few moments, if you have many Jira projects. The test confirms that Contrast can reach the specific Jira instance and the user can log in.
5. After testing the connection, configure [Jira for Assess \(page 589\)](#) or [Jira for Serverless \(page 590\)](#).

## See also

- [Configure Jira for Assess \(page 589\)](#)
- [Configure Jira for Serverless \(page 590\)](#)
- [Manage Jira credentials \(page 591\)](#)

## Configure Jira for Assess

After testing your Jira connection, you can configure Jira to create tickets based on triggers you've set.

## Before you begin

- Successfully [connected with Jira \(page 588\)](#)

## Steps

1. After Contrast connects to Jira, select **Applications** to add the Contrast applications that will trigger Jira tickets for security issues. You can also trigger Jira tickets only for applications with specific importance levels in Contrast. Select **Application importance** and add the application levels you want to use as a filter for Jira tickets.

2. Use the **Project name**, **Default epic**, **Default assignee** and **Default issue type** fields to set custom values for Jira tickets that Contrast creates. You can also map vulnerability severity levels in Contrast to Jira priority values to help teams groom security tickets. If you want to prefill additional Jira fields, select **Add Jira field**. Use the dropdowns to select the fields you want to add and the default value for the field.



### NOTE

Changing the **Project name** or **Default issue type** also changes the related Jira fields and values available to you. Contrast will keep any selected values that also apply to the new project or issue type.

3. Select the option to **Enable two-way integration**, if you want to change vulnerability status in Contrast every time an issue closes or reopens in Jira. This generates a URL that appears below the checkbox, which your Jira administrator must use to [register a webhook in Jira](#). In Contrast, use the Vulnerability status dropdowns to configure how a Jira ticket status update will also change vulnerability resolution status.

**NOTE**

If you choose **Not a problem** as a status, Contrast requires you to enter a **Reason** in the dropdown. The default selection in the dropdown is **Other**.

After you save the two-way integration, Contrast automatically tracks any status changes on related Jira tickets. You will see these as comments in the **Activity** tab for the vulnerability. Each comment includes the name of the Jira integration and a link to the ticket.

**NOTE**

Atlassian has deprecated the ability to register webhooks with non-https URLs. Therefore, Contrast on-premise users need to [configure HTTPS \(page 687\)](#) before attempting to enable Jira two-way integration.

4. If you want a new Jira ticket made when Contrast discovers a vulnerability, select the option to **Automatically create tickets for new vulnerabilities discovered**. Then select which **Severity levels** or **Rules** should trigger new Jira tickets. If Contrast creates a single Jira ticket for multiple vulnerabilities, the ticket status applies to all vulnerabilities associated with the ticket. If Contrast creates multiple tickets for a single vulnerability, all Jira tickets must close before Contrast can close the vulnerability.

**NOTE**

Automation options are not retroactive and will not generate Jira tickets for past vulnerabilities.

5. Select **Save** and begin using your Jira integration. To remove the integration select **Delete configuration**.

## Configure Jira for Serverless

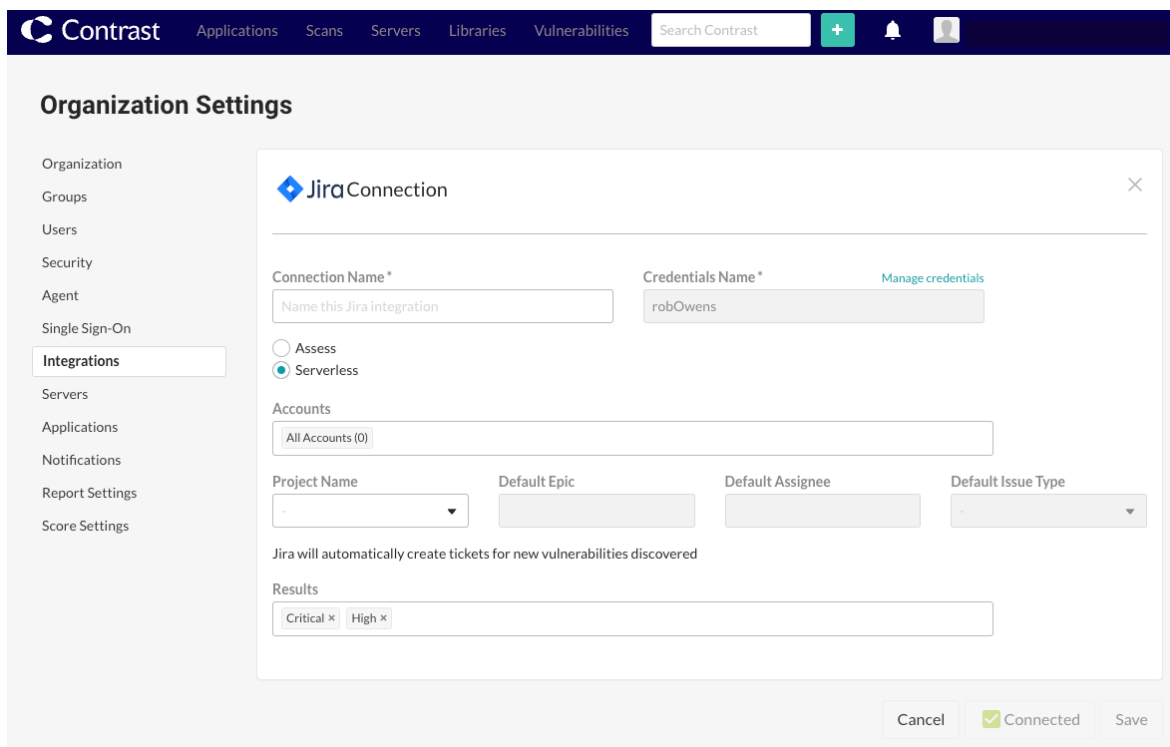
After testing your Jira connection, you can configure Jira to choose a subset of severities and result categories from which the integration should create a Jira ticket.

### Before you begin


- Successfully [connected with Jira \(page 588\)](#)

### Steps

1. After Contrast connects to Jira, select **Accounts** to configure the AWS accounts that from which results will have Jira tickets created.



2. Choose a Jira **Project** in which Contrast should create tickets.
3. Choose the type of **Results** for which Contrast should create tickets.
  - Permissions
  - Exploits
  - Dependencies (CVEs)
4. Set the **Default Issue Type** and **Default Assignee**.

 **NOTE** Changing the **Project** or **Default issue type** also changes the related Jira fields and values available to you. Contrast will keep any selected values that also apply to the new project or issue type.

5. If you want to prefill additional Jira fields, select **Add Jira field**. Use the dropdowns to select the fields you want to add and the default value for the field.
6. Select **Save** and begin using your Jira integration. To remove the integration select **Delete configuration**.

### Manage Jira credentials

Contrast saves the most recent credentials for a Jira integration to help you set up new connections faster. The username, API key or password, and Jira URL values that you enter in your first configuration are the default credentials for the next Jira integration. Contrast will pre-populate the next Jira configuration with the default credentials, but you can modify these values, if you want. You can also manage saved sets of Jira credentials to update all affected configurations.

To create or edit a single configuration with credentials that are different from your default set:

1. Go to the **user menu > Organization Settings > Integrations**.
2. Select **Show configurations** to see the list of existing Jira integrations. Select the one you want to update.
3. Select **Manage credentials** to see the Jira connection configuration details.
4. In the **URL** field, use the dropdown to choose a set of saved credentials, or manually update the **URL, username, and API key or password**.

5. Once you've updated the fields, select **Test connection** to be sure the changes work.
6. Select **Save**.

**NOTE**

If you're using new credentials, you must choose to override the existing set of credentials under the given name, or save the new values as a new credential set under a different name.

To edit multiple Jira configurations at the same time:

1. In Contrast, go to the **user menu > Organization settings > Integrations**.
2. Select **Manage credentials** in the Jira Integration.
3. In the **Manage Jira credentials** form, use the dropdown to select a set of saved credentials.
4. Edit the username, API key or password, or Jira URL.
5. Select **Rename** if you want to use a different name for the edited credentials.

**NOTE**

Any updates to a set of credentials will affect all configurations using that set.

6. Select **Test connection** to be sure the integration works.
7. Select **Save**.

**NOTE**

Any updates to a set of credentials will change all configurations that use this set.

## See also

- [Jira integration \(page 588\)](#)
- [Connect to Jira \(page 588\)](#)
- [Configure Jira for Assess \(page 589\)](#)
- [Configure Jira for Serverless \(page 589\)](#)

## Contrast Maven plugin

**Maven** is a build tool that builds, packages, and tests your Java applications.

The Contrast Maven plugin can integrate Contrast Assess and Scan into your project's Maven build.

Use the [Contrast Maven Plugin Reference Documentation](#) for more details on:

- [Goals](#)
- [Usage](#)

## Goals

- **Scan:** The scan goal analyzes the Maven project's artifact with Contrast Scan to find vulnerabilities using static analysis.
- **Install:** The install goal includes the Contrast Java agent in integration testing to provide Contrast Assess runtime security analysis.
- **Verify:** The verify goal verifies that none of the vulnerabilities found by Contrast Assess during integration testing violate the project's security policy (fails the build when violations are detected).



## See also

- [Contrast Scan \(page 441\)](#)
- [Install the Java agent \(page 52\)](#)

## Integrate with Microsoft Teams

Use the Microsoft Teams integration to receive notifications from Contrast in your configured Microsoft Teams instance.

To connect Microsoft Teams:

1. Go to your team in your Microsoft Teams account and choose the channel you want to send messages to.
2. Select the **More** icon.
3. Select **Connectors** from the menu.
4. In the **Incoming webhook** row, select **Configure**.
5. Enter a name for the Incoming webhook and click **Create**.
6. Copy the webhook URL. You will use this to set up the integration in Contrast.
7. Select **Save**.
8. In Contrast, under the **user menu**, go to **Organization settings > Integrations**.
9. In the Microsoft Teams row, select **Connect**.
10. Enter a name for the integration.
11. Paste the webhook URL copied from Microsoft Teams.
12. Select an application to enable notifications.
13. Select **Save**.



### IMPORTANT

Contrast will disconnect this integration if it fails to return a successful response after 5 attempts.

## Integrate with PagerDuty

Integrate with PagerDuty incident management to receive attack notifications from Contrast.

To connect PagerDuty:

1. In the **user menu**, go to **Organization Settings > Integrations**.
2. Select **Connect** in the PagerDuty row.
3. In the window, enter a **Name** for the integration. This name will be displayed in notifications from Contrast.
4. In the **Message Severity** dropdown, choose the behavior of the alert. The default selection is "Critical." For more information about message severity, see the [PagerDuty documentation](#).
5. Enter an **Integration key**. To find your integration key to enter in this field, follow the steps in the [PagerDuty documentation](#).
6. In **Applications**, select the applications in your portfolio that you want Contrast to automatically generate incidents for within PagerDuty. The default selection is "All Applications."
7. Once you complete all of the fields, select **Test connection**. This process may take a few minutes, depending on the number of your PagerDuty projects. The test verifies that Contrast can reach the PagerDuty instance and that a message can be sent.

Manage notifications from your PagerDuty integration in [organization notifications \(page 645\)](#).

**IMPORTANT**

Contrast will disconnect this integration if it fails to return a successful response after 5 attempts.

## Integrate with Solutions Business Manager

Integrate with Solutions Business Manager to receive notifications from Contrast.

Before you start, you must have:

- Solutions Business Manager account credentials (username and password)
- A running Solutions Business Manager instance accessible via HTTP to Contrast
- A project to associate the application instrumented by Contrast

To connect Solutions Business Manager:

1. Go to **Organization settings > Integrations** in the **user menu**.
2. Click **Connect** in the Solutions Business Manager row.
3. In the **Connect with Serena** page, enter a name for the bugtracker entry. It will be displayed when sending findings to bugtrackers.
4. Enter a username for the account connected to the Solutions Business Manager instance.
5. Enter the password for the username specified.
6. In the **Host** field, enter the URL to the Solutions Business Manager instance.
7. Select the application you would like to map to the Solutions Business Manager instance.
8. Enter the **Solutions Business Manager Project ID** to associate with this application.
9. Select **Test** to verify communication. This ensures that Contrast can communicate and authenticate with the instance, as well as verify the existence of the specified project.

## Integrate with Slack

With the Slack integration, you can receive notifications from Contrast in your configured Slack instance using a format similar to in-app notifications.

To connect Slack:

1. In Slack, go to your team's **Build** settings.
2. Add a new **Incoming webhooks** custom integration.
3. Choose the appropriate channel to which to send messages.
4. Copy the **Webhook URL**.
5. In Contrast, in the **user menu**, go to **Organization settings > Integrations**.
6. Select **Connect** in the Slack row.
7. Name the integration and paste the URL.
8. Selection the application for which you want to enable notifications.
9. Select **Save**.

To test the integration:

1. Go to **Organization settings > Notifications**.
2. In the dropdown under **Integrations**, select the Slack integration name.
3. For each **Subscription** (event type) you want to be notified of, click the toggle in the **Integrations** column.
4. Cause an event type to occur, and confirm that you get a notification in the Slack channel you specified.

**IMPORTANT**

Contrast will disconnect this integration if it fails to return a successful response after 5 attempts.

## Integrate with Splunk on-call (formerly VictorOps)

Set up an integration with VictorOps incident management to receive attack notifications from Contrast.

To connect VictorOps:

1. In the **user menu**, go to **Organization settings > Integrations**.
2. Select **Connect** in the VictorOps row.
3. Enter a **Name** for the integration. This is displayed in notifications from Contrast.
4. Use the dropdown to choose the **Message type** of the alert. The default selection is "Critical." For more information about message types, see the VictorOps documentation on [incident fields](#).
5. Enter the **URL** for the connection. You can generate the URL in VictorOps through a REST API endpoint. To get a URL or more information, see the VictorOps documentation on [REST endpoint](#).
6. Select **Test connection**. This process may take a few minutes, depending on the number of your VictorOps projects. The test verifies that Contrast can reach the VictorOps instance and that the specified user can log in.
7. Once a connection is made, click in the multiselect field to choose the **Applications** for which you want to send notifications. The default selection is "All Applications."

**IMPORTANT**

Contrast will disconnect this integration if it fails to return a successful response after 5 attempts.

## Contrast Visual Studio plugin

Use the Visual Studio plugin to see vulnerability information for instrumented applications from the Visual Studio IDE.

The plugin directs you to a line of code inside Visual Studio, and you can view related details in the Contrast application. This way developers can get application security feedback at the time of development for faster remediation.

The plugin supports Visual Studio versions 2017 (15.0 and later) and 2019.

To install, configure and use the Visual Studio plugin:

1. In Visual Studio, select **Extensions**.
2. In the new window, select **Online** from the left navigation panel.
3. Search for "Contrast", and select **Download**.
4. After you finish the download, restart the IDE.
5. In Visual Studio, go to **Tools > Options**.
6. In the search, enter "Contrast Security" and select **Contrast Security - Connection**.
7. In the **Contrast Connection** form, add the **Contrast URL**, **Username**, **Service key**, **API key** and **Organization ID** in the appropriate fields. You can find these in your [profile \(page 421\)](#).

**NOTE**

The API key must belong to the organization you want to access or you'll get authorization errors. After many failed attempts, this will lock your account.

8. Select **Add**. Visual Studio automatically tests the connection as it attempts to retrieve the organization from Contrast.
9. Select the organization in the **Organizations** field, and select **OK**.
10. In Visual Studio, go to **View > Other Windows > Contrast Security Integration**. You can also search for "Contrast Security Integration". This view shows a list of all the vulnerabilities from Contrast.
11. To filter the list, click the **Filter** icon at the top-left corner of the page.
12. In the window that appears, choose from multiple filters, including servers, applications, severity levels, states and last detected dates.
13. If you can't see your vulnerabilities list, select **Refresh**. To clear all selected filters, click the Clear icon. This also applies for Server and Application lists.

**NOTE**

If you can't see your vulnerabilities even after refreshing the list, you must filter your vulnerabilities. You must repeat this process after selecting a different organization in the **Connection** settings so that filters and vulnerabilities are refreshed correctly.

14. Under the **Actions** column, you can click the magnifying glass icon to see more information about the vulnerability. Use the icon to go to the **Vulnerability** page in Contrast.

## Contrast Visual Studio Code plugin

Use the Visual Studio Code plugin to see vulnerability information for instrumented applications from Visual Studio Code environments when Contrast discovers security problems during functional tests.

The plugin shows you an overview of all vulnerabilities found in the application, as well as details for each vulnerability, like the HTTP request that exposed the vulnerability to Contrast.

The plugin supports Visual Studio Code versions 1.42.1 and later.

To install, configure and use the Visual Studio Code plugin:

1. In Visual Studio Code, go to the **Extensions** view and search "Contrast Security".
2. Select **Install**. After installation, restart Visual Studio Code.
3. To authenticate to your Contrast account, select the **Settings** icon in the **Contrast Security** view.
4. Select **Workspace** and enter your **API key**, **Organization ID**, **Contrast URL**, and **Authorization header**. You can find these values in your [profile \(page 421\)](#).
5. Select **Test Contrast connection** to validate your credentials. You will see a message that confirms either a successful connection or invalid credentials.
6. Select the **Refresh** icon to update vulnerability information. Under **Contrast Security**, you can see vulnerabilities grouped by **Severity** and ordered by **Status**. Select a vulnerability to view more details like **How to Fix**, **HTTP Information**, **Details**, and **Overview**. You can also see when the vulnerability was last detected and the current status. Vulnerability details display in the code editor under **Output**.

**TIP**

With the plugin, you can filter vulnerabilities by:

- Vulnerability metadata:
  - Application name
  - Status (such as Reported, Not a Problem, Remediated)
  - Environment (development, test, or production)
  - Tags (custom labels applied to vulnerabilities)
  - Detection date (specifically, First and Last detected)
- Session metadata:
  - Committer
  - Commit hash
  - Branch name
  - Git tag
  - Repository
  - Test run
  - Version
  - Build number

For example, you can choose to display only those vulnerabilities found on a specific feature branch (Branch Name) and committed directly by you (Committer), filtering out vulnerabilities introduced by a different developer on a separate feature branch.

Someone else can choose to filter vulnerabilities so that they only see results from a specific build (Build Number) that was blocked by their security team. They can immediately pinpoint the subset of vulnerabilities that need to be resolved before deploying the merged feature branch.

## Contrast Visual Studio for Mac plugin

Use the Visual Studio for Mac plugin to see vulnerability information for instrumented applications from the Visual Studio for Mac IDE.

The plugin directs you to the line of code and you can view more details in the Contrast Security pad. This way, developers can get application security feedback at the time of development for faster remediation.

The plugin supports Visual Studio for Mac versions 8.3.0 and later.

To install, configure and use the Visual Studio for Mac plugin:

1. From the [Contrast distribution repository](#), download the Visual Studio for Mac plugin file (*.mpack*).
2. In Visual Studio for Mac, go to **Visual Studio > Extensions**.
3. Click **Install from file...** and select the downloaded *.mpack* file. Allow the plugin to install, and restart Visual Studio for Mac.
4. Select **View > Pads > Contrast**. Then select **Configure** and add your **Contrast URL**, **Username**, **Service key**, **API key** and **Organization ID** in the given fields. You can find these in your [profile \(page 421\)](#).
5. Select **Test connection** to test your connection with Contrast. If the connection is successful, select **Save**.
6. Once the plugin is installed, you can return to **View > Pads > Contrast**, select the magnifying glass icon and then select an application. This will load vulnerabilities that Contrast has found

for the application. Select **Refresh** if you don't see the vulnerabilities list. Under each section, vulnerabilities display in order by severity, then by status.

You can select a vulnerability to see general or more detailed information. The **General Information** section includes severity, application, status, and history. The **Details** section includes information pulled from Contrast, such as details, notes, and activity for that vulnerability.

To clear all selected filters, select the broom icon. You can also view **Server** and **Application** lists in this way.

# Administration

Users with different [roles and permissions \(page 743\)](#) have different levels of access in Contrast. This allows different individuals and teams in your business to best use Contrast for their responsibilities:

- [Rules and policy administration: \(page 599\)](#) RulesAdmins can create and edit policies. Editors can add applications and manage some content details like scores and notifications.
- [Organization administration: \(page 630\)](#) Organization Administrators can configure settings for a particular organization.
- [System administration: \(page 670\)](#) For on-premises customers, SuperAdmins can install, configure and maintain Contrast at a system level. ServerAdmins and System Administrators can also help with this responsibility.

## Rules and policy administration

Maintaining your applications in Contrast requires different roles and permissions depending on what you'd like to do.

As a RulesAdmin, select **Policy management** in the user menu.

The screenshot shows the 'Policy Management' section in the Contrast application. It features a sidebar with navigation options like 'Assess Rules', 'Security Controls', and 'Vulnerability Management'. The main area displays a table of 'ASSESS RULES' with the following data:

Rule	Severity	Description	Development	QA	Production
Anti-Caching Controls Missing <small>.NET Framework, .NET Core, Go, Java, Node, Python, Ruby</small>	NOTE	Verifies that caching controls are used to protect application content.	168	168	180
Application Disables "secure" Flag on Cookies <small>Java</small>	MEDIUM	Verifies that cookies have the 'secure' flag.	71	71	71
Arbitrary Server Side Forwards <small>.NET Framework, Java</small>	HIGH	Verifies that no untrusted data is used to build a path used in forwards.	146	146	146
Authorization Rules Misordered <small>.NET Framework</small>	MEDIUM	Verifies that the application's authorization rules do not include an allow all user rule before a deny rule.	75	75	75
Authorization Rules Missing Deny Rule <small>.NET Framework</small>	MEDIUM	Verifies that the application's authorization rules include a deny rule.	75	75	75
Cache Control Header Disabled <small>.NET Framework</small>	MEDIUM	Verifies that the application does not disable the cache control header which helps prevent disclosure of sensitive information via the browser cache.	75	75	75
Cookie Has No 'secure' Flag <small>.NET Framework, .NET Core</small>	MEDIUM	Verifies that cookies have the 'secure' flag.	77	77	77
Cross-Site Request Forgery <small>Java</small>	HIGH	Verifies that tokens are used to prevent forgeable HTTP traffic	71	71	71
Cross-Site Scripting <small>All application languages</small>	MEDIUM	Verifies that no untrusted data is used in generated HTML pages	181	181	181
Detailed Error Messages Displayed <small>.NET Framework</small>	MEDIUM	Verifies that the application does not inadvertently reveal sensitive or technical information to an attacker via detailed error messages.	75	75	75
Event Validation Disabled <small>.NET Framework</small>	MEDIUM	Verifies that the application does not disable ASP.NET event validation.	75	75	75
Expired Session IDs Not Regenerated <small>.NET Framework</small>	LOW	Verifies that the application generates new session IDs rather than allowing attackers to use expired session IDs	75	75	75
Expression Language Injection <small>Java</small>	HIGH	Verifies that untrusted data is not used in the evaluation of JSP Expression Language.	71	71	71
Forms Auth Protection Mode <small>.NET Framework</small>	MEDIUM	Verifies that the application is using both encryption and validation for forms authentication.	75	75	75
Forms Authentication Cross-App Redirect <small>.NET Framework</small>	MEDIUM	Verifies that the application does not allow for cross-app redirects for authentication which can expose the forms authentication ticket in the URL.	75	75	75
Forms Authentication SSL <small>.NET Framework</small>	MEDIUM	Verifies that forms authentication requests must be submitted over SSL.	75	75	75

Here you can manage:

- [Assess rules \(page 600\)](#)
- [Security controls \(page 601\)](#)
- [Vulnerability policy \(page 604\)](#)

- [Set Protect rules \(page 610\)](#)
- [CVE shields \(page 614\)](#)
- [Virtual patches \(page 618\)](#)
- [Log enhancers \(page 620\)](#)
- [Block or allow IP addresses \(page 626\)](#)
- [Edit IP source names \(page 627\)](#)
- [Application exclusions \(page 621\)](#)
- [Compliance policy \(page 625\)](#)
- [Library policy \(page 628\)](#)
- [Sensitive data \(page 629\)](#)

A user with RulesAdmin permissions can also:

- [Instrument an application \(page 30\)](#)
- [Enable Protect \(page 631\)](#)
- [Approve or deny pending vulnerability status changes \(page 536\)](#)
- [Enable notifications \(page 630\)](#)
- [Set default scoring \(page 648\)](#)

## Set Assess rules

To view a list of all rules applied, select **Applications > Your application name > Policy > Assess** or under the user menu, select **Policy management > Assess rules**. Each rule is listed with a severity and description, as well as an indicator of which environments it applies to.


You can also [set the default Assess rules for an organization \(page 601\)](#).

## Before you begin

- Ensure that you have an Organization Administrator or RulesAdmin role.
- Log in and select the correct organization.

## Steps

Apply Assess rules and settings:

1. To apply Assess rules to particular environments for applications:
  - a. When viewing the list of rules under **Applications**, use the toggles to turn each rule on or off for each environment. You can also use the checkboxes in the left column to select multiple rules, then select **Change Mode** to apply them. In the window that appears, toggle the rules on or off for each environment and select **Done**.
  - b. Alternatively, under **Policy management > Assess rules**, select a rule to see a list of applications that are associated with that rule. Use the toggles to turn rules on or off for each application.
2. To update settings for individual Assess rules:
  - a. Under **Policy management**, select the name of rule to show a list of applications associated with the rule.
  - b. To select one or more applications, select the check box next to each application. To select all applications, select the **Application** check box.
  - c. Select the **settings** icon (  ) in the top right.
  - d. In the window that appears, select the **Likelihood**, **Impact** and **Confidence Level** of the vulnerabilities for which this rule is intended.
  - e. Optionally, select the checkbox to **Override** to enable this option to update these fields after the configuration is saved.
  - f. In the **Risk Description** field, enter additional information regarding potential consequences of exposure to this vulnerability. You can also provide a **Recommendation**



- g. In the **References** field, enter a link to an external reference related to the specific vulnerability to provide more context for the rule.
- h. Select **Save**.

### Set Assess rules for organizations

When you add and configure an agent for an application or create a new organization, Contrast applies a set of default Assess rules.

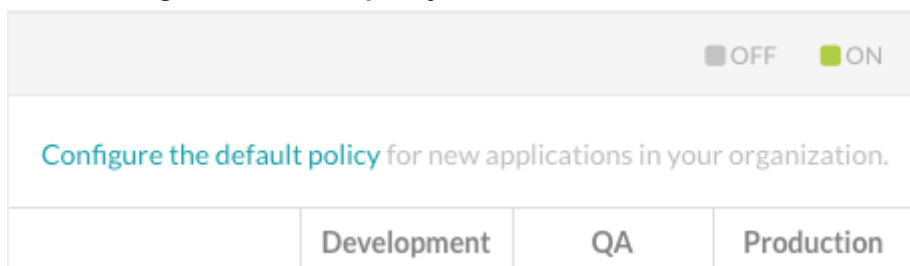
Use this procedure to change the default settings for Assess rules at an organization level. These settings apply to any new application that you add to a Contrast organization. These changes have no effect on existing applications in the organization.

### Before you begin

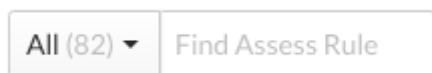
- Ensure that you have an Organization Administrator or Organization RulesAdmin role.
- Log in and select the correct organization.

### Steps

1. Under the user menu, select **Policy management**.
2. Select **Configure the default policy**.



3. Select **All** as the filter.



4. For each Assess rule, use the toggles to turn each rule on or off for each environment.

Rule	Severity	Description	Development	QA	Production
Anti-Caching Controls Missing All application languages	NOTE	Verifies that caching controls are used to protect application content.			

### Security controls

A security control is a method in your code that ensures the data passing through it is safe to use in your application. Contrast trusts information that is passed through built-in security controls it knows about. Contrast monitors many methods from third-party libraries to determine whether a data flow is safe.

In some cases, your organization may choose to build its own security controls which are not known to Contrast. For these cases, create security controls that teach Contrast to account for your custom method. Adding custom security controls results in Contrast reporting more accurate results.

## Types of security controls

- **Input Validators:** Validators are methods that ensure only properly formed and formatted data is accepted as input before it's passed to other parts of the application. They are designed to allow the input field to accept or reject specific characters.  
Input validation is the primary method of preventing SQLi, XSS, and other input-validation related attacks.
- **Sanitizers:** Instead of validating input, sanitizers render input safe before it's passed to other parts of the application, like databases. For example, a sanitizer might take a single quote that could be used in a potential injection attack and change it to double quotes.

## When to use security controls

Create security controls when Contrast does not have visibility into methods, classes, or libraries that your application is using to protect it from input validation issues (sanitizers and input validators).

If you know about the validators or sanitizers that your applications use, you can add them manually or move a suggested security control that Contrast detects automatically to the list of security controls that you apply to your applications.

After you add and enable security controls, they suppress input vulnerabilities in Assess that the security control is designed to mitigate. It is very important that you apply your security control to the proper vulnerability rule.

## Effects of using security controls

Security controls affect any vulnerability and detection for specified rules. Input validators and sanitizers are usually designed for or are applicable to a specific type of data, a particular field, page, or specific application. Enabling a security control for all rules can result in false negatives findings.

Use security controls carefully. You might need to apply a security control to specific rules only. For example, if a validator or sanitizer protects your application from XSS, it may not be effective against SQL injection. If you apply a security control to all rules, Contrast would likely suppress aSQLi vulnerability which would results in false negative finding.

A security control should be good enough to assure you that is it protecting your application against a wide range of attacks.

## Roles for security controls management

Only users assigned an organizational role of RulesAdmin or higher can view or modify security controls.

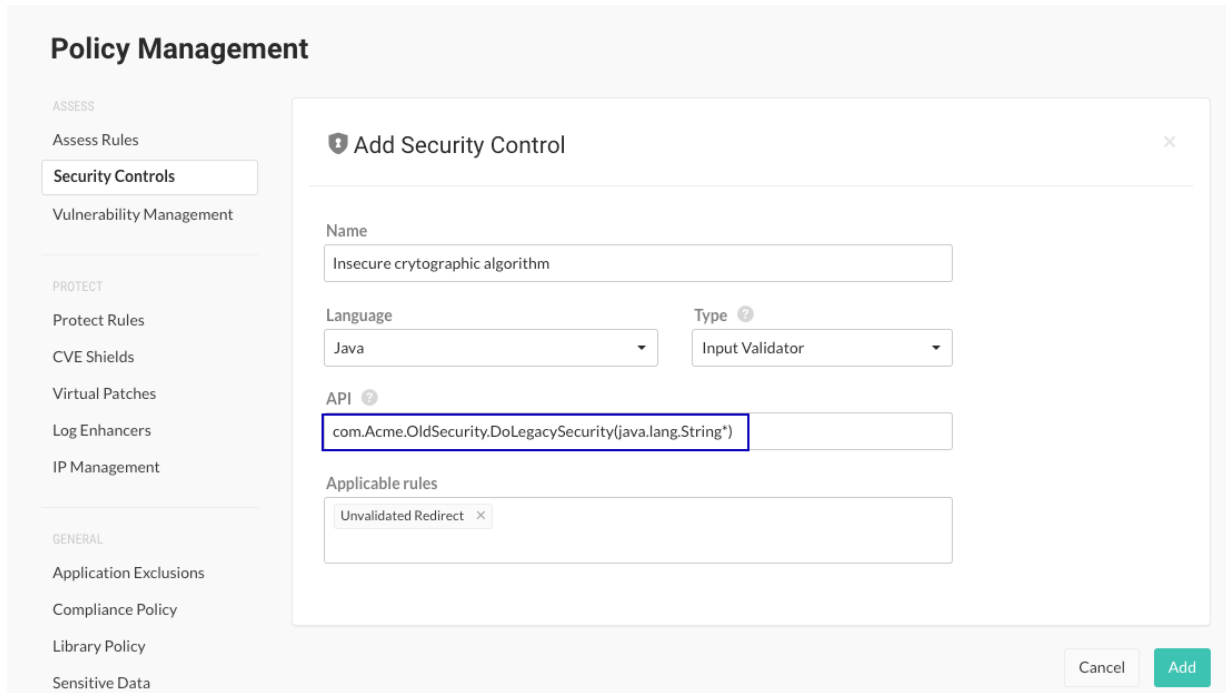
## Supported languages

Security controls apply to Java, .NET Framework, and .NET Core languages only.

## Security control example

Assume that you have a method called `DoLegacySecurity()` inside a class called `com.Acme.OldSecurity` that is being reported for using insecure cryptographic algorithms, You create a security control and specify this method signature:

```
com.Acme.OldSecurity.DoLegacySecurity( java.lang.String* )
```



In this example, `Java.lang.String*` is the marked parameter to be validated.

When creating the security control, you are careful to not include any trailing parameter definitions or extra characters.

Contrast matches this method signature against the stack trace for any vulnerabilities it finds and suppresses them.

### Add, edit or delete security controls

Security controls apply to Java, .NET Framework, and .NET Core languages only.

#### Steps

1. Select **User Menu > Policy Management**, select **Security controls**.  
The Security Controls grid shows a list existing security controls, if there are any.
2. Select the name of an existing security control to edit, or select **Add security control** to create one.
3. In the panel that opens, specify this information:
  - **Name**
  - **Language**: Select Java , .NET Framework, or .NET Core.
  - **Type**: Select either one of these methods:
    - **Input validators** accept user input and take corrective action if unsafe data is received.
    - **Sanitizers** clean the data that is passed in, making it safe for consumption by any interpreter. Many sanitizers prevent one type of attack, but not another.
  - **API**: When specifying the API, consider these conventions:
    - Java must include method name and parameters. Use fully qualified types, intended to target only `java.lang.String` parameters (not boolean, int, long, short double, float, and so forth).
    - **.NET Framework and .NET Core** :
      - Include a return type (or void), method name and parameters. Use fully qualified types, intended to target only `System.String` parameters.
      - Verify that no white space exists between the parameters.
      - Mark the parameters that are going to be validated or sanitized with an asterisk ( \* ).
  - **Applicable vulnerability rules**: You can choose **All**, or select one or more individual vulnerabilities.

4. Select **Save** to create a new security control. If you are editing an existing security control, you also have the option to delete the security control from this panel with the **Delete** icon.
5. At the bottom of the table, you will see **Suggestions** for potential security controls that Contrast detects, along with their class and method. (You can hide the section by clicking on the caret in the header row.)

If a security control is automatically discovered for the first time, a notification is sent to all users with at least Viewer permissions for the corresponding applications.

Hover over the API to see where this suggestion was discovered, and optionally, select the name of the application to see the vulnerabilities in context of that application.

Use the **plus** icon ( + ) at the end of the suggestion row, to add the suggestion as a new security control and include it in the table above. You can edit the Name, API and Type fields inline before adding it. After you add the security control, select the name and verify that the security control is applied to the correct application rules.

Use the **Delete** icon ( 🗑 ) to delete the suggestion. Contrast doesn't repeat suggestions, so once you delete it, an API is never suggested again. There is no way to view historical suggestions or get them back.



#### NOTE

Servers may require restart. Contrast provides a list of servers affected by your selection.

## Create security controls for specific vulnerabilities

You can also create security controls in the context of a particular vulnerability with a tag event.

If Contrast has captured runtime data flow for a vulnerability, you can select **Vulnerabilities > Vulnerability name > Details** to see more information about that vulnerability. Potential security controls that are detected trigger a tag event and this is shown as a low severity (green) event. Expand the event and you can select **Add a security control**.

Also, if you mark a vulnerability as **Not A Problem** with the reason "Goes through an internal security control," you can define that security control at that time.

## Vulnerability management policies

Vulnerability policies let administrators with Organization RulesAdmin or Organization Administrator roles define a set of criteria that, when triggered, either changes the status of a vulnerability or flags it for review. The criteria that define the policy includes vulnerability rules, severity, application, and route.

Vulnerability policies result in a more accurate view of which vulnerabilities need attention and which are considered remediated and closed. You have the option of setting auto-verification policies and violation policies.

You can set [in-app notifications \(page 646\)](#) when vulnerabilities violate these policies. Administrators are notified of violations in-app and by email.

## Types of Auto-verification policies

[Auto-verification \(page 606\)](#) policies automatically change the status of a vulnerability that meets specific criteria to **Remediated - Auto-verified**. These policies are useful when you want a more accurate view of vulnerabilities that need attention instead of relying on manually changing the status of vulnerabilities after they are fixed and verified.

An auto-verification policy can be session-based, route-based, or time-based:

- **Session-based auto-verification (recommended):** A combination of metadata values that you set in the agent configuration file define a session. You control when a session ends by calling a Contrast API at the end of a test run.  
You need an automated test suite for this type of auto-verification.
- **Route-based auto-verification:** A combination of metadata values that you set in the agent configuration file define a session. Use this type of auto-verification if you cannot use session-based auto-verification.  
You need an automated test suite for this type of auto-verification.
- **Time-based auto-verification:** Use this method of auto-verification if you have high confidence that your application will exercise all routes within a specified time period.  
You can use automated or manual testing with this type of auto-verification.

## Auto-verification behavior

- Contrast marks a vulnerability as **Remediated - Auto-Verified** if Contrast does not discover it on the same route across two different sessions. If two sessions report the exact same session metadata values, Contrast views the two sessions as a single session.  
Depending on the defined values, each agent run could be part of a single session or every agent run could have its own session. If you are integrating Contrast into a CI/CD pipeline, ensure that you send at least one session metadata key-value pair that is unique each time you deploy a new version of the application. For example, configure the agent to send the Commit Hash, Build Number, or Version metadata because these values are likely to change for each application deployment.
- If a vulnerability that Contrast previously marked as **Remediated - Auto-Verified** reappears when the same route is exercised, its status changes to **Reported**. Contrast updates the details in the Activity tab on the vulnerability details page.
- If a vulnerability that Contrast previously marked as **Remediated - Auto-Verified** reappears when the same route is exercised after you disable or delete an auto-verification policy, the vulnerability status changes to **Reported**. Contrast updates the details in the Activity tab on the vulnerability details page.

## Session metadata for session-based and route-based auto-verification

For session-based or route-based vulnerability policies, [add session metadata \(page 433\)](#) to the agent configuration files:

- Providing unique session metadata allows Contrast to create a baseline of findings that lets it verify whether a vulnerability was remediated based on route comparisons.
- Using the Test Run session metadata field is a good way to ensure that Contrast is tracking routes and vulnerabilities across an entire test run even if you restart the agent and the application multiple times during the run.  
Contrast creates a unique session ID for every unique metadata key-value pair. Using session metadata in this manner combines multiple test runs into a single test session. This action is useful in situations where different code paths on the same route are tested.
- Using the Commit Hash, Build Number, or Version metadata is useful because these values are likely to change for each application deployment.

## Violation policies

[Violation policies \(page 609\)](#) trigger a violation notice when a vulnerability matches a set of specific criteria. If triggered, you see the vulnerability in red text in the vulnerabilities list. Use the vulnerabilities filter to view only vulnerabilities with policy violations.

## Policy triggers

These trigger types activate a vulnerability policy:

- **Session-based (recommended):** Triggers an auto-verification policy when a vulnerability is seen, or not seen, on a specific route during a session. When you use this trigger, use the Contrast API to end the session. This feature lets you define when a session ends so that you can get immediate results from a test run.
- **Route-based:** Triggers an auto-verification policy when a vulnerability is seen, or not seen, on a specific route. This trigger is available for technologies where Contrast can identify routes.
- **Time:** Triggers a violation or auto-verification policy after a specified number of days.

## Environments

For optimal results, configure the vulnerability policies to apply to the environments where you are using test automation. If you are running the same application on multiple servers, ensure that each server is configured for the Development, QA, or Production environment.

## Multiple policy actions

If multiple policies affect the same vulnerability, these rules determine how Contrast applies the policies:

- Auto-verification policies take precedence over violation policies. For example, if an auto-verification deadline applies first, the vulnerability is closed and never flagged.
- Between two time-based triggers, the action with the closest deadline applies first. For example, if a violation deadline applies first, the vulnerability is flagged and then auto-verified when the later deadline applies.

## Set auto-verification vulnerability policies

[Auto-verification policies for vulnerabilities \(page 604\)](#) automatically change the status of a vulnerability that meets specific criteria to **Remediated - Auto-verified**. These policies can be session-based, route-based or time-based.

When you add a policy, it is turned on, by default. You can turn a policy off or on in the Enabled column in the Auto-verification tab.

Auto-Verification		Violation			
Policy	Vulnerability Rules	Applications	Description	Environments	Enabled
test	Note	All		All	<input checked="" type="checkbox"/>
Simon Test Time-Based	All	WebGoat7	7 day duration	All	<input type="checkbox"/>

## Before you begin

- An Organization RulesAdmin or Organization Administrator role is required.
- Use Contrast version: 3.7.2 and later.
- Verify you are using the minimum version of supported agents:
  - .NET Framework 20.4.1
  - .NET Core 1.0
  - Java 3.7.3.14895
  - Node.js 2.11.0

- Python 3.4.0
- Verify that you are using a [supported framework](#). (page 609)
- If you plan to use session-based or route-based auto-verification, [configure unique session metadata](#) (page 433) (for example, Commit Hash, Build Number, or Version) in the agent configuration files.

## Set an auto-verification policy

1. From the user menu, select **Policy management**.
2. Select **Vulnerability management**.
3. In Vulnerability policy, select the **Auto-verification** tab.
4. Select **Add policy**.
5. In **Name**, enter a name for the policy.
6. In **Vulnerability rules**, select one or more severity levels or Assess rules that you want to associate with the policy.
7. In **Applications**, select one or more importance levels or applications that you want to associate with the policy.  
To find specific levels or applications, select the Applications box and start typing.
8. In **Environments**, select one or more server environment where the policy is applied: All environments, Development, QA, or Production.
9. Under **Trigger**, select the type of trigger you want to use for the policy (select one or both types of triggers):
  - To set a time-based trigger, select **Mark any vulnerability as “Verified – Auto-Remediated” after** and select the number of days after which the vulnerability policy is marked as auto-verified. This trigger is useful if you are confident that vulnerabilities will be fixed and routes will be exercised within the selected time frame. If Contrast finds the vulnerabilities again, it reopens them.



### TIP

Use time-based auto-verification along with session-based or route-based auto-verification to find situations where routes change drastically from build to build. For example:

- Major code refactoring where you add new routes and remove old routes.
- A route is no longer exercised because it is no longer valid.

- To set a trigger for session-based or route-based auto-verification:
    - a. Select **Auto-verify based on session or route**.  
Session or route-based auto-verification take precedence over a time-based trigger.
    - b. Select **ONE** of these options (you can't use both options at the same time):
      - **Session-based auto-verification (recommended)**: This type of auto-verification policy lets you define when a session ends so that you can get immediate results from a test run, including making pass/fail decisions for your builds. Session-based auto-verification is the preferred method for auto-verification. When you select this option, you end sessions by adding calling the Contrast API at the end of a test run.
      - **Route-based auto-verification**: If you can't use session-based auto-verification, consider using route-based auto-verification. In this case, the session metadata that you configure for your agent define the session.  
Route-based triggers only work for certain technologies with identifiable routes.
10. Select **Save**.

## Configure a test run for session-based auto-verification

Session-based auto-verification, the recommended auto-verification method, requires you to make calls to the Contrast `SBAVRouteSession` API at the end of a test run. The following examples show different approaches for closing sessions.

To find your authorization header and API key, log in to the Contrast web interface and under the user menu, select **User settings**.

- End the session defined by a session ID and application ID. Use commands similar to the following example:

```
curl --location --request POST 'https://<HOST>/Contrast/api/ng/organizations/<ORG-UUID>' \
--header 'Authorization: <Your-Auth-Header-Value>' \
--header 'API-Key: <API-KEY>' \
--header 'Content-Type: application/json' \
--data-raw '{
  "sessionId": "0",
  "appId": "5b4960b3-a111-4f2a-bf24-7367be7c8302"
}'
```

- End the session defined by a session ID, the application name, and the application language. Use commands similar to the following example:

```
curl --location --request POST 'https://<HOST>/Contrast/api/ng/organizations/<ORG-UUID>' \
--header 'Authorization: <Your-Auth-Header-Value>' \
--header 'API-Key: <API-KEY>' \
--header 'Content-Type: application/json' \
--data-raw '{
  "sessionId": "0",
  "appName": "FakeRubyApp",
  "appLanguage": "JAVA"
}'
```

- End the session defined by metadata key-value pairs configured for the application and the application ID. Use commands similar to the following example:

```
curl --location --request POST 'https://<HOST>/Contrast/api/ng/organizations/<ORG-UUID>' \
--header 'Authorization: <Your-Auth-Header-Value>' \
--header 'API-Key: <API-KEY>' \
--header 'Content-Type: application/json' \
--data-raw '{
  "appId": "abc"
  "metadata": [
    { "label": "developer", "value": "carlos" },
    { "label": "repo", "value": "ts" }
  ]
}'
```

- End the session defined by these metadata key-value pairs configured for the application with application name and language. Use commands similar to the following example:

```
curl --location --request POST 'https://<HOST>/Contrast/api/ng/organizations/<ORG-UUID>' \
--header 'Authorization: <Your-Auth-Header-Value>' \
--header 'API-Key: <API-KEY>' \
--header 'Content-Type: application/json' \
--data-raw '{
  "appName": "FakeJavaApp",
  "appLanguage": "JAVA"
  "metadata": [
    { "label": "developer", "value": "carlos" },
    { "label": "repo", "value": "ts" }
  ]
}'
```



## Update a vulnerability policy

1. From the user menu, select **Policy management**.
2. Select **Vulnerability management**.
3. In Vulnerability policy, select the **Auto-verification** tab.
4. Select the policy.
5. Update the values, as needed.
6. Select **Update**.

## Auto-verification supported frameworks

These frameworks support auto-verification policies:

- **Java:** Jersey 2, Spring MVC 4, Struts 1, Struts 2, Servlets (beta)
- **.NET Framework:** ASP.NET MVC (versions 4 and 5), WebForms, WebAPI and WCF
- **.NET Core:** ASP.NET Core MVC (versions 2.1, 2.2, 3.0 and 3.1) and ASP.NET Core Razor Pages (versions 2.1, 2.2, 3.0 and 3.1)
- **Node.js:** Express, Hapi 17+, Koa and Kraken
- **Ruby:** Rails and Sinatra
- **Python:** Django, Pyramid and Flask

## Set violation vulnerability policies

Violation policies mark a vulnerability as being in violation of a policy. When this policy is triggered, the vulnerability is displayed in red text in the Vulnerabilities list.

When you add a policy, it is turned on, by default. You can turn a policy off or on in the Enabled column in the Violation tab.

Policy	Vulnerability Rules	Applications	Description	Environments	Enabled
All must be remediated in 28 days Time-Based	All	All	28 day duration	All	<input checked="" type="checkbox"/>
All High must be remediated in o... Time-Based	Critical High	All	7 day duration	All	<input type="checkbox"/>

## Before you begin

- An Organization Rules Admin or Organization Admin role is required.

## Steps

1. From the user menu, select **Policy management**.
2. Select **Vulnerability management**.
3. Select the **Violation** tab.
4. To add a policy:
  - a. Select **Add policy**.
  - b. In Name, enter a name for the policy.
  - c. In Vulnerability rules, select the vulnerability severity levels or Assess rules that you want to associate with the policy.

- d. In Applications, select the application importance levels or applications that you want to associate with the policy.
  - e. In Environment, select the environments for the servers hosting the applications where you want to apply the policy.
  - f. Under Trigger, select **Flag any existing vulnerability after** and select the number of days.
  - g. Select **Save**.
5. To update a policy:
    - a. On the Violations tab, select a policy.
    - b. Change any of the policy values.
    - c. Select **Update**.

## Protect rules

Apply Protect rules to monitor or block specific kinds of attacks in application environments. Every rule represents a type of attack that exploits vulnerabilities in either custom code or open-source libraries, such as SQL injection or cross site scripting.

Contrast includes many Protect rules you can use to monitor or block attacks, like these:

- **Command injection:** Carefully crafted inputs can execute tainted operating system level commands.
- **Cross-site scripting:** A web application vulnerability that can allow users to run arbitrary JavaScript in other user's browsers.
- **Expression language injection:** A vulnerability type for many frameworks and custom code that happens when an application mistakenly evaluates user inputs as expression languages like OGNL, SpEL, or JSP EL.
- **Method tampering:** An attack against authentication or authorization systems that have implicit "allow all" settings in their security configuration.
- **Path traversal / Local file include:** A vulnerability that allows users to control which files an application opens and reads.
- **SQL and NoSQL injection:** Carefully crafted inputs to the application that alter SQL or NoSQL queries in order to steal data or execute code.
- **Unsafe file upload:** A vulnerability in the upload process that allows malicious files to bypass upload protections and perform malicious actions. This rule affects files with commonly-used extensions including (but not limited to): SVG, ASP, ASPX, \*SH, JAR, and JAVA. In Monitor mode, this rule reports potentially unsafe file uploads to Contrast. In Block mode, Contrast blocks uploads of these files.
- **Untrusted deserialization:** A web application vulnerability that allows users to pass arbitrary objects to a deserializer and execute remote code.
- **XML external entity processing:** A vulnerability in XML processing that allows users to read, write, and potentially, execute remote code to a file.

## Set Protect rules

You can set [Protect rules \(page 610\)](#) that monitor or block attacks in your application environments.

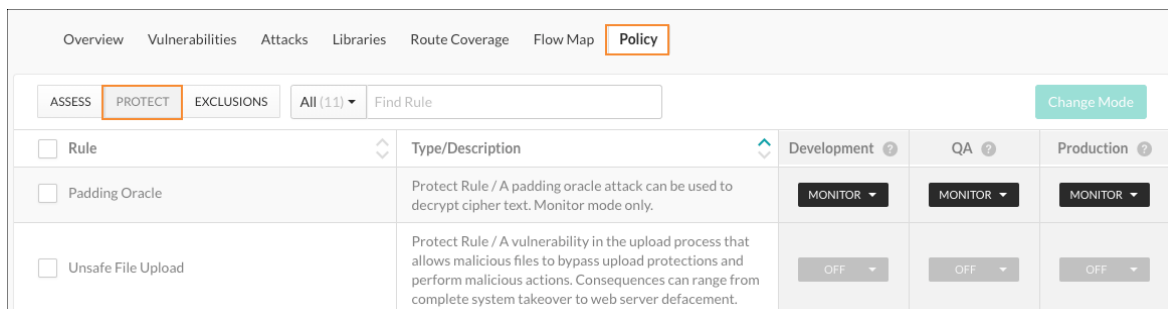
When you add new applications, Contrast applies a set of default Protect rules to them. You can change the modes for an organization's [default Protect rules \(page 613\)](#).

## Before you begin

- An Application RulesAdmin role is required to set Protect rules for applications.
- An Organization RulesAdmin or Organization Administrator role is required to set Protect rules for an organization.
- Ensure that Contrast (hosted customers) or a SuperAdmin (on-premises customers) [granted Protect permissions \(page 708\)](#) for the organization.

## Steps

1. Select **Applications** in the header.
2. Select an application name and select **Policy**.
3. Select **Protect**.



4. To find a specific rule, enter the rule name in the search box.
5. For each rule, set the mode for each environment:
  - a. Select the dropdown for each environment.
  - b. Select one of these modes:
    - **Off:** This mode disables the rule.
    - **Monitor:** The agent identifies and reports attacks.
    - **Block:** The agent identifies, reports and blocks attacks.



### IMPORTANT

If an attack matches a rule and the mode for that rule is set to **Block**, the Java, .NET Framework, and .NET Core agents throw an `AttackBlockedException`.

To ensure the application doesn't crash, edit the application to handle the `AttackBlockedException`.

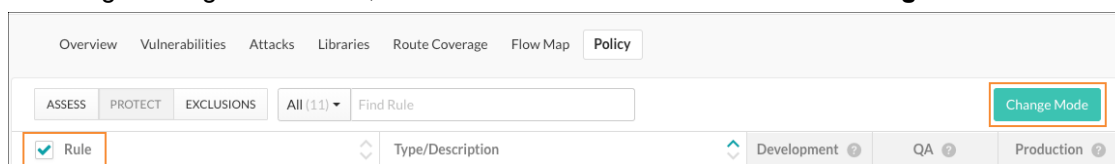
- **Block at perimeter:** The agent blocks a possible attack before the application can process it. This option is not available for all rules.
  - **Monitor at perimeter:** The agent attempts to identify and report a possible attack before the application can process it. This option is not available for all rules.
- If you block or monitor at the perimeter, the agent doesn't verify the attack at the *sink*. This action can lead to false positive results.



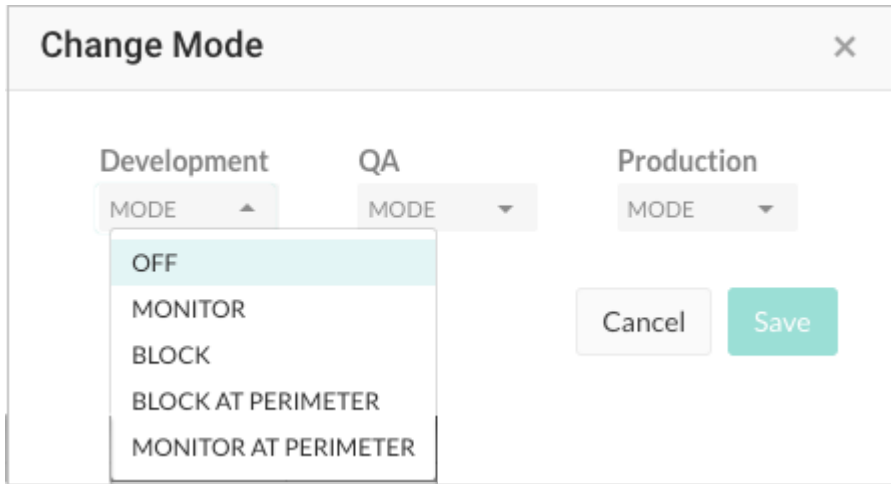
### TIP

You can test policies by setting a different mode for a Protect rule in each environment. This action lets you see how various options work in pre-production and won't disrupt production defenses.

6. To apply settings to multiple rules, use one of these methods:
  - a. Select the checkbox next to each rule that you want to change and select **Change Mode**.
  - b. To change settings for all rules, select the **Rules** checkbox and select **Change Mode**.



- c. In the Change Mode window, set the mode for each environment and select **Save**.



7. To set Protect rules for all applications in the organization that use a specific rule: This step requires an Organization RulesAdmin role.
  - a. Select **user menu > Policy management > Protect rules**.
  - b. To filter the list of rules, use the dropdown to filter the rules by language or the search field to find a rule by name.
  - c. Select a rule name to manage settings for all applications that currently use the rule.

### Policy Management

ASSESS

- Assess Rules
- Security Controls
- Vulnerability Management

PROTECT

- Protect Rules**
- CVE Shields
- Virtual Patches
- Log Enhancers
- IP Management

GENERAL

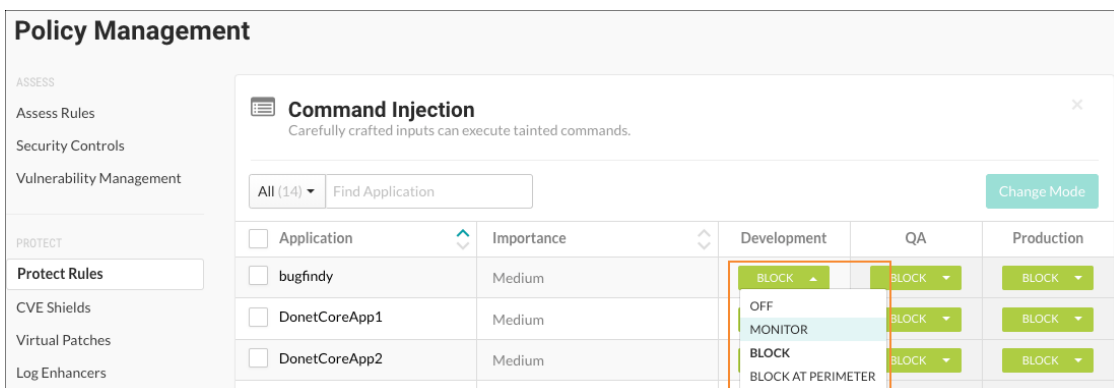
- Application Exclusions
- Compliance Policy
- Library Policy
- Sensitive Data

PROTECT RULES 
 OFF  
  MONITOR/MONITOR AT PERIMETER  
  BLOCK  
  BLOCK AT PERIMETER

.NET Framework (15) Find Rule Configure the default policy for new applications in your organization.

Rule	Description	Development	QA	Production
<b>COMMAND INJECTION</b>				
<b>Command Injection</b> <small>.NET Framework, .NET Core, Java, Node, Python, Ruby</small>	Carefully crafted inputs can execute tainted commands.	<span style="background-color: #333; color: white; padding: 2px;">4</span> <span style="background-color: #90a040; color: white; padding: 2px;">9</span>	<span style="background-color: #90a040; color: white; padding: 2px;">1</span>	
<b>Chained Commands - Command Injection</b> <small>.NET Framework, .NET Core, Node</small>	Detects chained commands as potential attacks since command chaining is often used by attackers to invoke sensitive system commands.	<span style="background-color: #ccc; padding: 2px;">3</span> <span style="background-color: #333; color: white; padding: 2px;">1</span>		
<b>Command Backdoors - Command Injection</b> <small>.NET Framework, .NET Core, Node</small>	Detects when user input is executed as a system command or is passed as a command parameter to common shell programs (e.g. /bin/sh -c "some user input").	<span style="background-color: #333; color: white; padding: 2px;">4</span>		
<b>Dangerous Paths - Command Injection</b> <small>.NET Framework, .NET Core, Node</small>	Detects dangerous paths as part of system commands as attackers often try to get access to sensitive paths or files.	<span style="background-color: #333; color: white; padding: 2px;">4</span>		

- d. Use the dropdown to set the Protect mode for each environment.



## Set Protect rules for organizations

When you add and configure an agent for an application or create a new organization, Contrast applies a set of default Protect rules.



### NOTE

Starting in August 2021, new organizations include an optimized set of Protect rules. This configuration is designed to provide the highest value to users, including enhanced performance.

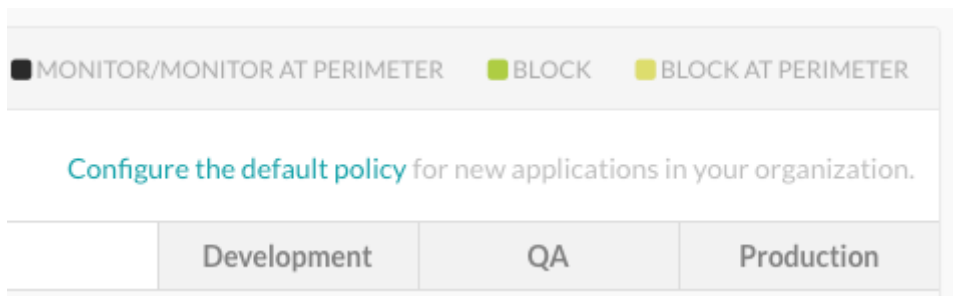
Use this procedure to change the default settings for Protect rules at an organization level. Changing these settings affects new application that you add to a Contrast organization. These changes have no affect on existing applications in the organization.

## Before you begin

- Ensure that you have an Organization Administrator or Organization RulesAdmin role.
- Log in and select the correct organization.

## Steps

1. Under the user menu, select **Policy management**.
2. Select **Protect rules**.
3. Select **Configure the default policy**.



4. For each Protect rule, select the dropdown for the environment where the application is hosted (Development, QA, and Production).
5. Select one of the following modes:
  - **Off**: This mode disables the rule.

- **Monitor:** The agent identifies and monitors attacks.
- **Block:** The agent identifies, reports, and blocks attacks.
- **Block at perimeter** The agent blocks a possible attack before the application can process it. This option is not available for all rules.
- **Monitor at perimeter:** The agent attempts to identify and report a possible attack before the application can process it. This option is not available for all rules.

## CVE shields

Common Vulnerabilities and Exposures (CVE) provide a standardized identifier for a given vulnerability or exposure. They also provide a baseline for evaluating the coverage of your tools.

Contrast provides several CVE shields to help protect your applications that contain CVEs. CVE shields are useful for legacy applications that use vulnerable libraries that are difficult to update.

You only need CVE shields when the vulnerability isn't a common attack class like SQL injection or untrusted deserialization. In some cases, Contrast creates a CVE shield to get more data that is specific to a particular threat, even if there's an existing Protect rule that prevents the attack from occurring. This action helps provide more context into exploitation. It helps organizations map ongoing attacks to trends in the overall security ecosystem.

[View CVE shields \(page 614\)](#)

[Set modes for CVE shields \(page 615\)](#)

## View CVE shields

The CVE shields list displays the following information:

**Policy management**

ASSESS

- Assess Rules
- Security Controls
- Vulnerability Management

PROTECT

- Protect Rules
- CVE Shields**
- Virtual Patches
- Log Enhancers
- IP Management

GENERAL

- Application Exclusions

CVE SHIELDS OFF MONITOR/MONITOR AT PERIMETER BLOCK

Find CVE Shield

CVE Shield (ID)	Description	Development	QA	Production
Apache Tomcat Arbitrary Code Execution CVE-2017-12617 <span>BETA</span>	A remote code execution vulnerability in Tomcat 7.0.0 through 7.0.81, 8.0.0.RC1 through 8.0.46, 8.5.0 through 8.5.22, and 9.0.0.M1 through 9.0.0	1		
Apache Tomcat VirtualDirContext File Browsing Vulnerability CVE-2017-12616 <span>BETA</span>	A flaw in VirtualDirContext in Tomcat 7.0.0 through 7.0.80, allows an attacker to view sourcecode and other files on the system.	1		

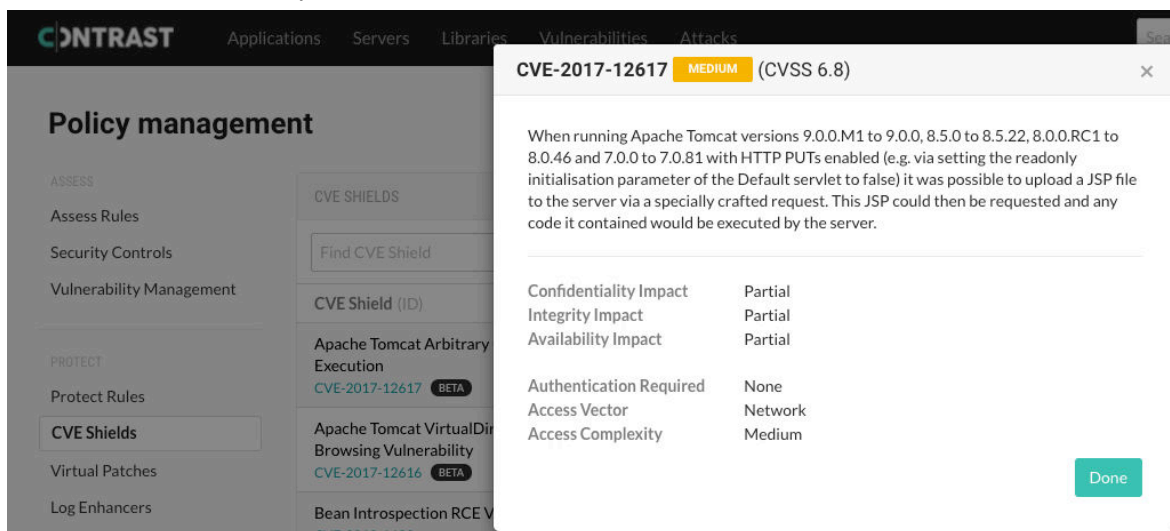
- The CVE shields that Contrast provides for specific CVEs.
- A description of the CVE.
- The environments in which the servers hosting an application are running.
- The mode configured for the CVE shield:
  - **Off:** This mode disables the CVE shield entirely.
  - **Monitor:** In this mode, the CVE shield identifies and reports attacks.
  - **Monitor at perimeter:** In this mode, the CVE shield tries to identify and report a possible attack before the application can process it. This option is not available for all CVE shields.
  - **Block:** In this mode, the CVE shield identifies, reports, and blocks attacks.

- The applications, if any, that contain a specific CVE.  
The CVE shield defends this vulnerability against attack.

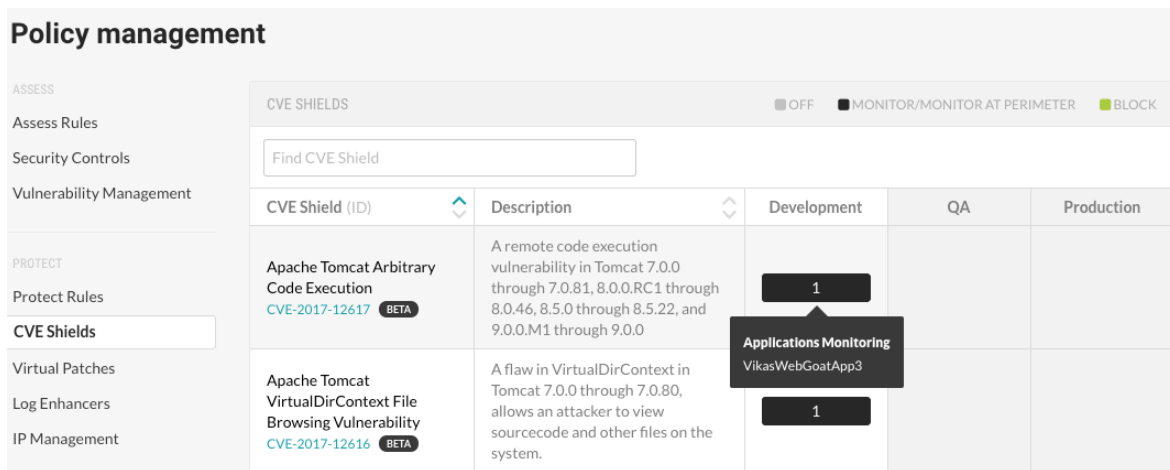
## Steps

To view CVE shields:

1. From the user menu, select **Policy management**.
2. Under Protect, select **CVE shields**.
3. To find a specific CVE, enter a full or partial name in the search box.
4. To view details about a specific CVE, click the link below the CVE name.



5. To view which applications contain a CVE, in one of the environment columns, hover over the number. The tooltip lists the applications that the CVE shield is defending. The number indicates the number of applications that contain the CVE. The mode indicates how the CVE shield is configured.



## Set modes for CVE shields

Instead of detecting categories of attacks, CVE shields defend specific CVEs in applications from attacks.

Set one of the following modes for applications hosted on servers running in a Development, QA, or Production environment:

- **Off:** This mode disables the CVE shield entirely.

- **Monitor:** In this mode, the CVE shield identifies and reports attacks.
- **Monitor at perimeter** In this mode, the CVE shield tries to identify and report a possible attack before the application can process it. This option is not available for all CVE shields.
- **Block:** In this mode, the CVE shield identifies, reports, and blocks attacks.

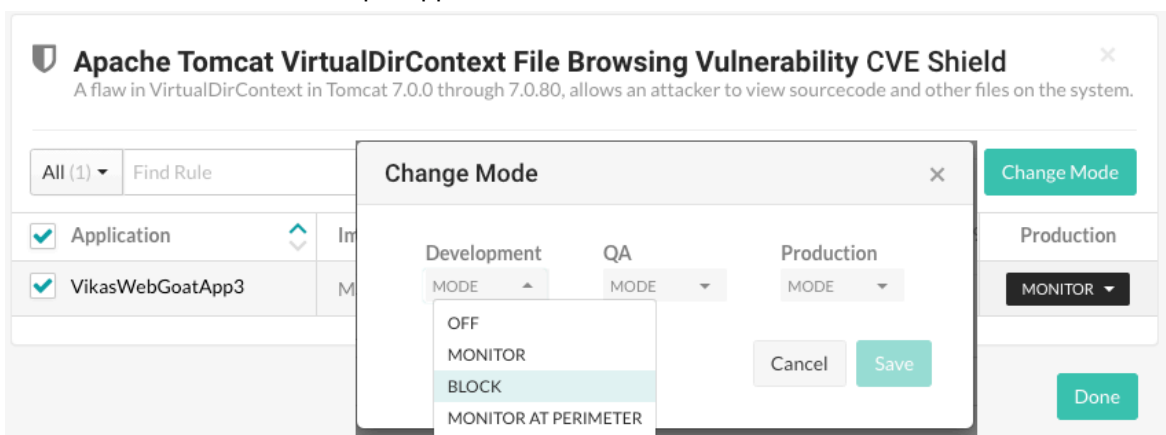
### Before you begin

- **Required:** Check that you have Organization or Rules Admin permissions.
- Check that [settings \(page 470\)](#) for servers hosting your applications are configured to use the correct environments.

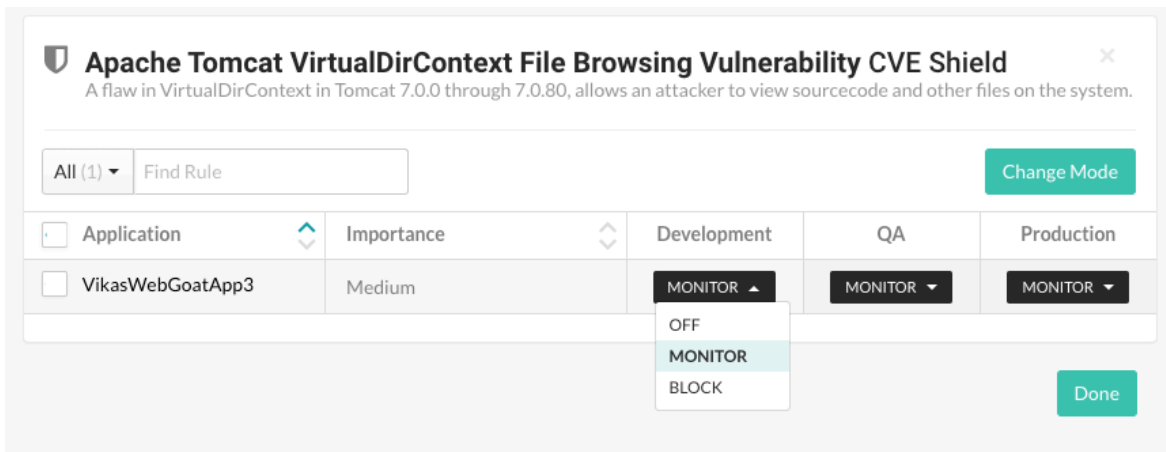
### Steps

To view CVE Shields.

1. From the user menu, select **Policy management**.
2. Select **CVE shields**. and click the name of a CVE shield.  
To find a specific CVE shield, enter a partial or full name in the search box.
3. To set the mode for all or multiple applications:



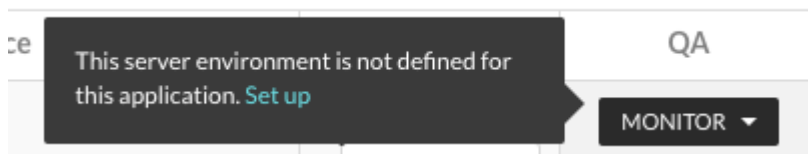
- a. To select all applications, select the **Application** checkbox. To select multiple applications, select the checkbox for each application.
  - b. Click **Change mode**.
  - c. In the Change Mode window, select the CVE shield mode for the selected applications in a one or more environments.
  - d. Click **Done**.
4. To set the mode for a single application:



- a. At the end of the row for an application, select the menu in an environment column.



If an environment is not defined for the server hosting the application, when you hover on that environment, a tooltip appears. To configure the server for that environment, click **Set up** and select the settings icon (⚙️) at the end of the server row.



- b. Select a CVE shield mode for the application in the selected environment.
- c. Click **Done**.

## Set modes for CVE shields for organizations

When you add and configure an agent for an application in a Contrast organization, Contrast applies a set of default CVE shields.



### NOTE

Starting in August 2021, new organizations include an optimized set of CVE shields. This configuration is designed to provide the highest value to users, including enhanced performance.

Use this procedure to change the default settings for CVE shields at an organization level. These settings apply to any new application that you add to a Contrast organization. These changes have no effect on existing applications in the organization.

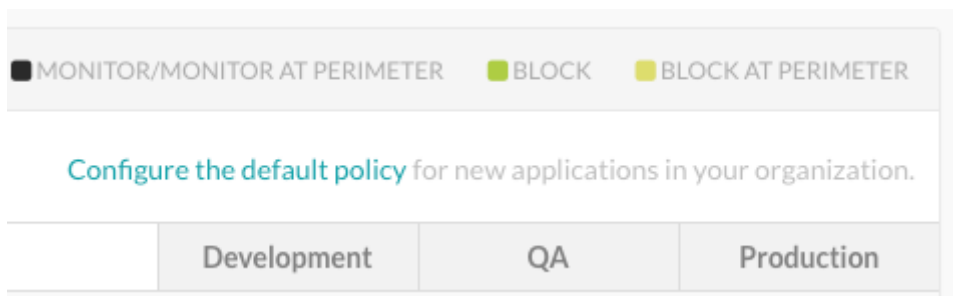
### Before you begin

- Ensure that you have an Organization Administrator or Organization RulesAdmin role.
- Log in to or select the correct organization.

### Steps

To change modes for CVE shields:

1. Under the user menu, select **Policy management**.
2. Select **CVE shields**.
3. Select **Configure the default policy**.



4. For each CVE shield, select the dropdown for the environment where the application is hosted (Development, QA, and Production).
5. Select one of the following modes:
  - **Off**: This mode disables the CVE shield entirely.

- **Monitor:** In this mode, the CVE shield identifies and reports attacks.
- **Monitor at perimeter:** In this mode, the CVE shield tries to identify and report a possible attack before the application can process it. This option is not available for all CVE shields.
- **Block** In this mode, the CVE shield identifies, reports, and blocks attacks.

## Manage virtual patches

Virtual patches are custom, short-term rules that block HTTP requests matching specific criteria (for example, URL, parameter keys or values, and so forth) before an application can process them.

Organization Administrators and RulesAdmins can view and manage virtual patches.

To add a virtual patch:

1. In the **user menu**, under **Policy management**, select **Virtual patches**.
2. Find virtual patches by using the language filters or the search field above the grid.

VIRTUAL PATCHES						
All (4) ▾		Find Virtual Patch		<a href="#">+ Add Virtual Patch</a>		
		Description	Development	QA	Production	
Java (4)	⌵	Anertix on E				
.NET Framework (0)		Autogenerated patch for Anertix on ErikTomcatEclipse	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
.NET Core (0)		Blocks Klein for Acct Name	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Node (0)		spring cmd injection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Ruby (0)		Struts2 S2-045 Remote Command Execution Patch	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

3. Click on the name of a patch to edit the rule configuration, or select **Add virtual patch** to add a new one.  
You can also select the **Delete** icon to delete a rule or use the toggles in the grid to enable or disable each environment.
4. In the window that appears, add a **Name** and **Description** .

Add Virtual Patch
✕

---

**Name**

**Description**

**Apply To** ?

Applications

Application language

Application technology

**Conditions** ?

User Agent	matches	Value	✕
User Agent	matches	Value	✕

[+ Add Condition](#)

5. Under **Apply to**, use the radio button to choose whether the rule applies to specific **Applications**, an **Application language** or an **Application technology**. After clicking the appropriate button, use the multiselect field that appears to further refine your choice.
6. Under **Conditions**, use the dropdowns to select the conditions under which the patch should apply to the applications. Select **Add another condition** in a separate row, if necessary.

When you select how the virtual patch value is applied, select one of the following options:

- Equals
- Contains
- Matches (using Perl-Compatible Regular Expressions - PCRE)
- Does not equal
- Does not contain
- Does not match (using Perl-Compatible Regular Expressions - PCRE)

Both the **Matches** and **Does not match** options support the use of Perl-Compatible Regular Expressions (PCRE). If you select **Matches** or **Does not match** option, you can define a regular expression that matches a value in the selected field of the HTTP request.

If the expression matches, or does not match as specified, the virtual patch is applied and the mitigation action specified in the patch configuration is taken.



**NOTE**

Regular expressions can be very powerful, but they can also be complex and difficult to create correctly. If you're not familiar with PCRE expressions, ask for assistance from a security expert or [Contrast Security](#) to ensure that your Virtual Patches are configured correctly and effectively.

As a starting point, look at [Regular expression reference \(page 624\)](#). This reference provides some examples of what is possible with PCREs.

7. Select **Add** to save the configuration.

## Add or edit log enhancers

Log enhancers are instrumentation instructions that allow the Contrast agent to log additional parameters and data in the application, without requiring any source code changes.

By using these deep security instrumentation techniques, a user can specify the API and parameter to log, and the Contrast agent adds this information to the *security.log* file as part of RASP logging.



### NOTE

Starting in August 2021, new organizations include an optimized set of log enhancers. This configuration is designed to provide the highest value to users, including enhanced performance.

To add, edit or delete a log enhancer:

1. Under [policy management \(page 599\)](#), select **Log enhancers**.
2. Filter by language, or use the search to find the existing log enhancer you want to edit and select the name, or select **Add log enhancer**. Use the toggles in the grid row to enable or disable the rule in each environment.

LOG ENHANCERS						
All (18) ▾ Find Log Enhancer		<a href="#">+ Add Log Enhancer</a>				
Log Enhancer	Description	Development	QA	Production		
Apache SSL HostName Verifier Changed <small>Java</small>	The SSL hostname verifier changed after the SSLSocketFactory object was created	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
ESAPI Default Login <small>Java</small>	ESAPI login using current request	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
ESAPI Exception <small>Java</small>	ESAPI threw a runtime security exception	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
ESAPI Exception with cause <small>Java</small>	ESAPI threw a runtime security exception	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

3. In the window that appears, enter a **Name** and **Description**.

4. Enter a **Log level (page 750)** and **Log type**.

5. Under **API to log**, enter:

- **Language**
- **API:** Use the structure `<class_name>.<method_name>(<argument_types>)`. For example:

```
public boolean com.acme.Authenticator.authenticate(String user, String password)
```

- **Format:** Enter the log description, including relevant data from the function call. You can include any of the following placeholders in your message:
  - `{{O}}`: Print the string representation of the object on which this call is made. If the method is static, this may be null or empty.
  - `{{Pn}}`: Print the given parameter at index `n`. Note that `n` starts at 1.
  - `{{P1}}`: Print the first parameter into the message.
  - `{{R}}`: Print the return value of the function.

6. Select **Add** to save the rule.

## Application exclusions

Exclusions are used to suppress events. You might want to suppress events if you are using an external security control outside of the scope of Contrast's agent instrumentation. For example:

- As an administrator, you need to change the HTML that shows up on your web page, even though this qualifies as a cross-site scripting (XSS) vulnerability. In this case, you can create an exclusion that prevents these changes from being reported.
- You use an edge device to place the correct headers on outbound HTTP responses to stop click-jacking attacks. However, the issue might be appropriately reported because the application never provided the required protection.
- When you test beta rules, you can use exclusions to suppress false positives.

If you are using Java, Node.js, .NET, Python, or Ruby agents, you can [add an application exclusion \(page 622\)](#) under policy management, or from the list of attack events.

You can view a list of existing exclusions either at **Applications > Your application name > Policy > Exclusions** or in the **user menu > Policy management > Application exclusions**.

## Add application exclusions

Java, .NET Framework, .NET Core, Node.js, Python, and Ruby agents let you use an [application exclusion \(page 621\)](#) to exclude certain applications, or parts of them, from security analysis.

Currently, Go and PHP agents do not support application exclusions.



### NOTE

Message queue exclusions are available for Java agents only. This feature is currently not generally available. To get access to Message queue exclusions, contact [Contrast support](#).

## Before you begin

- An Admin or RulesAdmin role is required.
- Node.js, Python, and Ruby agents do not support code exclusions.
- Only Java agents support message queue exclusions.

## Steps

1. Select **Applications** in the header and select the name of your application. Exclusions only apply to the application for which they were created.
2. Select the **Policy** tab and then, select **Exclusions**.
3. Select **Add Exclusion**.



### TIP

You can also create an exclusion from an existing attack event. When viewing the list of attack events, **Attacks > Attack events**, select the triangle in the far right column, then select **Add exclusion**. Selecting this button pre-populates the exclusion fields based on the details of this specific event.

Once created, this exclusion is visible in the list of exclusions.

4. In Add Exclusions, enter a **Name** for this exclusion (something you'll remember easily).
5. Select the **Exclusion type**.  
Input, URL and Queue/topic-based exclusion definitions accept a subset of Perl Compatible Regular Expressions (PCRE) which includes these values:

```
. * for 0 or more of any character
.+ for 1 or more of any character
.? for 0 or 1 of any character
. for 1 of any character
\. for an escaped literal of . for usage Example: somefile\.jsp
```

Use these [regex examples \(page 624\)](#) to guide you.

Select one of these options:

- **Code:** Enter the method signatures you want to be suppressed. For example, if you have a method called `doLegacySecurity()` inside a class called `com.Acme.OldSecurity` that is being reported for using insecure cryptographic algorithms, you can ignore it by entering:

```
Com.Acme.OldSecurity.DoLegacySecurity
```

Be sure to include the entire method signature without a trailing parameter definition or any other extra characters. Contrast matches this method signature against the stack trace for any vulnerabilities found. Contrast suppresses any method signatures containing a match.

- **Input:** Enter an input type and an input name. Any findings using this input will be suppressed.
  - For **Parameter, Header and Cookie:** You must specify the name of the particular input for which you wish to suppress findings. You can use wildcard \* to suppress all findings from the selected input type.
  - **QueryString and Body:** These will suppress findings from the entire QueryString and Body, respectively. The QueryString and Body may only be excluded in conjunction with the URL exclusion pattern defined below.

For the **Input** exclusion type, under Applied URLs, choose how to apply URLs:

- **All URLs:** Findings using the specified input type and name will be suppressed regardless of where they've come from.
- **These URLs:** Specify a set of paths to which to apply the exclusion. You can use [regex \(page 624\)](#) and [wildcard expressions. \(page 624\)](#)



### IMPORTANT

Do not include protocol schemes (`http://` or `https://`) or hostnames; only use path names beginning with `/`.

Slash followed by dot-wildcard `/.*` is an acceptable substitute for listing all URLs.

Designate URLs that should be ignored by certain rules.

- **URL:** Designate URLs that should be ignored by certain rules. List the URL paths to be excluded, one per line. You can use [regex \(page 624\)](#) and [wildcard expressions \(page 624\)](#).
- **Queue/topic:** Specify a message queue or topic that should be ignored by certain rules. A message queue has one consumer while a topic has multiple consumers.

Currently, this option is supported by Java only.

For the Queue/topic exclusion type, under Applied queues, choose how to apply the queues or topic names:

- **All queues/topics:** Findings from all queues and topics are suppressed.
- **These queues:** Specify a list of queue or topic names to be excluded. You can specify queue names or use [regex. \(page 624\)](#) and [wildcard expressions \(page 624\)](#).

- Under **Applicable rules**, specify the scope of rules affected by the exclusion. All rules is the default, or you can click in the box to select multiple options:
  - **All rules** applies the exclusion to all vulnerabilities found in both Assess and Protect mode.
  - Under Assess, **All Assess rules** applies to all vulnerabilities found when Assess is enabled.
  - Under Protect, **All Protect rules** applies to all attack events when Protect is enabled.
  - Under the Assess section or the Protect section, selecting individual rules lets you further narrow the focus. Exclusions are only applied to vulnerabilities that the selected rules find.

If you select **Input** as the exclusion type, you can only select rules that are not triggered by user input.

- Under Assess and Protect, select individual rules found in both Assess and Protect mode.

- Select the box next to **Suppress all events that match this exclusion** if you want Contrast to suppress historical events that have already been reported.

- Select **Add**.

The exclusion is added to the list of exclusions. Any inputs that match the criteria you entered won't be processed with the rules you've applied.

You can view this list either at **Applications > Your application name > Policy > Exclusions** or in the **user menu > Policy management > Application exclusions**. From the list, you can use the toggles to enable or disable the exclusion for Assess or Protect.

## Regular expression reference

Use this table, and the examples below, for reference when [creating application exclusions \(page 622\)](#):

Effect	Pattern	Example pattern	Example match
Start of a string	^	^w+	Start of a string
End of a string	\$	w+\$	End of a string
Case-insensitive match of following string	(?i)	(?i)%0a	%0a or %0A
A single character of: a, b or c	[abc]	[abc]+	a bb ccc
A character except: a, b or c	[^abc]	[^abc]+	Anythingbutabc.
A character in the range: a-z	[a-z]	[a-z]+	Only a-z
A character not in the range: a-z	[^a-z]	[^a-z]+	Anythingbuta-z.
A character in the range of: a-z or A-Z	[a-zA-Z]	[a-zA-Z]+	abc123DEF
Any single character	.	.+	abc
Any whitespace character	\s	\s	anywhitespacecharacter
Any non-whitespace character	\S	\S+	any non-whitespace
Any digit	\d	\d	not 1 not 2
Any non-digit	\D	\D+	not 1 not 2
Zero or one of a	a?	ba?	ba b a
Zero or more of a	a*	ba*	a ba baa aaa ba b
One or more of a	a+	a+	a aa aaa aaaa bab baab
Exactly 3 of a	a{3}	a{3}	a aa aaa aaaa
3 or more of a	a{3,}	a{3,}	a aa aaa aaaa aaaaaa
Between 3 and 6 of a	a{3,6}	a{3,6}	a aa aaa aaaa aaaaaa aaaaa
Period (dot) is a literal character	.	a.b	string.string

## Wildcard expressions

When specifying Input, URL, or Queue/topic exclusions for applications, you can build wildcard expressions using:

- `.*` to mean 0 or more of any character
- `.+` to mean 1 or more of any character
- `.?` to mean 0 or 1 of any character
- `.` to mean 1 of any character
- `\.` for an escaped literal of `.` for usage

Example: `somefile\.`jsp

## Wildcard expression examples

Desired effect	Regular expression	Example
Exclude all subpaths	/myapp/.+	Excludes all paths with the initial URL of /myapp/
Exclude one character from subpath	/.yapp	Excludes all subpaths that are 5 characters and end in yapp (like myapp)
Exclude one subpath explicitly	/myapp/thispath	Excludes only /myapp/thispath
Exclude path ending	/.*ignore	Excludes all paths ending in ignore
Exclude paths containing	/.*value.*	Excludes all paths containing value
Exclude path containing	/.?value.*	Excludes all paths either starting with value or paths that have one character before value
Exclude paths where a period (dot) is used as a literal character and not a wildcard.	/myapp\.js	Excludes only myapp.js You can use up to three instances of this expression.



## Set compliance policy

You can define compliance policies for application compliance within your organization. If any designated applications violate this policy, Contrast marks them so you can quickly find them and fix them. (Administrators are also notified of violations by email.)

To set compliance policy:

1. Under [policy management \(page 599\)](#), select **Compliance policy**.
2. You will see a list of existing compliance policies if there are any. You can enable or disable policies using the toggles, or delete them with the **Delete** icon.
3. Select the name of any policy to edit, or select **Add policy** at the top of the grid to create a new compliance policy.
4. In the panel that opens enter:
  - **Name:** Choose a name for the policy.
  - **Policy criteria:** The default is **All rules**, or you can type ahead and select vulnerabilities by severity level(s), security standards or Assess rules.
  - **Applications:** The default is All applications or you can type ahead and select applications by level(s) of importance and/or individual name.
5. Select **Add** or **Save**.



### NOTE

For default policies, the **Name** and **Policy criteria** fields are locked, and you cannot delete them. However, you can modify application selections for default policies.



### TIP

Enabled policies can be used to filter applications by compliance policy. To do this select Applications. In the Applications page, click the Advanced link to filter application by Compliance Policy.



### NOTE

If an applicable vulnerability isn't remediated, or applicable Security Standards and Assess Rules are being violated, Contrast flags the corresponding applications in the Applications page. Hover over the warning icon in the Applications grid or go to the application's details page for a link to the violated policy.

## IP management

Manage IP policy in your organization with denylists, allowlists (trusted hosts), and source names:



### NOTE

For denylists and allowlists, Contrast checks the `Client Address` and the `X-Forwarded-For` request headers to see if the IP addresses match the list entries.

- **IP denylist:** Sets rules that let Contrast Protect block all IP addresses in this list  
Using a denylist is appropriate for immediate triage until you can put a more permanent Protect policy in place or conduct an investigation.
- **IP allowlist:** Marks trusted hosts conducting internal vulnerability scans as safe. Contrast doesn't show data for IP addresses in this list.  
Entries in this list don't override entries in IP denylists  
Contrast Assess features remain unaffected and continue to function as normal.  
Contrast Protect ignores all IP addresses (or ranges) that match entries in this list. It does not monitor or block any attacks from IP addresses in the list.
- **Source name:** Labels attack events caused by known sources, such as pen testers, based on one or more IP addresses or subnet masks.  
When you view attacks in the **Attacks > Monitor** and **Attack Details** pages, Contrast displays the source name instead of the attacker's IP information. Displaying this value allows you to quickly identify and differentiate expected events from attack events that need your attention.

## See also

- [Block or allow IPs \(page 626\)](#)
- [Manage source names \(page 627\)](#)

## Deny or allow IP addresses

Use IP denylists or IP allowlists to [manage IP addresses \(page 625\)](#) in your organization.

## Before you begin

- You must have the organization role of Admin or RulesAdmin role.
- You can use Classless Inter Domain Routing (CIDR) notation to specify a subnet mask.

## Steps

1. From the user menu, select **Policy Management > IP Management**.
2. Manage denylists:
  - a. Select the **IP denylist** tab.
  - b. To edit a denylist, select a denylist name, change the displayed information, and select **Save**.
  - c. To add an IP address to a denylist, select **Add IP to denylist**, specify the details, and select **Add**.

**Add IP to denylist** [Close]

Name  
test

IP address/subnet mask ? Expires  
1.1.1.1 1 week

Matches 1.1.1.1 - 1.1.1.1

Cancel Add

3. Manage allowlists:

- a. Select the **IP allowlist** tab.
- b. To edit an allowlist, select the allowlist name, change the displayed information, and select **Save**.
- c. To add an trusted host to an allowlist, select **Add trusted host**, specify the details, and select **Add**:

**Add IP as trusted host**

Name  
test-now

IP address/subnet mask ?  
2.2.2.2  
Matches 2.2.2.2 - 2.2.2.2

Expires  
1 week

Cancel Add

## Manage source names

Use source names to quickly identify non-threatening, internal traffic and testing, while monitoring attack events in your organization.

You can label one or more IP addresses and subnet masks with a source name of your choice. When the source name is saved, you can see the name (rather than user IP information) by selecting **Attacks > Monitor** or looking on the **Attacks details** page. This can make it easier to identify the named attacker as a known source when assessing attack events.

To create source names:

1. Go to the **user menu > Policy management > IP management > Source names**.
2. Select **Add source name**.
3. Enter the **Name** you want to use to identify one or more IP addresses.
4. Add the **IP address/Subnet mask** to identify with this source name. Use the link to **Add** more IP addresses or subnet masks to the group, if necessary.
5. Use the dropdowns to select the **Start** and **End** dates and times for the source name. You may choose to create a custom time span that starts on a past date; in this case, the source name applies retroactively to any attack events.
6. Once the fields are completed, select **Add** to save the source name.  
Once a source name is added in your organization, the source name appears for attacks that match the criteria on the **Monitor** and **Attack** details pages. This will help you [monitor attacks \(page 541\)](#).  
If the data reported for an attack event matches more than one source name, Contrast applies the name that you updated most recently.
7. To edit a source name later, select the source name. In the **Edit source name** form that opens, make changes and select **Save**.
8. To delete a source name, either select the **Delete** icon in the **Source names grid**, or below the **Edit source names** form. Once the name is deleted, all references to the name are replaced with the IP information.

## Set library policy



### IMPORTANT

License policy is available to Contrast SCA customers only. Contact your Organization Administrator to enable SCA.

Contrast can flag libraries that don't meet your organization's criteria to ensure your applications are secure.

If a library is restricted or used in an application that's below a specific version, it's marked as a policy violation by Contrast. You can also tell Contrast to automatically grade any library that violates the policy with the letter "F" to flag it in the Contrast interface. (Administrators are notified of violations in both the product and by email.)



### NOTE

Library versions include any major, minor, and patch versions.

To set a library policy:

1. In the user menu, select **Policy Management > Library Policy**.
2. Check the box to **Restrict libraries** and choose which libraries you want to exclude from your portfolio. You can select multiple.
3. Check the box to **Enable version requirements** and choose one or multiple libraries that must be within your given number of versions.
4. Click the **Add another requirement** link to create version requirements for additional library groupings.
5. Check the **Restrict licenses** box to set a policy on open-source licenses that you want to restrict. If an open-source license is restricted, then any libraries that use the restricted license will be marked as a policy violation.  
The license policy lists open-source licenses in SPDX format, listed by short identifier and followed by the full name. Any license type that you want to restrict must be selected. Contrast includes any 'or later' licenses it identifies in your portfolio. For example, if you restrict by GPL-3.0-only, any licenses that are GPL-3.0-or-later will be included in that restriction.
6. Check the box next to **Fail libraries in violation of policy**, to automatically assign a failing score to any library that violates a set policy.  
If a library fails to comply with a set policy, the name, a warning icon and the library score are highlighted in red in the **Libraries** page. Hover over the icon or go to the library's **Overview** page for more information about the violation.  
If you choose to automatically fail libraries, Organization Administrators will be notified when [adjusting score settings \(page 648\)](#).

## Sensitive data masking

Sensitive data masking limits risk to your organization and helps meet compliance requirements.

Data masking protects sensitive data in your applications by redacting it in vulnerability and attack reports that are sent to Contrast, syslog or security log.

Contrast offers several categories of sensitive data, or data types, that are comprised of specific keywords that the agent automatically identifies and redacts in reports. A user with at least RulesAdmin permissions can [manage sensitive data \(page 629\)](#).

Contrast agents mask sensitive data in query parameters, request headers, cookies and body. Your agent identifies sensitive data by searching for specific keywords used in the input name. If the agent finds a match, it redacts the value for that input, and replaces it with a placeholder with the format `contrast-redacted-{datatype}`, where `datatype` is the category of sensitive data to which the keyword belongs.

Contrast agents do **not** mask individual fields in request bodies with a content type other than `application/x-www-form-urlencoded`; however, you can configure the agent to mask the entire request body. Contrast agents also do not mask data that appears in the data flow portion of a vulnerability report, if using Assess, or in the vector of an attack event, if using Protect.



## NOTE

Contrast agents make a “best effort” attempt to avoid printing sensitive data in Contrast log statements; however, it’s possible that sensitive data could appear in the Contrast log, if the log level is set to DEBUG or lower. Whenever possible, you should avoid setting production systems to log at DEBUG or lower. If a system that deals with sensitive data is set to log at DEBUG or lower, you should take steps to ensure that those logs are not being sent to an external system to avoid leaking any sensitive data.

For example, this HTTP request sent by an agent as part of a vulnerability report shows two inputs that the agent identified as sensitive, as well as the placeholders it used to mask the values of the input before sending the report to Contrast, syslog server or security log.

```
PUT /employee/5 HTTP/1.1
Host: yourdomain.com
Content-Type: application/x-www-form-urlencoded
Content-Length: 30
apikey: contrast-redacted-authentication-info

ssn=contrast-redacted-government-id&department=sales
```

In this case, the header value is masked because "apikey" matches a keyword in the "Authentication Info" data type, and the form parameter is redacted because "ssn" matches a keyword in the "Government ID" data type for your Contrast organization. (Keyword matches are case insensitive.)

## Manage sensitive data types

[Sensitive data masking \(page 628\)](#) limits risk to your organization and helps meet compliance requirements.

1. Under policy management, select **Sensitive data**.
2. Here you can see an alphabetical list of sensitive data types. Use the search field to find a particular type by name or keyword.
3. Check the box next to **Mask entire body** to enable redaction of the entire HTTP request body. This will apply to all applications in your organization.
4. Critical data types and keywords determined by Contrast apply to all applications in your organization by default, and can't be edited or disabled. For data types that Contrast has not determined to be critical, you may use the toggle in the grid to enable or disable them for the organization.

5. Click on the name of the data type in the grid to add custom keywords. In the **Edit sensitive data type** form, select **Add custom keywords** to add more keywords and specify the applications to which they apply. **Default keywords** aren't editable, and apply to all applications.
6. Select **Save**.

## Add and edit notifications as a RulesAdmin

Notification defaults are set by an Organization Administrator, but as a RulesAdmin you can enable or disable existing notifications or create new ones.

1. Under [organization settings \(page 633\)](#), select **Notifications**.
2. Use the toggles to enable or disable existing notifications.
3. To create a new notification, select **Create notification**.
4. In the window that appears, enter:
  - Name
  - Frequency
  - Description
  - Applications
  - Application tags
  - Users
5. Select **Save**.

## Organization administration

If you have Organization Administrator permissions you can do everything a [RulesAdmin \(page 599\)](#) or [Editor \(page 419\)](#) can do, plus, at an organization level you can:

- [Configure organization settings \(page 633\)](#)
- [Enable Assess \(page 630\)](#)
- [Enable Protect \(page 631\)](#)



### NOTE

Organization Administrators have the highest organization level permissions. Other [organization roles \(page 745\)](#) also have capabilities that span across their organization.

If [configured at a system level \(page 706\)](#), users can fill the Organization Administrator role across multiple organizations.

## Enable Assess

To enable Assess:

1. Log in to Contrast as an Organization or Application Administrator.
2. Select **Servers** in the header.
3. Either scroll or use the search at the top of the page to find the server(s) you want to analyze. Turn the Assess toggle on (green). There are three ways to do this:
  - Select the toggle in the Assess column of the list of servers.
  - Select the server name to view information about that Server, and use the toggle there.
  - Under organization settings, select **Server** and use the Assess toggle there.
4. Enabling Assess requires an Assess (application) license. To license an application, select **Applications** in the header. Select **Unlicensed** next to the application name and you'll be prompted to apply a license.

**NOTE**

Under [organization settings \(page 633\)](#), with Organization selected in the left navigation, Organization Administrators can select the box next to **Automatically apply licenses to new applications** so this doesn't have to be done manually for every application.

- Restart the application server to ensure the Contrast agent instruments your application with Assess capabilities. Once that's complete, Contrast begins to receive vulnerability analytics. The application no longer has **Unlicensed** next to it, which means there is an Assess license assigned to it.

**NOTE**

Although you can see the types of vulnerabilities that Contrast discovers without an Assess license, you won't be able to retrieve any details unless you have a license.

## Enable Protect

Enabling Protect for users lets them access and see Protect data. Enabling Protect for servers lets applications use Protect to monitor and block attacks.

**NOTE**

If you enable Protect on servers with existing applications, restarting the applications is required for Protect to take effect.

## Before you begin

- Go to **Organization settings > Users** and verify that you have permissions to access Protect data and settings.
  - For hosted customers, Contrast grants Protect permissions to organizations and user roles in the organization.
  - For on-premises customers, SuperAdmin, ServerAdmin, or System Administrator roles are required to [grant Protect permissions for one or more organizations. \(page 708\)](#)  
These roles can also configure which user roles have access to Protect data.
- Ensure that you have [licenses \(page 635\)](#) that you can apply to servers.
- To enable Protect for users, an Organization Administrator role is required.


## Steps

- To configure the Protect settings in the Contrast web interface, log in to Contrast.
- Enable users to see and use Protect data:
  - In the user menu, select **Organization Settings**.
  - Select **Users**.
  - For each user who needs access to Protect data, turn on the Protect setting (  )
  - To have the new setting take effect, tell users to log out of the Contrast web interface and log in again.

## 3. Enable Protect on servers:

**NOTE**

To automatically [allocate licenses \(page 635\)](#), an Organization Administrator or RulesAdmins role is required. This option is useful if you don't want to enable Protect for servers, one at a time.


- a. Select **Servers** in the header.
- b. Select a server.
- c. To enable Protect in the Contrast web interface, turn on the Protect setting (  ). Use any of the these methods:
  - Turn on the setting in the **Protect** column of the list of servers.
  - Select the server name and in the Overview tab, turn on the Protect setting.
  - Under Organization settings, select **Server (page 642)**, select an environment, and turn on the Protect setting.

**IMPORTANT**

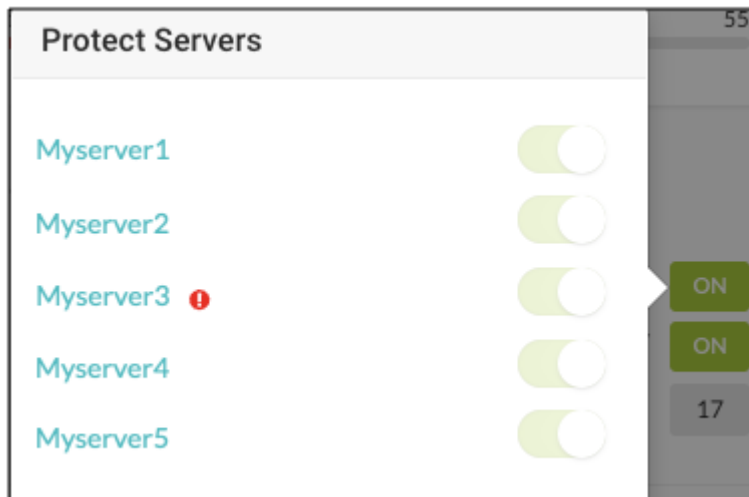
The Protect setting in an agent configuration file overrides the setting from the Contrast web interface.

4. To verify that Protect is turned on for a specific server, in the Servers tab, select the server and then select **Overview**.  
If one or more applications that the server is hosting are not configured to use Protect, a warning icon displays next to the Protect setting.



5. To determine if an application is using Protect on each server hosting it, go to the Applications page:
  - a. Select **Applications** in the header.
  - b. Select an application.
  - c. In the Overview tab, under each environment, check that the Protect status is **On**.  
The number of servers hosting the application that have Protect turned on displays next to the Protect status in the format of **x of y** (for example, **11 of 17**)
  - d. To see if the application is configured to use Protect for each server hosting it, select the **Protect** status (  ).  
If the application is not configured to use Protect on a specific server, a warning icon displays next to the server name.





6. (Optional) Configure an application to use Protect:
  - a. Update the Protect setting in the [agent's configuration file \(page 30\)](#) to `true`.
  - b. Restart your application to have Protect take effect.

Once the application restarts, Contrast starts monitoring attacks, blocking attacks, and displaying attack data in the Contrast web interface.



### IMPORTANT

The Protect setting in the agent configuration file overrides the settings from the Contrast web interface.

## License behavior

Contrast applies Protect licenses automatically to servers when these conditions exist:

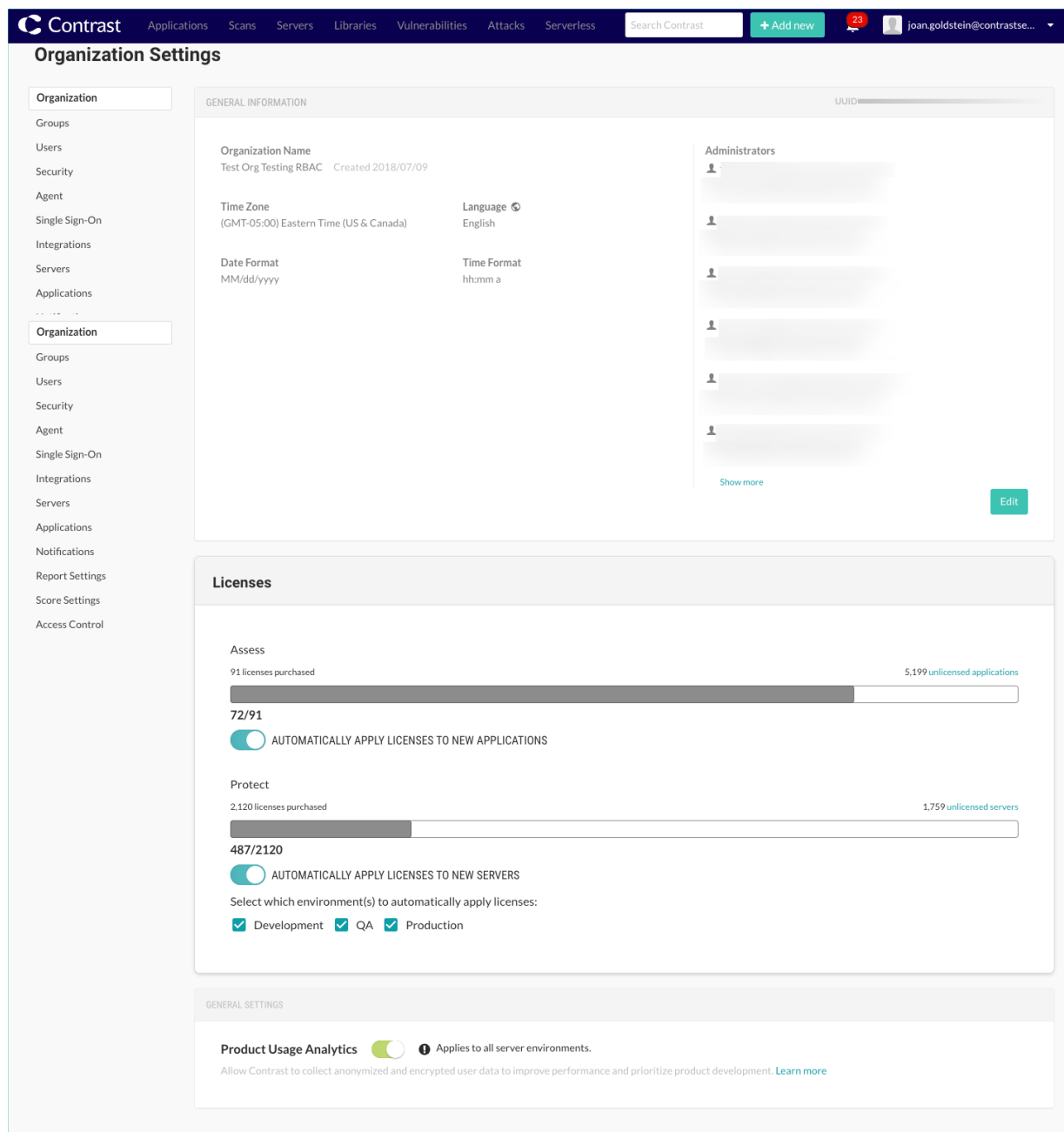
- Protect is turned on for an organization.
- Automatic application of Protect licenses are turned on for an organization.
- A server exists in one or more environments where automatic licensing is turned on.

If you also use the Protect setting in an agent configuration file, it overrides the license behavior in the following ways:

- **Protect is turned on in the agent configuration file**
  - If Protect licenses are available when the application starts, you might notice the server is licensed for a very brief period of time. Contrast removes the license automatically as soon as the agent registers the application.
  - If **no** Protect licenses are available when the application starts, Contrast tries to apply a license to the server every time the agent communicates with Contrast.
- **Protect is turned off in the agent configuration file**
  - If Protect licenses are available when the application starts, Contrast tries to apply a license to the server. When an agent registers an application with Contrast, it removes the license applied to the server.
  - If **no** Protect licenses are available when the application starts, Contrast doesn't apply a license to the server.

## Configure organization settings

If you have Organization Administrator permissions you can configure settings for your organization(s):



1. Log in to Contrast as Organization Administrator.
2. If you have multiple organizations, select the name of the organization you want to configure in the **user menu**.
3. Select **Organization settings** in the **user menu**. Here you can access settings for your:
  - Organization ([general information \(page 635\)](#), [license \(page 635\)](#), [diagnostics \(page 640\)](#))
  - [Users, groups and permissions \(page 637\)](#)
  - Security ([passwords \(page 641\)](#), [two-step authentication \(page 641\)](#), [IP range \(page 641\)](#), [email domain restrictions \(page 641\)](#))
  - API (view organization and agent keys)
  - [Single sign-on \(SSO\) \(page 642\)](#)
  - [Integrations \(page 553\)](#)
  - [Servers \(page 642\)](#)
  - [Applications \(page 644\)](#)
  - [Notifications \(page 645\)](#)

- [Report Settings \(page 647\)](#)
- [Score Settings \(page 648\)](#)

## Configure general organization information

1. Under [organization settings \(page 633\)](#), select **Organization** in the left navigation.
2. In the top right corner you can see the UUID for this organization. (This is helpful in [bulk adding users \(page 704\)](#).)
3. This panel also shows general information about the organization like:
  - Organization name
  - Default time and date formats for the organization
  - Default language settings for the organization such as Japanese (if enabled by a superadmin), English, or Spanish



### NOTE

Individual user settings override most general organization settings (time and date formats, for example) with the exception of language settings. User language settings override organization language settings for things specific to the user, such as user notifications or emails. However, user language settings will not override organization language settings for things specific to the organization, such as organization-level notifications.

4. Select **Edit** to change any of the information on this panel.
5. Make changes and select **Save**.

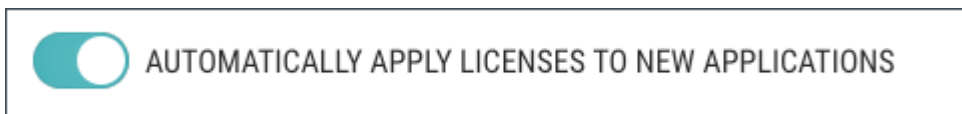
## Allocate licenses for organizations, applications, and servers

### Before you begin

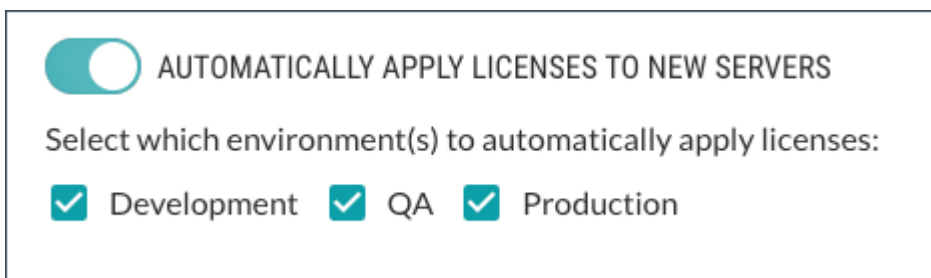
- An Organization Administrator role is required.
- If your organization has consumed all allocated Assess licenses, hosted customers are asked to [contact Support](#).
- For on-premises customers, the SuperAdmin can [make more licenses available at a system level \(page 731\)](#).

### Steps

1. See an overview of license usage in an organization:
  - a. From the user menu, select **Organization settings**.
  - b. Select **Organization**.
  - c. Under **Licensing**, view information about Assess and Protect licenses:
    - Available and used Assess (application) licenses, as well as how many applications are unlicensed.
    - Available and used Protect (server) licenses as well as how many servers are unlicensed. If you are using more licenses than you purchased, the available licenses section of the license bar is replaced with the number of additional licenses in use.
2. (Optional) Under **Licensing**, automatically apply licenses to new applications or servers:
  - a. For Assess licenses, turn on **Automatically apply licenses to new applications**.



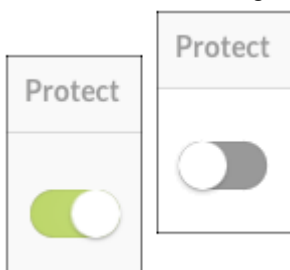
- b. For Protect licenses, turn on **Automatically apply licenses to new servers**. Select the server environments.




The Protect settings in an agent configuration file override this setting for the server hosting that application.

For example, if you turn on this setting and the setting for Protect in an agent configuration file is set to `false`, Contrast turns off Protect for the server hosting that application. No Protect licenses are applied to the server.

3. If needed, apply Assess licenses to individual applications:
  - a. Select **Applications** in the header.  
In the applications list, applications that are unlicensed show **Unlicensed** after their name. You cannot view vulnerability data for the application if it is unlicensed.
  - b. To apply a license to an unlicensed application, select **Unlicensed**.
  - c. In the Apply License window, select **Apply License**.
4. If needed, remove Assess licenses from applications by [deleting the application \(page 430\)](#). Licenses applied to applications permanently count towards the number of maximum allowable applications. Deleting a licensed application has no effect on the number of licenses you are allowed to apply to applications
5. If needed, add or remove Protect licenses from individual servers:
  - a. Select **Servers** in the header.
  - b. Turn the Protect setting on or off for the server.



- c. Restart applications that the server is hosting.



**IMPORTANT**  
The Protect setting in an agent configuration file overrides this setting.

### Protect license behavior

Contrast applies Protect licenses automatically to servers when these conditions exist:

- Protect is turned on for an organization.
- Automatic application of Protect licenses are turned on for an organization.
- A server exists in one or more environments where automatic licensing is turned on.

If you also use the Protect setting in an agent configuration file, it overrides the license behavior in the following ways:

- **Protect is turned on in the agent configuration file**
  - If no Protect licenses are available when the application starts, Contrast tries to apply a license to the server every time the agent communicates with Contrast.

- **Protect is turned off in the agent configuration file**

- If Protect is turned off for the server, based on an organization setting or you turn off Protect after the server is registered with Contrast, no license is applied.
- If Protect is turned on for the server, based on an organization setting or you turned on Protect after the server is registered with Contrast, a license is applied, however Protect is turned off in the agent.

## Manage users, groups and permissions at an organization level

If [allowed at a system level \(page 703\)](#), an Organization Administrator can manage user permissions for the organization by:

- [Adding a user or editing user settings \(page 637\)](#)
- Managing organization permissions with [access groups \(page 637\)](#)

### Add or edit a user at an organization level

If you add users within an organization, you can assign them to access groups for the applications within that organization. For most Contrast installations, the [default \(page 703\)](#) is to set roles and permissions at an organization level, however if you have users who need to access multiple organizations, [add those users at a system level \(page 703\)](#).

To add users:

1. Log in to Contrast with Organization Administrator permissions.
2. Select **Organization settings** in the **user menu**.
3. Select **Users** in the left navigation.
4. Select a user name from the list of users to edit their entry, or select **Add user** to add a new user.
5. For each user you can enter:
  - **Organization role:** Select one of the default [organization roles \(page 745\)](#) that apply to all applications in this organization or [create a custom access group \(page 637\)](#).
  - **Application access groups:** Select one of the default [application roles \(page 744\)](#) that apply to all applications in this organization or create a custom access group to grant specific permissions to certain applications.
  - **Access permissions:** You can allow users access to the API, to the Contrast web interface and to Protect data. (Protect permissions can also [be granted at a system level \(page 708\)](#).)



#### TIP

If you assign someone an administrator role, be sure to grant them both API and Contrast web interface access.

6. Select **Add** or **Save**.

### Add, edit, or delete an organization access group

Use organization access groups to assign users permissions and capabilities by [role \(page 743\)](#).

Contrast provides default access groups that you can use instead of creating your own:

- **View:** Members of this group have read-only access to the Contrast interface to see scores, libraries, vulnerabilities and comments.
- **Edit:** Members of this group can remediate findings, add tags, manage vulnerabilities, edit attributes, merge applications, add or delete applications, and create servers.
- **Rules Admin:** Members of this group can edit rules and policies in the application, enable Protect, manage notifications and scoring.
- **Admin:** Members of this group can configure and manage settings for the organization.

## Before you begin

An Organization Administrator role is required.

## Steps

1. Under **organization settings (page 633)**, select **Groups**.
2. Select an existing group to edit, or select **Add group** to create a new group.



### TIP

To find groups you can use the quick filter dropdown or the search field in the top left, or use the up/down arrows at the top of each column to sort.

The default groups that Contrast provides, indicated with a lock icon, have fixed applications and roles, and can't be deleted. You can only add or remove users from these default groups.

3. Fill out the form with:
  - **Group name:** Choose something that reflects the purpose, permissions and capabilities you will assign to this group.
  - **Application access:** Select the application name here to associate this group with the application. You can also set a group name when you are setting up a new application.
  - **Role:** Select the application role you want the members of this group to have within the corresponding application.
  - Select **Add access** to add more applications and roles.
4. Next to **Members**, on the right, type ahead to select one or more users to assign to the group.
5. When you are finished, select **Add** to create the new group.



### NOTE

If users are assigned to two groups with conflicting roles for all applications or organizations, the role that provides the most restrictive access applies.

6. To delete a group, select **User menu > Organization settings > Groups**. Find the group you want to delete and select the Delete icon in that row.  
Once this is confirmed, the group is removed and any access provided by that group is revoked from all users assigned to the group.

**TIP**

To assign a user a role for all applications in the organization, assign them both an organization role and an application role from the default role groups. (For example, set both the organization and application roles to "Administrator" and they will have administrator permissions for all applications in your organization.)

To give a user access to a particular application, create an access group for that application and add the user to that group. Users not assigned to any application access groups won't have access. A user can have various roles across applications within a single organization.

Most Contrast customers use single organization deployments. Groups created at an organization level impact the roles and permissions across that particular organization. Organization access groups can also be created [at a system level \(page 706\)](#) to allow users access to more than one organization

**Create an API only user**

Create an API Only user account that you can use for all plugins or integrations.

**Best practice:** Add a user account that's only purpose is for use with plugins and integrations. Doing so avoids a situation where a user leaves and you delete that user's account. The deletion of that account would result in breaking the plugins and integrations that you use.

An API only account does not receive email notifications, even if the notification settings are turned on.

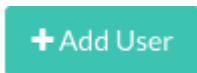
**Before you begin**

- An Organization Admin role is required.
- API Only users can access Contrast's REST API but cannot log in to the Contrast web interface.

**Steps**

To create an API only user:

1. From the user menu, select **Organization settings**.
2. Select **Users**.
3. Select **Add User**.



4. Enter the user name , email address, and time zone information.
5. Select the **Role**.

**Best practice:** Select [Edit \(page 745\)](#) for the Organization role to give the user the least permissive role.

It is not recommended to give API only users Admin permissions.

6. Select an Application access group.  
**Best practice:** Select [View \(page 744\)](#) or [Edit \(page 744\)](#) for the Application access group. Depending on the API endpoints you want to call, and if you are trying to GET (read) or POST (write), the API only user might require the higher Edit permission instead of View.
7. Select the **API only** checkbox.

**NOTE**  
 Selecting the API only checkbox overrides the Access option, if it's enabled. API only users have no access to the Contrast web interface.

- In **Organization Settings > Users**, verify that you can see with new user with the **API Only** label next to the name.

Name (Username)	Status	Organization Role	Last Login	UI Access	Serverless	Protect	
Smith Jane ApiUser@acme.com	API Only	Edit		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

- If you are using access groups to restrict access to specific applications, add the API only user to the [groups \(page 637\)](#) for the applications that you want the API user to access. Verify access by looking at **Permissions** in the user profile.
- To use the API only user account, get the connection strings:
  - From the user menu, select **Organization settings**.
  - Select **Users**.
  - Hover over the API only label next to the user's name and copy the displayed Service key.
  - Create the Authorization header with a command similar to this example:

```
echo -n '[email address of the API only account:Service Key]' | base64
```

### Manage usage analytics

Contrast collects usage data to understand how to build a better product. Confidential customer data is not tracked, and all user data is anonymized for analytics performed on aggregate information.

As an Organization Administrator, you can enable or disable usage data collection for the organization:

- Under [organization settings \(page 633\)](#), select **Organization**.
- Under **General settings**, use the toggle to disable or enable **Product usage analytics**. It is enabled by default.

Diagnostics are also [managed at a system level \(page 730\)](#).



## Set a password policy at an organization level

As long as it is [allowed at a system level \(page 726\)](#), as an Organization Administrator, you can regulate passwords within your organization by creating a password policy.

1. Under [organization settings \(page 633\)](#), select **Security**.
2. Enter the following settings for your policy:
  - Password Strength: This can be **Weak, Medium, Strong, Complex** or **Custom**. If you choose **Custom**, enter the minimum required number of **Uppercase letters, Lowercase letters, Numbers** and **Symbols**.
  - Enter the number of characters required in the **Minimum length** field.
  - Use the dropdown to choose the length of time allowed before **Password expiration**.
  - Enter the number of login attempts allowed before **Login lockout**.
  - Choose the length of time allowed before **Inactive account expiration**.
  - Check the box to **Restrict password reuse**, and use the dropdown to choose the number of times each password may be reused.
  - Check the box to **Restrict password reset**, and use the dropdown to choose the number of days during which a user can reset their password after their reset request is sent.
  - Use the dropdowns to select the amount of time that may pass before **Idle timeout** and **Session timeout**.
3. Select **Save**.

## Restrict email domains

Restrict which email address domains can receive Contrast information.

1. Under organization settings, select **Security**.
2. Under **Email domains**, enter comma delimited email domain names that should be allowed to receive information from Contrast. For example, `yourbusiness.com`.
3. Select **Save**.

## Set IP range

Restrict which IP addresses can access your Contrast account. This affects both browser and API access.

1. Under [organization settings \(page 633\)](#), select **Security**.
2. Enter the IP address for which you want to allow access. Select **Add IP address** to enter additional addresses. You can also specify a range of IP addresses by using Classless Inter Domain Routing (CIDR) notation `10.0.0.0/24`.
3. Select **Save**.

## Enable two-step authentication at an organization level

To enable or disable two-step authentication:

1. Under [organization settings \(page 633\)](#), select **Security** in the left navigation.
2. Turn the toggle on (green) to enable two-step authentication.
3. Two-step verification is enabled and users can [choose how they want to receive two-step authentication notices. \(page 420\)](#)



### NOTE

For on-premises customers, this must be [allowed at a system level \(page 713\)](#).

If a user belongs to multiple organizations, their default organization determines their two-step authentication settings.

## Configure single sign-on (SSO) at an organization level

For on-premises customers, single sign-on can be [configured at a system level \(page 723\)](#). For hosted customers, Contrast Security configures authentication; however, an Organization Administrator may be granted permissions to set up SSO for their organization.



### NOTE

If users are identified with a user ID rather than an email address, those accounts don't automatically transfer over to the SSO configuration and must be recreated.

1. Under organization settings, select **Single-sign-on** and click the link to **Get started**.
2. You may receive a warning window regarding the implications of changing authentication. Please read it carefully before proceeding.
3. Use the provided information to set up Contrast with your IdP.
4. Provide a name for your IdP as well as the associated metadata to connect to Contrast.
5. If you want to automatically create new user accounts when someone make a SAML request to log in to Contrast, check the box to **Enable user provisioning**.
  - Use the dropdowns to choose the **Default organization role** and **Default application access group** for the new users.
  - Add the **Accepted domains** that must be used to trigger user provisioning (for example, contrastsecurity.com)
6. Click **Test connection** button to test the configuration. If an error occurs, Contrast provides a debug log for troubleshooting. (This test only validates the metadata and Contrast's ability to connect to the IdP.)
7. Once the test is successful, select **Save**.
8. Open a **new** browser window, private browsing session or incognito window, and attempt the SSO login with your account. If you're unsuccessful, go back to the browser in which you're still logged in, disable SSO for the organization and then select Revert to Contrast-managed authentication and confirm the change.

### See also

[☑ Configuring user and group provisioning with Okta](#)

[☑ Configuring ADFS to automatically add users to groups](#)

## Set server defaults at an organization level

Server settings provide default configurations to new servers (and their agents) that you add to Contrast. You can customize these configurations and set specific defaults for each environment.

### Before you begin

- An Organization Administrator role is required.

### Steps

1. Under [organization settings \(page 633\)](#), select **Servers**.
2. Use the dropdown to choose the environment in which you want to apply the default (development, test or production). Check the box next to **Set as default environment** if you want to specify a default environment for future server configuration.
3. Use the dropdown to choose the **Log Level**. The default [log level \(page 693\)](#) selection is **ERROR**.
4. Under **Automatic server cleanup**, enter the length of time that you would like servers to be offline before they are automatically cleaned up. The default value is 30 days.

A background task runs every five minutes to check if there is an organization with automatic server cleanup enabled.

If there are one or more servers with no activity received within the configured time frame, Contrast disables the servers automatically. They are no longer visible under **Servers** in the Contrast web interface.

Contrast keeps Information on vulnerabilities and attacks related to these servers even after they're disabled. Protect licenses from disabled servers return to the pool of licenses.

5. Under **Assess**, specify these settings:
  - a. Select which stacktraces should be captured (all, some or none).
  - b. To optimize analysis performance, select **Enable sampling for higher performance**.
    - If Contrast sees the same URL being called multiple times, it analyzes the URL based on the the number of times specified in the Baseline setting.
    - Afterwards, if Contrast continues to see the same URL, it only checks it based on the Frequency setting.
    - Contrast retains samples for the number of seconds specified for the Window setting. After the time specified for the Window setting elapses, Contrast analyzes the URL again, according to the Baseline setting.

Configure these settings:

  - **Baseline:** The number of times that Contrast analyzes URLs to complete sampling. The default setting is **5**.
  - **Frequency:** The number of times that Contrast analyzes URLs after the Baseline is achieved. The default setting is **10**.
  - **Window:** The number of seconds that Contrast retains samples before reverting to the Baseline. The default setting is **180**.
6. Under **Protect**, specify these settings:
  - a. To enable Protect, turn on the Protect toggle.



### IMPORTANT

Turning Protect on selects the setting to apply Protect licenses to new servers automatically.

Administrators receive emails each time a server is licensed. As servers go up and down frequently, you may want to setup an email filter for any unwanted traffic.

In this section, the license bar shows the number of purchased Protect licenses in use. If you are using more licenses than you purchased, the license bar also shows the number of additional licenses in use.

- b. To turn on bot blocking, select **Enable bot blocking**.  
Bot blocking blocks traffic from scrapers, attack tools and other unwanted automation.  
To view blocked bot activity, under **Attacks > Attack Events**, use the **Automated** filter option.



### NOTE

You can configure bot blocking in the [YAML files \(page 33\)](#) for Java, .NET Framework, .NET Core, Ruby, and Python.

- c. To send Protect events to syslog, select **Enable output of Protect events to syslog**.  
Configure these settings:
  - Enter the **IP Address** and **Port** in the given fields. Use the dropdown to chose the **Facility**.
  - Click on the event severity badges, and use the dropdown to choose a message **Severity** level for each one. The defaults are:

- **1 - Alert** for Exploited
  - **4 - Warning** for Blocked
  - **5 - Notice** for Probe
7. To retain library details, turn on the **Retain Library Data** toggle. When enabled, Contrast retains library details for the last server being deleted from Contrast during server cleanup.
  8. To send agent data to Contrast, turn on the **Agent diagnostics** toggle. Contrast uses this data to improve rules, performance, and to prioritize product improvements.

## Set application defaults at an organization level

Use this procedure to choose default settings for applications at an organization level.

### Before you begin

- An Organization Admin role is required.

### Steps

1. Under [Organization settings \(page 633\)](#), select **Applications**.
2. Use the dropdown to choose an **Importance** level for applications. Your options are **Critical, High, Medium, Low, Unimportant**. The default selection is Medium.
3. Under **Policy**, select the remediation and [compliance policies \(page 625\)](#) you would like to automatically apply to applications.  
You can still add applications to policies that aren't included in your default settings at a later time.
4. Under Session metadata, to set the default [session metadata filtering \(page 431\)](#) to the most recent session, select **Filter application details by most recent session**.  
This selected filter affects the application's Vulnerabilities and Route coverage tabs.
5. Under Behavior, select **Automatically apply licenses to new applications** if you want licenses to be applied automatically.  
A status bar shows you how many licenses have been used out of the total number available.  
Select the license link to understand the breakdown of your organization's licenses.
6. Use the **Custom Fields** section to [configure custom metadata \(page 644\)](#) that should be provided for each of the applications in your organization.
7. Select **Save**.

## Create custom fields to request application metadata

You can configure requests for custom metadata that is collected whenever you add a new application to Contrast.

When you [install and configure an agent \(page 30\)](#), you are prompted to enter metadata for the fields you create and to add the information in the agent configuration file. The metadata is then displayed in the **Applications** list, where you can also use it to filter applications, and the application's **Details** page in the Contrast web interface.



### NOTE

The following agent versions support custom metadata fields:

- Java 3.5.6.591 and later
- .NET 18.10.35 and later
- Node 1.35.0
- Python 1.2.0
- Ruby 2.0.8



## IMPORTANT

The data supplied in the custom fields are required for Agent configuration and YAML file download. The downloads will be disabled without the data.

### Before you begin

- An Organization Administrator role is required.

### Steps

1. Under organization settings, select **Applications**.
2. Under Custom fields, for each field enter:
  - **Field type:** Freeform, Numeric or Point of contact. The type of field determines the type of validation.
  - **Name:** Enter a label for this field.  
To ensure compatibility with the Contrast APIs, use lower camel-case formatting for custom field names. For example, use `businessID`, not `BusinessID` or `Business ID`.
  - **Value condition:** Use the checkbox to indicate whether the metadata value provided should be **Required** or **Unique**.
3. Select **Add field** to complete as many rows as needed.
4. As you provide information for each field, you will see the formatted property that you can copy and paste into your agent configuration files. Add the information for each key=value pair to the agent configuration file.
5. To prevent reporting of data for applications that don't include all required fields, select **Restrict applications missing required fields**. This option applies to new and existing applications in the organization.  
When you select this option, the Contrast web interface displays a warning message if an application is missing a required field in the agent configuration file. The Contrast web interface displays the application, however, the agent reports no data for it, including exercised routes and vulnerabilities.  
If you choose not to restrict applications, any application missing a required field is successfully added and the agent reports data. Contrast displays a warning message that one or more fields are missing.

### Manage notifications at an organization level

Notifications alert users in specific situations, such as the discovery of a vulnerability or an attack on an application. Organization Administrators can [set default settings \(page 646\)](#) for Contrast notifications for all users in their organization. Individual users can [choose how they want to receive these notifications \(page 422\)](#).

There are two primary channels available for notifications:

- **In Contrast:** Notifications are available directly in the Contrast application. Select the **Notification** icon in the top right header to view your notifications.
- **Email:** A System Administrator can [configure Contrast \(page 734\)](#) to communicate with an appropriate SMTP system to receive notifications by email.

**NOTE**

For some features that require user notifications, Contrast automatically notifies the affected users when a Contrast administrator enables the feature. (You can't control these notifications in the **Notifications** page.) Contrast requires user and administrator notifications for features including [vulnerability status approval \(page 664\)](#) and other **Policy Management** settings.

**Set administrative notifications**

Administrators automatically receive the following notifications for high-level events in their organization in the Contrast application and by email.

- **Application licensed:** A new application was [licensed \(page 635\)](#) in Contrast.
- **Application license expiring:** The license for an active application is expiring. (Contrast sends this notification two months, one month and one week prior to the expiration date).
- **Licenses expiring:** Existing license(s) with no associated applications is expiring. (Contrast sends this notification two months, one month and one week prior to the expiration date).
- **Remediation policy violation:** A vulnerability is in violation of an existing [remediation policy \(page 604\)](#).
- **Library policy violation:** A library is in violation of an existing [library policy \(page 628\)](#).
- **Compliance policy violation:** An application is in violation of an existing [compliance policy \(page 625\)](#).

Administrator and RulesAdmin users at the application and the organization level must receive policy violation notifications. You can [manage your notifications \(page 422\)](#) to minimize the number of notifications or consolidate them into a single email.

You can also receive notifications soliciting approval when a user requests to close certain vulnerabilities. This must be [configured \(page 664\)](#) by an Organization Administrator.

**Set default user notifications**

As an Organization Administrator, you can define default notification settings for all users in your organization both for integrations and for email and in-app notifications in Contrast. Individual users can [choose how they receive those notifications \(page 422\)](#).

To configure default notification settings for an organization:

1. Under [organization settings \(page 633\)](#), select **Notifications**.
2. Use the toggles to enable or disable the subscriptions listed on the left:
  - **Active attack:** There is an active attack on an application with Protect enabled.
  - **New vulnerability:** Contrast has detected a new vulnerability. Click in the field to enable notifications for specific severity levels or "Library"; the default selection is "All".
  - **Server offline:** Contrast can't reach a server.
  - **New comment:** A team member commented on a finding.
  - **New asset:** A new asset to which the user has access has been onboarded. Click in the field to set this notification for "Application" or "Server"; the default selection is "All".
  - **Email digest:** A daily summary of Contrast activities. (Email only)

**NOTE**

To enable subscriptions for a particular integration, select **Add integration** to add an integration, or select an existing integration from the dropdown at the top of the Integrations column.

## Create custom notifications

As an Organization Administrator, you can set notification defaults, or create custom notifications.

To create a custom notification:

Select **Organization settings > Notifications > Create notification** at the top of the **Custom notifications** list. In the window that appears, fill out the following form fields.

1. Use the radio buttons to choose **Vulnerability** or **Attack**.
2. Choose a **Name** for the notification.
3. Use the dropdown to set the notification **Interval** as **Daily**, **Weekly**, or **On Event**.
4. Enter a **Description** for the notification's purpose.
5. Click in the multiselect field to choose the **Applications** for which this notification applies.
6. Choose the **Application Tags** for which this notification applies.
7. Choose which organization **Users** should receive the notifications.
8. Use the dropdowns to choose your **Conditions**.

Click the **Add Condition** link to add a row.

Contrast supports these conditions for custom notifications:

Notification types	Condition	Description
Category	Is or Is Not	Categories are high-level groupings of rule types such as Authentication, Injection, Cryptography, etc. There are 11 categories within Contrast rule types.
Impact	Is, Is Lower Than, Is Higher Than	Impact is measured in High, Medium and Low ratings based on how a rule type affects a given organization. Every rule type has a default impact configuration setting which can be customized.
Likelihood	Is, Is Lower Than, Is Higher Than	Likelihood is measured in High, Medium and Low ratings based on how frequent a rule type may occur. Every rule type has a default likelihood configuration setting that can be customized.
URL	Is, Contains, Starts With	A specific URL from an application.
Class	Is, Contains, Starts With	A specific Java or .NET class.
Method	Is, Contains, Starts With	A specific Java or .NET method.



### IMPORTANT

If you choose multiple conditions, Contrast uses AND logic for the notifications. Contrast generates the notifications when all selected conditions apply to the situation.

## Set report defaults

Report settings offer a single interface for Organization Administrators to define the template of hard-copy [compliance reports \(page 548\)](#).

1. Under [organization settings \(page 633\)](#), select **Report Settings**.
2. Define the default values for reports created within the organization:
  - **Report type:** Click to select a report type.
  - **Vulnerability status:** Confirmed, Not a problem, Remediated, Reported, Fixed
  - **Vulnerability tag:** This will apply to any vulnerability with the designated tag.
  - **Inclusions:** Select the box to include status of vulnerabilities or notes on the vulnerabilities in the report.
  - **Custom footer:** Add a custom footer you want to appear in the reports.

3. You can run a report to see the results. The defaults will pre-populate the report generation window, but the user can still make any necessary changes.

## Customize score settings at an organization level

Contrasts designates an [application score \(page 748\)](#), which can optionally depend on a [library score \(page 483\)](#). To customize score settings at an organization level:

1. Under [organization settings \(page 633\)](#), select **Score settings**.
2. Under **Overall score**, choose how applications in this organization are scored:
  - **Default score** is the average of your application's library score and its custom code score.
  - **Custom code-only score** ignores library score when calculating the overall application score. If you select this option, you can click to select specific languages, or apply it to all languages.
3. Under **Library score**, choose how libraries in this application are scored:
  - **Default score** uses an algorithm that includes vulnerabilities, as well as the age and versioning of a library.
  - **Vulnerability-only score** bases scoring solely on vulnerabilities present in the library.
4. Select **Save**.



### TIP

A RulesAdmin can configure policy settings in **Policy Management** so that any library in violation automatically receives a failing score (F). Once these settings are chosen, you'll see an alert message in Score Settings. Clicking the policy link in the alert navigates you to Library Policy, where administrators may view and revise these settings.

## Role-based access control for Contrast Scan

To give users access to Contrast Scan, set up resource groups, roles, and user access groups.

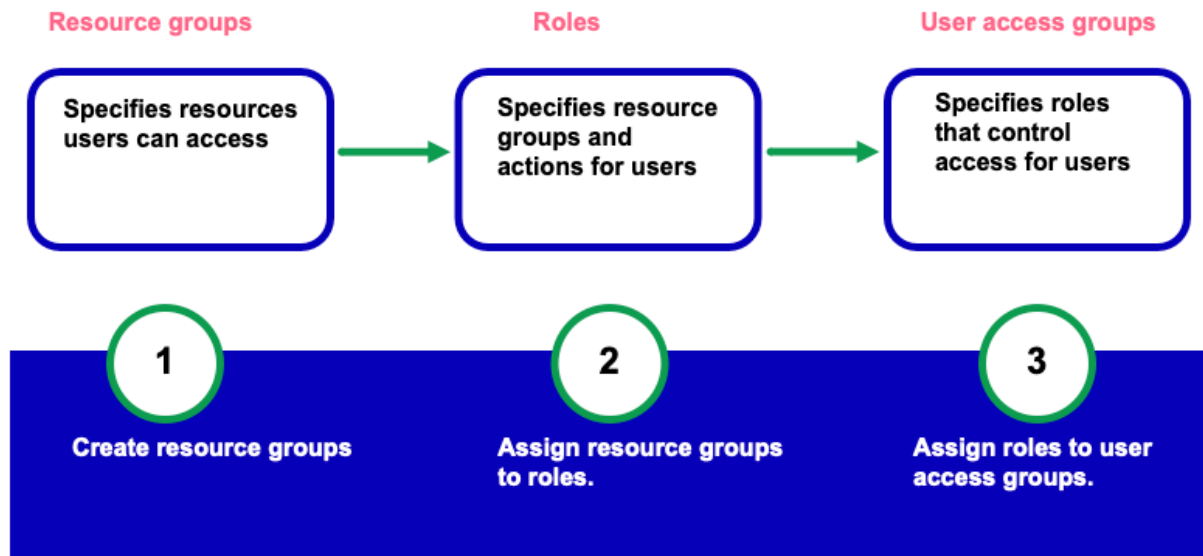


### NOTE

In the Contrast web interface, if you don't see the Access Control setting under Organization settings, contact [Contrast support](#).

To manage access for all other Contrast capabilities, set up [organization users and access groups \(page 637\)](#).





## Access control settings

Access control for Scan requires these settings:

- **Resource groups: (page 650)** These groups determine which Scan projects users can access, depending on their assigned role.  
You can use built-in resource groups or create custom groups.
- **Roles: (page 654)** Roles define the Scan actions that users have permissions to perform.  
You can use built-in roles or create custom roles.  
The built-in RBAC Admin role automatically includes all users with an Organization Admin role. This built-in role lets you manage all user access groups, roles, and resource groups for Contrast Scan.
- **User access groups: (page 659)** These groups assign roles to users.  
You can use built-in user access groups or create custom user access groups.

## Methods for managing access control

To manage access control, use either of these methods:

- **Contrast web interface**  
The Contrast web interface provides a visual method for setting up and managing access control. This method requires an Organization Admin role.
- **Access control APIs**  
The access control APIs are useful if you want to automate access control management or integrate it into existing systems. This method requires the `PLATFORM_ORG_MANAGE` permission.  
Read more about the [access control APIs](#).

## Naming standards and requirements

Names for resource groups, roles, and user access groups must be unique for each organization. For example, you can't create two roles with the name, **MyAdmins**.

Before you create custom roles or groups, consider developing a naming standard for all custom elements. Doing so will help make managing a large number of custom elements easier. One approach is to map the names of resource groups to the roles that you would associate with those groups. For example, if you create a resource group named **Ecommerce**, a good role name would be **Ecommerce Developer**. The users with this role are your developers working on ecommerce applications.

Requirements for all custom elements are:

- Names can contain up to 50 characters.
- Descriptions can contain up to 1024 characters.
- You can use special characters and spaces in names and descriptions.

## Resource groups for Contrast Scan

Resource groups let you specify the Contrast Scan capabilities that users can access, based on their assigned roles.



### NOTE

Currently, only scan projects are supported for resource groups.

## Resource groups tab

The Resource groups tab displays the list of existing groups. From this tab, you can:

- View a list of resource groups.  
Use search to find specific groups.
- Manage resource groups:
  - [Add a resource group for Scan \(page 651\)](#).
  - [Edit a resource group for Scan \(page 652\)](#).
  - [Delete a resource group for Scan \(page 653\)](#).

**Organization Settings**

Resource Groups Roles User Access Groups

**Resource groups**

Search

+ Add Group

RESOURCE GROUP	DESCRIPTION
All Projects	All Projects
Ecommerce projects	Ecommerce applications

Page 1 of 4 Results per page 10 25 50

## Built-in resource group for Contrast Scan

You can select this built-in resource group for Contrast Scan roles:

- **All projects:** includes all scan projects in the organization



### NOTE

You cannot change the settings for a built-in resource group.

## Add resource groups for Contrast Scan

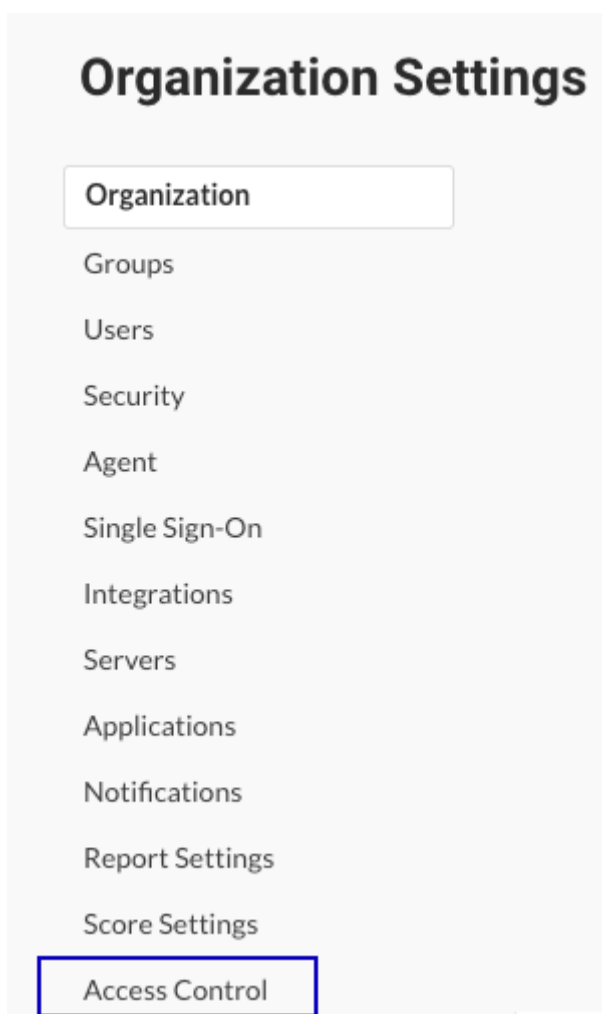
Resource groups let you specify the Scan components that users can access. Currently, scan projects are the only supported resources.

### Before you begin

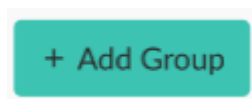
- An Organization Admin role is required.

### Steps

1. From the user menu, select **Organization settings**.
2. Select **Access control**.



3. Select the **Resource groups** tab.
4. Select **Add group**.



5. In the Add resource group for Scan window, specify these settings:

### Organization Settings

The screenshot shows the 'Add resource group' form. On the left is a navigation menu with 'Access Control' selected. The main form has three tabs: 'Resource Groups', 'Roles', and 'User Access Groups'. The form contains the following fields:

- Resource group name:** Ecommerce
- Resource group description:** Applications for Ecommerce
- Resource groups:** All Resource Groups
- Projects:** [TESTING] - 2022-09-30T08:38:31.001Z
- Applications:** (empty)

On the right, a 'Your resource group summary' panel displays the entered values. At the bottom right are 'Cancel' and 'Add' buttons.

- **Resource group name:** Specify a descriptive name. The name must be unique for the organization. Use up to 50 characters, including spaces and special characters.
- **Resource group description:** Specify a description that's easy to understand. Consider using a description that identifies the purpose of the group. Use up to 1024 characters, including spaces and special characters.
- **Resource groups:** Select resource groups to include in this group. If you select resource groups, selecting an individual project is optional.
- **Projects:** Select individual Scan projects to include in this group. If you select projects, selecting a resource group is optional.

6. Select **Add**.  
You can now assign this resource group to a role.

### Edit resource groups for Contrast Scan

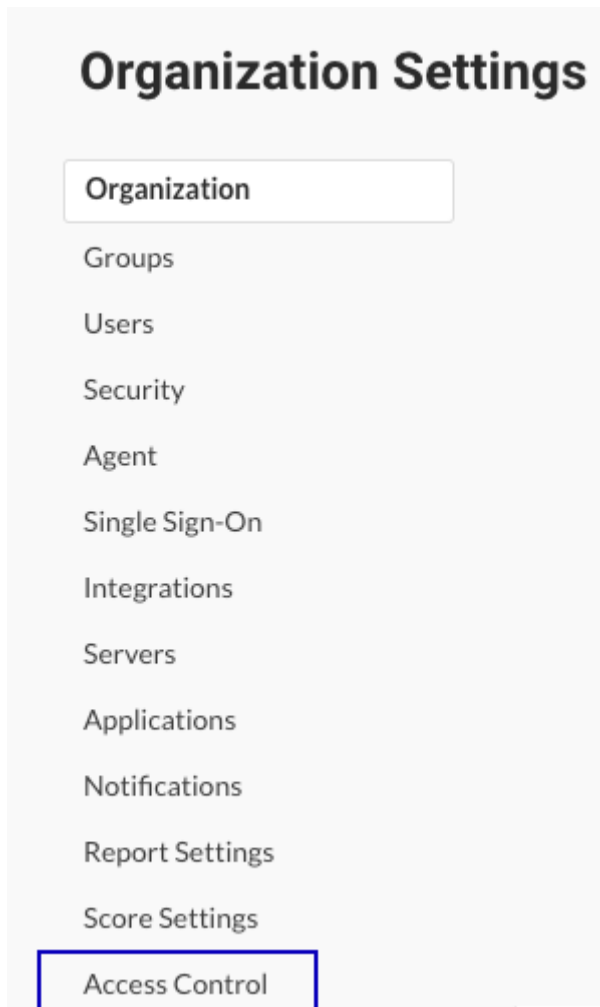
Use this procedure to change settings for a resource group. You can change any or all of the settings.

#### Before you begin

- An Organization Admin role is required.

#### Steps

1. From the user menu, select **Organization settings**.
2. Select **Access control**.



3. Select the **Resource groups** tab.
4. Select the **Edit** icon (✎) at the end of the row for the group you want to change.
5. Change the settings for the resource group and select **Save**.

### Delete resource groups for Contrast Scan

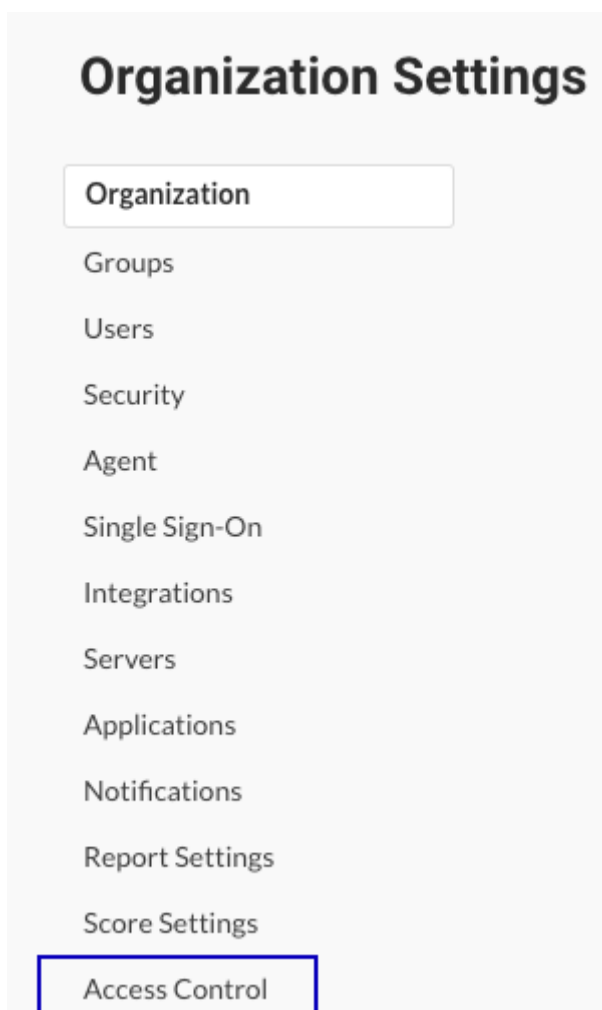
Use this procedure to delete a resource group.

#### Before you begin

- An Organization Admin role is required.

#### Steps

1. From the user menu, select **Organization settings**.
2. Select **Access control**.



3. Select the **Resource groups** tab.
4. Select the **Delete** icon (🗑️) at the end of the row for the group you want to delete.
5. In the Delete resource groups window, select **Delete**.

## Roles for Contrast Scan

Roles let you define the Contrast Scan capabilities that users with a specific role can access.

### Roles tab

The Roles tab displays the list of existing roles. From this tab, you can:

- View a list of roles.  
Use search to find specific roles.
- [Add a custom role for Scan. \(page 655\)](#)
- [Edit a custom role for Scan \(page 657\).](#)
- [Delete a custom role for Scan. \(page 658\)](#)

**Organization Settings**

Resource Groups **Roles** User Access Groups

**Roles**

Search

+ Add Role

ROLE	DESCRIPTION
MANAGE_ALL_PROJECTS_ROLE	System Role to Manage All Projects
UPLOAD_ARTIFACTS	System Role to Upload Artifacts for All Projects
MANAGE_ORGANIZATION	System Role to Manage Organization
View Projects	View all Projects
VIEW_ALL_PROJECTS	System Role to View All Projects

Page 1 of 1

Results per page 10 25 50

### Built-in roles for Contrast Scan

You can select these built-in roles for user access groups:



#### NOTE

You cannot change the settings for the built-in roles.

- **RBAC Admin:** Includes all Scan actions for the organization. If you have an Organization Admin role, Contrast assigns this role to you automatically.
- **View all projects:** Includes these actions:
  - View all details for scans and scan projects.
  - Download scan results in a SARIF or CSV file.
- **Upload artifacts:** Includes these actions:
  - Upload files for scanning.
  - Start scans.
- **Manage all projects:** Includes these actions:
  - View all details for scans and scan projects.
  - Download scan results in a SARIF or CSV file.
  - Create scan projects.
  - Update scan project details.

### Add roles for Contrast Scan

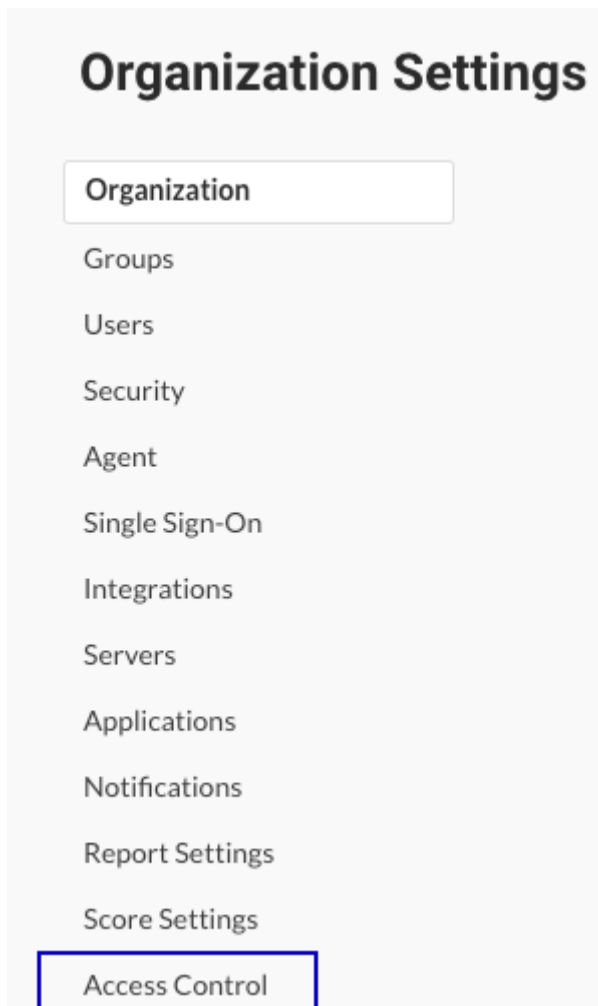
Create roles to customize which Scan resources and actions users can access.

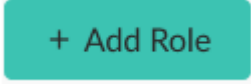
## Before you begin

- An Organization Admin role is required.
- Determine if you need to [add a custom resource group \(page 651\)](#) for the role.

## Steps

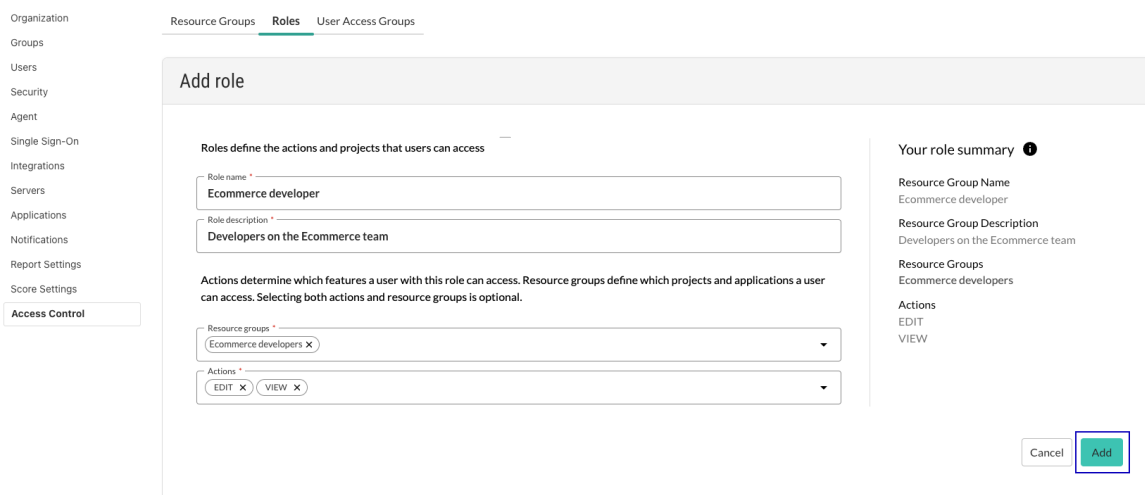
1. From the user menu, select **Organization settings**.
2. Select **Access control**.



3. Select the **Roles** tab.
  4. Select **Add role**.
- 
- A screenshot of a teal button with a white plus sign and the text '+ Add Role' in white.
5. Specify the role settings:



Organization Settings



- a. **Role name:** Specify the name for the role.  
The name must be unique for the organization. Use up to 50 characters, including spaces and special characters.
  - b. **Role description:** Specify a description of the role.  
Consider using a description that indicates the purpose of the role. Use up to 1024 characters, including spaces and special characters.
  - c. **Resource groups:** Select one or more resource groups.  
Select a [built-in resource group \(page 650\)](#) or a [custom group \(page 651\)](#).
  - d. **Actions:** Select the Scan actions for the group:
    - **PLATFORM\_ORG\_MANAGE:** Manage all access control entities such as user access group, roles, and resource groups for organizations.
    - **SAST\_PROJECT\_MANAGE:** View scan details, upload artifacts, create scan projects, and update scan project details.
    - **SAST\_PROJECT\_VIEW:** View details for scan projects and scan details, including vulnerabilities, other findings, and policies
    - **SAST\_SCAN\_UPLOAD:** Upload files for scanning and start scans.
6. Select **Add**.  
You can now assign this role to user access groups.

**Edit roles for Contrast Scan**

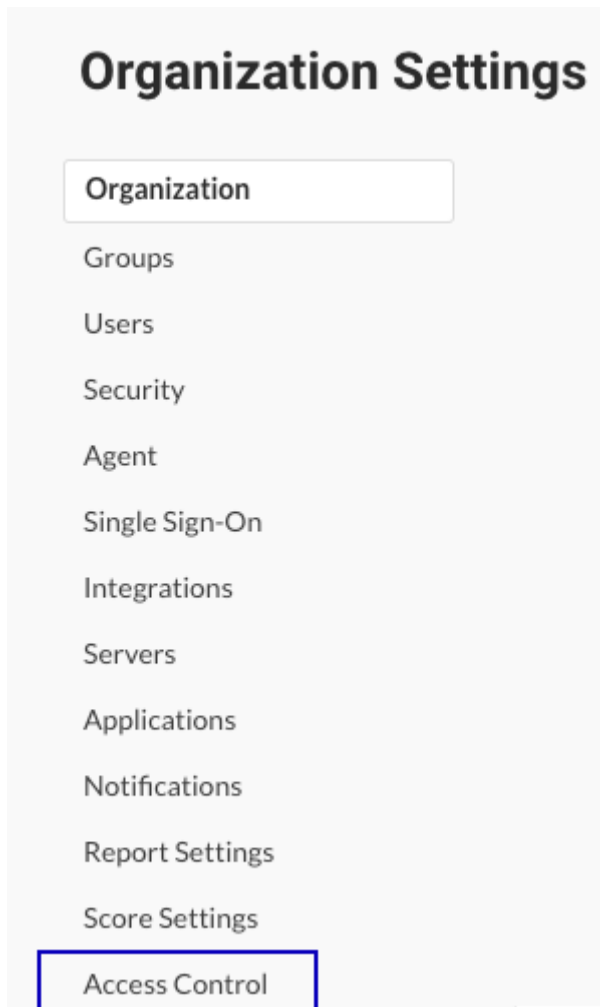
Use this procedure to edit or copy an existing custom role.

**Before you begin**

- An Organization Admin role is required.
- You can copy an existing role and edit it to add a new role.

**Steps**

1. From the user menu, select **Organization settings**.
2. Select **Access control**.



3. Select the **Roles** tab.
4. To edit an existing role, select the **Edit** icon (✎) at the end of the row for the role you want to change.
5. Change the settings, as needed and select **Save**.

### Delete roles for Contrast Scan

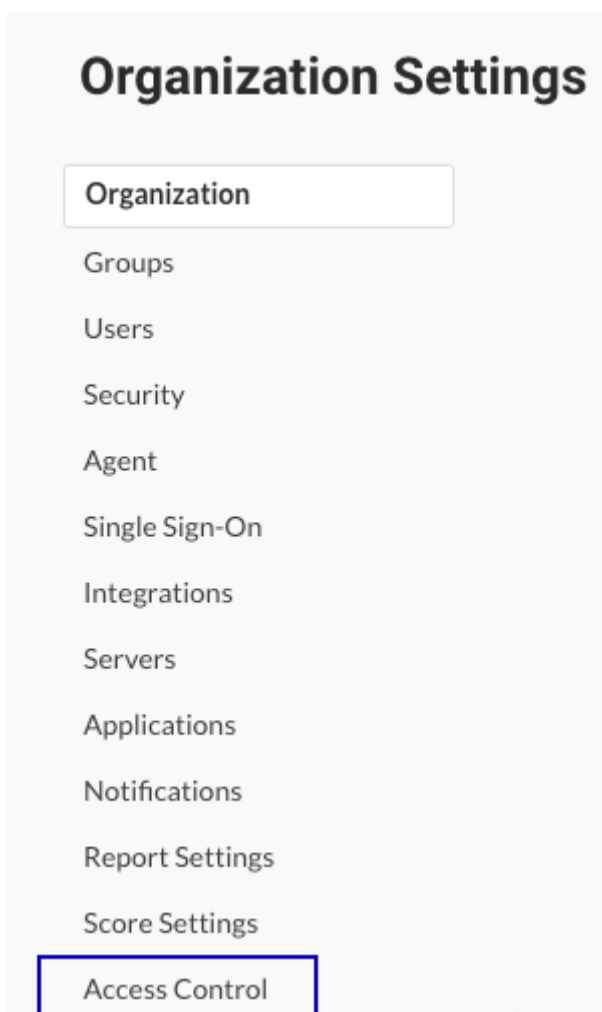
Use this procedure to delete a custom role.

#### Before you begin

- An Organization Admin role is required.
- You can delete only custom roles, not built-in roles.

#### Steps

1. From the user menu, select **Organization settings**.
2. Select **Access control**.



3. Select the **Roles** tab.
4. Select the **Delete** icon (🗑️) at the end of the row for the role you want to delete.
5. In the Delete role window, select **Delete**.

## User access groups for Contrast Scan

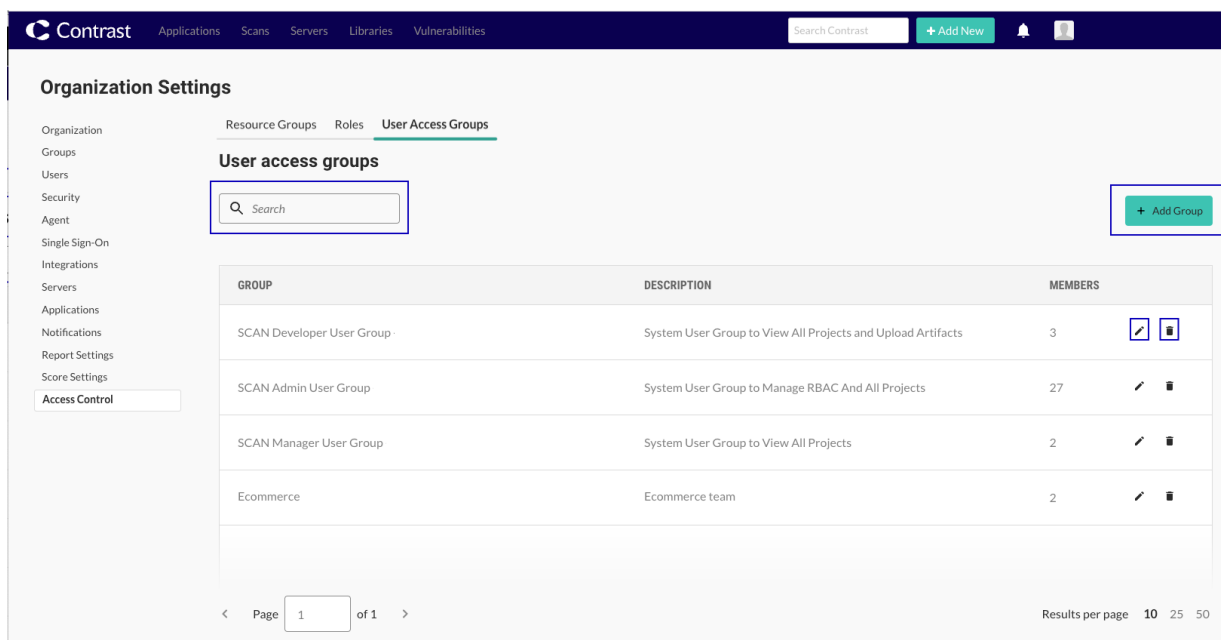
User access groups let you specify specific roles and resource groups for one or more users.

You can add users to built-in user access groups or create [custom groups \(page 660\)](#).









### User access groups tab

The User access groups tabs displays the list of existing groups. From this tab, you can:

- View a list of user access groups.  
Use search to find specific groups.
- [Add a user access group for Scan. \(page 660\)](#)
- [Edit a user access group for Scan. \(page 662\)](#)
- [Delete a user access group for Scan. \(page 663\)](#)



The screenshot displays the 'Organization Settings' page in the Contrast application. The 'User Access Groups' tab is selected, showing a search bar and an 'Add Group' button. Below these is a table with the following data:

GROUP	DESCRIPTION	MEMBERS	
SCAN Developer User Group	System User Group to View All Projects and Upload Artifacts	3	 
SCAN Admin User Group	System User Group to Manage RBAC And All Projects	27	 
SCAN Manager User Group	System User Group to View All Projects	2	 
Ecommerce	Ecommerce team	2	 

At the bottom of the table, there is a pagination control showing 'Page 1 of 1' and a 'Results per page' dropdown set to 10, with options for 10, 25, and 50.

## Built-in user access groups for Contrast Scan

You can add users to these built-in user access groups:

- **Scan Admin Group:** Includes these roles:
  - RBAC Admin
  - Manage all projects in all organizations.
- **Scan Manager Group:** Includes this role:
  - View all projects
- **Scan Developer Group:** Includes these roles:
  - View all projects
  - Upload artifacts



### NOTE

Other than adding users, you cannot change the settings for the built-in user access groups.

## Add user access groups for Contrast Scan

Create user access groups to let a collection of users access Contrast Scan. The roles you assign to users in the group determine which Scan capabilities they can access.

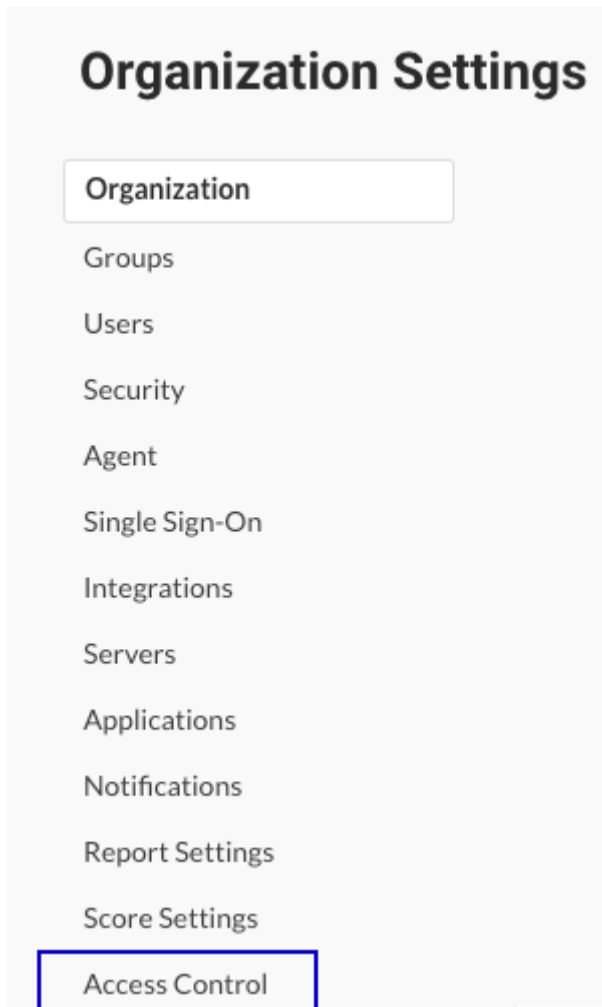
### Before you begin

- An Organization Admin role is required.
- [Add organization users \(page 637\)](#), if necessary.
- Determine whether you need to [add custom roles \(page 655\)](#) or [custom resource groups \(page 651\)](#).

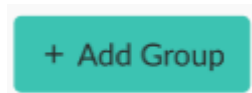
### Steps

1. From the user menu, select **Organization settings**.

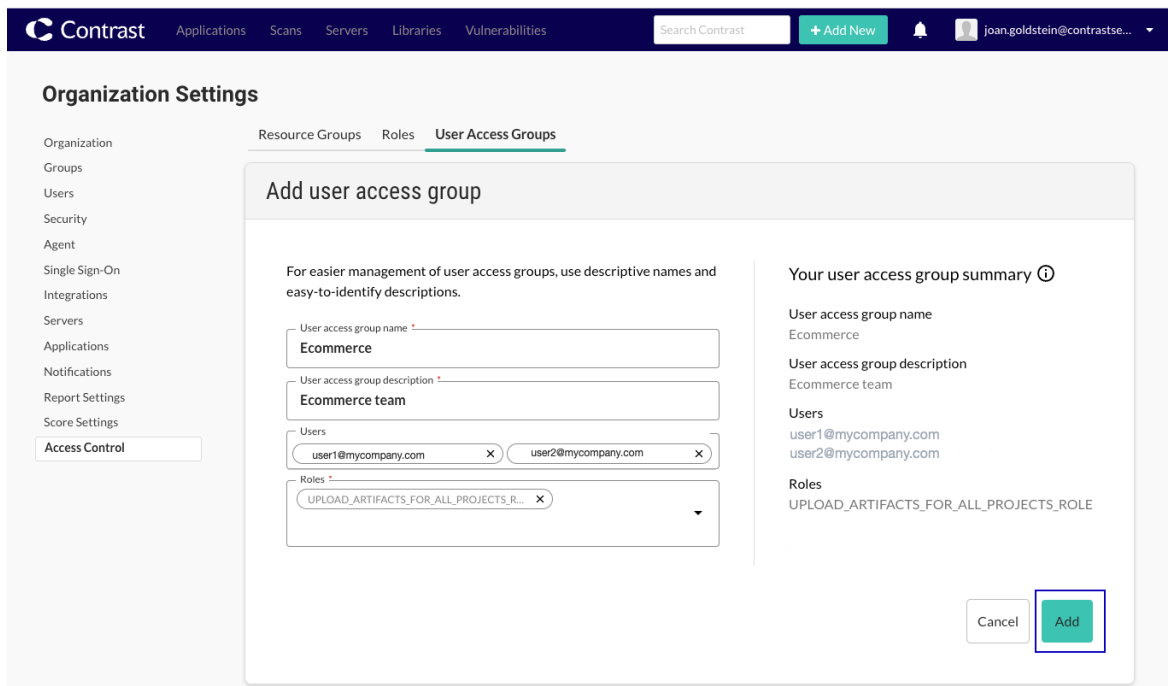
2. Select **Access control**.



3. In the User access groups tab, select **Add group**.



4. In the Add user access group for Scan window, specify these settings:



- **User access group name:** Specify a name for the user group. The name must be unique for the organization. Use up to 50 characters, including spaces and special characters.
- **User access group description:** Specify a description of the group. Consider using a description that clearly identifies the purpose of the group. Use up to 1024 characters, including spaces and special characters.
- **Users:** Specify users for the group. To display a list of users, select the triangle ▾ at the end of the box or start typing a name. If you don't see specific users, go to the **Users** page under **user menu > Organization settings** and verify that they are Contrast organization users.
- **Roles:** From the dropdown, select one or more roles to apply to all users in the group. You can select [built-in roles \(page 654\)](#) or [custom roles \(page 655\)](#).

5. Select **Add**.

## Edit user access groups for Contrast Scan

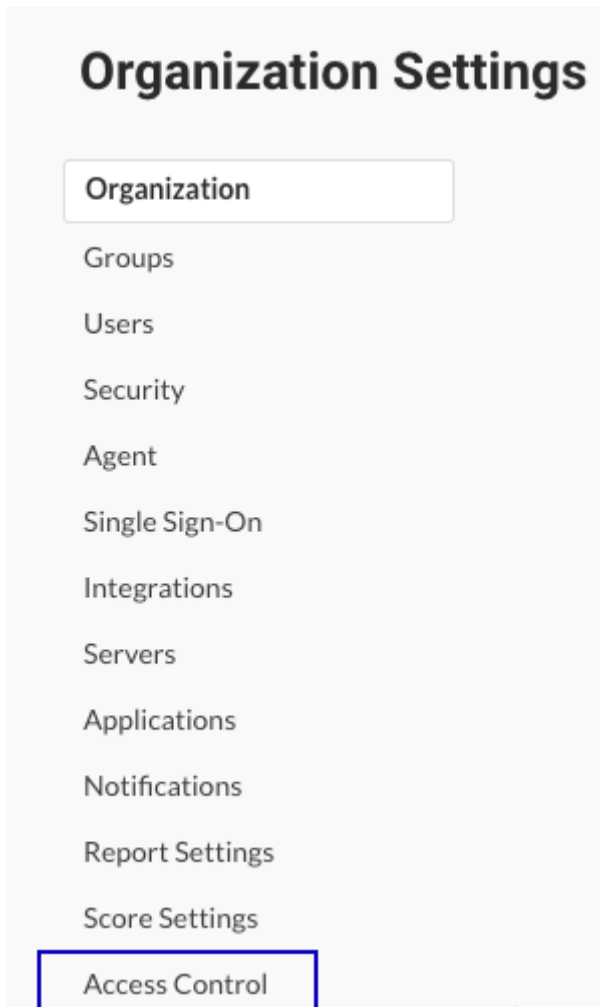
Use this procedure to edit an existing user access group. You can edit some or all of the settings.

### Before you begin

- An Organization Admin role is required.

### Steps

1. From the user menu, select **Organization settings**.
2. Select **Access control**.



3. Select the **User access groups** tab.
4. Select the **Edit** icon (✎) at the end of the row for the group you want to change.
5. Change the settings, as needed and select **Save**.

### Delete user access groups for Contrast Scan

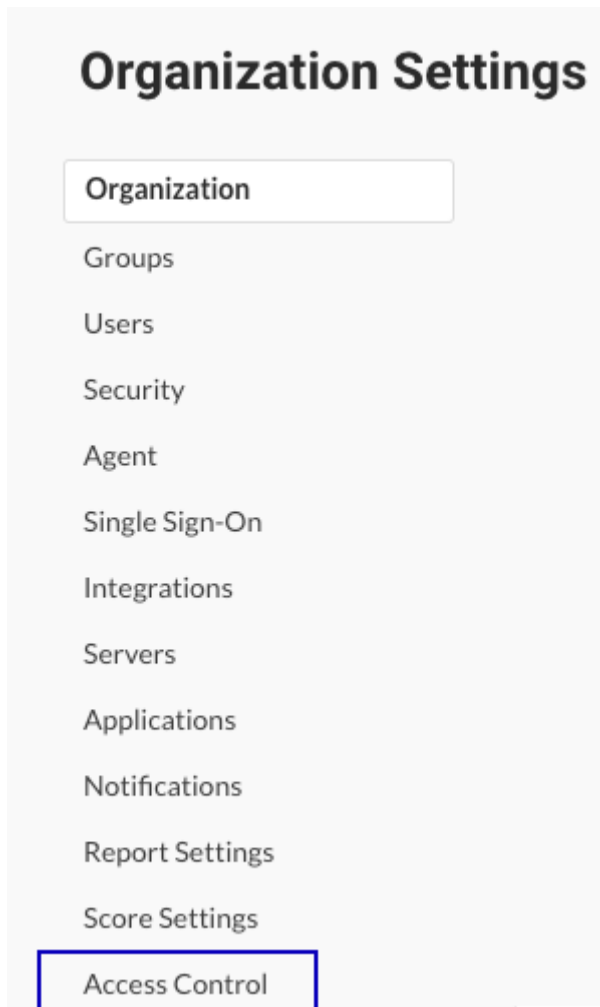
Use this procedure to delete a user access group.

#### Before you begin

- An Organization Admin role is required.

#### Steps

1. From the user menu, select **Organization settings**.
2. Select **Access control**.



3. Select the **User access groups** tab.
4. Select the **Delete** icon (■) at the end of the row for the group you want to delete.
5. In the Delete user access group window, select **Delete**.

### Require vulnerability approval

As an Organization Administrator, you can [require administrative approval when closing vulnerabilities \(page 604\)](#) in your organization. You must be an Organization RulesAdmin with RulesAdmin permissions for the target application in order to [approve or deny vulnerability closures \(page 536\)](#).

To configure this requirement:

1. In the **user menu**, select **Policy management > Vulnerability management > Vulnerability behavior**.
2. Select the box next to **Require administrator approval when closing vulnerabilities**.
3. Choose the statuses and severities of vulnerabilities that should automatically go into a **Pending** state when a user moves to close them.
4. When a user requests to close any qualifying vulnerabilities, Contrast sends an in-app notification to all Organization Administrators saying that a review is needed.  
Each vulnerability status will remain **Pending** until an Organization Administrator submits a review of the closure. To qualify for administrative approval, *both* a status and severity must be selected. If a reviewer denies the closure of a vulnerability, they must provide a reason for denial. Once confirmed, the reviewer's feedback appears in the vulnerability's **Activity** tab.  
If you disable the feature, any pending closures are automatically approved.



**NOTE**


While in a **Pending** state, the vulnerability's previous status still applies for the purpose of organizational reports and statistics.

**View audit log**

Contrast captures activity about all user sessions including changes to settings or licenses, actions on vulnerabilities, and much more.

1. Under the **User Menu**, select **Organization Settings > Security**.
2. Click the **View Audit Log** option on the upper-right of the screen.

Contrast captures activity about all user sessions. [View Audit Log](#)



This opens the audit log page.

### Organization Settings

- Organization
- Groups
- Users
- Security**
- API
- Single Sign-On
- Integrations
- Servers
- Applications
- Notifications
- Report Settings
- Score Settings

#### Audit Log

Contrast captures activity about all user sessions including changes to settings or licenses, actions on vulnerabilities, and much more

Generated On	Message
01/20/2022 14:51	User i@contrastsecurity.com updated their account: [language=ja] differs from [language=en]
01/20/2022 14:46	- User i@contrastsecurity.com successfully logged in from [99.239.113.31].
01/20/2022 14:06	- @contrastsecurity.com at [99.239.113.31] was logged out due to inactivity.
01/20/2022 13:35	User updated their account: [language=en] differs from [language=ja]
01/20/2022 13:29	- User successfully logged in from [75.164.138.150].
01/20/2022 12:38	- @contrastsecurity.com at [75.108.58.4] was logged out due to inactivity.
01/20/2022 12:37	t@contrastsecurity.com impersonating t@contrastsecurity.com @contrastsecurity.com - User @contrastsecurity.com successfully logged in from [109.149.234.37].
01/20/2022 12:37	- User @contrastsecurity.com successfully logged in from [73.87.185.16].
01/20/2022 12:08	- User @contrastsecurity.com successfully logged in from [75.108.58.4].
01/20/2022 11:43	- User @contrastsecurity.com successfully logged in from [73.87.185.16].
01/20/2022 10:47	Remediation Policy 'test' disabled by @contrastsecurity.com
01/20/2022 10:47	Remediation Policy 'test' enabled by @contrastsecurity.com
01/20/2022 10:36	@contrastsecurity.com @contrastsecurity.com - User @contrastsecurity.com successfully logged in from [109.149.234.37].
01/20/2022 10:26	- @contrastsecurity.com at [73.87.185.16] was logged out due to inactivity.
01/20/2022 10:13	- User @contrastsecurity.com successfully logged in from [75.108.58.4].
01/20/2022 10:12	- User @contrastsecurity.com successfully logged in from [75.108.58.4].
01/20/2022 09:52	@contrastsecurity.com impersonating @contrastsecurity.com] User @contrastsecurity.com is now impersonating user @contrastsecurity.com
01/20/2022 09:51	@contrastsecurity.com impersonating @contrastsecurity.com] User @contrastsecurity.com is now impersonating user @contrastsecurity.com
01/20/2022 09:48	@contrastsecurity.com @contrastsecurity.com - User @contrastsecurity.com successfully logged in from [109.149.234.37].
01/20/2022 09:47	@contrastsecurity.com @contrastsecurity.com - User @contrastsecurity.com successfully logged in from [109.149.234.37].
01/20/2022 08:45	- User @contrastsecurity.com successfully logged in from [31.154.49.58].
01/20/2022 08:36	i@contrastsecurity.com impersonating @contrastsecurity.com] User @contrastsecurity.com is now impersonating user @contrastsecurity.com
01/20/2022 07:45	Server 'PLogan-1' is offline
01/20/2022 07:40	- User @contrastsecurity.com successfully logged in from [31.154.49.58].

This is where you'll find information about:

Agents	Downloading the agent/agent launcher/contrast service
Alerts	Creating Deleting Updating
Applications	Applying a license Archiving Changing Assess rule configurations Changing organization settings Enabling/disabling a rule Merging/unmerging Restoring Resetting

Attacks	Adding notes to events Creating/Editing/Deleting notes Suppressing
Bugtrackers	Creating Updating
Email	Adding domains Sharing libraries
Groups	Creating/Updating/Modifying membership of organization groups
IP ranges	Adding Removing
Keys	Rotating API and Agent service keys
Notification settings	Updating for an organization or user
Patches	Creating/Updating/Toggling/Deleting virtual patches
Policies	Changing cleanup settings Changing library restrictions Changing password Changing scoring Changing timeouts Creating/Deleting/Disabling/Enabling/Updating compliance policies Creating/Deleting/Updating/Enabling organization remediation policies Creating/Deleting/Updating/Enabling security controls Creating/Deleting/Updating/Enabling rule exclusion policies
Reports	Creating reports Vulnerability trend reports
Servers	Changing defaults Creating notifications Deleting/Disabling/Updating/Removing licenses Enabling/Disabling Protect
SuperAdmin	Creating Impersonating a user Updating
Traces	Adding/Editing/Deleting notes Auto-remediation Sharing/Deleting/Merging/Marking status of a trace (or bulk traces) Updating severities
Users	Adding Activating Changing access Creating/creation via provisioning/in bulk Deleting Granting/Revoking Protect Importing into an organization Underprivileged user attempts Updating

**TIP**

Use the search fields to look for a specific log by date or name.

## Impersonation

Impersonation lets someone with a [system role \(page 747\)](#) access an organization as an existing user to troubleshoot issues.

Contrast turns off impersonation for organizations after 24 hours, automatically.

For hosted customers, if the impersonation setting is not visible for your organization, contact [Contrast Support](#). On-premises customers can manage and use impersonation, as needed.

## Impersonation access

By default, the impersonation setting is enabled for all organizations. Organization Admins manage whether you can impersonate another user in an organization.

To change access to impersonation:

- SuperAdmins can turn on or turn off the **Can enable impersonation** setting for a specific organization by [editing the organization \(page 701\)](#).  
This setting affects whether Organization Admins can see the Impersonation setting for an organization.
- Organization Admins can manage impersonation use by [editing an organization's Security settings. \(page 668\)](#)

When you turn on impersonation:

- If you have a SuperAdmin role, you can use [impersonation \(page 711\)](#) by selecting **Impersonate** for an organization on the Organizations page.  
You can impersonate the first Organization Admin for the organization.
- If you have a SuperAdmin role, you can select a user to impersonate on the Users page.
- If you have a SuperAdmin role, you can use [impersonation \(page 711\)](#) by selecting **Impersonate** for an organization on the Organizations page.  
You can impersonate the first Organization Admin for the organization. You must have access to the organization.

## Audit log

The Contrast audit log shows impersonation activity including:

- When impersonation is turned on or off
- The organization where impersonation occurred
- The server key associated with an impersonation status change
- Rejected impersonation attempts

## Enable impersonation

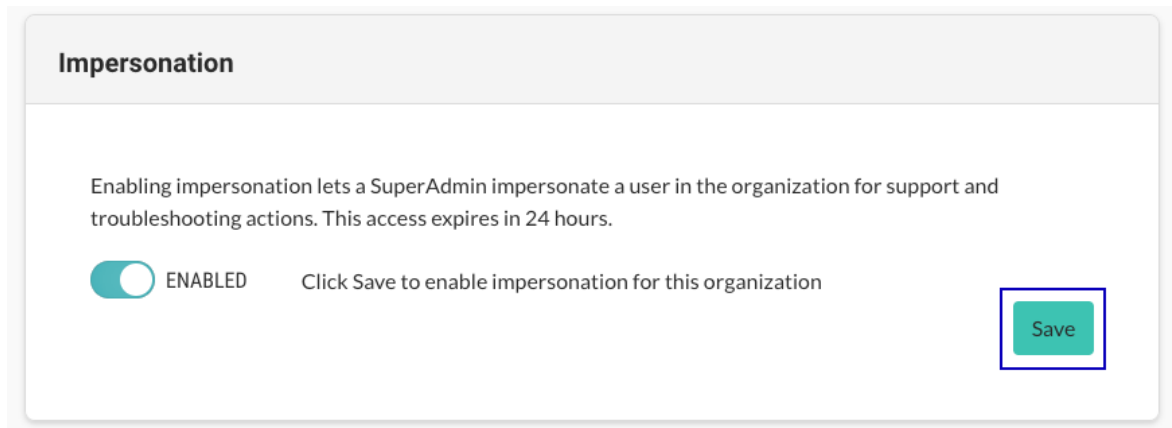
Use this procedure to turn on [impersonation \(page 668\)](#) for an organization.

## Before you begin

- An Organization Admin role is required.
- Verify that the setting to enable impersonation is visible under **Organization settings > Security**.  
If the setting is not visible:
  - **Hosted customers:** Contact [Contrast Support](#).
  - **On-premises customers:** Ask a SuperAdmin to [edit the organization \(page 701\)](#) and turn on the **Can enable impersonation** setting.

## Steps

1. From the user menu, select **Organization settings**.
2. Select **Security**.
3. Under Impersonation, select the setting to enable it and select **Save**.



# System Administration

Only on-premises customers require system administration. System administration is handled by Contrast Security for hosted customers.

See an overview of how to [get started on-premises \(page 670\)](#) or decide how to [manage your system administration \(page 700\)](#).

## Get started on-premises

As an on-premises customer, you can set up your own instance of Contrast without connection to the internet. You only need to set this up once per organization.



### IMPORTANT

If you are able to use Contrast as a hosted solution, you don't have to complete the additional installation and maintenance of the Contrast application on-premises.

Contrast hosted is SOC-2 Type II compliant and continuously receives feature updates. To connect to Contrast hosted, use the credentials provided by your administrator to log in and continue to [install an agent \(page 30\)](#).

For on-premises customers, to use Assess, Protect or both, you must complete at least two installations:

- [Install Contrast \(page 675\)](#)
- [Install an agent for each application server \(page 30\)](#)

The Contrast installation contains all embedded components that make up the system configuration, including a Tomcat servlet container, MySQL database instance, and an AdoptOpenJDK Hotspot Java Virtual Machine. All of these components are embedded within the installation binary and deployed to a single server as part of the Contrast architecture.

Before installing the Contrast application, verify that your environment complies with the:

- [System requirements \(page 671\)](#)
- [Sizing recommendations \(page 672\)](#)

After installation, you can further configure:

- [Tomcat \(page 686\)](#)
- [JRE \(page 687\)](#)
- [HTTPS \(page 687\)](#)
- [Contrast settings \(page 728\)](#)

For the long term, make sure you have a plan to:

- [Manage system administration \(page 700\)](#)
- [Configure settings \(page 728\)](#)
- [Maintain the Contrast system \(page 735\)](#)

## Contrast installation

Options for installing and deploying Contrast in an on-premises environments include:

- [Install with the Contrast installer \(page 675\)](#)
- [Use a distributed MySQL database \(page 679\)](#)
- [Deploy with a WAR file. \(page 677\)](#)
- [Deploy in a distributed environment \(page 681\)](#)

### Next steps

- Review the [Contrast system requirements. \(page 671\)](#)
- Review the [Contrast sizing recommendations \(page 672\)](#).
- Download the Contrast installer from the [Contrast Hub](#) or with [curl commands \(page 673\)](#).

## Contrast system requirements

The following table lists the system requirements for installing the Contrast application.

Before you install Contrast:

- [Download the Contrast Installer \(page 674\)](#) from the [Contrast Hub](#) or by using [curl commands \(page 673\)](#).
- Review the [sizing recommendations. \(page 672\)](#)

Requirement	Recommended	Minimum	Notes
OS Architecture	64-bit	64-bit	Due to memory requirements, the Contrast application can only run on 64-bit architectures.
Operating system	<ul style="list-style-type: none"> <li>• RHEL 8</li> <li>• RHEL/CentOS 7</li> <li>• Microsoft Windows 2019</li> <li>• Ubuntu 18.04 LTS or higher (up to 20.04 LTS)</li> </ul>	<ul style="list-style-type: none"> <li>• RHEL/CentOS 7</li> <li>• Microsoft Windows 2012 R2 or higher</li> <li>• Ubuntu 16.04 LTS</li> </ul>	Support for CentOS 6 ended on December 1, 2020.
Java	Java is bundled with the installer.		
MySQL	<ul style="list-style-type: none"> <li>• For on-premises customers using Contrast versions 3.8.11 or prior, MySQL 5.7.23 is bundled with the installer.</li> <li>• Beginning with Contrast 3.9.0, MySQL 8 is bundled with the Linux on-premises installer.</li> <li>• Beginning with Contrast 3.9.3, MySQL 8 is bundled with the Linux and Windows on-premises installer.</li> </ul> <p>If you experience issues, <a href="#">contact Support</a>.</p>		



### IMPORTANT

- For on-premises customers using MySQL 8 (which has binary logging enabled by default), the system variable `log_bin_trust_function_creators` must be set to **ON** so that Contrast can create stored procedures. For more details, see [MySQL documentation](#).
- For on-premises customers using MySQL 8, the system variable `local_infile` must be set to **ON** so that Contrast can accept CSV files to help the import of SCA data. For more details, see [Security Considerations for LOAD DATA LOCAL](#).

## MySQL and Java requirements for distributed installations

Use these requirements if you are deploying Contrast as a distributed application or are using your own MySQL database. For all other on-premises installations, use the MySQL and Java software included in the Contrast installer.

If you experience issues, [contact Support](#)

Requirement	Recommended	Minimum
Java	11	11
MySQL	<ul style="list-style-type: none"> <li>8.0.30 (Contrast 3.9.1 or later)</li> <li>5.7.23 (Contrast 3.9.0 or earlier)</li> </ul>	<ul style="list-style-type: none"> <li>8.0.27 (Contrast 3.9.1 or later)</li> <li>5.7.23 (Contrast 3.9.0 or earlier)</li> </ul>

## SuperAdmin account

To ensure that connections for integrations work correctly, create a SuperAdmin account that is different from the default account that Contrast Security created. Continuing to use the default SuperAdmin account can result in connection errors.

## Distributed configuration for large number of agents

If you plan to use more than 100 connected agents, use a [distributed configuration \(page 681\)](#). Without a distributed configuration for this situation, you are likely to experience performance issues.

## Sizing recommendations for the Contrast application

The CPU and memory resources for Contrast can vary based on the number of agents connected and application traffic communicating back to the Contrast application. The recommendations on this page apply to the application service.

Additional factors that impact performance include:

- Web traffic from consumers of Contrast reporting data.**  
 Contrast is a highly transactional system that presents calculated and real-time data sets back to consumers of the data. The more users interface with the system, the greater the demand for computing and memory.
- Large amounts of data maintained in the application over extended periods of time.**  
 You can proactively purge data over time or choose to keep the data. With any transactional system, the larger the data set to query against, the greater the computing requirements.
- More than 100 connected agents**  
 If you plan to use more than 100 connected agents, use a [distributed configuration \(page 681\)](#). Without a distributed configuration for this situation, you are likely to experience performance issues.

Use these guidelines to choose the appropriate mix of resources to scale the requirements to your workload:

- Small workload:** A small workload is about three to 30 agents communicating to Contrast, and about five to 25 web traffic end users who access the system multiple times a day and actively use alerts, reports and integrations.  
 The greater the number of connected agents, the greater the memory requirements are for Contrast to handle in-flight traces. Storage depends on the life of trace data and the preservation of log files by system administrators.

vCPUs	Clock speed	RAM	Storage
~4 to ~8	2.5 GHz to 3.3 GHz	16 GB to 24 GB	100 GB to 200 GB

- Large workload:** A large workload is about 30 to 100 agents communicating to Contrast, and more than 25 web traffic users for full-scale enterprise deployments. End users access the system multiple times of day, and actively engage in Contrast features such as alerts, reports and integrations.



The greater the number of connected agents and end users, the greater the memory requirements for Contrast to handle in-flight traces. Storage depends on the life of trace data and the preservation of log files by system administrators.

vCPUs	Clock speed	RAM	Storage
~8 to ~16	2.5 GHz to 3.3 GHz	24 GB to 48 GB	200 GB to 500 GB



### IMPORTANT

Regardless of your workload size, allocate at least 16 GB of RAM to the Contrast application.



### TIP

Follow the large workload guidelines if you are using the Contrast REST API architecture for automation or data extraction purposes and for continuous integration of agents with large automated regression suites.

## Download Contrast software with curl commands

When your license is provisioned, a good way to download the Contrast installer and licenses is to use curl commands. If you're unsure about who holds access for your company, [contact Support](#).

You can also download other software files using curl commands.

Alternatively, you can download installers and license files from the [Contrast Hub](#).



### NOTE

Starting with Contrast 3.9.10, the installer doesn't include the library and CVE data. For an air-gapped installation, you need to download this data manually. If you have internet access, you can configure your system to [upgrade this data automatically \(page 698\)](#).

## Steps for downloading installation files

1. To download the latest version of the Linux Contrast installer, use this command:

```
curl -L https://hub.contrastsecurity.com/h/api/artifacts/installer/sh/nocache -u <ContrastHubUsername>
```

Replace `<ContrastHubUsername>` with the username for your Contrast Hub account. After you enter the command, you are prompted to enter the password.

2. To download the latest version of the Windows Contrast installer, use this command:

```
curl -L https://hub.contrastsecurity.com/h/api/artifacts/installer/exe/nocache -u <ContrastHubUsername>
```

Replace `<ContrastHubUsername>` with the username for your Contrast Hub account. After you enter the command, you are prompted to enter the password.

3. **Air-gapped installations:** To download the library and CVE data, use this command:

```
curl -JLO https://hub.contrastsecurity.com/h/api/artifacts/ardy_export -u <ContrastHubUsername>
```

Replace `<ContrastHubUsername>` with the username for your Contrast Hub account. After you enter the command, you are prompted to enter the password.

4. To download the latest Contrast WAR file, use this command:

```
curl -JLO https://hub.contrastsecurity.com/h/api/artifacts/war -u <ContrastHubUsername>
```

Replace `<ContrastHubUsername>` with the username for your Contrast Hub account.

The WAR file is useful if you have an existing Tomcat server and you want to install Contrast on that server.

5. To download the license file, use this command:

```
curl --request GET --url https://hub.contrastsecurity.com/h/rest/customer/license/text
```

Replace `<ContrastHubUsername>` with the username for your Contrast Hub account. After you enter the command, you are prompted to enter the password.

6. After you download the files, [install Contrast \(page 675\)](#).

## Additional software downloads

You can use this curl command to download additional Contrast software:

```
curl -JLO https://hub.contrastsecurity.com/h/api/artifacts/<OtherSoftware> -u <ContrastHubUsername>
```

Replace `<Other Software>` with any of the these values:

- For the .NET Framework agent, use `dotnet`
- For the .NET Core agent, use `dotnet_core`
- For the .NET Core installer for IIS, use `dotnetcore_installer_for_iis`

## Download the Contrast installer

When your license is provisioned, you get access to a [Contrast Hub](#) account where you can download installers and licenses. If you're unsure about who holds access for your company, [contact Support](#).

Alternatively, you can use [curl commands \(page 673\)](#) instead of the Contrast Hub to download installers and licenses.



### NOTE

Starting with Contrast 3.9.10, the installer doesn't include the library and CVE data. For an air-gapped installation, you need to download this data manually. If you have internet access, you can configure your system to [upgrade this data automatically \(page 698\)](#).

## Steps

1. Log in to the Contrast Hub with the credentials provided to you.
2. Download the Contrast installer for your operating system.
  - a. Select **Downloads** in the header.
  - b. Select **Installers**
  - c. Select the file to download:

CONTRAST HUB Home Downloads

### TeamServer

Installers

Version	OS	Release Date	File Name	File Size	
3.8.11.1683721903	linux	01/11/2022	Contrast-3.8.11.1683721903-NO-CACHE.sh	869.91 MB	<a href="#">Download</a> <a href="#">MD5 Sum</a>
3.8.11.1683721903	windows	01/11/2022	Contrast-3.8.11.1683721903-NO-CACHE-x64.exe	874.14 MB	<a href="#">Download</a> <a href="#">MD5 Sum</a>

- **Linux installer:** Contrast<version>-NO-CACHE.sh
- **Windows installer:** Contrast<version>-NO-CACHE-x64.exe

3. **Air-gapped installations:** [Download the library and CVE data \(page 697\)](#).

If you have internet access, you don't have to download the data; you can configure your system to [upgrade library and CVE data automatically \(page 698\)](#) after installation.

4. Download the license file.

The license file is configured with a [SuperAdmin \(page 747\)](#) account and a regular user account. You'll need the license to complete the installation of the Contrast application.

- Select **Home** in the header.
- Select **Licenses**.
- Select the license file to download.

5. After you download the files, [install Contrast. \(page 675\)](#)

## Install Contrast on-premises



### IMPORTANT

These installation instructions are for on-premises use only.

If you are using the hosted version of Contrast, you can [instrument your applications \(page 30\)](#) without installing Contrast. Get started by [installing an agent \(page 30\)](#).

Contrast updates the library data approximately every 24 hours. If you have internet access, your Contrast installation pulls the data from a Contrast database hosted on the cloud. If you don't have internet access (air-gapped installations), you can download the data manually.

### Before you begin

- [Download the Contrast Installer \(page 674\)](#) from the [Contrast Hub](#) or by using [curl commands. \(page 673\)](#)
- If you don't have internet access (air-gapped installations), [download the library data manually \(page 697\)](#).
- Review the [system requirements \(page 671\)](#) and [sizing recommendations \(page 672\)](#).

### Steps

1. Preconfigure your base operating system with a shared library for running MySQL. Additionally, the system package `fontconfig` is required on Linux to install fonts. Run the command for your operating system:

- **RHEL 8:**

```
[contrast@myserver ~]# dnf install -y ncurses-compat-libs libaio fontconfig
```

- **CentOS or RHEL 7:**

```
[contrast@myserver ~]# yum install -y libaio fontconfig
```

- **Ubuntu or Debian:**

```
[contrast@myserver ~]# apt-get install -y libaio1 libaio-dev fontconfig
```


- **Windows:** MySQL requires [Microsoft Visual C++ 2015-2022 Redistributable Update..](#)

2. Run the installer as a privileged user.

- On Windows, right-click on the installer and select **Run As Administrator**.
- On Linux, use the `sudo` command to start the installer.

3. Respond to installer questions according to your situation. (For example, you can [create a MySQL backup \(page 737\)](#) or [configure the JRE \(page 687\)](#)).

You can further configure Contrast after startup. You can customize installer behavior using these command line arguments when you run the installation script:

Command line argument	Description
-h -help	Shows help for common command line arguments.
-c	Forces the installation to run in Console mode.
-q	Executes the installer in Unattended mode.
-g	Forces the installation to run in GUI mode. (Windows only).
-console	If the installer is executed in Unattended mode and the <code>-console</code> argument is passed on Windows, a second console shows the output of the installer.
-overwrite	Forces the installer to overwrite all files in Unattended mode regardless of the overwrite policy specified in the installer.
 <b>CAUTION</b> This can cause your configuration to be overwritten back to default values.	
-dir	Only valid in Unattended mode; specifies the directory where Contrast should be installed.
-Dinstall4j.debug	By default, the installer catches all exceptions, creates a crash log and informs the user about the location of that log file. This might be inconvenient when debugging an installer; so, this system property switches off the default mechanism, and exceptions are printed to <code>stderr</code> .
-Dinstall4j.keepLog=true	The installer creates a log file prefixed <code>i4j_log</code> for all installations and uninstallation in your temp directory. This log file can be helpful for debugging purposes. If your installer contains an <b>Install files</b> action and terminates successfully, the log file is copied to <code>[installation dir]/install4j/installation.log</code> . Otherwise, the file is deleted after the installer or uninstaller terminates by default.
-Dinstall4j.alternativeLogFile=[path]	When using the <code>-Dinstall4j.keepLog=true</code> option, the log file won't be deleted. With the <code>-Dinstall4j.alternativeLogFile=[path]</code> option, the log file is copied to the file specified with <code>[path]</code> . This should be an absolute path name. Neither option has any effect if the log file has already been copied to the installation directory.
-varfile (file-name)	Specifies a variable-file to be used. When installing in Unattended mode, this allows you to provide customizations to the default values set by the installer.
--skip-preflight	Skips preflight checks (current user is root, dependencies present). If using this parameter, it must be the first parameter passed on the command line.



**NOTE**

If you're using a distributed setup for the Contrast application, you should use a distributed MySQL instance during setup.

**IMPORTANT**

Client agents use the Contrast URL to communicate back to the application. Contrast makes the best attempt to determine the hostname and pre-populate this value; but, if the provided hostname isn't resolvable by clients on the network, they won't be able to communicate back to the server.

Please set this value to a Contrast host or load balancer that's reachable by your agent hosts.

4. Installation completes and the Contrast application performs its initial configuration. To confirm it has finished, you can visit the URL you specified above.

**NOTE**

If you're [upgrading your version of Contrast \(page 696\)](#), any required update tasks are included at this point.

5. The first time the Contrast application starts after installation, there are [only two users that can log in \(page 684\)](#) to the user interface: the default SuperAdmin and the default Organization Administrator. Go to `http://<ContrastServer>:8080/Contrast` (where `<ContrastServer>` is either the IP address or hostname setup during installation), log in as both users and change the password for each.

**IMPORTANT**

To keep your application secure, either disable these default logins and create new ones, or at very least change the default passwords.

6. Once Contrast is installed, the next step is to [configure system settings \(page 728\)](#) (for example, allocate licenses, set up authentication, and allow users to receive notifications and run reports). To ensure your library data is current, configure your system to [upgrade library data automatically \(page 698\)](#). If you don't have internet access (air-gapped installations), [update library data manually \(page 697\)](#).

## Additional options

After you install Contrast, you have options for expanding your installation:

- Use a [distributed MySQL database \(page 679\)](#)
- Deploy with a [WAR file \(page 677\)](#)
- Deploy in a [distributed environment \(page 681\)](#)

## Deploy Contrast with a WAR file

Using this procedure lets you manage the different components of the Contrast installation separately. After using this method to deploy Contrast, you can upgrade your configuration by replacing the existing WAR file with a new one.

## Before you begin

- [Install Contrast. \(page 675\)](#)

## Steps

1. Create a compressed file that contains the following files from the directory where you installed Contrast (for example, `/usr/local/contrast`):

- `data/agents/`
- `data/conf/`
- `data/esapi/`
- `data/.contrast`
- `data/.initialized`
- `data/cache/`
- `data/contrast.lic`
- `webapp/Contrast.war`

**Example:** This example shows how to create a TAR file that contains the Contrast files:

```
$ cd /usr/local/contrast
$ tar -czvf ~/ctdc.tar.gz data/agents data/conf data/contrast.lic data/esapi/ data/ca
```

2. Install Tomcat and Java:

- Use the same version of Tomcat that is included in the Contrast installer.
- [A supported version of Java \(page 671\)](#)

3. Set up the `contrast-data` directory.

The volume where you create this directory must be large enough for log files, caches and ActiveMQ persistence. For best performance, use a separate volume to handle growth without impacting your overall system.

- a. Create the `contrast-data` directory with a command similar to the following:

```
$ mkdir /opt/contrast-data
```

This example creates the directory in the `/opt` directory, but you can create it in any location.

- b. Unarchive the compressed file you created in step 1 into the `contrast-data` directory.
- c. Check the contents of the directory using a command similar to the following:

```
ls /opt/contrast-data/conf
```

You should see files named `general.properties` and `database.properties` among several others.

- d. To ensure there are no access issues, change the owner and group for the `contrast-data` directory with a command similar to the following:

```
$ chown -R tomcat7:tomcat7 /opt/contrast-data
```

4. To complete the configuration, in the `JAVA_OPTS` environment variable, set the location of `contrast.home` and `contrast.data.dir` to the location where you unarchived the compressed file.

This example shows one way to set the `JAVA_OPTS` variable. Use the documentation for your environment to determine the best way to set this variable.

```
-XX:+UseTLAB
-XX:+UseCompressedOops
-XX:+UseConcMarkSweepGC
-XX:+UseParNewGC
-XX:CMSFullGCsBeforeCompaction=1
-XX:+CMSParallelRemarkEnabled
-XX:+PrintVMOptions
-XX:+PrintCommandLineFlags
-Xmx4g
-Xms4g
-server
-XX:MaxPermSize=768m
-Dcontrast.data.dir=/opt/contrast-data
```

```
-Dcontrast.home=/opt/contrast-data
-XX:+HeapDumpOnOutOfMemoryError
-Xloggc:/opt/contrast-data/gc.out
```

- Place the `Contrast.war` file in the Tomcat `webapps` directory.

Create a symbolic link, copy, or move the `Contrast.war` file from the location where you unarchived the compressed file to the Tomcat `webapps` directory.

- This example shows how to create a symbolic link to the file in a Ubuntu environment:

```
$ sudo ln -s /opt/contrast-data/webapp/Contrast.war /var/lib/tomcat7/webapps/Contra
```

- This example shows how to copy the file in a Ubuntu environment:

```
$ cp /opt/contrast-data/webapp/Contrast.war /var/lib/tomcat7/webapps/Contrast.war
```

## Create a distributed MySQL environment

You can use an external MySQL database (an open-source database that runs on both Windows and Linux) with your existing on-premises installation. For example, this is necessary if you are using a [distributed deployment of Contrast \(page 681\)](#).



### TIP

Work with your Operations and/or Database team to ensure a secure and durable installation.

You can use a [snippet of Ansible](#) that you can use to install the MySQL on Ubuntu 14.04.

You can also [download the gpg. keyfile](#) from MySQL. Contrast changes the bind address to "\*", but recommends binding your MySQL server to the IP of your application server. Create a user and grants that offer access to only the Contrast schema and limited to the host IP address or subnet.

## Steps

In the following steps, replace `<jdbc.host>`, `<jdbc.port>`, `<jdbc.user>`, `<jdbc.pass>`, and `<jdbc.schema>` with your host, port, user, password, and schema.

- Install and configure a [supported version \(page 671\)](#) of MySQL on the database server host.
- Create a maintenance window for Contrast downtime.
- [Back up the embedded MySQL database \(page 737\)](#).
- Connect to MySQL.

- Windows:**

```
mysql -h <jdbc.host> -P <jdbc.port> -u <jdbc.user> -p <jdbc.schema>
```

- Linux:**

```
./mysql -h <jdbc.host> -P <jdbc.port> -u <jdbc.user> -p <jdbc.schema>
```

- Create the Contrast database with this command:

```
create database <jdbc.schema>;
```

- Create a MySQL user with this command:

```
CREATE USER '<jdbc.user>'@'%' IDENTIFIED BY '<jdbc.pass>';
```

- Grant permissions for the Contrast user with this command:

```
GRANT ALL PRIVILEGES ON *.* to '<jdbc.user>'@'%';.
```

8. Exit from MySQL.
9. Restore the MySQL backup. Replace <backup\_location> with your backup location and <backup\_filename> with your backup filename.

- **Windows:**

```
mysql -h <jdbc.host> -P <jdbc.port> -u <jdbc.user> -p <jdbc.schema> < <backup_location>
```

- **Linux:**

```
./mysql -h <jdbc.host> -P <jdbc.port> -u <jdbc.user> -p <jdbc.schema> < <backup_location>
```

10. Update the configuration in the [encrypted properties editor \(page 735\)](#). Edit the encrypted file \$CONTRAST\_HOME/data/conf/database.properties. Look for database.type; if it doesn't exist, create a new property. Set this value to distributed and modify the database connection values to point to the distributed database you want to use.

```
user@ubuntu:/opt/contrast/bin$ ./edit-properties -e ../data/esapi/ -f ../data/conf/
jdbc.type : MYSQL
database.prod.dir : /opt/contrast/data/db
jdbc.debug : false
jdbc.pass : pass
jdbc.schema : contrast
jdbc.host : ubuntu
database.bk.time : 6:39:14
jdbc.port : 3306
database.bk.enabled : false
database.enabled : true
jdbc.url : jdbc:mysql://ubuntu:3306/contrast
jdbc.user : contrast
database.bk.dir : /opt/contrast/data/backups/db
jdbc.dialect : com.aspectsecurity.contrast.teams
jdbc.driver : com.mysql.jdbc.Driver
```

```
Enter the name of the property to edit [q to Quit]: database.type
Create new Property [database.type](y/N): y
Enter a value for the property: distributed
```

```
jdbc.type : MYSQL
database.prod.dir : /opt/contrast/data/db
jdbc.debug : false
jdbc.pass : pass
jdbc.schema : contrast
jdbc.host : ubuntu
database.bk.time : 6:39:14
jdbc.port : 3306
database.bk.enabled : false
database.enabled : true
database.type : distributed
jdbc.url : jdbc:mysql://ubuntu:3306/contrast
jdbc.user : contrast
database.bk.dir : /opt/contrast/data/backups/db
jdbc.dialect : com.aspectsecurity.contrast.teams
jdbc.driver : com.mysql.jdbc.Driver
```

```
Enter the name of the property to edit [q to Quit]:
```



**NOTE**

If you're converting from a default embedded database configuration to a distributed configuration, `database.bk.enabled` also needs to be set to `false`. It's your responsibility to configure your own backups when running a distributed database configuration with Contrast.

11. If your on-premises installation is on a Windows system, remove the `contrast-server` service dependency on MySQL.  
Before you restart Contrast, remove the `contrast-server` service dependency on the MySQL service with the following command:

```
sc config contrast-server depend= ""
```

12. [Restart Contrast \(page 685\)](#).

## Distributed deployment of Contrast

A distributed configuration of Contrast deploys the database and application server to separate servers. Use a distributed configuration if you:

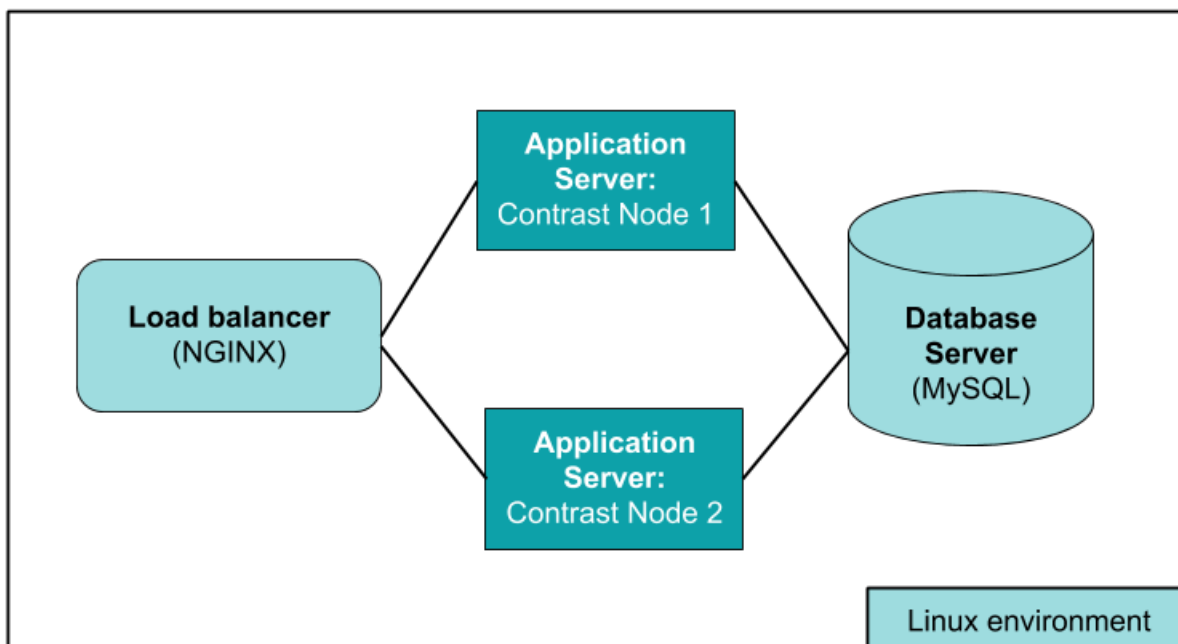
- Plan to use more than 100 connected agents  
Without a distributed configuration for this situation, you are likely to experience performance issues.
- Want to use load-balancing for better performance and scalability
- Require additional administration and management

## Distributed configuration example

This example shows a configuration for installing Contrast in a Linux environment at `/usr/local/contrast`. Your organization may use different environments or have different guidelines on where to install third-party software.

The example shows a configuration using these servers:

- A load-balancer
- A database server
- Two application servers running the Contrast application.  
You can more servers, as needed.



## Before you begin

- Distributed deployment requires an understanding of your environment and the loads it can easily handle.  
To determine whether it's best to use a distributed deployment of Contrast or a dedicated instance, [Contact Support](#).
- If you are **already using Contrast**, use your existing instance as **Application Server 1** and be sure it uses a distributed database configuration. Before you continue, you should:
  - If you don't already have one, [create a distributed MySQL environment \(page 679\)](#).
  - Get Contrast application version numbers by looking in the `VERSION` file in `/usr/local/contrast/VERSION`. Get the Contrast database version using this command:

```
select `version` from schema_version ORDER BY `installed_on` DESC LIMIT 1;
```

You need the version numbers to determine the order of tasks.

For example, if the application version is 3.3.2 and the database is version 3.3.2.012, you can say the versions are the same because it's safe to drop .012 from the database version number. Because of this, an existing application server A can run with a separate database B on version 3.3.2. If you want to install application version 3.4.2 onto a new application server C and connect it to database B, you will need to either stop or update server A before installing version 3.4.2 on server C.

- If you are **new to Contrast**, you should:
- Install and configure MySQL on the database server according to [Contrast system requirements \(page 671\)](#). Create a MySQL user who has permissions to connect remotely. You will use these credentials to connect to Contrast.
- [Install Contrast \(page 675\)](#) on **Application Server 1** with a distributed database configuration.
- Select the option for a distributed MySQL instance. Point the database creation to the database server, for example:

```
Choose a MySQL database configuration.
Default [1, Enter], Distributed [2]2
Host
[localhost]
<enter hostname of Mysql server>
```

```
Port
[13306]
3306
```

#### Credentials

```
Username
contrast
```

#### Password

```
<enter mysql password for contrast account>
```

## Set up distributed servers

1. Create a TAR file from the Application Server 1's configuration files:

- data/conf/
- data/esapi/
- data/contrast
- data/initialized
- data/contrast/lic
- webapp/Contrast.war
- VERSION

Use a command similar to the following example:

```
$ cd /usr/local/contrast
$ tar -czvf ~/ctdc.tar.gz data/agents data/conf data/contrast.lic data/esapi/ data/.i
```

2. [Install Contrast \(page 675\)](#) on **Application Server 2**.

Complete the installation process as a privileged user.

- On Windows, right-click on the installer and select **Run as administrator**.
- On Linux, use a `sudo` command to launch the installer.



### IMPORTANT

```
Full or Application Only Install
Choose the desired installation type:
Full install [1, Enter], Application Server Only [2]
2
```

Select **Application Server Only** and use the TAR file you created in the previous step. Do the same for any additional application servers you want to add to the distributed configuration.

3. Test the [default users \(page 684\)](#) created by the application to be sure they work with both Contrast **Application Servers (1 and 2)**.
4. Set up a load balancer (like NGINX) on the fourth server. If you choose NGINX, use the [basic installation instructions](#).



### NOTE

Contrast requires sticky or persistent sessions for better performance. For example, with an NGINX load balancer, use the Ip Hash method to guarantee that requests from the same address get to the same server if it's available.

5. Once you set up the server, you must configure Contrast to point to your load balancer. To do this, edit the `/data/conf/general.properties` file on each node. Change the `teamserver.url` value in the YAML config file to that of the load balancer and restart the Contrast application server.

If you are doing health checks for the load balancer, use this URL:

```
<CONTRAST_SERVER>/Contrast/api/public/ng/information
```

where `<CONTRAST_SERVER>` is the host name of the Contrast application server.



### IMPORTANT

Agents use the Contrast URL to communicate back to the application. Contrast attempts to determine the hostname and pre-populate this value. If clients on the network can't resolve the hostname you provide, they won't communicate back to the server. Please set this value to a Contrast host or load balancer that the agent hosts can reach.

When installation is complete, Contrast begins an initial configuration. It can take two to three minutes to fully start up.

- To check configuration progress, watch `server.log` and `contrast.log`. When the server successfully starts, you will see something like this in `server.log`:

```
260916 20.18.25,837 {} {} {} INFO (Server.java:303) Contrast TeamServer Ready -
```

## Run Contrast

To run Contrast:

- Windows:** In Windows, Contrast is installed as a system service. You can start and stop the service through the Windows Service Manager application.
- Linux:** The Contrast daemon is registered as an `init.d` daemon. To start and stop the server use:

```
/etc/init.d/contrast-server <start|stop|restart|status>
```

Or

```
service contrast-server <start|stop|restart|status>
```

To start the Contrast server independently of the parent shell, execute:

```
nohup /path/to/installation/contrast/bin/contrast-server start >/dev/null 2>1
```

At this point, it's helpful to tail the server logs:

```
$ tail -f $CONTRAST_HOME/logs/server.log
```

And then the application logs:

```
$ tail -f $CONTRAST_HOME/logs/contrast.log
```

If Contrast starts successfully, you will see this message in the `server.log`:

```
190116 21.22.15,703 {} {} {} INFO (ConnectionTester.java:50) Received code 200 from Tea
190116 21.22.15,707 {} {} {} INFO (ConnectionTester.java:60) Server start has been veri
190116 21.22.15,709 {} {} {} INFO (Server.java:319) Contrast TeamServer Ready - Took 20
```

## Default and SuperAdmin credentials

As the system administrator who installs Contrast, you can manage the following sets of credentials:

- Contrast Hub credentials:** New customers receive an email with the username and a link to set the password. You will need these credentials to [download the installer \(page 675\)](#) and to log in to [Contrast Hub](#).
  - Username:** Contrast provides the username in the format `example@domain.com`. It is the same username as the Default Organization Administrator.

- **Password:** Create this password when you select the link in the activation email.
- **Default SuperAdmin credentials:** These credentials are included in the license. They are used for managing the Contrast application in the [role of SuperAdmin \(page 747\)](#).
- **Username:** Contrast provides the username in the format `contrast_superadmin@domain.com`, where *domain* is the name of your company's email domain.
- **Password:** The default password is: `default1!`.
- **Default Organization Administrator credentials:** The Organization Administrator can use these credentials to log in to Contrast after [installation \(page 675\)](#) and set up and maintain the organization.
- **Username:** Contrast provides the username in the format `example@domain.com`. It is the same username as the Default Organization Administrator.
- **Password:** The default password is: `default1!`.



### IMPORTANT

Be sure to change the supplied default passwords as soon as you have successfully logged in. You can reset the SuperAdmin password [in Contrast \(page 420\)](#) or by using command line on [Windows \(page 727\)](#) or [Linux \(page 727\)](#).

## Restart Contrast

To restart Contrast:

1. Use the following command(s):

- **Windows:**

```
net stop "Contrast Server"
```

Once the service is completely shut down:

```
net start "Contrast Server"
```

- **Linux:**

```
sudo service contrast-server restart
```

2. At this point, it's helpful to tail the server logs:

```
$ tail -f $CONTRAST_HOME/logs/server.log
```

3. And then the application logs:

```
$ tail -f $CONTRAST_HOME/data/logs/contrast.log
```

4. If Contrast starts successfully, you will see this message in the server.log:

```
190116 21.22.15,703 {} {} {} INFO (ConnectionTester.java:50) Received code 200 from
190116 21.22.15,707 {} {} {} INFO (ConnectionTester.java:60) Server start has been v
190116 21.22.15,709 {} {} {} INFO (Server.java:319) Contrast TeamServer Ready - Took
```

## Uninstall Contrast

Each installation comes with a script for safely uninstalling Contrast plus all embedded components such as Java, Tomcat and MySQL. The script is packaged within the root directory of the Contrast installation. On Unix, the file is an executable script labeled *uninstall*. On Windows, a command file is packaged in the installation directory called *uninstall.cmd*.

Before uninstalling:

- [Create a backup of MySQL \(page 737\)](#) using the database backup tool provided with Contrast.
- Shut down Contrast using either the Windows or Unix service script.

To remove Contrast from your servers using **Windows**:

1. Open the Windows Explorer.
2. Navigate to the Contrast installation directory.
3. Click on the file *uninstall.exe* and run. Run the uninstall with the same privileges you ran the installation (as an administrator).
4. Follow the prompts to perform uninstallation.

To remove Contrast from your servers using **Unix**:

1. Open a Linux console.
2. Change directory (`cd`) to the Contrast installation directory.
3. Execute the command `uninstall`.
4. Follow the prompts to perform uninstallation.



#### NOTE

You'll delete the vast majority of files when performing an uninstallation. However, an administrator may need to delete a few remaining files manually, such as:

- The *Contrast HOME* directory
- The *Contrast DATA* directory
- The *Contrast LOGS* directory
- The *Contrast MYSQL* directory

## Post-installation

After you install Contrast, you have options that might help you improve your Contrast environment.

### Post-installation tasks

Consider these post-installation options:

- [Configure Tomcat \(page 686\)](#)
- [Configure the Java Runtime Environment \(page 687\)](#)
- [Configure HTTPS \(page 687\)](#)
- [Customize MySQL \(page 690\)](#)
- [Configure reporting storage \(page 692\)](#)
- [Configure logs \(page 693\)](#)
- [Use Redis as a shared cache \(page 694\)](#)

### Configure Tomcat

During [installation \(page 675\)](#), you set some values for the memory used by the embedded Tomcat server on which Contrast runs.

As you add more applications or find more vulnerabilities, you may notice a degradation in performance which can indicate you have reached the maximum amount of memory allowed for this server.

To increase memory settings:

1. Stop the Contrast server by running the `contrast-server stop` command.
2. When the server is stopped and `Contrast/logs/contrast-stdout.log` ends with `[MySqlDResource] shutdown complete`, it is safe to change memory settings.
3. In the Contrast bin directory, `c:/Program Files/Contrast/bin` or the default `/opt/Contrast/bin`, open a file named `contrast-server.vmoptions`. It should look something like this:

```
-XX:+UseG1GC
-XX:+UseStringDeduplication
-XX:+PrintVMOptions
-XX:+PrintCommandLineFlags
-XX:+UseContainerSupport
-XX:InitialRAMPercentage=50.0
-XX:MaxRAMPercentage=50.0
-XX:MinRAMPercentage=50.0
-Dcontrast.data.dir=/opt/contrast-data
-Dcontrast.home=/opt/contrast-data
-XX:+HeapDumpOnOutOfMemoryError
-Xloggc:/opt/contrast-data/gc.out
-server
```

4. You can update the values for:
  - `Xms`: the amount of memory allocated to the server on start
  - `Xmx`: the maximum amount of memory the server can use
  - `MaxPermSize`
 These values can change depending on the memory available on the machine hosting Contrast.
5. Save the file and start Contrast back up using the `contrast-server start` command.



#### TIP

See [JVM documentation](#) for help with tuning.

## Configure the Java Runtime Environment (JRE)

During [installation \(page 675\)](#), you are given the option to use either an embedded JRE or a pre-installed JRE.

To configure the JRE:

1. Open `$CONTRAST_HOME/install4j/pref_jre.cfg` with a text editor.
2. Add the complete path to the Java version you would like to use. For example:

```
C:\Program Files\Java\jre11
```

## Configure HTTPS

By default, HTTP is used for connections between Contrast and the agents. You may need to add or replace HTTP with HTTPS for both Contrast and agent traffic, which you can do with Tomcat's built-in connector functionality. There are two ways to do this:

- **Contrast HTTPS connector:** Configure Contrast to listen to HTTPS connections on a port that you specify by adding a certificate to a Java KeyStore.
- **Reverse proxy method:** Use a standard web server, such as Apache HTTPD or NGINX, in front of the Contrast server configured to reverse proxy requests using Contrast's AJP connector.

You can customize the configuration further as described in [How-To Modify Supported TLS Versions and Ciphers on On-Premise Contrast Server](#).

## Use the Contrast HTTPS connector

Use these steps to create a Java KeyStore (JKS), with a signed certificate, that your on-premises Contrast application server will use at runtime.

1. Use the Java keytool command to create a Java KeyStore (JKS) (for example, `contrast.jks`) containing a private and public key for a certificate with an alias of `contrast-server`.

```
keytool -genkeypair -alias contrast-server -keyalg RSA -keystore contrast.jks
```



### IMPORTANT

When you create the JKS and the private key, it is important that both passwords are the same. If the passwords are different, the HTTPS connector doesn't work.

2. Generate a Certificate Signing Request (CSR) (`contrast.csr`). You can add DNS or IP fields as needed to include these as Subject Alternative Names on the certificate.

```
keytool -certreq -alias contrast-server -file contrast.csr -keystore contrast.jks -ex
```

3. Send the resulting CSR file to your CA. The CA will provide you with either multiple PEM files or a single PCKS #7 file.
4. Import the files into the Java KeyStore. Use these instructions depending on the file type you receive.



### NOTE

In order for Contrast to use the SSL Certificate, the certificate can't be protected with a passphrase.

- **Multiple PEM files:** These files have extensions of `.CRT` or `.PEM` (PEM files open as readable text). One file contains the certificate, while the others contain the root and possibly one or more intermediate certificates.

The certificates must be imported into the KeyStore in a top-down order, with the server certificate itself being imported last. The server certificate should have the same alias used when the KeyStore was created. For example, if you were provided with `root.cer`, `inter.cer` and `server.cer`, you should import them as:

```
keytool -import -trustcacerts -alias root -file root.cer -keystore contrast.jks
keytool -import -trustcacerts -alias intermediate -file inter.cer -keystore contrast.jks
keytool -import -trustcacerts -alias contrast-server -file server.cer -keystore contrast.jks
```

- **Single PCKS #7 file:** This file has an extension of `.P7B`, `.CER` or possibly `.CRT`. This file contains the server certificate bundled with all necessary root and intermediate certificates. The server certificate should have the same alias used when the KeyStore was created. For example, for a file `certificate.p7b`, import it as:

```
keytool -import -trustcacerts -alias contrast-server -file certificate.p7b -keystore contrast.jks
```



**NOTE**

If you retrieve your certificates through another method, you may need to create a keystore differently. For example, if you end up with a:

- `server.crt`, `priv.key` and `inter.crt` files: Convert the files to a PKCS #12 and create a keystore using these commands.

```
openssl pkcs12 -export -out cert.pfx -inkey priv.key -in server.crt -cert
keytool -importkeystore -srckeystore cert.pfx -srcstoretype pkcs12 -destk
```

- PKCS #12 file: Create a keystore with this command.

```
keytool -importkeystore -srckeystore cert.pfx -srcstoretype pkcs12 -destk
```

5. Once KeyStore setup is complete, open the `<YourPath>/data/conf/server.properties` file in your text editor, where `<YourPath>` is the path where Contrast is installed.

Replace `<port>`, `<file>`, `<password>`, `<hostname>` with your port, JKS file path, password, and the hostname alias given in the `keytool` command.

```
https.enabled=true
https.port=<port>
https.keystore.file=<file>
https.keystore.pass=<password>
https.keystore.alias=<hostname>
```

**IMPORTANT**

If using Windows, the full path to the JKS file must be escaped. For example:

```
https.keystore.file=C:\\Program\ Files\\Contrast\\data\\conf\\ssl\\contrast
```

You may find it useful to set the `http.enabled` and `ajp.enabled` options to `false` to ensure that only connections made over HTTPS are allowed to the Contrast server.

6. Open the `<YourPath>/data/conf/general.properties` file, and change the value of the `teamserver.url` property to reflect your change. Agents must be updated manually the first time after you make this change. Future updates to the agent will be automatic.
7. **Optional:** [Modify supported TLS versions and cipher suites](#).
8. Restart the Contrast server service, and ensure that it's now listening on the HTTPS port you configured.

**NOTE**

It is also possible to use the HTTPS connector with a self-signed certificate.

## Use the reverse proxy method

To use Apache JServ Protocol (AJP) with the reverse proxy method:

1. Ensure that the Contrast server is configured to listen for connections using the AJP protocol. Open the `CONTRAST_HOME/data/conf/server.properties` file in your text editor and verify that the following options are set:

```
ajp.enabled=true
ajp.port=8009
ajp.secretRequired=true|false
ajp.secret=somesecret
```

Choose the `ajp.port` setting to reflect the port on which you'd like the server to listen for incoming connections. If you want the AJP connector to be the only way to access the server, disable the `http.enabled` and `https.enabled` options.

If the `secretRequired` is configured to `true`, the `ajp.secret` setting should have a non-null, non-zero length value. Request workers are required to have the secret keyword; otherwise, the requests are rejected. The workers must provide a matching value, or the request will be rejected regardless of the setting of `secretRequired`.

2. After updating the `server.properties` file, restart the Contrast server service for the changes to take effect.
3. To configure the front-end server, refer to your server's documentation for instructions on how to configure it to use AJP. (For example, see [Apache](#) or [NGINX AJP](#) documentation.)

## Customize MySQL



### NOTE

This procedure applies to the embedded MySQL database, not a distributed configuration.

To match the needs of your environment, you might need to change the default settings that Contrast specifies for the MySQL database. For example, after an upgrade, you might need to adjust the value for the `innodb_buffer_pool_size` setting.

To change the default MySQL settings, use the `my_extra.cnf` options file. The Contrast installer includes this file as part of the on-premises installation.

Contrast loads its default options file first and then, applies custom settings that you specify in the `my_extra.cnf` file.

## Steps

1. Find the `$CONTRAST_HOME/data/conf/my_extra.cnf` file.
2. Add or change [MySQL settings](#), as needed.
3. [Restart Contrast. \(page 684\)](#) or, if you're using Microsoft Windows, restart the MySQL service.

## Set up a proxy configuration

Setting up a proxy configuration for your on-premises installation lets you integrate Contrast with tools that exist inside your network (and don't require a proxy) and outside of your network (which require web proxy access).

### Set up methods

You can use either of these methods to set up a proxy configuration:

- JVM arguments in the `contrast-server.vmoptions` file.
- The proxy settings in the Contrast Web interface.  
JVM arguments in the options file override settings in the Contrast web interface.

## Steps

- **Use JVM arguments (preferred method)**

1. In the Contrast bin directory, `c:/Program Files/Contrast/bin` or the default directory `/opt/Contrast/bin`, open `contrast-server.vmoptions`.
2. Add these JVM arguments to the file (for security purposes, `https` arguments are preferred):
  - `https.proxyHost` or `http.proxyHost`  
The host name of the proxy server. Use this argument for communication with externally-hosted software.
  - `https.proxyPort` or `http.proxyPort`  
The port number on which the proxy server listens for traffic.
  - `http.nonProxyHosts`  
A list of hosts, separated by a vertical bar (`|`), which you connect to directly, bypassing the proxy server. This argument works for both `https` and `http` configurations. Use this argument to exclude on-premise hosts that are deployed in the same network as your Contrast installation.  
For example, if you have an on-premises Jira installation as well as an integration for MS Teams in the cloud, you can use the `http.nonProxyHosts` argument to exclude the Jira integration from using the proxy server, as shown in the following example:

```
-Dhttps.proxyHost=89.148.22.17  
-Dhttps.proxyPort=3128  
-Dhttp.nonProxyHosts=jira.mycompany.com|*.internal.mycompany.com
```

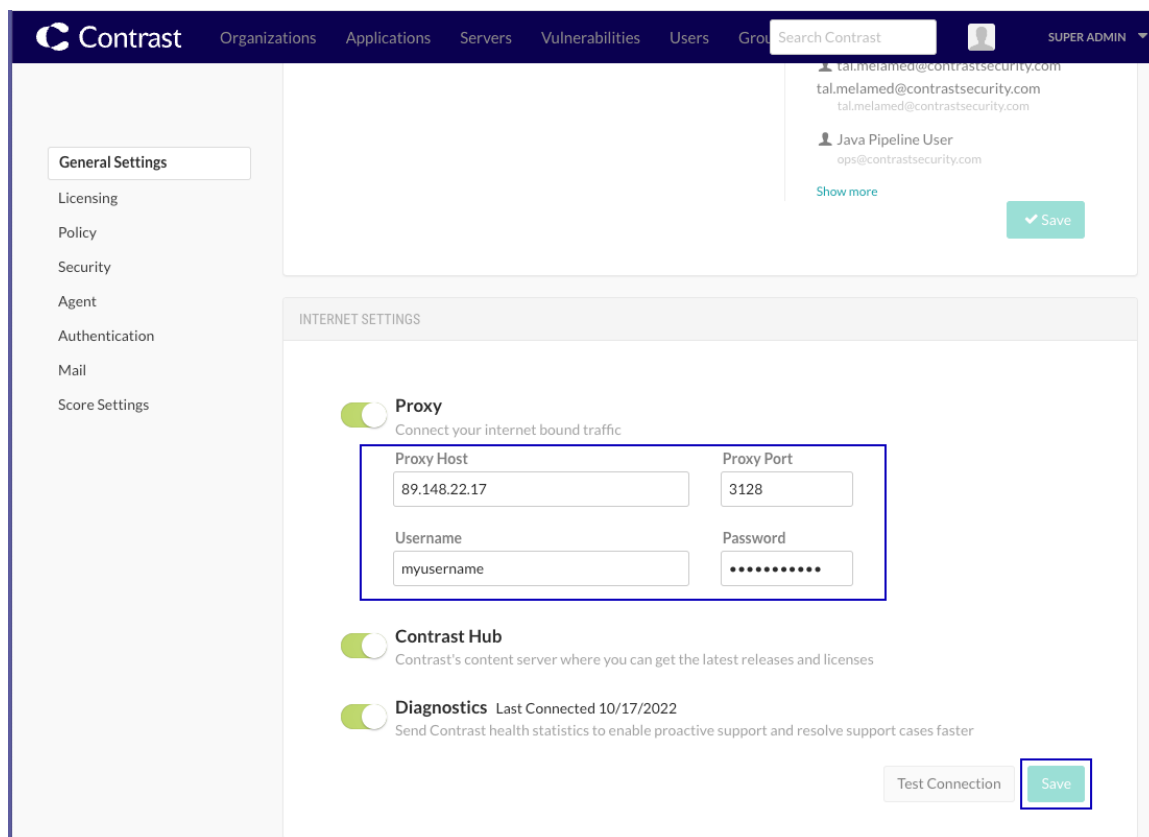
In this example, the proxy host is `89.148.22.17`, listening for traffic on port `3128`. This configuration bypasses the proxy server when communicating with the host for `jira.mycompany.com` as well as hosts matching `*.internal.mycompany.com`.

- **Use the Contrast web interface:**

1. In the user menu, select **SuperAdmin**.
2. Select **System settings**.
3. Under Internet settings, select **Proxy**.



4. Specify the proxy host name, the port number, the username for the proxy server, and the password for the proxy server.



5. Select **Save**.

### Configure reporting storage for the system

As SuperAdmin, you can configure reporting storage options by adding the following properties to the `contrast/data/conf/general.properties` file:

- **reporting.storage.mode:** The value options are `DB` and `FILE_SYS`.
- **reporting.storage.path:** This is required when storage mode is set to `FILE_SYS`.

The recommended setting for `reporting.storage.mode` is `FILE_SYS`. When `DB` is configured, files are stored in the database, adding unnecessary contention on the database.

With the `FILE_SYS` option, you must set up a file-sharing service where all Contrast nodes are able to access the file path. Provide this path as the value for `reporting.storage.path`.



#### NOTE

The path should be an absolute path, such as `/Users/user1/reporting`.

For Windows, be sure to escape the colon or the path will not work. For example, this path will fail:

```
reporting.storage.path=C:\Contrast\data\reports
```

You must use either forward slashes or two backslashes around the colon for it to work, like this:

```
reporting.storage.path=C:\\Contrast\\datareports
```

With the default configuration, 1,250 vulnerabilities can be exported from an attestation report. In some cases, a user may want to run a larger report containing more than 1,250 vulnerabilities. Depending on the size of the instance, Contrast may run into heap space issues.

To decrease or increase the limit, set the `reporting.generation.limit` property in the `general.properties` file, and then restart Contrast.

## Contrast logs

For the Contrast application, Log4j version 2 is used as the logging framework.

You can [configure logging thresholds \(page 693\)](#), control log file destinations, and see an overview of each log available in Contrast.

Find these logs under the `$CONTRAST_HOME/logs` directory:

- `server.log`
- `catalina.out`

Other logs, like these, can be found in `$CONTRAST_HOME/data/logs`:

- `contrast.log`
- `ldap_ad.log`
- `migration.log`
- `audit.log`
- `mysql_error.log`

This table shows all of the primary log files in Contrast.

Log file	Description
<code>audit.log</code>	Logs audit events such as: <ul style="list-style-type: none"> <li>• Logging in and out of the application</li> <li>• Impersonating another user</li> <li>• Switching organizations</li> <li>• Accessing the administrator portal</li> <li>• Changes to the configuration and settings of Contrast by a SuperAdmin account</li> <li>• User account service issues (locked accounts, password changed, etc.)</li> <li>• Deleting traces</li> <li>• Changes to a license or an expired license notification</li> <li>• API Key changes</li> </ul>
<code>console.log</code>	Default application event log
<code>contrast-error.log</code>	Logs messages printed to <code>stderr</code>
<code>contrast-stdout.log</code>	Logs messages printed to <code>stdout</code>
<code>contrast.log</code>	Like Tomcat's <code>stdout</code> or <code>console</code> log, <code>contrast.log</code> shows most key events happening inside Contrast to inform or help with debugging. It includes information about: <ul style="list-style-type: none"> <li>• applications</li> <li>• servers</li> <li>• libraries</li> <li>• traces</li> <li>• users</li> <li>• Java stack traces for debugging purposes when a server exception takes place</li> </ul>
<code>security-events.log</code>	Formerly the <code>esapi.log</code> , this log file is used for capturing key events from Contrast, such as the loading of a given property file.
<code>migration.log</code>	Contains a summary of all database migrations that occur against the Contrast application between updates. It references the Contrast version, the migration script that ran and the status of the script.

## Configure logs at a system level

Contrast collects [multiple log files that log events and messages \(page 693\)](#).

You can configure the `log4j2.xml` file used to host the Log4j configuration that is packaged in the Contrast application (and optionally apply [Log4j custom levels](#)).



### CAUTION

before making any changes to this file to ensure the formatting is syntactically correct. A server restart is not required *if the changes are entered correctly*.

1. Find the file under `$CONTRAST_HOME/data/conf`.
2. The first parameter of the file below is a monitor interval that refreshes the settings based on the variable defined. By default, Contrast checks every 60 seconds and refreshes the logging configuration.

```
<Configuration monitorInterval="60">
```

3. Edit the file as needed.



### TIP

Read more about appenders and delivering LogEvents in the [Log4j documentation](#). Contrast predominantly makes use of the [Rolling File Appender](#), which is an *OutputStreamAppender* that writes to the file named in the `fileName` parameter, and rolls the file over according to the *TriggeringPolicy* and the *RolloverPolicy*.

Here is a sample file of the appenders for `contrast.log`. It shows a daily appender with a 1 GB max file size policy and no more than 15 files of rollover. This appender also compresses the file and renames it daily.

```
<RollingFile name="DAILY" fileName="${contrast.logs.dir}/logs/contrast.log"
            filePattern="${contrast.logs.dir}/logs/contrast.%d.%i.log.gz" i
    <PatternLayout>
        <Pattern>%d{ddMMyy HH:mm:ss,SSS} {%X{session.id}} {%X{user.name}} {
    </Pattern>
    </PatternLayout>
    <Policies>
        <TimeBasedTriggeringPolicy/>
        <SizeBasedTriggeringPolicy size="1 GB"/>
    </Policies>
    <DefaultRolloverStrategy max="15"/>
</RollingFile>
```

The logger section of the file defines which Java packages should log to a specific appender and at a given log level.

## Use Redis as a shared cache (on-premises)

You can configure Contrast to use a shared cache on a Redis server.

This topic does not provide details about setting up Redis servers.

## Contrast properties for Redis

Use these properties:

Property name	Description
<code>cache.userredis</code>	A Boolean value indicating whether Contrast uses Redis for caches.
<code>contrast.cache.redis.db.index</code>	An Integer specifying the database index where Contrast stores cache information.
<code>contrast.cache.redis.proto</code>	A string that controls which protocol to use when Contrast connects to the Redis server.
<code>contrast.cache.redis.host</code>	A string containing the host name or IP address of the Redis server.
<code>contrast.cache.redis.port</code>	An Integer representing the TCP/IP port that the Redis server uses using to listen for new client connections.
<code>contrast.cache.redis.password</code>	A string containing the password used to authorize client access to the Redis server.
<code>contrast.cache.redis.client.name</code>	A string that identifies the client.

## Before you begin

- You need this information:
  - The host name or IP address for the Redis server
  - The listening port for the Redis server
  - The password for a user account on the Redis server
  - The database index that the cache should target
- Verify that the Redis server is configured to use TLS (REDISS)

## Steps

- Create a `contrast.properties` file in the `/data/conf/` folder.  
Ensure this file has the correct permissions to let a `contrast_server` user access it.
- In the property file, add the Contrast properties for Redis.  
At a minimum, configure values for the host name, listening port, and password for the Redis server.  
**Property file example:**

```

cache.userredis=true
contrast.cache.redis.db.index=0
contrast.cache.redis.proto=rediss
contrast.cache.redis.host=contrast-redis-server.company.com
contrast.cache.redis.port=6379
contrast.cache.redis.password=changeme
contrast.cache.redis.client.name=contrast
            
```
- [Restart Contrast \(page 685\)](#).
- To verify the configuration** look in the `/data/logs/contrast.log` file.  
This file contains all the information on the current configuration and interactions with Redis. Key terms to look for include:
  - RedissonCache
  - Redisson
  - CacheConfiguration

## System updates and upgrades

Periodically, Contrast Security provides updates and upgrades for on-premises Contrast software.

### Updates and upgrades

Use these procedures:

- [Upgrade Contrast \(page 696\)](#)
- [Upgrade agents \(page 697\)](#)

- [Update IP address \(page 697\)](#)
- [Update library data \(page 697\)](#)
- [Upgrade library data automatically \(page 698\)](#)
- [Update license \(page 699\)](#)

## Upgrade Contrast

Contrast releases patches and upgrades as part of the embedded on-premises installer file, which you can download from the Contrast Hub.

The installer intelligently determines that a previous version of Contrast exists on a given system. You can choose to run the updater portion of the process, or run an installation in a separate location. If a previous installation exists, you must configure a parallel installation to run on separate ports.

### Before you begin

Back up the `cacerts` file in the `$CONTRAST_INSTALLATION/jre/lib/security` directory.

The upgrade process overwrites this file which can result in login issues. These certificates are used for [LDAP integrations \(page 723\)](#).

### Steps

1. [Create a MySQL backup \(page 737\)](#) and store the backup file on a separate file system or drive to avoid any issues with restoration. The installer attempts to create a database backup as part of the upgrade process, but to be safe, do this manually. Also, back up all configuration files located at `$CONTRAST_HOME/data/conf`.
2. Be sure the Contrast application is running when you start the installation process. Agents will continue to send vulnerability and library messages during this time. When the application initiates a shutdown on its own, the agents defer sending messages until it can reach the application.
3. The upgrade process is nearly identical to the original process to [install the Contrast application \(page 675\)](#); however, you will be asked to choose to update an existing installation or perform a new installation. You should choose to update an existing installation.
4. The upgrade will initially perform a database backup. Depending on the size of your database, this process can take a few seconds to a few minutes. During this operation, the application should be accessible to agents and end users.
5. The update then deploys a new file system under the installation directory. This primarily consists of deploying the `Contrast.war` file directory to the `$CONTRAST_HOME/webapps` directory. The application won't be accessible while the file system is updated.
6. Once a successful file system update is complete, the application starts up. While the application is starting up, you can follow along in the log files (`migration.log` and `contrast.log`, specifically). Log entries are written for both file system and database updates in a sequential manner.



#### NOTE

Configuration files and database components aren't updated until the initial startup step.

7. The first indicator of a successful update is that you can access the Contrast application by either logging in to the Contrast web interface or using an API request.



#### TIP

In the **user menu** you will see a link to the Release News for the version you are using.

8. Review the contents of the `migration.log` immediately after the upgrade. This log will reveal any issues experienced as part of the update process.



**NOTE**

In the minutes after the upgrade, deployed agents might attempt to update to the latest agent version. These agents won't reflect their own update until each has restarted and established contact with the Contrast application.

## Upgrade agents (on-premises)

You can download most agents from public repositories. To download .NET and .NET Core agents, go to the Contrast Hub.

Copy downloaded agents to sub-directories in the `$CONTRAST_HOME/data/agents` directory in the Contrast application. On-premises installations of Contrast are automatically configured to support this directory.

## Steps

1. Download the latest version of an agent from the appropriate repository:
  - **.NET:** Download from the [Contrast Hub](#).
  - **.NET Core:** Download the .NET Core agent or the .NET Core agent installer for IIS from the [Contrast Hub](#)
  - **Java:** Download from the [Maven](#).
  - **Node.js:** Download from [NPM](#).
  - **Python:** Download from the [PyPi](#).
  - **Ruby:** Download from [RubyGems](#).
  - **Go:** Download from [Debian \(page 400\)](#) or [RPM \(page 400\)](#).
2. Copy the agents to the appropriate sub-directory for each agent language in the `$CONTRAST_HOME/data/agents` directory.  
For example, if you download a Java agent, copy it to the `$CONTRAST_HOME/data/agents/java` sub-directory.  
You don't need to restart the Contrast application. Agents reload dynamically and become accessible for download.

## Update your IP address

Whether you moved the installation, or had to change the hostname or IP address of your Contrast application, you must also complete these steps.

1. Log in to Contrast as SuperAdmin.
2. In the top right, select **SuperAdmin > System Settings > General Settings**.
3. In the **General** panel, change the **TeamServer URL** to `IP:port/Contrast`.
4. Select **Save**.
5. [Restart Contrast \(page 685\)](#) to apply the changes.

## Upgrade SCA library data manually

Starting with Contrast version 3.7.4, you can download SCA library data manually from the Contrast Hub. This method is useful in situations where you don't have internet access (air-gapped installations).

## Before you begin

- A Contrast Hub account is required.
- For optimal performance, plan to download the library data on a monthly basis.
- If you have a [distributed deployment \(page 681\)](#) with multiple servers, use the procedure in this topic for one instance. You can use the same downloaded library data files on multiple installations.



### IMPORTANT

For on-premises customers using MySQL 8, the system variable `local_infile` must be set to **ON** so that Contrast can accept CSV files. For more details, see [Security Considerations for LOAD DATA LOCAL](#).

## Steps

1. Log in to the [Contrast Hub](#).
2. Select **Downloads**.
3. Select **Library data exports** and download the archive version you want.



### TeamServer

[Installers](#)

[Wars](#)

#### Library Data Exports

Release Date	File Name	File Size			
09/14/2021	Contrast-Data-Export-202109141732.zip	2.96 GB	<a href="#">Archive</a>	<a href="#">Download</a>	<a href="#">MD5 Sum</a>
09/13/2021	Contrast-Data-Export-202109131732.zip	2.95 GB	<a href="#">Archive</a>	<a href="#">Download</a>	<a href="#">MD5 Sum</a>
09/12/2021	Contrast-Data-Export-202109121732.zip	2.94 GB	<a href="#">Archive</a>	<a href="#">Download</a>	<a href="#">MD5 Sum</a>

4. Extract the downloaded ZIP file and place the CSV files in the `data/libraries` directory. Some files may be hidden due to their names, so ensure all extracted files are moved to this directory.
5. [Restart Contrast. \(page 685\)](#)  
When Contrast restarts, the data is imported in the background. The CSV files are deleted from the folder as each file is imported.
6. Check the `data/logs/contrast.log` file for success messages as each script completes. For example, you may see a message like this:

```
Beginning CSV import from 'C:\Program Files\Contrast\data\libraries\java.csv' into 'a
```

## Upgrade SCA library data automatically

Starting with Contrast version 3.6.4, you can configure the Contrast application to update Contrast SCA library data automatically.

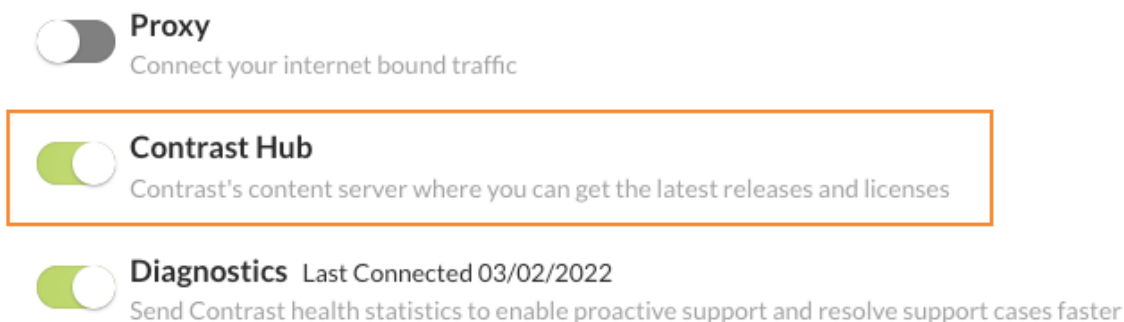
Contrast updates the library data approximately every 24 hours; newly added CVEs are updated every 30 minutes and will then be included in the 24-hour schedule. Your Contrast installation pulls the data from a Contrast database hosted on the cloud.

## Before you begin

- Configure your firewall to allow access to this URL:  
`https://ardy.contrastsecurity.com/production`
- A SuperAdmin role is required.

## Steps

1. Log in to the Contrast web interface as a SuperAdmin user.
2. From the user menu, select **System settings**.
3. Select **General settings**.
4. Under Internet settings, turn on **Contrast Hub**.



## Update your on-premises Contrast license

You may occasionally need a new license file. There are two ways to update this file:

- As a SuperAdmin, you can log in to the application and update the license in Contrast.
- You can replace the license file on the local file system. (If the license is expired, you must use this method.)

To replace the license **in the Contrast web interface**:

1. Log in as SuperAdmin.
2. Select **Licensing** in the left navigation.
3. Click **Update this license** at the bottom of the panel.
4. Enter your **Contrast Hub credentials** ([page 684](#)) to download and apply the latest license from the Contrast Hub.
5. If you don't have access to the Contrast Hub, click **Upload license** and paste your license in the field provided.
6. Select **Update**.
7. **Restart Contrast** ([page 685](#)) to apply the new license changes.

To replace the license **in the Contrast file system**:

1. Obtain a new license from the Contrast Hub, your account manager or the technical support team.
2. Rename the new license file `contrast.new.lic`.
3. Stop the Contrast application service.
  - **Windows:** Use the service control panel
  - **Linux:** Execute `sudo service contrast-server stop` or another appropriate command for the distribution configuration. Execute `ps aux | grep contrast` to verify that all Contrast application processes have stopped, and confirm there are no processes listed. If `mysqld` is still running, it may take a few minutes to terminate on its own after stopping the service. If it doesn't terminate, [contact Support](#). **Do not kill the processes.**

**IMPORTANT**

Don't move the current *contrast.lic* file. Contrast needs both the old and new license files to upgrade the license.

4. Place the new license file in the `<contrast_home>/data` directory.  
On Linux, confirm that the new license file has the same owner, group and permissions as other files in that directory. (Execute `ls -l` to list the directory contents with permissions and owners.) A backup of the current license called *contrast.lic.bak* will be created in the same directory when the new one is consumed during startup.  
Execute `sudo chown contrast_service:contrast_service contrast.new.lic` to change the owner and group.  
Execute `sudo chmod 644 contrast.new.lic` to change the permissions.
5. Start the Contrast application as normal.
  - **Windows:** Use the service control panel.
  - **Linux:** Execute `sudo service contrast-server start` or another appropriate command for the distribution configuration.
6. The new license takes effect.

To update all instances of the Contrast application, follow the steps for the file system method described above for each application instance that's running.

## Manage system administration

Depending on the size of your organization and how you manage your Contrast installation, you can set up [roles \(page 747\)](#) to best meet your system administration needs.

For a small organization, a single SuperAdmin can manage all system administration work. If you want to share the responsibilities, you can [designate additional SuperAdmins or ServerAdmins \(page 706\)](#).

- A **SuperAdmin** is responsible for the system administration of Contrast. This may be assigned to one or more individuals. They have access to the **SuperAdmin** option in the user menu, which allows them to configure organizations, applications, servers, vulnerabilities, users and groups.
- A **ServerAdmin** is identical to a SuperAdmin except without access to users or groups. They have access to the ServerAdmin option in the user menu, which allows them to configure organizations, applications, servers and vulnerabilities.

If you have a separate individual or group of individuals that manages end users and agent licenses, you can [add a system access group \(page 706\)](#) to designate users as **System Administrators** or **Observers**.

- A **System Administrator** is responsible for maintaining organizations and groups. They have access to the SuperAdmin option in the user menu, which allows them to configure organizations, applications, servers, vulnerabilities, users and groups. They can also impersonate administrators at an organization level.
- A **System Observer** has read-only access to organizations, users, applications, groups and traces. They have read-only access to the **Observer** option in the user menu, which allows them to view organizations, applications, servers, vulnerabilities and users.

**NOTE**

If a user is designated as **No Access**, they are blocked from system level access to the designated organization(s).

## Manage multiple organizations

On-premises users deploying in a multi-tenant environment can set up Contrast to support multiple organizations within the same system. During the installation process, a default organization is created. After that, users with SuperAdmin credentials can create additional organizations. To do this:

1. Log in to Contrast as SuperAdmin.
2. In the **user menu** select **SuperAdmin** to view system administration options.
3. Select **Organizations** in the header.
4. Select **Add organization**.
5. Supply valid information for the new organization and designate an Organization Administrator by entering credentials of the user who will fill this role.
6. When a user is granted access to the new organization (either in the above step, or by becoming a member of an [organization access group \(page 637\)](#)) they can move between organizations by selecting the organization name in the **user menu**.



### IMPORTANT

If you are an Organization Administrator and you want to change settings for a particular organization, you must first switch to that organization in the **user menu**, before selecting **Organization settings**. The active organization will show a green check next to its name in the **user menu**.

## Add/edit an organization

In Contrast, an organization is a group of associated users and applications with a shared business purpose. Contrast uses multi-tenant architecture: each Contrast customer is a tenant, represented as an organization.

### Before you begin

- To create an organization, a [System Administrator \(page 747\)](#) role is required.
- All organizations require a unique name as well as an [Organization Administrator \(page 745\)](#) to oversee the organization.

### Steps

- **To add an organization:**
  1. In the **user menu**, select **SuperAdmin**.
  2. Select **Organizations** in the header, then select **Add organization**.
  3. In the Add organization window, specify the details for the organization:

**Add Organization**

Organization Name

Protect  Enable SCA

License Consumption

Require users to manually apply allocated licenses

Automatically apply allocated licenses

Assess (Application licenses)

Protect (Server licenses)

Language

Date Format  Time Format

Time Zone

Additional Options

Enable Duplicate Vulnerability Notification

Enable Route-Based Auto-Verification

Enable Security Standards Report

Enable DISA STIG Checklist reporting

Allow beta language testing

Enable Harmony

Enable SAST

Enable CloudNative

Agent Diagnostics

Application Library Status  BETA

Admin Email

Admin First Name

Admin Last Name

Require Email Activation

Admin Password

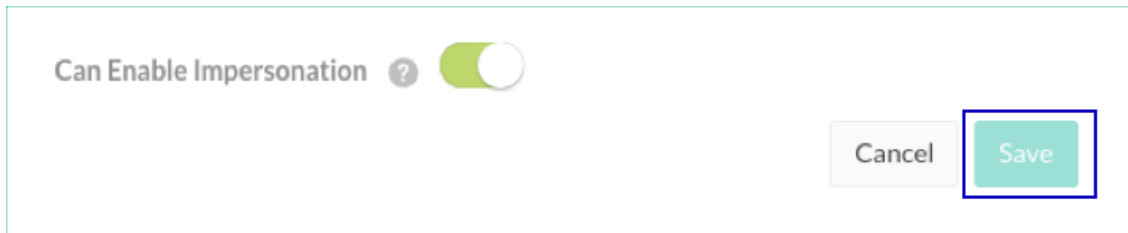
Confirm Admin Password

- Enter the new **Organization name**.
  - Use the toggle to enable **Protect**, if appropriate.
  - Use the toggle to **Enable SCA** licensing, if appropriate.
  - Under **License consumption**, use the radio buttons to manually or automatically apply allocated licenses.
  - Select the default **Language** for the organization.
  - Use the dropdowns to choose **Date** and **Time** formats and a **Time zone**.
  - Select additional options for duplicate vulnerability notification, [route-based auto-verification \(page 606\)](#), [DISA STIG checklist reporting \(page 548\)](#), [diagnostics \(page 730\)](#) and any other features.
  - Complete the profile information for the Organization Administrator, including their email, name and password.
  - Only check the box to **Require email activation** if you have a mail server set up with the Contrast application.
4. Select **Add** to create the organization. You may continue to create as many organizations as you need for multi-tenant support.
- **To edit an organization:**
    1. In the **user menu**, select **SuperAdmin**.
    2. Select the name of the organization you want to edit.
    3. Update information as needed and select **Save**. Additional settings in the Edit organization window include:

- **CVSS 3.11:** Contrast is compatible with CVSS 3.1. For on-premises customers, SuperAdmins can enable the scoring by turning on **Enable CVSS 3.1**. Hosted customers must contact [Contrast Support](#) to turn on this setting.



- Hosted customers must contact [Contrast Support](#) to change this setting. If you turn this setting off, Organization Admins cannot manage impersonation for their organizations. Hosted customers must contact [Contrast Support](#) to change this setting.



## Manage users and permissions at a system level

Before setting up Contrast and adding users, be familiar with Contrast settings for :

- **Users:** You can add users [one at a time \(page 703\)](#), or [bulk add multiple users \(page 704\)](#). In the **user menu** select **SuperAdmin**, then select **Users** in the header to see all users and their status (who's awaiting activation, active or inactive, or locked out of their account based on a security policy).
- **Authentication:** You can set up Contrast to use its own internal directory, or use an [external directory like LDAP or Active Directory \(page 728\)](#).
- **Groups and permissions:** Access and permissions are determined by [roles \(page 743\)](#). Most roles are assigned with [access groups \(page 706\)](#). SuperAdmin and ServerAdmin roles are [designated differently \(page 706\)](#). You can also [grant Protect permissions \(page 708\)](#) at a system level or when [adding a new user \(page 703\)](#) or [bulk adding users \(page 704\)](#).

As a SuperAdmin or System Administrator, you can add users at a system or organization level.

Adding a user to a system group provides them access to the System Administration interface or allows them to perform activities across organizations in cross-organization groups.

You can also add users within a single organization with a defined role to determine their application access and privileges.

### Add or edit a user at a system level

System and Organization Administrators can create users individually, in groups, or through [Microsoft Active Directory \(AD\) \(page 714\)](#) or [LDAP \(page 718\)](#) integrations.

### Before you begin

- A System Administrator or Organization Administrator role is required.
- All users are required to have a default organization and a default role within that organization. [SuperAdmin and ServerAdmin roles \(page 706\)](#) are designated differently.
- When adding an individual user, or multiple users at one time, you can also grant Protect permissions for the users.

## Steps

1. Log in as a SuperAdmin or System Administrator.
2. Select **SuperAdmin** in the **user menu**.
3. Select **Users** in the header.
4. Select a **user name** to edit an existing user or select **Add user** to add a new user.
5. Enter the user's **First name**, **Last name** and **Email address**.
6. Select **Require email activations**, if you want to use email activation instead of requiring a password.
7. Select a **System roles (page 747)** for the user.  
The default role is **None**.
8. Select the **Organization** to which the user belongs.
9. Select the default **Organization role**.
10. Select a custom or default **Application access group**:  
Contrast provides these default groups:
  - **View**: Members of this group have read-only access to the Contrast interface to see scores, libraries, vulnerabilities, and comments.
  - **Edit**: Members of this group can remediate findings, add tags, manage vulnerabilities, edit attributes, merge applications, add or delete applications, and create servers.
  - **Rules Admin**: Members of this group can edit rules and policies in the application, enable Protect, and manage notifications and scoring.
  - **Admin**: Members of this group can configure and manage settings for an organization.
11. Select a **Date format**, **Time format**, and **Time zone**.
12. To let Organization Administrators change user settings at an organizational level, select **Use organization settings**.  
This option is selected by default.  
To create user settings at a system level, clear the this option.:
  - a. Clear **User organization settings**.
  - b. To restrict users to using the API only and not the Contrast web interface, **Select Make user API only**.
  - c. To let the user see and use Assess data, turn on **Access**.
  - d. To let the user see and use Protect data, turn on **Protect**.



### TIP

You can also [grant Protect permissions \(page 708\)](#) at an organization level.

13. Select **Add** or **Save**.

## Add multiple users to an organization

You can use a CSV file to add multiple users to an organization.

## Before you begin

- For on-premises customers, a SuperAdmin role is required.
- For hosted customers, an Organization Administrator role is required.

## Steps

1. Go to the Users list:
  - a. For hosted customers, under the user menu, select **Organization settings** and then, select **Users**.



- b. For on-premises customers, under SuperAdmin, select **Users** in the header.
2. Create a spreadsheet with the recommended information and save it as a CSV file:
  - Include the required fields for each user.
  - Format all field headings and values exactly as shown in the table below.
  - Add a new column for any optional fields.

**TIP**

Hover over the **Upload** icon and select the link in the tooltip to download a CSV template to get started.

**CSV fields:**

Field name	Required	Value
<b>First Name</b>	Required	User first name
<b>Last Name</b>	Required	User last name
<b>Email or Username</b>	Required	If you are using the Contrast's default internal directory, enter the user's email.  If you are using an external directory, change <b>Email</b> to <b>Username</b> in the CSV, and enter usernames that match those in your external directory exactly.
<b>Organization UUID</b>	Required for on-premises customers	Get this value from the organization's <a href="#">general information settings (page 635)</a> .
<b>Organization Role</b>	Required	Values can be View, Edit, Rules_admin or Admin.
<b>Date Format</b>	Optional	The default value is the organization setting, such as MM/dd/YYYY.
<b>Time Format</b>	Optional	The default value is the organization setting, such as hh:mm a.
<b>Timezone</b>	Optional	The default value is the organization time zone.
<b>Protect</b>	Optional	The default value is Off.
<b>Groups</b>	Optional	Values can be View, Edit, Rules Admin, Admin or custom group names. Format multiple group names as GroupA&&GroupB&&GroupC.
<b>Language</b>	Optional	The default is the value <a href="#">configured for the organization (page 635)</a> .
<b>System Administration</b>	Optional	The default value is Off.
<b>Email Activation</b>	Optional	If the value is None, the default is Required Password.
<b>Password</b>	Optional	This field is required if the Email Activation field is set to false.

Field name	Required	Value
Api Only	Optional	The default value is off.
Access	Optional	The default value is On.

3. Select the black **upload icon** next to **Add user**, then select the CSV you created. Once the spreadsheet upload is in progress, you can leave the page and continue with other tasks in Contrast. If the upload is successful, you'll see a confirmation message that includes the number of users uploaded. If the upload failed, you'll see an error message that includes the source of the error in the spreadsheet.

## Designate SuperAdmins or ServerAdmins

The **SuperAdmin** has the highest level system administration permissions.

A **ServerAdmin** has the same permissions and capabilities as a SuperAdmin, except without access to users and groups.

You must have at least one person as SuperAdmin. If you want to designate more than one user as SuperAdmin, do not share a log in, instead:

1. Log in as SuperAdmin.
2. Select **User menu > SuperAdmin > Users**.
3. Find the user you want to designate as SuperAdmin. (You can search by name, email or organization, or find their name in the grid.)
4. Select the user name to open the **Edit user** window.
5. In the **System Administration** field, select **SuperAdmin** or **ServerAdmin**.
6. Select **Save**.



### TIP

Anyone designated as a SuperAdmin or ServerAdmin will be able to access **SuperAdmin** in the top right **User menu**. Also a small key icon will appear next to their name in the **SuperAdmin > Users** grid. Hover over the key to see the assigned role.

## Add, edit or delete a system access group



### NOTE

System access groups are only available to on-premises customers. You must be a SuperAdmin to add a system access group.

To add a system access group:

1. Select **User menu > SuperAdmin > Groups**.
2. Select an existing group to edit, or select **Add group** to create a new group.



### TIP

To find groups you can use the quick filter dropdown or the search field in the top left, or use the up/down arrows at the top of each column to sort.

- Fill out the form with:
  - Group name:** Choose something that reflects the purpose, permissions and capabilities you will assign to this group.
  - Type:** Select **System**.

**TIP**

You can also [add an access group at an organization level \(page 637\)](#). However, if you add access groups at a system level, you have the option of creating cross-organization groups.

Cross-organization groups might be helpful if you have a security team that supports multiple business units that each have their own organization.

Members of a cross-organization group are able to switch between organizations by selecting the name in the user menu.

- System access:** Select the organization you want this group to access.
  - Role:** Select the [system role \(page 747\)](#) you want the members of this group to have within the corresponding organization.
  - Select **Add system access** to add more organizations and roles.
- Next to **Members**, on the right, type ahead to select one or more users to assign to the group. Select the X to delete members.

**NOTE**

Users can belong to many groups. They don't have to be created within a particular organization in order to gain access to that organization.

- When you are finished, select **Add** to create the new group, or select **Save** if you are editing an existing group. The members you added to this group will now have permissions that correspond to their role.



### IMPORTANT

If users are assigned to two groups with conflicting roles for all applications or organizations, the role that provides the most restrictive access applies.

Note that only organization and application level groups are [visible to a user \(page 422\)](#), if you are confused about your access level, it may be that stricter permissions have been imposed at a system level.

However, a role assigned to a specific application overrides a role assigned to all applications, even if the application-specific role is more permissive than the role given to all applications.

If a user is assigned to two custom groups that provide roles for the same application, the role with the least privilege applies.

[System \(page 747\)](#), [organization \(page 745\)](#) and [application \(page 744\)](#) roles are listed in order from most to least permissive.

In the following examples of conflicting role permissions, permissions in Group 2 take precedence.

Group 1	Group 2 (takes precedence)
<b>Application Editor</b> for all applications	<b>Application Viewer</b> for all applications
<b>Organization Viewer</b> for all applications	<b>Application Administrator</b> for the Red application
<b>RulesAdmin</b> for the Red application	<b>No Access</b> for the Red application



### TIP

To delete a group, select **User menu > SuperAdmin > Groups**. Find the group you want to delete and select the Delete icon in that row.

Once this is confirmed, the group is removed and any access provided by that group is revoked from all users assigned to the group.

## Grant Protect permissions (on-premises)

For on-premises customers with multiple organizations, you can grant permissions that let all or some user roles in one or more organizations access Protect data.

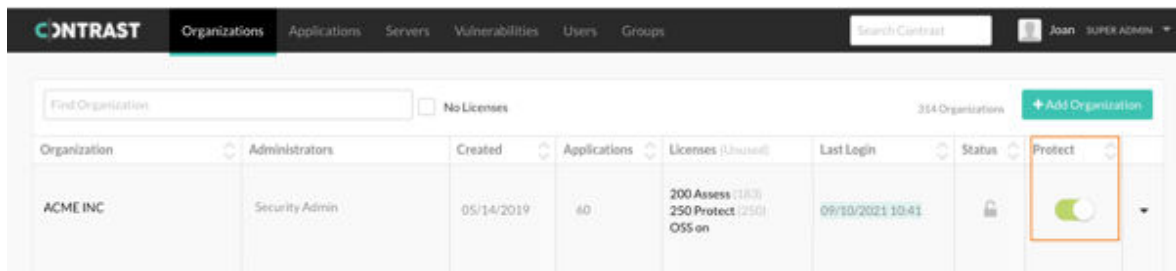
### Before you begin

- A SuperAdmin role is required.
- Identify the organizations whose users need access to Protect data.
- Identify which user roles in an organization need access to Protect data.

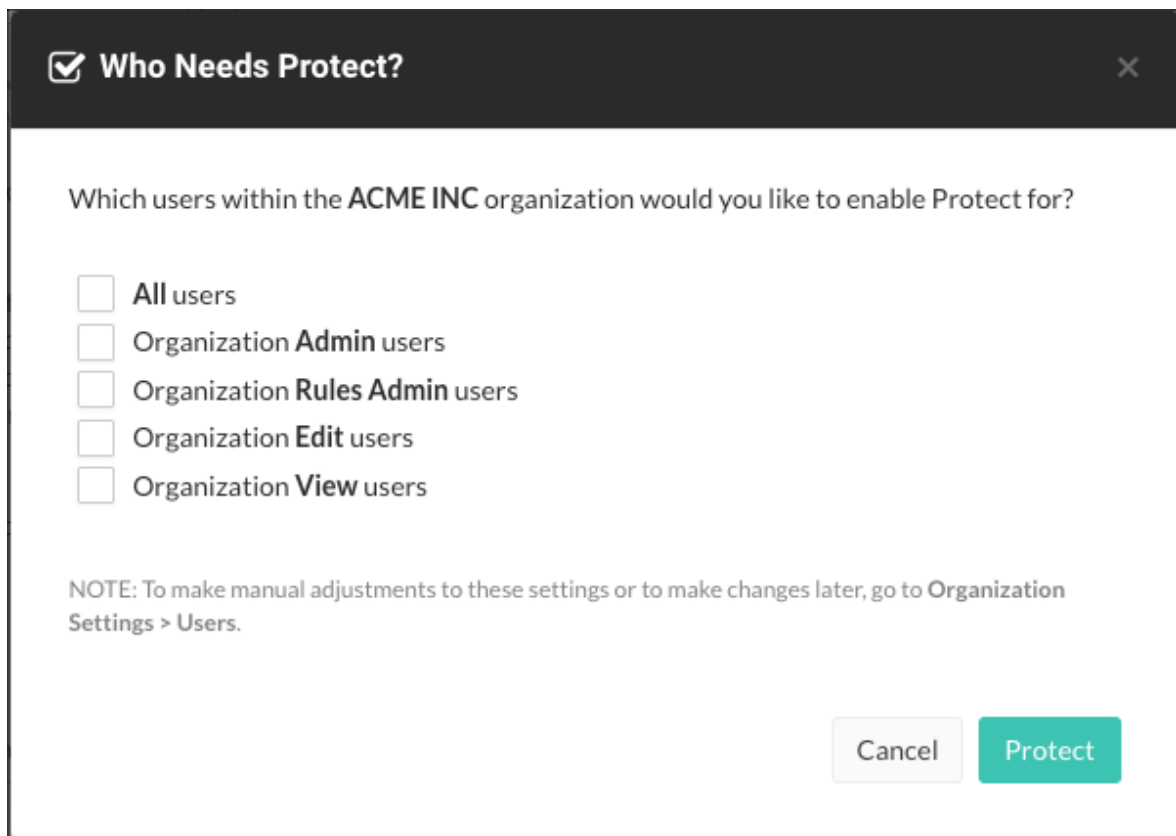
### Steps

1. Log in as SuperAdmin.
2. Select **SuperAdmin** in the user menu.
3. Select **Organizations** in the header.

- Find the organization for which you want to enable Protect. In the Protect column for that row, turn the setting on.



- In the Who needs Protect window, select the roles that need permission to see and access Protect data.



Select **All users** or specific user roles.

You can also enable or disable Protect access for [individual users \(page 703\)](#).

- Select **Protect**.  
When you make this change, the users with the selected roles have access to Protect data.

### Automatically add users to groups with SSO

You can automatically add users to groups with single sign-on (SSO).

- Update your SAML configuration in your IDP:

```
<saml2:AttributeStatement xmlns:saml2="urn:oasis:names:tc:SAML:2.0:assertion">
  <saml2:Attribute Name="contrast_groups" NameFormat="urn:oasis:names:tc:SAML:2.0:attribute"
    <saml2:AttributeValue xmlns:xs="http://www.w3.org/2001/XMLSchema"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xsi:type="xs:string"
      >GROUP1</saml2:AttributeValue>
    <saml2:AttributeValue xmlns:xs="http://www.w3.org/2001/XMLSchema"
```

```

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:type="xs:string"
>GROUP2</saml2:AttributeValue>
...
</saml2:Attribute>
</saml2:AttributeStatement>

```



**IMPORTANT**

The attribute values listed under `contrast_groups` must exactly match an existing group name. Contrast won't create new groups based on the values listed under this attribute.

2. Then in Contrast, under [organization settings \(page 633\)](#), select **Single sign-on** and use the check boxes at the bottom of the form to enable one or both of these:
  - **Add users to their Contrast groups upon SSO login:** Upon login, Contrast adds users to groups listed in the `contrast_groups` attribute in the SAML assertion.
  - **Remove users from their Contrast groups upon SSO login:** Upon login, Contrast removes users from groups not listed in the `contrast_groups` attribute in the SAML assertion.

**References**

- User email as NameID

```
<md:NameIDFormat>urn:oasis:names:tc:SAML:1.1:nameid-format:emailAddress</md:NameIDFormat>
```

- First name and surname

```

1<saml2:Attribute Name="http://schemas.xmlsoap.org/ws/2005/05/identity/claims/givenname"
2      NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
3      >
4      <saml2:AttributeValue xmlns:xs="http://www.w3.org/2001/XMLSchema"
5      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
6      xsi:type="xs:string"
7      >Dan</saml2:AttributeValue>
8      </saml2:Attribute>

```

- User group management

```

<saml2:AttributeStatement xmlns:saml2="urn:oasis:names:tc:SAML:2.0:assertion">
<saml2:Attribute Name="contrast_groups" NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri"
<saml2:AttributeValue xmlns:xs="http://www.w3.org/2001/XMLSchema"xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
<saml2:AttributeValue xmlns:xs="http://www.w3.org/2001/XMLSchema"xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
...
</saml2:Attribute></saml2:AttributeStatement>

```

**See also**

- [Configuring user and group provisioning with Okta](#)
- [Configuring ADFS to automatically add users to groups](#)

**Default and SuperAdmin credentials**

As the system administrator who installs Contrast, you can manage the following sets of credentials:

- **Contrast Hub credentials:** New customers receive an email with the username and a link to set the password. You will need these credentials to [download the installer \(page 675\)](#) and to log in to [Contrast Hub](#).

- **Username:** Contrast provides the username in the format *example@domain.com*. It is the same username as the Default Organization Administrator.
- **Password:** Create this password when you select the link in the activation email.
- **Default SuperAdmin credentials:** These credentials are included in the license. They are used for managing the Contrast application in the [role of SuperAdmin \(page 747\)](#).
  - **Username:** Contrast provides the username in the format *contrast\_superadmin@domain.com*, where *domain* is the name of your company's email domain.
  - **Password:** The default password is: `default1!`.
- **Default Organization Administrator credentials:** The Organization Administrator can use these credentials to log in to Contrast after [installation \(page 675\)](#) and set up and maintain the organization.
  - **Username:** Contrast provides the username in the format *example@domain.com*. It is the same username as the Default Organization Administrator.
  - **Password:** The default password is: `default1!`.



### IMPORTANT

Be sure to change the supplied default passwords as soon as you have successfully logged in. You can reset the SuperAdmin password [in Contrast \(page 420\)](#) or by using command line on [Windows \(page 727\)](#) or [Linux \(page 727\)](#).

## Impersonate users

Impersonating users lets you access organizations as if you have the same role and permissions as the impersonated user. Impersonation is helpful when you need to troubleshoot issues.

If you have a ServerAdmin or System Admin role, you can impersonate the first Organization Admin for an organization by selecting **Impersonate** for an organization on the Organizations page. To use impersonation, you must have access to these organizations.

If you have a ServerAdmin or System Admin role, you can impersonate the first Organization Admin for an organization by selecting **Impersonate** for an organization on the Organizations page. To use impersonation, you must have access to these organizations.

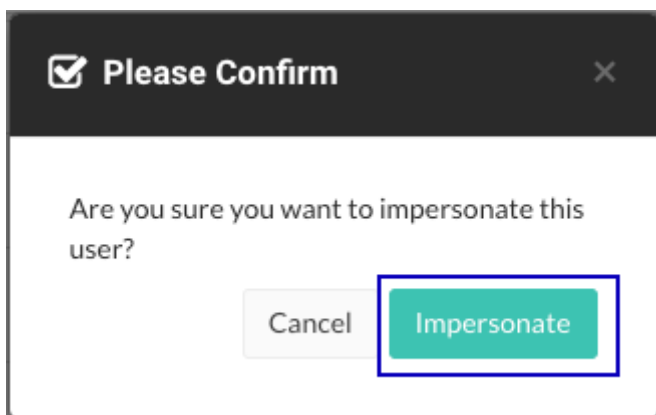
Contrast turns off impersonation automatically after 24 hours.

## Before you begin

- The user you choose to impersonate must have an [organization role \(page 745\)](#).
- If the Impersonation option is not visible for an organization, a SuperAdmin must turn on the [Can enable impersonation \(page 701\)](#) setting for the organization.
- An Organization Admin must [enable impersonation \(page 668\)](#) for the organization that you want to access.

## Steps

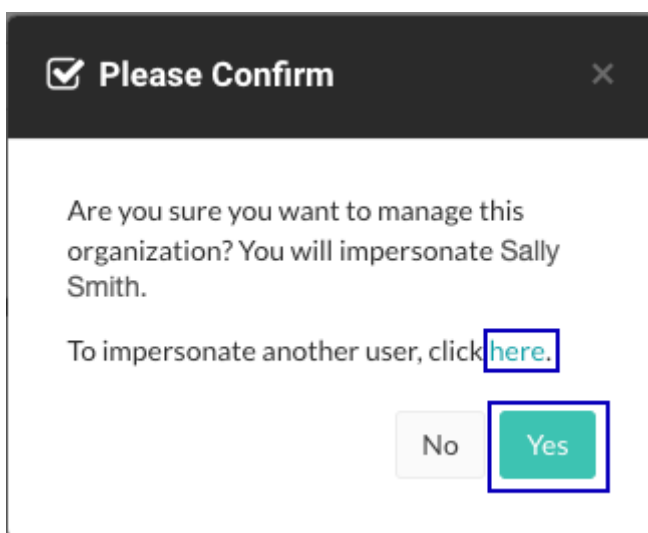
- **To start impersonation at a user level:**
  1. Log in to the Contrast web interface as a SuperAdmin.
  2. Select **Users**.
  3. At the end of the row for the user you want to impersonate, select the triangle ( ▾ ) and select **Impersonate**.
  4. In the Please confirm window, select **Impersonate** to confirm that you want to impersonated the selected user.



Contrast opens a session as the impersonated user.

- **To start impersonation at an organization level:**

1. Log in to the Contrast web interface as a SuperAdmin, ServerAdmin, or System Administrator.
2. Select **Organizations**, if not already selected.
3. At the end of a row for an organization you want to access, select the triangle ( ▾ ) and select **Impersonate**.
4. In the Please confirm window, select **Yes** to confirm that you want to impersonate the displayed user or select a different user who is an administrator for the organization you want to access.



## Configure authentication



### NOTE

For hosted users, Contrast Security configures authentication. However, an Organization Administrator may be granted the ability to override these settings, including SSO setup.

To request this change contact [Contrast Support](#).

By default, Contrast stores a user directory that includes user's login name, credentials and other details about application authentication. Database credentials are stored (using a one-way hash) in the internal Contrast database. You can set a [password policy \(page 726\)](#) and [two-step authentication \(page 713\)](#) for users in Contrast.



Alternatively, you can use an external directory for authentication, in which case, only the username is stored in the Contrast database. Contrast supports:

- [LDAP \(page 718\)](#)
- [Active Directory \(page 714\)](#)
- [Single Sign-On \(page 723\)](#)
- [Trusted HTTPS Proxy \(page 726\)](#)

Any changes to the authentication settings require that you [restart Contrast \(page 685\)](#). To change authentication, select **Authentication** under [system settings \(page 728\)](#).



### IMPORTANT

When you switch between authentication modes, be aware:

- Any users that were created under the previous authentication mode will no longer work, unless the user's email address is the same between the new and old authentication provider.
- After you setup your new authentication mode and restart your server, users can't login to Contrast until their accounts are added to a new or existing organization. For on-premises customers, the SuperAdmin can take care of the Organization Administrator accounts, and then each Organization Administrator is responsible for the users within that organization.



### NOTE

When you use an external authentication provider mode (LDAP or AD), the username field when adding a user functions as a live search that shows users in the proper group.



### TIP

Since roles and permissions are managed by access groups (and not the user directory), it is best practice to create access groups before configuring authentication. You will need at least two unique access groups, one for administrators and one for users.

## Enable two-step authentication at a system level

To enable or disable two-step authentication:

1. Under [system settings \(page 728\)](#), select **Security** in the left navigation.
2. Turn the toggle on (green) to enable two-step authentication.
3. Select the box next to **Allow organization override** to allow Organization Administrators to [choose whether or not to require the feature for users \(page 641\)](#).

**NOTE**

If a user belongs to multiple organizations, their default organization determines their two-step authentication settings.

A user can also [choose how they want to receive two-step authentication notices. \(page 420\)](#)

## Configure Microsoft Active Directory

As a [System Administrator \(page 747\)](#), you can configure Contrast to connect to a Microsoft Active Directory (AD). Use the AD connector to configure this integration. AD has a well-defined structure for directories, resulting in fewer possibilities and a more direct configuration.

**NOTE**

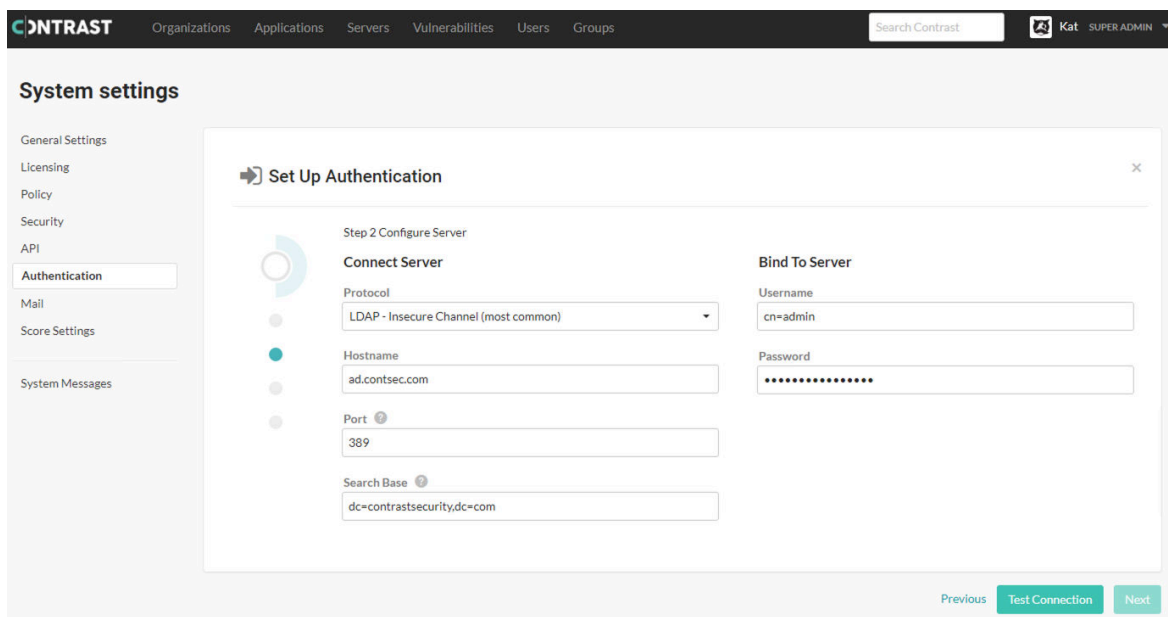
Switching to AD from a different authentication method such as a local database may result in issues if the user ID attribute is inconsistent.

## Access if AD is offline

In the event that your AD service experiences connectivity or configuration issues, use the default SuperAdmin account to log in to Contrast. This feature ensures that you continue to have immediate access to your Contrast account even when AD is offline.

## Steps

1. Start by creating a user in the Active Directory Server that is a dedicated read-only user. The user should have read permission to the directory, including users with permission limited only to the Search Base. You will need this user to set the Search Base when [configuring users for AD \(page 716\)](#) and when binding to user.
2. Create user groups in the external AD server. You will later use these groups to [assign SuperAdmin privileges \(page 716\)](#) in Contrast.
3. Under [system settings \(page 728\)](#), select **Authentication**.
4. Select **Change authentication method** and follow the steps to configure server, groups and advanced settings.
5. Select **Active Directory**.
6. Enter the following information. Some settings may be different for LDAP over SSL (LDAPS) as noted.



Under **Connect server**:

- **Protocol:** Enter the protocol that should be used to communicate with the LDAP server. Choose **LDAP** or **LDAPS** from the dropdown. The default is **LDAP**. Additional configuration may be needed for the **LDAPS** option if you are [using a self-signed or privately-signed certificate with AD \(page 717\)](#).
- **Hostname:** Enter the hostname to connect to when communicating with the LDAP server; either the DNS hostname or IP address of the AD server. In multi-tenant forests, this should be the Global Catalog Server. The default is localhost".
- **Port:** Enter the port to connect to when communicating with the LDAP server. For standard (single-tenant, single-domain) directories, this should be port **389 (LDAP)** or **636 (LDAPS)**. In multi-tenant or multi-domain forests, this should be **3268 (LDAP)** or **3269 (LDAPS)**.
- **Search base:** Enter the base DN (a distinguished name that represents the global base level container for your AD environment) to use when communicating with the LDAP server. This is usually your domain or subdomain name. The default is `dc=contrastsecurity,dc=com`. If your login domain is *yourdomain.com*, your base DN would be `dc=yourdomain,dc=com`.

Under **Bind to server**.

- **Username:** Enter the full DN of the user who can bind to the directory to perform search functionality. The default is `cn=Directory Manager`.
- **Password:** The password of the user account that the application should use when connecting to the LDAP server.

7. Select **Test connection** to ensure connectivity to the server. Once connectivity is verified, select **Next**.
8. [Configure groups. \(page 716\)](#)
9. [Configure advanced settings. \(page 716\)](#)
10. Once all of the configuration options are set, verify that you are able to log in as both a SuperAdmin and an Organization Administrator using the **Test login** button.



**NOTE**

If the test seems to take an excessive amount of time, it's likely a result of having the wrong setting for the **Follow referrals** option in [Advanced settings \(page 716\)](#). Once you switch the setting, you should be able to verify login functionality more quickly.

11. Select **Finish** to complete the configuration.

## Configure groups for Active Directory

As part of [Active Directory configuration \(page 714\)](#), you will need to configure groups.

Contrast doesn't perform Data Access Control using the integrated AD servers. In other words, roles and access to data within the application are handled by the application and Organization Administrators set user roles. However, there is an Access Control check when logging in or creating new users to ensure that the provided user belongs to the correct group in Active Directory (AD).

### Steps

#### STEP 3 Configure Groups ?

##### Contrast User Group



##### Contrast SuperAdmin Group

1.

Use the groups that you created on your external AD server to assign users to one of the following Contrast groups.

- **SuperAdmin group:** This group allows users to log in to the Super Administrator interface. Users in this group are authenticated and authorized the first time they log in to Contrast.
- **User group:** This group allows users to be added to an organization and log in to the Contrast web interface. This group is appropriate for all other users.  
To let users log in, [add them \(page 637\)](#) to the organization manually in the Contrast web interface.



#### NOTE

If you add a user to both groups in your AD instance, Contrast automatically adds them to the SuperAdmin group during configuration.

2. Select **Query for groups** to enable a live search of existing groups as you begin to type within the input fields.



#### NOTE

To create users with AD authentication in Contrast while bypassing the Access Control check, execute the following query in the database.

```
UPDATE teamserver_preferences SET property_value='true' WHERE property_name
```

## Configure settings for Active Directory

As part of [Active Directory configuration \(page 714\)](#), under **Advanced settings** enter:

**Set Up Authentication**

**STEP 4**  
**Advanced Settings**

User Base DN

User ID Attribute  
 Login ID  Email Address  
 User Principal

Search Within Nested Groups

Follow Referrals ?

Limit Referrals ?

Previous

- **User base DN:** The default is `cn=Users`, the default container for AD. However, if your AD is configured differently, this will be the path to the top-most container where users are stored in the directory.  
 For example, if your users are stored in the DN `CN=Engineering,CN=GlobalUsers,DC=intranet,dc=example,dc=com` and your base DN is `DC=intranet,DC=example,DC=com`, the value of the User DN suffix will be `CN=Engineering,DC=GlobalUsers`.
- **User ID attribute:** Enter the user attribute that the user will enter as the username when logging in to the Contrast application. Use the attribute that will be most familiar to the users. The default is **Email address**.
  - **Login ID:** The AD `sAMAccountName` attribute; this is usually the username that you use to log in to Windows.
  - **Email address:** The AD `mail` attribute containing the email address of the user.
  - **User principal:** The AD `userPrincipal` attribute containing the full username.
- **Search within nested groups:** Enable or disable searching within nested groups. The toggle is disabled by default.
- **Follow referrals:** In multi-tenant or multi-domain enterprise forests, LDAP queries may be referred to another server for more details. The toggle is disabled by default.
- **Limit referrals:** Limit to how many referrals should be followed when AD replies with a `Referral` response. The default is "5".

## Use self-signed or privately-signed certificates with Active Directory

If you [configure your AD integration \(page 714\)](#) to connect to your server using SSL, you may need to import your server's certificate into a new truststore to be used by the Contrast JRE.

1. Acquire the server's certificate from your administrators in PKCS#12 format. If you're using a self-signed certificate, this will be the actual AD server's certificate. If you have a private CA, you need the CA certificate for that server.
2. Once you have the certificate for the server, create a truststore that contains that certificate. Run the following commands as an administrator from a command shell in the directory where Contrast is installed.

```
$ mkdir data/conf/ssl
$ jre/bin/keytool -import -file <path to certificate> -alias <hostname> \
  -keystore data/conf/ssl/truststore.jks
```

3. After you create your truststore containing either your server's or CA certificate, add the following lines into the `bin/contrast-server.vmoptions` file:

```
-Djavax.net.ssl.trustStore=<full path to truststore>
-Djavax.net.ssl.trustStorePassword=<password you set for the trustStore, if any>
```

4. You should now restart the Contrast server service, and verify that queries against AD will use SSL.

## Configure LDAP

Contrast integrates with many types of Lightweight Directory Access Protocol (LDAP) servers. LDAP is an Internet protocol that web applications can use to look up users or groups listed on an LDAP directory server.

Contrast supports these LDAP server types:

- OpenLDAP
- OpenDS
- ApacheDS
- Fedora Directory Server
- Microsoft Active Directory
- Generic LDAP Servers

Connecting to an LDAP directory server is useful if you manage users and groups in a corporate directory, and you want to delegate the responsibility of managing user access of the application to your corporate directory administrators.



### NOTE

Switching to LDAP from a different authentication method such as a local database may result in issues if the user ID attribute is inconsistent.

A system administrator can configure the LDAP server:



### IMPORTANT

If you configure your LDAP integration to connect to your server using SSL, you may need to take extra steps for [self-signed or privately signed certificates \(page 723\)](#).

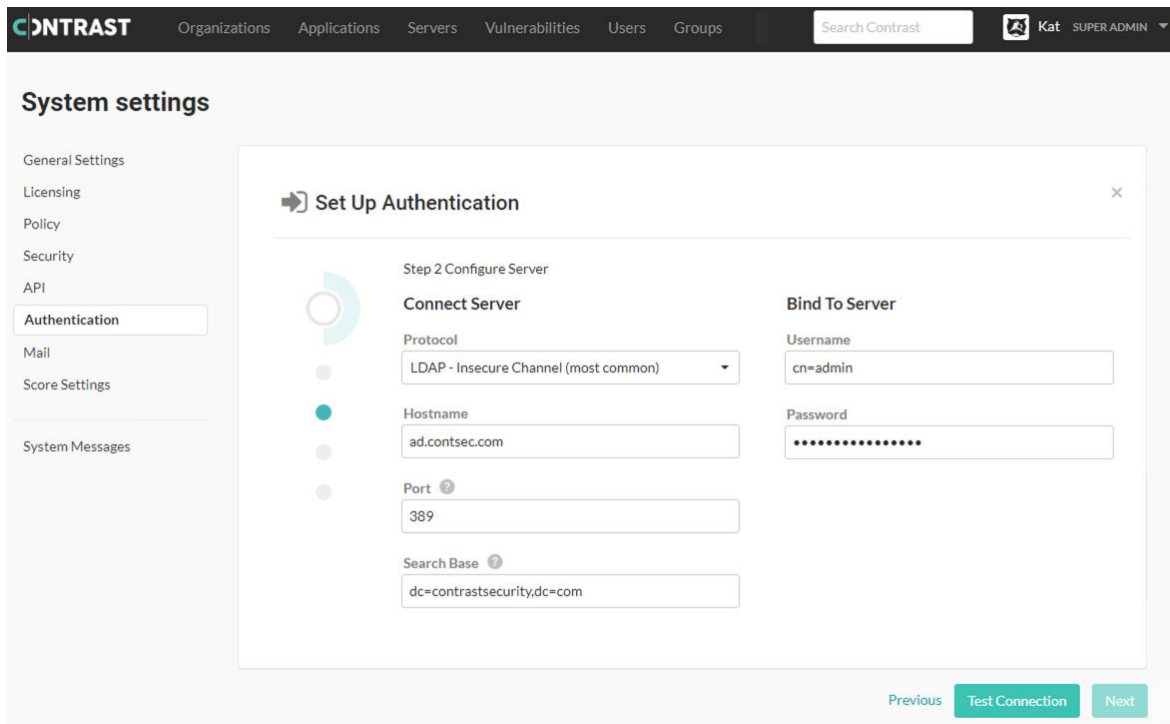
## Access if LDAP is offline

In the event that your LDAP service experiences connectivity or configuration issues, use the default SuperAdmin account to log in to Contrast. This feature ensures that you continue to have immediate access to your Contrast account even when LDAP is offline.

## Steps

1. Start by creating a user in the LDAP Server that is a dedicated read-only user or read-write user (depending on how you configure Contrast to interact with the LDAP directory). The user should be have read permission to the directory, including users with permission limited only to the Search Base. You will need this user to set the Search Base when [configuring users for LDAP \(page 721\)](#) and when binding to user.

2. Create user groups in the external LDAP server. You will later use these groups to [assign SuperAdmin privileges \(page 720\)](#) in Contrast.
3. Under [system settings \(page 728\)](#), select **Authentication**.
4. Select **Change authentication method**.
5. Select **LDAP**.
6. Enter required information under **Connect server** and **Bind server**.



Option	Description	Default
<b>Connect server</b>		
<b>Protocol</b>	The protocol that should be used to communicate with the LDAP server. Choose between <b>LDAP</b> or <b>LDAP with SSL (LDAPS)</b> .	<b>LDAP</b>
<b>Hostname</b>	Enter the hostname to use when communicating with the LDAP server.	localhost
<b>Port</b>	Enter the port to use when communicating with the LDAP server.	<b>389 (LDAP), 636 (LDAPS)</b>
<b>Search base</b>	Enter the base distinguished name (DN) to use when communicating with the LDAP server. If your login domain is <i>yourdomain.com</i> , your base DN would be <i>dc=yourdomain,dc=com</i> .	dc=contrastsecurity,dc=com
<b>Bind to server</b>		
<b>Method</b>	Select the method to use when connecting to the LDAP server. Options are shown in the next table.	Simple
<b>Username</b>	Enter the full DN of the user that should bind to the directory to perform queries and check authentication.	N/A
<b>Password</b>	Enter the password for the bind user specified in the <b>Username</b> field.	N/A

There are four supported bind mechanisms that can be used by Contrast. Each has different required fields:

Method	Description	Required Fields	Optional Fields
Anonymous	Administrators provide anonymous, read-only access to the directory.	None	N/A
Simple	This is standard username and password authentication. The username and password are verified as provided by the LDAP server.	Username, Password	N/A
DIGEST-MD5	A username and password are provided and hashed using MD5 prior to sending to the server to be authenticated.	Username, Password	SASL Realm

Method	Description	Required Fields	Optional Fields
CRAM-MD5	The LDAP server issues a pre-authentication challenge, which is sent with the MD5 hashed username and password to be authenticated.	Username, Password	SASL Realm

- Once you configure the connection to the LDAP server, select **Test connection**. Testing the connection ensures that the application can connect to the LDAP server and perform queries.
- [Configure groups for LDAP \(page 720\)](#).
- [Configure users for LDAP \(page 721\)](#).
- To verify that the group and user mappings are correctly configured, select **Test login**.
- Once you've successfully logged in as both SuperAdmin and Organization Administrator, select **Finish** to complete the configuration.

## Configure groups for LDAP

As part of the [LDAP configuration \(page 718\)](#), you will need to configure groups.

Organization Administrators set the [roles and permissions \(page 743\)](#) for users, and each application handles roles and access to data within that application. When configuring users, you can opt to [add users to an access group on login \(page 721\)](#). However, even if that is not enabled, Contrast uses the LDAP directory to ensure that the provided user belongs to the correct group.

To configure groups:


- Enter the following values:

Option	Description	Default
<b>Group type</b>	Groups types depend on your server functionality and configuration. Groups are either: <ul style="list-style-type: none"> <li><b>Static:</b> Groups track members through an attribute on the object, such as <code>uniqueMember</code>. The remaining four options in this table only apply to static groups.</li> <li><b>Dynamic:</b> The user object tracks its own membership. Groups are added dynamically to the user object when the user becomes a member of a group.</li> </ul>	<b>Static</b>
<b>Group subtree</b>	Configures whether subtrees of the Base DN should be included when searching for groups in the directory.	<b>Enabled</b>



Option	Description	Default
<b>Base DN</b>	This is the distinguished name (DN) where the application can find groups in your LDAP server (like the User Base DN).	ou=Groups
<b>Object class</b>	If left blank, the application uses the default values of "group," "groupOfUsers," or "groupOfUniqueUsers." This isn't a required field, as it is standard across LDAP deployments.	N/A
<b>Group member attribute</b>	<p>The attribute within a group object in the directory that contains the members of that group. This may differ for your LDAP deployment, so ensure that you are using the correct attribute with your LDAP administrator.</p> <p>Each member of the group should be listed as a full distinguished name (DN) not a relative distinguished name (RDN). For example: "cn=smith,ou=Users,cn=support,dc=test,dc=org".</p> <p>If you use an RDN, Contrast does not see that user in the LDAP group.</p>	uniqueMember

- Use the groups you previously created in your external LDAP server, to assign users to one of the following groups
  - SuperAdmin group:** This group allows users to log in with SuperAdmin permissions.
  - Users group:** This group allows users to be added to an organization and log in to the standard interface. This group is appropriate for all other users.

 **IMPORTANT**

If a user belongs to both groups, and provisioning is disabled, the user will be created as a SuperAdmin. If provisioning is enabled, the user will be created without SuperAdmin permissions.

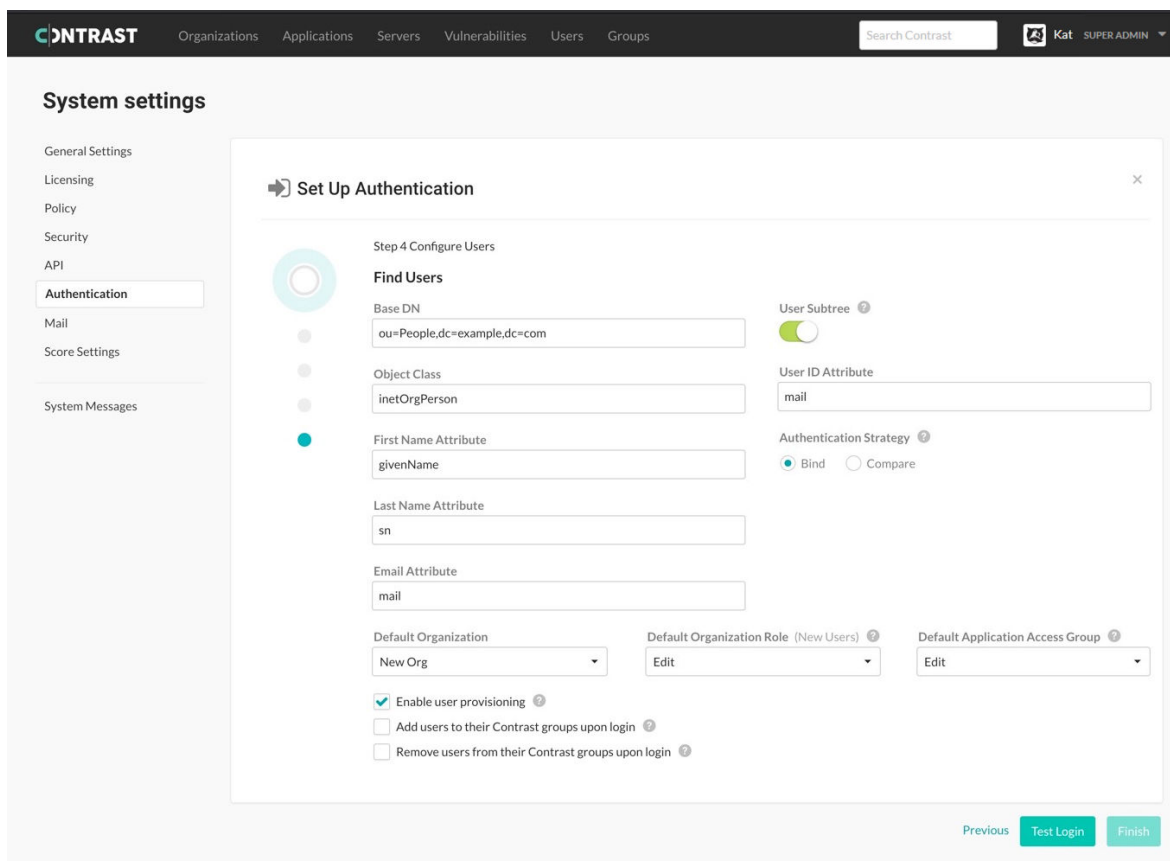
- Select **Query for groups** to enable a live search of existing groups as you begin to type within the input fields.

## Configure users for LDAP

As part of the [LDAP configuration \(page 718\)](#), you will need to configure users.

To fully integrate with an LDAP directory, Contrast needs information on how to connect to the LDAP server as well as how to find users and groups within the directory.

- Enter the following information on how you want Contrast to search for users in the directory. The default settings are correct for most LDAP deployments.



Option	Description	Default
Base DN	Indicate the container (under the global base DN) where Contrast should start searching for users. In most organizations, this is a single container (for example, <i>ou=Users</i> ), but your LDAP administrator should verify that you're searching the right container.	<i>ou=users</i>
Object Class	Indicate the LDAP object class for user objects in the directory.	<i>inetOrgPerson</i>
First Name Attribute	Indicate the LDAP field that contains a user's first name.	<i>givenName</i>
Last Name Attribute	Indicate the LDAP field that contains a user's last name.	<i>sn</i>
Email Attribute	Indicate the LDAP field that contains a user's email address.	<i>mail</i>
<b>User subtree</b>	If enabled, subtrees of the Base DN are included when searching for users.	<b>Enabled</b>
<b>User ID attribute</b>	Indicate the LDAP field that should be identified as the User ID. This is the username to enter when logging in to contrast.	<i>uid</i>
<b>Authentication strategy</b>	Choose how you want Contrast to authenticate users when they provide their credentials. <b>Bind</b> means the application sends the user's credentials to the server for authentication. <b>Compare</b> means the server hashes the user's credentials and compares them to the value of the password attribute.	<b>Bind</b>
<b>Password attribute</b>	The LDAP field that contains a user's password.  If you selected <b>Compare</b> for the authentication strategy, this attribute contains the hashed password for the user.	<i>userPassword</i>

- To automatically create new user accounts when someone makes an LDAP request to log in, check the box next to **Enable user provisioning**.  
Use the dropdowns to choose the **Default organization**, **Default organization role** and **Default application access group** for the new users.
- Contrast can automatically provision or de-provision users at login time based upon the user's LDAP groups. When this feature is enabled for LDAP-based authentication, users are added to a Contrast access group that maps to a corresponding LDAP group and removed from disallowed

Contrast groups. Users can be added to multiple groups, as well as added to groups that give them access to multiple organizations.



### IMPORTANT

For this to work, the Contrast groups must already exist, and the groups from LDAP (for provisioning purposes) must have the same name as the Contrast groups.

4. To add users to their groups when they log in to Contrast, check the box next to **Add users to their Contrast groups upon login**. To remove users from their groups when they log in to Contrast, check the box next to **Remove users from their Contrast groups upon login**.

## Use self-signed or privately-signed certificate with LDAP

If you [configure your LDAP integration \(page 718\)](#) to connect to your server using SSL, you may need to import your server's certificate into a new truststore to be used by the Contrast JRE.

1. To begin, acquire the server's certificate from your administrators in PKCS#12 format. If you're using a self-signed certificate, this is the actual LDAP server's certificate. If you have a private certificate (CA), you need the CA certificate for that server.
2. Once you have the certificate for the server, import it into the truststore used by the JRE running Contrast. Run the following command as an administrator from a command shell in the directory where Contrast is installed.

```
$ jre/bin/keytool -import -file <path to certificate> -alias <hostname> \-keystore <t
```

3. You should now restart the Contrast server service, and verify that queries against LDAP now use SSL.

## Configure single sign-on (SSO) at a system level

Single sign-on (SSO) is an authentication service that allows access to multiple applications using one set of credentials. As a System Administrator, you can configure Contrast to use this service with a SAML 2.0 supported provider.



### NOTE

For more information, see the [SAML 2.0 specification](#).

Authentication happens through an identity provider (IDP). You may use your own generic IDP or one of many popular third-party providers, such as [Okta](#), [OneLogin](#), [Ping Identity](#) or [ADFS](#).

Have your IDP metadata information ready, and then provide your metadata to connect to Contrast via an XML file or a Metadata URL.

For on-premises customers, the SuperAdmin configures SSO at the system level. Hosted customers can configure SSO at an organization level. Multi-tenant hosted instances can have multiple IDPs configured to a single instance of Contrast.



### NOTE

If users are identified with a user ID rather than an email address, those accounts don't automatically transfer over to the SSO configuration and must be recreated.

## Before you begin

When using SSO, you must configure your NameID to pass the user's email.

Optionally, to set the user's first and last name, you must configure their IdP to pass additional attributes via the SAML assertion using:

- **First name:** `http://schemas.xmlsoap.org/ws/2005/05/identity/claims/givenname`
- **Last name:** `http://schemas.xmlsoap.org/ws/2005/05/identity/claims/surname`

If those fields are not present or are blank, the default is to use the NameID field. And if user provisioning is enabled, the user's first and last name will auto-populate.

```

1<saml2:Attribute Name="http://schemas.xmlsoap.org/ws/2005/05/identity/claims/givenname"
2           NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:un
3           >
4           <saml2:AttributeValue xmlns:xs="http://www.w3.org/2001/XMLSchema"
5           xmlns:xsi="http://www.w3.org/2001/XMLSchema-insta
6           xsi:type="xs:string"
7           >Dan</saml2:AttributeValue>
8           </saml2:Attribute>

```

## Steps

1. Contrast doesn't provide keys for SAML authentication. If you enable SSO without providing private keys, you're only able to perform IDP-initiated logins. You need to generate your own self-signed key using the Java Keytool:

```
keytool -genkeypair -alias some-alias -keypass changeit -keyalg RSA -keystore samlKey
```

2. Use the [encrypted properties editor \(page 735\)](#) to modify `saml.properties`, and update the values to the keystore you created in the previous step.

```

authenticator.saml.keystore.path           : /path/to/samlKeystore.jks
authenticator.saml.keystore.default.key    : some-alias
authenticator.saml.keystore.passwordMap    : some-alias=changeit
authenticator.saml.keystore.password      : changeit

```

3. Once you make the changes, restart Contrast so that it picks up the new keystore.
4. In the Contrast, under [system authentication \(page 712\)](#), select **Authentication**, then **Change authentication method**.
5. Select **Single sign-on**.
6. Use the provided information to set up Contrast with your IDP. (You must also provide the **Entity ID** and **Metadata URL** in your IDP configuration.)

### ➔ Set Up Authentication ✕

Step 2 Configure Your Identity Provider  
Integrate your SAML Identity Provider (IdP) with Contrast to allow authentication of users using one set of credentials.

**What you'll need:** [Copy Metadata URL](#) ⓘ

Entity ID *		Metadata URL	Attributes
http://ec2-52-68-234-25.ap-northeast-1.compute.amazonaws.com/Contrast/saml/metadata		http://ec2-52-68-234-25.ap-northeast-1.compute.amazonaws.com/Contrast/saml/metadata	None required
Version	NameID Format	Consumer Binding	Assertion Consumer URL
2.0	Email Address	HTTP-POST	http://ec2-52-68-234-25.ap-northeast-1.compute.amazonaws.com/Contrast/saml/metadata

**What we need:**

Identity Provider \*

I have access to the metadata URL

IdP Metadata \*

```
<EntityDescriptor xmlns="urn:oasis:names:tc:SAML:2.0:metadata" entityID="http://ec2-52-68-234-25.ap-northeast-1.compute.amazonaws.com/Contrast/saml/metadata">
  <SPSSODescriptor AuthnRequestsSigned="false" WantAssertionsSigned="false"
    protocolSupportEnumeration="urn:oasis:names:tc:SAML:2.0:protocol
urn:oasis:names:tc:SAML:1.1:protocol http://schemas.xmlsoap.org/ws/2003/07/secext">
    <SingleLogoutService Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST"
      Location="http://ec2-52-68-234-25.ap-northeast-1.compute.amazonaws.com/Contrast/saml/metadata" />
  </SPSSODescriptor>
</EntityDescriptor>
```

Accepted Domain(s) (New Users) \*

 ✕

➕ Add domain

Default Organization:

Default Organization Role (New Users) ⓘ:

Default Application Access Group ⓘ:

Enable user provisioning ⓘ

Add users to their Contrast groups upon SSO login ⓘ

Remove users from their Contrast groups upon SSO login ⓘ

7. Provide a name for your **Identity provider**.
8. Enter your IDP metadata. Select the box if you **have access to the metadata URL**, then enter the URL.
9. If you want to automatically create new user accounts when someone make a SAML request to log in to Contrast, check the box next to **Enable user provisioning**.
  - Use the dropdowns to choose the **Default organization role** and **Default application access group** for the new users.
  - Add the **Accepted domains** that must be used to trigger user provisioning (for example, *yourdomain.com*).

**NOTE**

You can also [automatically add users to groups \(page 709\)](#).

10. Select **Save**. If an error occurs, you can [check debug logs \(page 693\)](#) for troubleshooting.
11. [Restart Contrast \(page 685\)](#) to apply the changes.

Once connected, you can return to the **SSO** tab to view and edit your settings. (You must retest and [restart Contrast \(page 685\)](#) to apply the changes.) To return the organization back to the default configuration, select **Revert to Contrast-managed authentication** and confirm the change.

If SuperAdmin was disabled during installation, you're provided with two sets of metadata: one for the public node and one for the secret node. You need to set up the configuration for both in the Contrast interface.

## See also

- [How to troubleshoot problematic SAML integrations](#)
- [Configuring user and group provisioning with Okta](#)
- [Configuring ADFS to automatically add users to groups](#)

## Enable HTTPS proxy authentication

You can use a trusted proxy for authentication, which authenticates the user and then sends the user's username to Contrast in an HTTP header. (This type of authentication is particularly useful for x509 clients.)

Users must be configured in Contrast before starting their authentication configuration, and use the same email address as their usernames for both configurations, in order to be granted access to Contrast after authentication.

To enable trusted HTTPS proxy authentication:

1. Update the *auth.properties* property file by changing the authentication mode in *~/path\_to\_contrast\_installation/data/conf/auth.properties* to *http\_header*.
2. By default, the HTTP header name is *Contrast-Authentication*. You can also configure this in the *auth.properties* file by updating the value of *auth.http.header.field.name*.
3. After restarting Contrast, each request must include the HTTP header *Contrast-Authentication: username* to log in.



### NOTE

Trusted HTTPS proxy authentication should only be used if all Contrast nodes are accessible exclusively through a trusted proxy. No nodes should be accessible directly; otherwise, an attacker could impersonate any authorized user.

## Set a password policy at a system level

Regulate passwords at a system level by creating a password policy.

1. Under [system settings \(page 728\)](#), select **Security**.
2. Under **Default password policy**, select the box if you want to **Allow organization override**. This way organization administrators can [set password policy for their organizations \(page 641\)](#).
3. Enter the following settings for your policy:
  - Set the password strength. This can be **Weak**, **Medium**, **Strong**, **Complex** or **Custom**. If you choose **Custom**, enter the number of minimum **Uppercase letters**, **Lowercase letters**, **Numbers** and **Symbols** required.
  - Enter the number of characters required in the **Minimum length** field.
  - Use the dropdown to choose the length of time allowed before **Password expiration**.
  - Enter the number of login attempts allowed before **Login lockout**.
  - Enter the length of time allowed before **Inactive account expiration**.
  - Check the box to **Restrict password reuse**, and use the dropdown to choose the number of times each password may be reused.

- Check the box to **Restrict password reset**, and use the dropdown to choose the number of days during which a user can reset their password after their reset request is sent.
- Use the dropdowns to select the amount of time that may pass before **Idle timeout** and **Session timeout**.

4. Select **Save**.

## Reset SuperAdmin password on Linux

To change the SuperAdmin password, edit the `contrast-server.voptions` file or use environment variables.

In most cases, editing the `contrast-server.voptions` file is the easiest method to use. If you are using containers for your Contrast application, use environment variables to reset the password.

### Steps

1. Open a command prompt and log in using the Contrast service account created during installation. For example:

```
sudo -su contrast_service
```

2. Shut down the Contrast server with this command:

```
$CONTRAST_INSTALLATION/bin/contrast-server stop
```

3. Are you going to use the `contrast-server.voptions` file to reset the password?

- If **yes**, go to [step 4](#).
- If **no**, go to [step 5](#).

4. To reset the password with the `contrast-server.voptions` file, use this procedure:

- Go to the `$CONTRAST_INSTALLATION/bin` directory. On most systems, this directory is `/opt/Contrast/bin`.
- Open the `contrast-server.voptions` file in a text editor.
- Add the following options to the file (replace `youremaildomain.com` with your email domain):

```
-Dreset.superadmin=true
-Dsuperadmin.username=contrast_superadmin@<your.email.domain.com>
-Dsuperadmin.password=<password>
```

5. To reset the password with environment variables instead of the `voptions` file, use this procedure:

- Go to the `$CONTRAST_INSTALLATION` directory. On most systems, this directory is `/opt/Contrast`.
- Enter the following command:

```
export INSTALL4J_ADD_VM_PARAMS="$INSTALL4J_ADD_VM_PARAMS -Dreset.superadmin=true"
```

6. Start the Contrast server with this command:

```
$CONTRAST_INSTALLATION/bin/contrast-server start
```

When the server starts, use the password you specified in step 4 or 5.

7. Shut down the Contrast server with this command:

```
$CONTRAST_INSTALLATION/bin/contrast-server stop
```

8. If you used the `contrast-server.voptions` file, remove the options you added in step 4.

9. Start the Contrast server as you normally would and exit the shell.

If you used environment variables to reset the password, this step clears the password from the `INSTALL4J_ADD_VM_PARAMS` environment variable.

## Reset SuperAdmin password on Windows

To reset the SuperAdmin password in the Contrast application.

1. Stop the Contrast Server service.
2. Launch a command prompt (`cmd.exe`) as an Administrator by right-clicking on **cmd.exe** and selecting **Run As Administrator**.
3. Go to the `Contrast\bin` directory. (On most systems, this is `C:\Program Files\Contrast\bin`.)
4. Use this command to edit the JVM options:

```
notepad contrast-server.vmoptions
```

5. Add the following options to the file. (Replace `youremaildomain.com` with your email domain.)

```
-Dreset.superadmin=true  
-Dsuperadmin.username=contrast_superadmin@<your.email.domain.com>  
-Dsuperadmin.password=<password>
```

6. Save the file and exit Notepad.
7. Use this command to start the Contrast service:

```
net start "Contrast Server"
```

8. Verify you are able to log in with the new password.
9. Enter the following command to stop the Contrast service:

```
net stop "Contrast Server"
```

10. Enter the following command to edit the JVM options:

```
notepad contrast-server.vmoptions
```

11. Remove the options added in step 5.
12. Save the file and exit Notepad.
13. Exit the command prompt.
14. Start the Contrast Server service as normal (from the Services control panel).

## Manage keys

As a System Administrator, you can set policies for the keys across all your organizations to make sure they always meet your security standards.

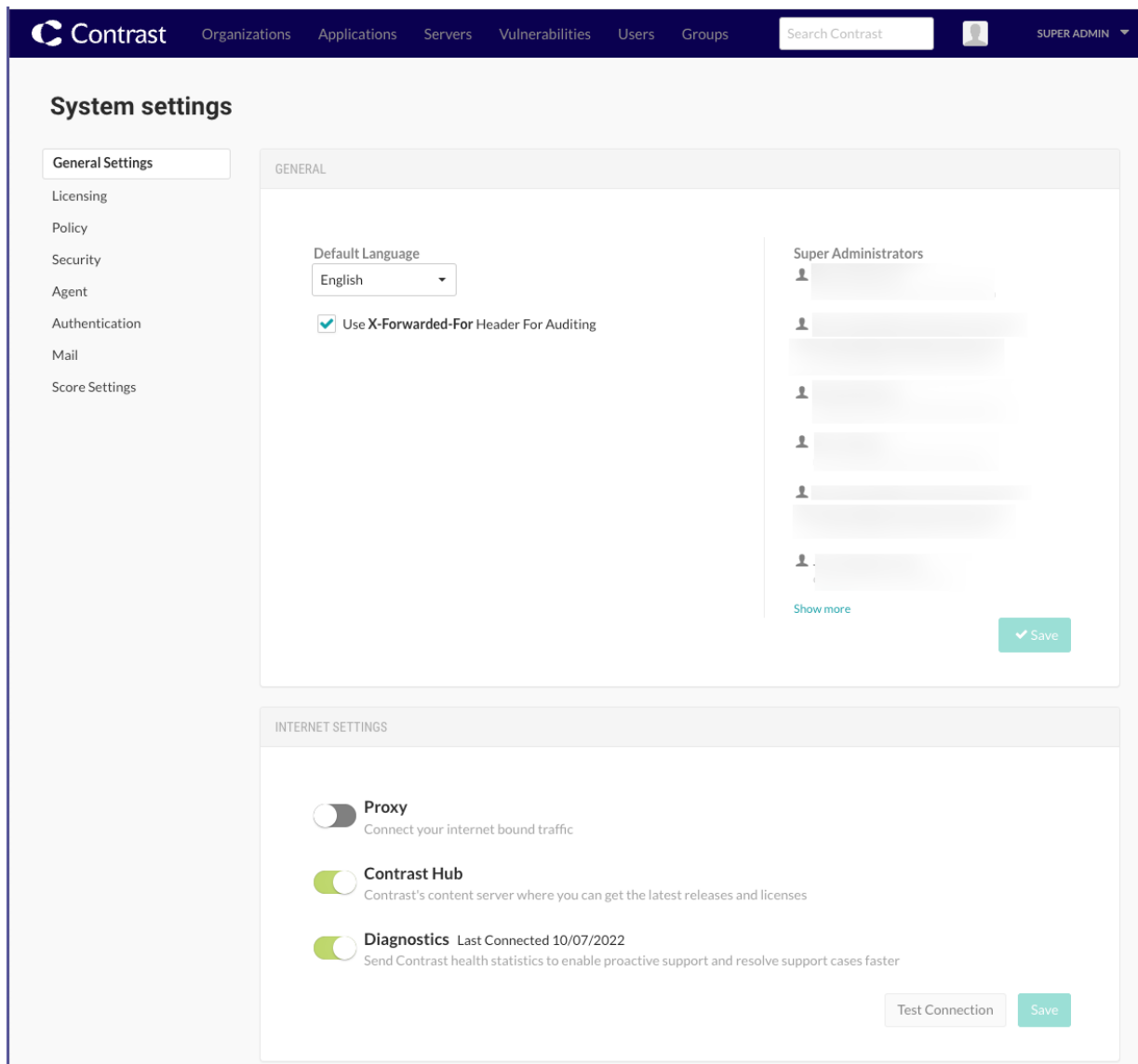
1. In [system settings \(page 728\)](#), select **Security**.
2. Under **API keys** choose the number of characters required as well as the minimum number of numerals, upper case characters and lower case characters required in the key. These standards apply when anyone [rotates the API key \(page 32\)](#).
3. Check the box at the top of the form if you want to **Mask invalid IPs on login**.
4. Select **Save**.

## Configure system settings

The System settings page lets you configure standard settings at a system level.

A [distributed deployment \(page 681\)](#) of Contrast requires a different configuration.





## Steps

1. Log in as SuperAdmin, ServerAdmin or System Administrator.
2. Select **SuperAdmin** in the **user menu**.
3. Select **System settings** in the **user menu**.  
 You can access:
  - [General settings \(page 730\)](#)
  - [Licensing \(page 731\)](#)
  - [Policy \(page 734\)](#) (library compliance settings)
  - [Security \(passwords \(page 726\), two-step authentication \(page 420\) and key management \(page 728\)\)](#)
  - [Agent keys](#) (these are the same [Agent keys \(page 32\)](#) that you can find in Organization settings).
  - [Authentication \(page 712\)](#)
  - [Mail \(page 734\)](#)
  - [Score settings \(page 648\)](#)

## Additional system settings

Additional system settings include:

- [Configure Tomcat \(page 686\)](#)
- [Configure Java Runtime Environment \(JRE\) \(page 687\)](#)
- [Configure HTTPS \(page 687\)](#)
- [Add organizations \(page 701\)](#)
- [Configure log levels \(page 693\)](#)
- [Configure reporting storage \(page 692\)](#)

## Configure general system settings

General settings is part of [system settings \(page 728\)](#). Here, you can configure these settings:

- **Default language:** Select the language for your user interface.
- **X-Forwarded-For header:** Check the box if you want to use this header for auditing.
- **Proxy:** Connect your internet bound traffic.
- **Hub:** Integrate with Hub for library and CVE updates.
- **Diagnostics:** Send Contrast health statistics to enable proactive support and resolve support cases faster.
- **Agent diagnostics:** Send Contrast agent data to improve rules, performance and to prioritize product improvements.
- **Heroku settings:** Enter your password and SSO salt for the Heroku integration.

## Manage diagnostics at a system level

Contrast collects diagnostics that measure customer product usage to help provide faster, more proactive support and guide delivery of new functionality.

Contrast periodically sends snapshots of relevant data elements and aggregations to a diagnostics service on Contrast's hosted platform. Data that could be used to identify a customer or organization is obscured using a one-way hash, and is encrypted both in transit and at rest. Due to privacy concerns, the data doesn't include application names, personally identifying information, code, vulnerability identities or customer network identifiers.

The data is then stored in a Contrast database, where it's made available to approved support and development users for analysis and reporting. Within the database, the data is attributed to customers to provide Customer Support insight into how to better assist Contrast customers.

Diagnostics improve customer support in three main ways:

- Customer Support analyzes diagnostics data for markers and reaches out proactively to customers to prevent problems.
- Data is used to quickly diagnose existing problems and reduce the cycle time for successfully resolving support cases.
- Deployment and usage insights help Contrast product development teams adjust and deliver new functionality that better address customer needs.

As a SuperAdmin, ServerAdmin or System Administrator, you can enable or disable diagnostics for your whole on-premises system:

1. In system settings, select **General settings** from the left navigation.
2. Under **Internet settings**, use the toggle to disable or enable it. Diagnostics are enabled by default.
3. Proxy settings apply to and diagnostics settings.



### TIP

You can also use the [REST API](#) to preview the data that will be transmitted to Contrast in these diagnostics.

## Allocate licenses at a system level

Contrast has these types of licenses:

- On-premises customers require a license to [install \(page 675\)](#) and [upgrade \(page 696\)](#) Contrast.
- Hosted and on-premises customers require specific licenses for Assess (application licenses), Protect (server licenses), and SCA (library licenses).

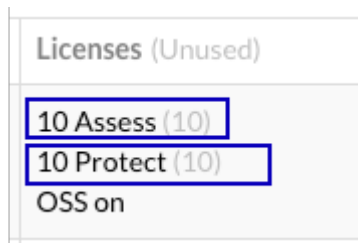
Use this procedure to allocate Assess and Protect licenses to organizations.

### Before you begin

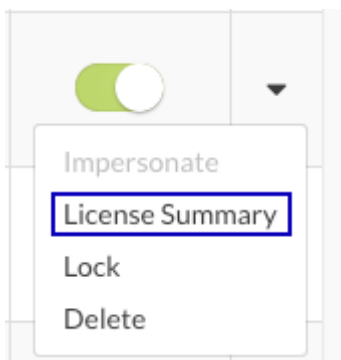
- For on-premises customers, a SuperAdmin or ServerAdmin role is required to allocate Assess and Protect licenses to a particular organization. Contrast Security handles this activity for hosted customers.
- Licenses applied to applications permanently count towards the number of maximum allowable applications. Deleting a licensed application has no effect on the number of licenses you are allowed to apply to applications.

### Steps to allocate licenses

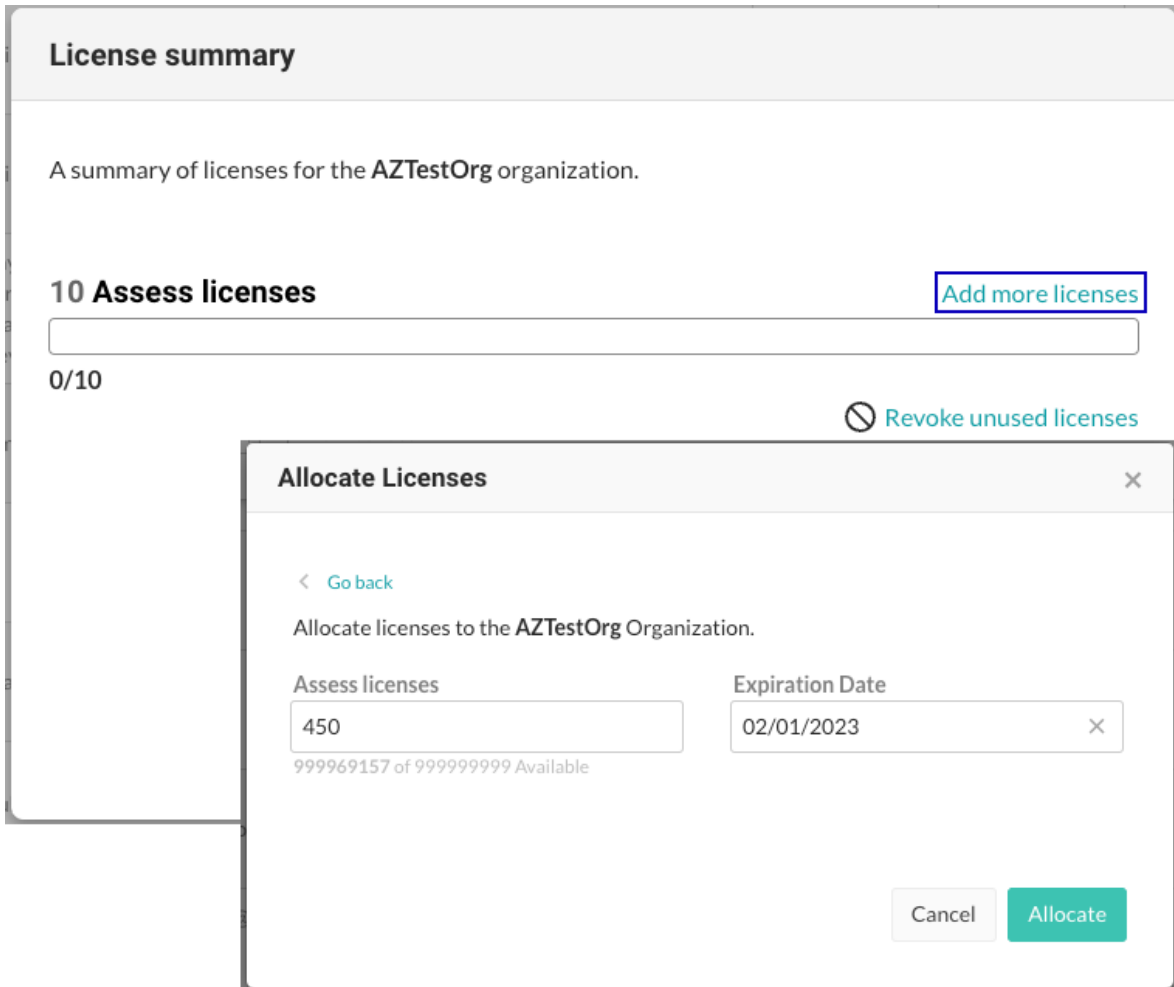
1. Select **SuperAdmin** or **ServerAdmin** in the **user menu**.  
You see a list of organizations. The **Licenses** column shows the total number of Assess and Protect licenses available for each organization, followed by the number of unused licenses in parentheses.
2. You see a list of organizations. The **Licenses** column shows the total number of Assess and Protect licenses available for each organization, followed by the number of unused licenses in parentheses.
  - Select **Assess** or **Protect** in the Licenses column.



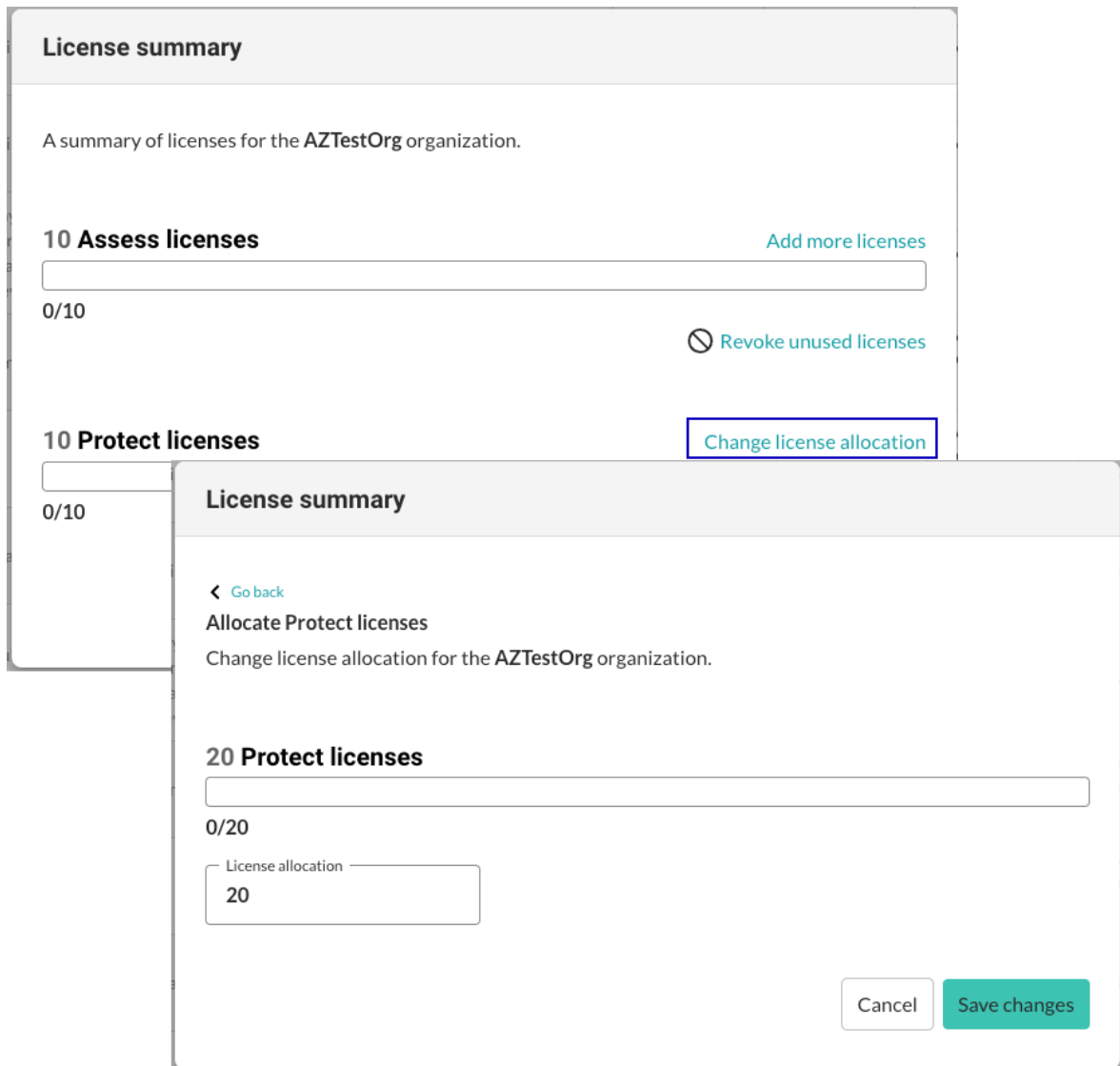
- Select the triangle ( ▾ ) at the end of a row and select **License summary**.



3. To add available Assess licenses to an organization:
  - a. Select **Add more licenses** above the Assess license bar.
  - b. In **Assess licenses**, enter the number of licenses you'd like to make available to this organization.
  - c. In **Expiration date**, enter an expiration date for the licenses you are adding.
  - d. Select **Allocate**.



4. To remove unused Assess licenses from an organization, select **Revoke unused licenses** below the Assess license bar.
5. To change the number of purchased Protect licenses allocated to an organization:
  - a. Select **Change license allocation** above the Protect license bar.
  - b. In **License allocation**, enter the number of licenses that you want to let the organization use. The default value is the number of purchased licenses. To revoke licenses for the organization, enter a value that's less than the number of purchased licenses. You can revoke more than the number of purchased licenses.
  - c. Select **Save changes**.



### Steps for license details and settings

1. To view the number of licenses available for each organization, Select **Organizations** in the header,  
The **Licenses** column shows the total number of Assess and Protect licenses available for each organization, followed by the number of unused licenses in parentheses.  
If Assess licenses are nearing expiration, you see a red warning icon. Hover over the icon to see the number of licenses expiring.
2. To view the number of available licences as well as the number of applications or servers that are unlicensed, from the user menu, select **System settings > Licensing**.
3. To automatically apply licenses to new applications or servers, under Licensing, select the toggle for Assess or Protect licenses. Then, select whether this setting applies to all applications or servers or only new ones.  
SuperAdmins, ServerAdmins and System Administrators also have the option to automatically apply licenses when you [add an organization \(page 701\)](#).
4. In the top right of the Licensing window, you can select **Allow Organization Administrators to override** these settings (this setting defaults to enabled).

### Customize score settings at a system level

Contrasts designates an [application score \(page 748\)](#), which can optionally depend on a [library score \(page 483\)](#). To customize score settings at a system level:

1. Under [system settings \(page 728\)](#), select **Score settings**.
2. Select an option for **Overall score** to determine how applications are scored in Contrast:
  - **Default score** is the average of your application's [library score \(page 483\)](#) and its custom code score.
  - **Custom code-only score** ignores library score when calculating the overall application score. If you select this option, you can click to select specific languages, or apply it to all languages.
3. Select an option for **Library score** to determine how libraries are scored in Contrast:
  - **Default score** uses an algorithm that includes vulnerabilities as well as the age and versioning of a library.
  - **Vulnerability-only score** bases scoring solely on vulnerabilities present in the library.
4. Select the box next to **Allow organization override** so that an Organization Administrator can [determine score settings at an organization level. \(page 648\)](#)
5. Select **Save**.



#### NOTE

A RulesAdmin can configure policy settings in **Policy Management** so that any library in violation automatically receives a failing score (F). Once these settings are chosen, you'll see an alert message in Score Settings. Clicking the policy link in the alert navigates you to Library Policy, where administrators may view and revise these settings.

## Manage library compliance policy

You can manage library compliance policy at the system level. Library compliance policy allows you to restrict libraries that applications can safely use and set version requirements for specific libraries. Contrast can flag applications that use restricted libraries and flag or fail libraries that violate the compliance policy.

To manage library compliance policy:

1. Open the **user menu** (your name in the top right corner of Contrast) and select **System settings (page 728)**.
2. Select **Policy**.
3. Set compliance requirements for your policy: libraries that are restricted from use, library version requirements, and whether Contrast should fail libraries that violate the policy.
4. Select **Allow organization override**, if you want Organization Administrators and RulesAdmins to [set compliance policy \(page 625\)](#) at an organization level.

## Manage email notifications at a system level

System Administrators can enable or disable and configure Contrast to communicate with an appropriate SMTP system to receive these notifications.

Notifications allow Contrast users to receive alerts in specific situations, such as the discovery of a vulnerability or an attack on an application or when a password is reset.

Organization Administrators can [set default settings \(page 645\)](#) for Contrast notifications at an organization level. Individual users can [adjust their own settings \(page 422\)](#).

To configure notifications at a system level:

1. Under [system settings \(page 728\)](#), select **Mail** in the left navigation.
2. Configure these settings:

- **Enable mail:** Use the toggle to enable or disable the feature.
- **Mail protocol:** Values can be "SMTP" or "SMTPs".
- **Mail host:** The fully qualified address of the SMTP server.
- **Mail port:** The likely value is "25".
- **Use SMTP auth:** Check the box to enable this setting.
- **Mail user:** A user account for authentication purposes on the SMTP system.
- **Mail password:** The password for the mail user associated with the SMTP system.
- **Mail from:** Enter the email address you want system notifications to be sent from.
- **Enable STARTTLS:** Check the box to enable this setting.

3. Select **Save**.

## Maintain Contrast on-premises

As a system administrator there are some ongoing tasks that are required for maintenance of the system. You may need to:

- [Back up MySQL databases \(page 737\)](#)
- [Improve performance \(page 27\)](#)
- [Upgrade Contrast \(page 696\)](#)
- [Upgrade the agents \(page 697\)](#)
- [Update library data \(page 697\)](#)
- [Update the Contrast license \(page 699\)](#)
- [Update the IP address \(page 697\)](#)
- [Manage SSL \(page 737\)](#)
- [Use the encrypted properties editor \(page 735\)](#)

## Use the encrypted properties editor

Contrast includes several configuration files in the `$CONTRAST_HOME/data/conf` directory. By default, Contrast encrypts the configuration files for security, but you can modify some of these files through workflows in Contrast.

For example, these are some of the encrypted properties files for on-premises installations:

Name	Contents
<code>ad.properties</code>	Settings to connect and configure Contrast to authenticate Active Directory groups.
<code>ldap.properties</code>	Settings to connect and configure Contrast to authenticate LDAP groups.
<code>database.properties</code>	Host and connection settings for communication between Contrast and MySQL.
<code>saml.properties</code>	SAML keystore security settings.

Contrast also includes an editing tool to decrypt these files and assist with configuration. This is helpful when you are [running Contrast \(page 684\)](#) and need to get values from encrypted properties files outside of the application or automatically update a property in the files, such as automatic password rotation.

To edit encrypted properties files:

1. Find the decryption tool in the `$CONTRAST_HOME/bin` directory.
  - **Linux:** the file is a shell script called `edit-properties`.
  - **Windows:** the file is a Windows command file called `edit-properties.cmd`.
2. Run the tool from a command prompt. This opens an application that allows you to update the value of an encrypted property:

```
$CONTRAST_HOME/bin/edit-properties -e $CONTRAST_HOME/data/esapi -f $CONTRAST_HOME/dat
```

3. You must provide input details to view or edit encrypted properties files. The basic inputs you need are:

- The path to *ESAPI.properties*.
- The target properties file to edit.

To find this information for the encrypted properties editor, execute `edit-properties` with no arguments:

```
contrast@EOP-TeamServer:~/contrast/bin$ ./edit-properties
```

```
usage: property-editor
  -c,--comment <text>          The comment for the top of the file
  -e,--esapi <path>           The path to the ESAPI.properties file
  -f,--targetFile <file>      The properties file to edit
  -o,--print-value             Print out the value of the property and exit
  -p,--property <name>       The name of the property to set
  -v,--value <val>           The value of the property
```

4. This example shows you how to edit an encrypted file. Provide the path to *ESAPI.properties* and the target properties file to edit. You will see the existing values encrypted in the file that you can edit. The usage options above allow you to view or edit a single property.

```
contrast@TeamServer:~/contrast/bin$ ./edit-properties -e ../data/esapi/ -f ../data/conf/
```

```
ad.userDn                : cn=Directory Manager
ad.identity.attribute.name : mail
ad.password              : NotaRealPassword
ad.nested.groups.enabled : false
ad.group.users           : cn=ContrastUsers,cn=Users,dc=contrast
ad.group.admin           : cn=ContrastAdmins,cn=Users,dc=contrast
ad.url                   : ldap://localhost:389
ad.base                   : dc=contrastsecurity,dc=com
```

5. You can also retrieve or update unencrypted values for a property. To retrieve values, pass another parameter to the properties editor. In this example, the user is looking for details about database properties:

```
$CONTRAST_HOME/bin/edit-properties \
  -e $CONTRAST_HOME/data/esapi \
  -f $CONTRAST_HOME/data/conf/database.properties \
  -p jdbc.username \
  -o
```

To update unencrypted values, pass a different set of arguments to the properties editor:

```
$CONTRAST_HOME/bin/edit-properties \
  -e $CONTRAST_HOME/data/esapi \
  -f $CONTRAST_HOME/data/conf/database.properties \
  -p jdbc.username \
  -v joe.user \
  -c "Updating JDBC Password"
```



**NOTE**

Add comments to indicate edits to encrypted properties files. This is useful for auditors or others who need to track configuration changes.



## Manage SSL

On-premises customers may need to use a Secure Sockets Layer (SSL) in the following situations:

- Setting up [HTTPS proxy authentication \(page 726\)](#)
- Integrating with [LDAP \(page 718\)](#) or [Active Directory \(page 714\)](#)
- Securing communication between agents and the Contrast application

## MySQL backups

Use these procedures to maintain the MySQL databases that the Contrast installer creates.

These procedures do not apply to a MySQL database that you create for distributed environments.

- [Create an automated MySQL backup \(page 737\)](#)
- [Backup MySQL manually \(page 737\)](#)
- [Restore database backups \(page 738\)](#)
- [Disable automated backups \(page 738\)](#)

## Backup MySQL manually

You can also use the `backup-db` script included with Contrast to do this.

### Before you begin

- Be sure you have permission to run the `backup-db` script. Typically, you must be the installation owner for a Contrast, root or Windows Administrator account to do this.
- Be sure that Contrast is running and MySQL is available.

### Steps

1. If you have not done so, configure the database backup location. Set a location for `database.bk.dir` by editing the `$CONTRAST_HOME/data/conf/database.properties` file with the [encrypted editor \(page 735\)](#).
2. Run the backup command for your environment:
  - **Windows:** `$CONTRAST_HOME\bin\backup-db.cmd`
  - **Linux:** `$CONTRAST_HOME/bin/backup-db.sh`

## Create an automated MySQL backup

You can create a backup of the Contrast MySQL database on a regularly scheduled basis. During [installation \(page 675\)](#), you can select this option and define a time and location for storing database backups.

If you skip this step during installation, you can still configure Contrast later to schedule database backups.

### Steps

1. Find Contrast database settings in `$CONTRAST_HOME/data/conf/database.properties`.
2. [Use the encrypted properties editor \(page 735\)](#) to identify database settings. The example below shows a Contrast database with backups enabled, scheduled and in a specific location. You can edit these settings, if any options need to change.

```
contrast@TeamServer:~/contrast/bin$ ./edit-properties -e ../data/esapi/ -f ../data/co
```

```
database.bk.time           : 4:0:0
database.bk.enabled       : true
database.bk.dir           : /mnt/backups/mysql/contrast
```

3. If you want to upgrade Contrast, you should capture any data created or changed since the last scheduled backup.

## Disable automated backups

You can stop automated backups of the Contrast MySQL database. Scheduled backups run through `schtasks` on Windows and `crontab` on Linux.

To disable automated backups:

For **Windows**, use Task Scheduler to disable or delete `ContrastBackup`.

For **Linux**:

1. Switch to the user under which you installed Contrast and run `crontab -l`.
2. This lists the scheduled job. You will see:
 

```
0 2 * * * /usr/local/contrast/bin/backup-db.sh
```
3. Run `crontab -e` to delete a single backup. Run `crontab -r` to delete all backups.



### CAUTION

The `-e` option allows edits with Vim to delete selected backups. The `-r` option deletes everything: be careful when you use it.

## Restore database backups

Use this procedure to restore the MySQL database that the Contrast installer creates.

This procedure does not apply to MySQL databases that you create for distributed environments.

### Before you begin

Database restoration should be performed by a MySQL Database Administrator.

### Steps

1. Use the [encrypted properties editor \(page 735\)](#) to identify the MySQL database settings.
2. Shut down Contrast.
3. Start up MySQL individually using the MySQL service packaged with Contrast. Replace `<Your-Path>` with the path to your Contrast home.

- **Windows:**

```
"<YourPath>\mysql\bin\mysqld.exe" --defaults-file="<YourPath>\data\conf\my.cnf"
```

- **Linux:**

```
sudo -u contrast_service <YourPath>/mysql/bin/mysqld --defaults-file=<YourPath>/dat
```

4. Connect to MySQL. Replace `<jdbc.host>`, `<jdbc.port>`, `<jdbc.user>` and `<jdbc.schema>` with your host, port, user and schema.

- **Windows:**

```
mysql -h <jdbc.host> -P <jdbc.port> -u <jdbc.user> -p <jdbc.schema>
```

- **Linux:**

```
./mysql -h <jdbc.host> -P <jdbc.port> -u <jdbc.user> -p <jdbc.schema>
```

5. Drop the Contrast database with `drop database <jdbc.schema>;`
6. Create the Contrast database with `create database <jdbc.schema>;`
7. Grant permissions to the Contrast user with `GRANT ALL PRIVILEGES ON *.* to 'contrast'@'%';`

8. Exit from MySQL.
9. Restore the MySQL backup. Replace <backup\_location> with your backup location and <backup\_filename> with your backup filename.

- **Windows:**

```
mysql -h <jdbc.host> -P <jdbc.port> -u <jdbc.user> -p <jdbc.schema> < <backup_locat
```

- **Linux:**

```
./mysql -h <jdbc.host> -P <jdbc.port> -u <jdbc.user> -p <jdbc.schema> < <backup_loc
```

10. Shut down MySQL:

- **Windows:**

Use the Windows Service Manager application to shut down the MySQL service.

- **Linux:**

```
$CONTRAST_HOME/mysql/bin/mysqladmin.exe shutdown -h localhost -P 13306 -u contrast
```

You are prompted for the password that is set in the encrypted properties editor.

11. Restart the fully-restored Contrast and MySQL together.

## Reference

These topics may be useful as an occasional reference on how to use Contrast:

- [Glossary \(page 740\)](#)
- [Roles and permissions \(page 743\)](#)
- [Agent supported technologies \(Java \(page 51\), .NET Framework \(page 124\), .Net Framework \(Legacy\), .NET Core \(page 174\), Node.js \(page 222\), Python \(page 291\), Ruby \(page 345\), Go \(page 396\)\)](#)
- [Application scoring guide \(page 748\)](#)
- [Library scoring guide \(page 483\)](#)
- [Log levels \(page 750\)](#)
- [Supported browsers \(page 754\)](#)
- [Regular expressions for application exclusions \(page 624\)](#)

## Glossary of terms

These terms are defined specifically as they apply to users of Contrast. You can hover over these terms in other topics to pull up the definition in context.

account takeover (ATO)	An account takeover is the result of an attack that steals login credentials or otherwise breaks authentication in web applications.
agent	An agent is language-specific code that is installed in a web application to gather and analyze security data, and report findings to Contrast when necessary.
application	An application is a logical grouping of customer code analyzed by a Contrast agent.
attack	An <a href="#">attack (page 538)</a> is made up of one or more attack events that occur within a discrete time frame.
attack event	An attack event is a violation of Protect rules or other suspicious application activity in instrumented applications. The event corresponds to a single attack vector, such as an HTTP request or SQL query. Multiple attack events make up an attack, usually in the same area of code and timeframe.
brute-force attack	A brute-force attack is the systematic submission of many passwords or passphrases with the intent of eventually guessing correctly.
chief information security officer (CISO)	The chief information security officer directs an organization's information security program to assure and demonstrate that sensitive assets are well-protected and staff can manage and prevent vulnerabilities.
command injection	Command injection attacks target the host operating system through a vulnerable application. They happen when a user passes unsafe data to a system shell through a form, cookie or HTTP header or some other part of the application.
common language runtime (CLR)	Common Language Runtime manages the execution of .NET Framework programs.
Common Vulnerabilities and Exposures (CVE)	<a href="#">Common Vulnerabilities and Exposures</a> is a list of publicly known cybersecurity vulnerabilities, used internationally to identify and track types of vulnerabilities.

continuous integration/continuous delivery (CI/CD)	Agile practice that encourages continuous iterations and automation in building, testing and deployment.
Contrast command line interface (Contrast CLI)	The Contrast CLI is a text-based user interface. It can be run in the development environment to get early software composition analysis (SCA) visibility of your open-source libraries before you build and deploy. Results from the CLI can be viewed in the text-based response and they are also represented as a <a href="#">dependency tree (page 483)</a> in Contrast.
Contrast Hub	The <a href="#">Contrast Hub</a> is where on-premises customers can download the Contrast installer and license files and check for agent updates.
Contrast service	The Contrast service is a program written in Go that connects the Contrast web interface with the Node.js, Ruby and Python agents.
credential stuffing	Credential stuffing is a brute force attack that automatically injects pairs of breached usernames and passwords to access user accounts.
cross-site scripting (XSS)	Cross-site scripting is an attack that occurs when malicious scripts are injected into a web application through user inputs that generate output without validating or encoding it.
dependency confusion	Dependency confusion, also known as a "substitution attack," is when an attacker registers the same name for an organization's internal library on a public package index in order to send vulnerable or malicious code into the organization's private code repositories.
environment	In Contrast, applications are organized into one of three environments: development, test (QA) and production.
environment variable	Environment variables are values you can pass to software at runtime, usually key/value pairs that you define outside of an application. In Contrast, these are used to <a href="#">configure the agents (page 30)</a> that instrument your applications and make sure they work within your preferred frameworks as expected and report metadata you want to see in Contrast.
false positive	A vulnerability that is falsely reported.
flow map	A flow map is a visualization of an instrumented application in Contrast that shows all back-end systems it uses and any other applications connected to it. This helps you assess risk by analyzing what else touches vulnerable applications.
instrument	Monitor applications with software agents that observe and report data at runtime. Contrast agents send security vulnerability data about your applications based on exercised routes.
interactive application security testing (IAST)	Security technology that analyzes data flows within a running application to detect and report possible security vulnerabilities.
IP allowlist	An IP allowlist is a rule that allows any HTTP request from IP addresses on that list.
IP denylist	An IP denylist is a rule that blocks any HTTP request from IP addresses on that list.

library	A library is any packaged code included in an application. <a href="#">Libraries (page 474)</a> can be public or private.
lightweight directory access protocol (LDAP)	LDAP is a lightweight client-server protocol for accessing and maintaining directory services. In Contrast, on-premises can <a href="#">use LDAP (page 718)</a> to manage users and logins.
manifest	Files that are stored with a project to declare which dependencies are required by a project.
National Institute of Standards and Technology (NIST)	NIST is a <a href="#">government agency</a> that promotes U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology, in multiple fields including cybersecurity.
Not a problem	<i>For library status.</i> This library has vulnerabilities that are acknowledged and the risks are acceptable.
Open Web Application Security Project (OWASP)	<a href="#">Open Web Application Security Project®</a> is a nonprofit foundation that works to improve the security of software through an open platform that supports shared security projects and member education. The <a href="#">OWASP Top Ten</a> lists the most critical security defects in Web applications.
path traversal	Path traversal is an attack that attempts to access critical system files and directories stored outside the web root folder. It uses variables that reference files with "dot-dot-slash" (../) sequences or absolute file paths.
policy	A policy is the set of rules for a given application or library that triggers security violations, status changes, or notifications when certain conditions are true. Policies assure more consistent security standards across applications or teams.
profiler chaining	Profiler chaining is a way to run the .NET Framework or .NET Core agent alongside other .NET profiler agents, such as performance or APM tools.
Remediated	<i>For library status.</i> The vulnerable library has been remediated.
Reported	<i>For library status.</i> Default status when a library with vulnerabilities is detected by Contrast.
rule	A rule is a security control used to identify a vulnerability or attack event. If the rule matches, the agent sends a vulnerability or attack event to Contrast for the affected application.
runtime application self-protection (RASP)	Contrast uses RASP methods to monitor attacks and actively defend applications in production.
score	Contrast provides <a href="#">library (page 483)</a> and <a href="#">application (page 748)</a> scores that reflect the current security situation for your applications or libraries.
security assertion markup language (SAML)	SAML is an XML-based standard used to create and exchange security information between online partners, such as single sign-on authentication.
security incident event management (SIEM)	SIEM systems collect and analyze security events and related data from other systems to support threat detection, compliance, and securi-

	ty incident management. Contrast integrates with several leading SIEM systems.
sensitive data masking	This feature redacts sensitive data in Contrast logs and other data transmissions from the Contrast agent, without affecting how that data is processed by the application.
single sign-on (SSO)	Single sign-on is an authentication or user identification service that gives users access to multiple systems with only one set of credentials.
sink	In <a href="#">data flow analysis (page 530)</a> , the sink is where data ends. A sink is any external format or location to which data is written.
Software Composition Analysis (SCA)	Identify vulnerable libraries, fail a build based on CVE severity, and view a dependency tree to understand the dependencies between libraries and where vulnerabilities have been introduced.
software development life cycle (SDLC)	The series of steps by which ideas become software that is used by people.
source	In <a href="#">data flow analysis (page 530)</a> , the source is where data starts. A source is any input data or request that enters a system.
SQL injection (SQLi)	A SQL Injection attack inserts or "injects" a SQL query within user input data from the client to get it into the application. The intent is to read or modify database data or send commands to the database ( <a href="#">for example</a> ).
stack trace	A stack trace lists the sequence of events that led to a failure. For Contrast, the stack trace shows the events that led to a security vulnerability.
static application security testing (SAST)	A method of finding potential vulnerabilities in applications without installing or running the application.
web application firewall (WAF)	A WAF inspects and filters web traffic to defend applications from common attacks.
webhook	Integration method that sends real-time data from one application to another via HTTP every time a specified event occurs.

## Roles and permissions

Permissions and capabilities are granted to users depending on the role they are assigned. Roles exist at the [application \(page 744\)](#), [organization \(page 745\)](#) and (for on-premises customers) [system \(page 747\)](#) levels. Most of these roles are defined when a user is assigned to an [access group \(page 637\)](#).

You can also:

- [View your own permissions \(page 422\)](#)
- [Manage organization permissions \(page 637\)](#)
- [Manage system permissions \(page 700\)](#)
- [Grant Protect permissions \(page 708\)](#)



**NOTE**

API-Only users can access Contrast's REST API, but can't log in to the user interface. Contrast doesn't recommend the creation of administrator API accounts.

**Application roles**

Application roles give users permissions and capabilities within a particular application. Application roles are assigned to [access groups \(page 637\)](#).

Use these application roles to grant permissions and capabilities within an application:

**View**

The View role for applications (Application Viewer) has read-only access to the Contrast interface to see scores, libraries, vulnerabilities and comments, but cannot perform edits to traces to the application.

**View Permission Details (Application)** ✕

<p><b>Application</b></p> <ul style="list-style-type: none"> <li><input type="radio"/> Archive</li> <li><input type="radio"/> Delete</li> <li><input type="radio"/> Edit</li> <li><input type="radio"/> License</li> <li><input type="radio"/> Merge</li> <li><input type="radio"/> Reset</li> <li><input type="radio"/> Restore</li> <li><input checked="" type="radio"/> Tag</li> <li><input checked="" type="radio"/> View</li> </ul>	<p><b>Vulnerabilities</b></p> <ul style="list-style-type: none"> <li><input type="radio"/> Delete</li> <li><input type="radio"/> Discussion</li> <li><input type="radio"/> Edit</li> <li><input checked="" type="radio"/> Export</li> <li><input checked="" type="radio"/> HTTP Replay</li> <li><input type="radio"/> Merge</li> <li><input type="radio"/> Send to Bugtracker</li> <li><input checked="" type="radio"/> Tag</li> <li><input checked="" type="radio"/> View</li> </ul>	<p><b>Libraries</b></p> <ul style="list-style-type: none"> <li><input checked="" type="radio"/> Manifest</li> <li><input checked="" type="radio"/> Tag</li> <li><input checked="" type="radio"/> View</li> </ul> <hr/> <p><b>Report</b></p> <ul style="list-style-type: none"> <li><input type="radio"/> Generate</li> </ul> <hr/> <p><b>Architecture</b></p> <ul style="list-style-type: none"> <li><input type="radio"/> View</li> </ul>	<p><b>Policy</b></p> <ul style="list-style-type: none"> <li><input type="radio"/> Edit</li> <li><input checked="" type="radio"/> View</li> </ul> <hr/> <p><b>Exclusions</b></p> <ul style="list-style-type: none"> <li><input type="radio"/> Create</li> <li><input checked="" type="radio"/> View</li> </ul>
--	---	--	---

Done

**Edit**

The Edit role for applications (Application Editor) can remediate findings, add tags, manage vulnerabilities, edit attributes, merge applications, add or delete applications, and create servers. The majority of Contrast users have this role.

**Edit Permission Details (Application)** ✕

<p><b>Application</b></p> <ul style="list-style-type: none"> <li><input checked="" type="radio"/> Archive</li> <li><input type="radio"/> Delete</li> <li><input type="radio"/> Edit</li> <li><input type="radio"/> License</li> <li><input checked="" type="radio"/> Merge</li> <li><input type="radio"/> Reset</li> <li><input checked="" type="radio"/> Restore</li> <li><input checked="" type="radio"/> Tag</li> <li><input checked="" type="radio"/> View</li> </ul>	<p><b>Vulnerabilities</b></p> <ul style="list-style-type: none"> <li><input checked="" type="radio"/> Delete</li> <li><input checked="" type="radio"/> Discussion</li> <li><input checked="" type="radio"/> Edit</li> <li><input checked="" type="radio"/> Export</li> <li><input checked="" type="radio"/> HTTP Replay</li> <li><input checked="" type="radio"/> Merge</li> <li><input checked="" type="radio"/> Send to Bugtracker</li> <li><input checked="" type="radio"/> Tag</li> <li><input checked="" type="radio"/> View</li> </ul>	<p><b>Libraries</b></p> <ul style="list-style-type: none"> <li><input checked="" type="radio"/> Manifest</li> <li><input checked="" type="radio"/> Tag</li> <li><input checked="" type="radio"/> View</li> </ul> <hr/> <p><b>Report</b></p> <ul style="list-style-type: none"> <li><input checked="" type="radio"/> Generate</li> </ul> <hr/> <p><b>Architecture</b></p> <ul style="list-style-type: none"> <li><input type="radio"/> View</li> </ul>	<p><b>Policy</b></p> <ul style="list-style-type: none"> <li><input type="radio"/> Edit</li> <li><input checked="" type="radio"/> View</li> </ul> <hr/> <p><b>Exclusions</b></p> <ul style="list-style-type: none"> <li><input type="radio"/> Create</li> <li><input checked="" type="radio"/> View</li> </ul>
---	--	---	---

Done



**Rules Admin** The Rules Admin role for applications (Application Rules Admin) can edit rules and policies in the application, enable Protect, and manage notifications and scoring for the application.

**Rules Admin Permission Details** (Application) ✕

<p><b>Application</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Archive</li> <li><input type="checkbox"/> Delete</li> <li><input type="checkbox"/> Edit</li> <li><input type="checkbox"/> License</li> <li><input checked="" type="checkbox"/> Merge</li> <li><input type="checkbox"/> Reset</li> <li><input checked="" type="checkbox"/> Restore</li> <li><input checked="" type="checkbox"/> Tag</li> <li><input checked="" type="checkbox"/> View</li> </ul>	<p><b>Vulnerabilities</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Delete</li> <li><input checked="" type="checkbox"/> Discussion</li> <li><input checked="" type="checkbox"/> Edit</li> <li><input checked="" type="checkbox"/> Export</li> <li><input checked="" type="checkbox"/> HTTP Replay</li> <li><input checked="" type="checkbox"/> Merge</li> <li><input checked="" type="checkbox"/> Send to Bugtracker</li> <li><input checked="" type="checkbox"/> Tag</li> <li><input checked="" type="checkbox"/> View</li> </ul>	<p><b>Libraries</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Manifest</li> <li><input checked="" type="checkbox"/> Tag</li> <li><input checked="" type="checkbox"/> View</li> </ul> <hr/> <p><b>Report</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Generate</li> </ul> <hr/> <p><b>Architecture</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> View</li> </ul>	<p><b>Policy</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Edit</li> <li><input checked="" type="checkbox"/> View</li> </ul> <hr/> <p><b>Exclusions</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Create</li> <li><input checked="" type="checkbox"/> View</li> </ul>
--	---	---	---

Done

**Admin** The Admin role for applications (Application Administrator) has no restrictions and can manage other users' access to the application.

**Admin Permission Details** (Application) ✕

<p><b>Application</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Archive</li> <li><input checked="" type="checkbox"/> Delete</li> <li><input checked="" type="checkbox"/> Edit</li> <li><input checked="" type="checkbox"/> License</li> <li><input checked="" type="checkbox"/> Merge</li> <li><input checked="" type="checkbox"/> Reset</li> <li><input checked="" type="checkbox"/> Restore</li> <li><input checked="" type="checkbox"/> Tag</li> <li><input checked="" type="checkbox"/> View</li> </ul>	<p><b>Vulnerabilities</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Delete</li> <li><input checked="" type="checkbox"/> Discussion</li> <li><input checked="" type="checkbox"/> Edit</li> <li><input checked="" type="checkbox"/> Export</li> <li><input checked="" type="checkbox"/> HTTP Replay</li> <li><input checked="" type="checkbox"/> Merge</li> <li><input checked="" type="checkbox"/> Send to Bugtracker</li> <li><input checked="" type="checkbox"/> Tag</li> <li><input checked="" type="checkbox"/> View</li> </ul>	<p><b>Libraries</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Manifest</li> <li><input checked="" type="checkbox"/> Tag</li> <li><input checked="" type="checkbox"/> View</li> </ul> <hr/> <p><b>Report</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Generate</li> </ul> <hr/> <p><b>Architecture</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> View</li> </ul>	<p><b>Policy</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Edit</li> <li><input checked="" type="checkbox"/> View</li> </ul> <hr/> <p><b>Exclusions</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Create</li> <li><input checked="" type="checkbox"/> View</li> </ul>
--	---	---	---

Done

The **No Access** role blocks user access to the application.

You can add application roles when you [create or edit an organization access group \(page 637\)](#).

### See also

[View permissions \(page 422\)](#)

### Organization roles

Users may have different roles across different organizations.

Every user has a default role for the default organization.

These are the organization roles:

**View**

The View role for organizations (Organization Viewer) has read-only access to the Contrast interface to see scores, libraries, vulnerabilities and comments, but cannot perform edits to traces to the application.

**View Permission Details** (Organization) ✕

**General**

- Org Info
- Report Settings
- Score Settings

**Servers**

- Delete
- Edit
- License
- Tag
- View

**Security**

- Audit
- Get API Keys
- IP Range
- Rotate API Keys
- Password Policy
- Session Timeouts

**Integrations**

- Edit
- View

**Libraries**

- Manifest
- Tag
- View

**Policy**

- App Exclusions
- Assess Rules
- Library Policy
- Protection Policy
- Remediation Policy

Done

**Edit**

The Edit role for organizations (Organization Editor) can remediate findings, add tags, manage vulnerabilities, edit attributes, merge applications, add or delete applications, and create servers. The majority of Contrast users have this role.

**Edit Permission Details** (Organization) ✕

**General**

- Org Info
- Report Settings
- Score Settings

**Servers**

- Delete
- Edit
- License
- Tag
- View

**Security**

- Audit
- Get API Keys
- IP Range
- Rotate API Keys
- Password Policy
- Session Timeouts

**Integrations**

- Edit
- View

**Libraries**

- Manifest
- Tag
- View

**Policy**

- App Exclusions
- Assess Rules
- Library Policy
- Protection Policy
- Remediation Policy

Done

**Rules Admin** The Rules Admin role for organizations (Organization Rules Admin) can edit rules and policies in the application, enable Protect, and manage notifications and scoring for the organization.

**Rules Admin Permission Details** (Organization) ✕

<p><b>General</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Org Info</li> <li><input type="checkbox"/> Report Settings</li> <li><input checked="" type="checkbox"/> Score Settings</li> </ul> <hr/> <p><b>Servers</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Delete</li> <li><input type="checkbox"/> Edit</li> <li><input type="checkbox"/> License</li> <li><input checked="" type="checkbox"/> Tag</li> <li><input checked="" type="checkbox"/> View</li> </ul>	<p><b>Security</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Audit</li> <li><input checked="" type="checkbox"/> Get API Keys</li> <li><input type="checkbox"/> IP Range</li> <li><input type="checkbox"/> Rotate API Keys</li> <li><input type="checkbox"/> Password Policy</li> <li><input type="checkbox"/> Session Timeouts</li> </ul> <hr/> <p><b>Integrations</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Edit</li> <li><input type="checkbox"/> View</li> </ul>	<p><b>Libraries</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Manifest</li> <li><input checked="" type="checkbox"/> Tag</li> <li><input checked="" type="checkbox"/> View</li> </ul> <hr/> <p><b>Policy</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> App Exclusions</li> <li><input checked="" type="checkbox"/> Assess Rules</li> <li><input checked="" type="checkbox"/> Library Policy</li> <li><input checked="" type="checkbox"/> Protection Policy</li> <li><input checked="" type="checkbox"/> Remediation Policy</li> </ul>
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[Done](#)

**Admin** The Admin role for an organization (Organization Administrator) is responsible for the configuration and management of the organization.

**Admin Permission Details** (Organization) ✕

<p><b>General</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Org Info</li> <li><input checked="" type="checkbox"/> Report Settings</li> <li><input checked="" type="checkbox"/> Score Settings</li> </ul> <hr/> <p><b>Servers</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Delete</li> <li><input checked="" type="checkbox"/> Edit</li> <li><input checked="" type="checkbox"/> License</li> <li><input checked="" type="checkbox"/> Tag</li> <li><input checked="" type="checkbox"/> View</li> </ul>	<p><b>Security</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Audit</li> <li><input checked="" type="checkbox"/> Get API Keys</li> <li><input checked="" type="checkbox"/> IP Range</li> <li><input checked="" type="checkbox"/> Rotate API Keys</li> <li><input checked="" type="checkbox"/> Password Policy</li> <li><input checked="" type="checkbox"/> Session Timeouts</li> </ul> <hr/> <p><b>Integrations</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Edit</li> <li><input checked="" type="checkbox"/> View</li> </ul>	<p><b>Libraries</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Manifest</li> <li><input checked="" type="checkbox"/> Tag</li> <li><input checked="" type="checkbox"/> View</li> </ul> <hr/> <p><b>Policy</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> App Exclusions</li> <li><input checked="" type="checkbox"/> Assess Rules</li> <li><input checked="" type="checkbox"/> Library Policy</li> <li><input checked="" type="checkbox"/> Protection Policy</li> <li><input checked="" type="checkbox"/> Remediation Policy</li> </ul>
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[Done](#)

You assign organization roles by [adding users to an organization access group \(page 637\)](#).

**See also**

[View permissions \(page 422\)](#)

**System roles**



**NOTE**

These roles are only available to on-premises customers.

When deciding how to [manage system administration \(page 700\)](#), you can use these roles to assign permissions and capabilities:

- A **SuperAdmin** is responsible for the installation and setup of on-premises instances. They may also be responsible for the system administration of Contrast, however, this may be assigned to one or more System Administrators. **SuperAdmins** can configure organizations, applications, servers, vulnerabilities, users and groups.
- A **ServerAdmin** is identical to a SuperAdmin except without access to users or groups. They have access to the **ServerAdmin** option in the user menu, which allows them to configure organizations, applications, servers and vulnerabilities.
- A **System Administrator** is responsible for maintaining organizations and groups. They have access to the **SuperAdmin** option in the user menu, which allows them to configure organizations, applications, servers, vulnerabilities, users and groups.
- A **System Observer** has read-only access to organizations, users, applications, groups and traces. They have read-only access to the **Observer** option in the user menu, which allows them to view organizations, applications, servers, vulnerabilities and users.
- The **No Access** role for a particular organization blocks users from that organization.

## Application scoring guide

The application score helps you gauge the general performance of each application.

Scores are based on how much of the application has been exercised, as well as the amount and severity of vulnerabilities found for that application.

Numeric scores map to letter grades that are shown in Contrast:

- **A:** 90-100
- **B:** 80-89
- **C:** 70-79
- **D:** 60-69
- **F:** 35-59

To calculate the application score, find the average of the application's [library score \(page 483\)](#) and the custom code score.

To calculate the custom code score, start with 100 points and subtract penalty points for the number of vulnerabilities found in your application times a penalty weight for their severity, shown here:

- **Critical:** Multiply the number of vulnerabilities by 20
- **High:** Multiply the number of vulnerabilities by 10
- **Medium:** Multiply the number of vulnerabilities by 5
- **Low:** Multiply the number of vulnerabilities by 1

Vulnerabilities are weighted differently depending on how likely they are to be exploited and how serious the effects would be.

For example, a SQL injection is considered **Critical** because automated tools exist to exploit them without expertise. An attacker who doesn't know anything about your application or schema can exfiltrate your entire database contents.

On the other hand, using a hashing algorithm like SHA-1 is considered **Low** because it has been known to exhibit serious weaknesses. Also it requires the resources of a very skilled attacker with extensive backing.

**TIP**

For example, to calculate your application score:

First determine your custom code score. If your application had 0 **Critical**, 1 **High**, 2 **Medium** and 1 **Low** vulnerability, your custom code score would be:

$$100 - (20 \times 0) - (10 \times 1) - (5 \times 2) - (1 \times 1) = 79$$

If you are running Contrast on an application with a library score of 85 and a custom code score of 79, your application score would be 82 which would be a B.

$$85 + 79 = 164$$

$$164 / 2 = 82$$

To improve your score:

- [Enable Protect rules \(page 610\)](#) and CVE shields to remove protected vulnerabilities from the score calculation.
- Remediate **Critical** and **High** vulnerabilities in your custom code.
- Address the vulnerable libraries.
- Update **High risk** libraries.

## Library scoring guide

Contrast provides letter grades for the security of your application's libraries so that you can use them as a reference point during analysis. The grades map to scores as follows:

- A: 90 - 100
- B: 80 - 89
- C: 70 - 79
- D: 60 - 69
- F: 35 - 59

Scores are based on three penalty factors:

- **Time:** The age of the library is calculated based on the number of full years between the release of the latest version and the version used in the application, multiplied by 2.5.
- **Status:** The status is calculated based on the number of versions that have been released since the current library in your application, multiplied by 10.
- **Security:** The CVE penalty of the library is the highest severity of all known CVEs for this library, multiplied by 10.

**NOTE**

Organization administrators can [adjust the scoring method \(page 648\)](#) to include only security criteria.



**TIP**

For example:

If you're using a library from January 2010 and the latest version came out in September 2013, the number of full years passed is two. So your time penalty would be:

$$2 \times 2.5 = 5$$

If you're using Version 1.1.1, but Versions 1.1.2 and 1.1.3 have been released, your penalty would be:

$$2 \times 10 = 20$$

If you have a library with the scores 2.4 and 2.2, the penalty would be:

$$2.4 \times 10 = 24$$

The final score of the library is calculated by subtracting each of the three penalty values from 100.

$$100 - 5 - 20 - 24 = 51$$

A score of 51 maps to a letter grade of F.

## Log levels

The log level setting controls which events are processed by server logging, and can help you more effectively capture events. They can be [configured at a system level \(page 693\)](#) or for a [particular server \(page 470\)](#) by any user with Editor permissions.

Log levels follow the Log4j standard and honor their level designations as much as possible.

INFO is the default value. ERROR level is sufficient in most cases, unless a problem occurs and you need to collect more detailed metrics.

Log level	Description
ERROR	Gives information about a serious error that needs to be addressed and may result in an unstable state.
WARN	Gives a warning about an unexpected event to the user. The messages coming out of this level may not halt the progress of the system.
INFO	Gives the progress and chosen state information. This level is useful for the end user.
DEBUG	Helps the developer debug the application. Level of the message logged is focused on providing support to an application developer.
TRACE	Gives more detailed information than the DEBUG level.

## Events and generic webhook variables

You can customize your [generic webhook \(page 573\)](#) response with data from Contrast events such as `NEW_VULNERABILITY` and `SERVER_OFFLINE`. Each event contains [general \(page 575\)](#), [application \(page 575\)](#), [server \(page 575\)](#) or [vulnerability \(page 575\)](#) variables you can call in your payload request.

Event	Variables
ATTACK_END	<a href="#">General (page 575)</a> , <a href="#">Application (page 574)</a> , <a href="#">Server (page 575)</a>
ATTACK_EVENT_COMMENT	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a> , <a href="#">Server (page 575)</a>
ATTACK_UPDATE	<a href="#">General (page 575)</a> , <a href="#">Application (page 575)</a> , <a href="#">Server (page 575)</a>

Event	Variables
EXPIRING_LICENSE	General (page 575), Application (page 575)
NEW_ASSET (if new application)	General (page 575), Application (page 575) and Server (page 575) (if new application)
NEW_ATTACK_APPLICATION	General (page 575), Application (page 575), Server (page 575)
NEW_ATTACK_UPDATE	General (page 575), Application (page 575), Server (page 575)
NEW_ATTACK	General (page 575), Application (page 575), Server (page 575)
NEW_VULNERABILITY_COMMENT	General (page 575), Application (page 575), Server (page 575), Vulnerability (page 575)
NEW_VULNERABILITY	General (page 575), Application (page 575), Server (page 575), Vulnerability (page 575)
NEW_VULNERABLE_LIBRARY	General (page 574), Application (page 575)
SERVER_OFFLINE	General (page 575), Server (page 575)
VULNERABILITY_CHANGESTATUS_CLOSED	General (page 575), Application (page 575), Server (page 575), Vulnerability (page 575)
VULNERABILITY_CHANGESTATUS_OPEN	General (page 575), Application (page 575), Server (page 575), Vulnerability (page 575)
VULNERABILITY_DUPLICATE	General (page 575), Application (page 575), Server (page 575), Vulnerability (page 575)

## Generic webhook variables

You can customize your [generic webhook \(page 573\)](#) response with data from Contrast events such as `NEW_VULNERABILITY` and `SERVER_OFFLINE`. Each event contains variables you can call in your payload request. Variables are either for general use or for an application, server or vulnerability.

Variables	Description
<b>General variables</b>	
<code>\$EventType</code>	The event type responsible for triggering the webhook For example: <code>SERVER_OFFLINE</code>
<code>\$Message</code>	A message summarizing the event that triggered the webhook
<code>\$OrganizationId</code>	The unique ID Contrast assigns to an organization when it is created
<code>\$OrganizationName</code>	The name of your organization
<code>\$Title</code>	Always returns "Contrast Security"
<b>Application variables</b>	
<code>\$ApplicationChild</code>	Returns true if the application is a child application, false if not
<code>\$ApplicationCode</code>	A secondary shorthand that appears in the title of an application, and is blank by default For example: <code>TEST</code>
<code>\$ApplicationContext-Path</code>	The context path of the application For example: <code>/example/somethingelse</code>
<code>\$ApplicationFirstSeen</code>	When the application was first seen, in Unix time For example: <code>1572033840000</code>
<code>\$ApplicationHasParentApp</code>	Returns true if the application has a parent, false if not
<code>\$ApplicationImportance</code>	Enumerated value of the application Importance level For example: <code>MEDIUM</code>
<code>\$ApplicationId</code>	The unique ID Contrast assigns to an application when it is created For example: <code>49fe2978-1833-4441-83db-2b7o486d9413</code>
<code>\$ApplicationImportanceDescription</code>	The importance level assigned to the application For example: <code>Medium</code>
<code>\$ApplicationLanguage</code>	The programming language of the application
<code>\$ApplicationLastSeen</code>	When the application was last seen, in Unix time For example: <code>1572033840000</code>
<code>\$ApplicationLicense-Level</code>	Whether or not the application has an Assess license Values: <code>Licensed, Unlicensed</code>

Variables	Description
\$ApplicationMaster	Returns true if the application is a primary application, false if not
\$ApplicationName	The name of the application
\$ApplicationParentAppId	The unique ID Contrast assigns to an application when it's created, in this case, the parent application, if it exists  For example: 49fe2978-1833-4441-83db-2b70486d9413
\$ApplicationTags	A comma separated list of the Application tags.
\$ApplicationTotalModules	The number of modules your application has
<b>Server variables</b>	
\$Environment	The environment of the server For example: DEVELOPMENT or PRODUCTION
\$ServerId	The ID of the server involved in the event  If more than one server is involved, this is a comma-delimited list of server IDs.
\$ServerName	The name of the server involved in the event  If more than one server is involved, this is a comma-delimited list of server names
<b>Vulnerability variables</b>	
\$Severity	If this event is triggered by a vulnerability, this is the severity of the vulnerability
\$Status	If this event is triggered by a vulnerability, this is the status of the vulnerability
\$TraceId	If this event is triggered by a vulnerability, this is the vulnerability ID
\$VulnerabilityAgentLanguage	The application language or framework name of the where the vulnerability was discovered (for example, .Java, .NET, Ruby, and so forth.)
\$VulnerabilityAppVersionTags	The application versions the vulnerability is found in  For example: v1.2.3
\$VulnerabilityAutoRemediatedExpirationPeriod	Auto-remediated expiration period for the vulnerability, in Unix time  For example: 1572033840000
\$VulnerabilityBugTrackerTickets	A comma delimited list of tickets created when the vulnerability was sent to bugtracker  For example: ticket1, ticket2, ticket3
\$VulnerabilityCategory	The category of vulnerability found For example: Injection
\$VulnerabilityClosedTime	When the vulnerability was closed, in Unix time  For example: 1572033840000
\$VulnerabilityConfidence	Confidence of the vulnerability
\$VulnerabilityDefaultSeverity	Default severity of the vulnerability
\$VulnerabilityDiscovered	When the vulnerability was first discovered, in Unix time  For example: 1572033840000
\$VulnerabilityEvidence	The evidence of the vulnerability
\$VulnerabilityInstanceIdUuid	The unique ID Contrast assigns to a vulnerability instance when it is created  For example: R33T-N00B-TGIF-RM6P
\$VulnerabilityFirstTimeSeen	When the vulnerability was first seen, in Unix time For example: 1572033840000
\$VulnerabilityImpact	The impact level of the vulnerability Values: Low, Medium, High
\$VulnerabilityLastTimeSeen	Last time the vulnerability was seen, in Unix time For example: 1572033840000
\$VulnerabilityInstanceLastTimeSeen	Last time the vulnerability was seen, in Unix time For example: 1572033840000
\$VulnerabilityLicenseLevel	License level of the vulnerability
\$VulnerabilityLikelihood	The likelihood of the vulnerability  Values: Low, Medium, High



Variables	Description
\$VulnerabilityReportedToBugTracker	When the vulnerability was sent to a bugtracker, in Unix time For example: 1572033840000
\$VulnerabilityReportedToBugTrackerTime	Returns true If the vulnerability was sent to a bugtracker
\$VulnerabilityRule	Rule associated with the vulnerability
\$VulnerabilityRuleName	Name of the rule associated to the vulnerability
\$VulnerabilityRuleTitle	Title of the rule associated to the vulnerability
\$VulnerabilitySubStatus	Substatus of the vulnerability
\$VulnerabilityTags	Custom tags associated with the vulnerability For example: my-custom-tag
\$VulnerabilityTitle	Title of the vulnerability
\$VulnerabilitySubStatusKeyCode	Key code of the vulnerability substatus
\$VulnerabilityTotalTracesReceived	Total number of times the vulnerability was received
\$VulnerabilityUuid	The unique ID used to look up a vulnerability
\$VulnerabilityVisible	true if the vulnerability is licensed and visible, false if not
\$VulnerabilityRule	If event is triggered by a vulnerability, this is the rule that the vulnerability violated
\$VulnerabilityTags	If event is triggered by a vulnerability, this is a comma-delimited list of tags associated with the vulnerability

## Regular expression reference

Use this table, and the examples below, for reference when [creating application exclusions \(page 622\)](#):

Effect	Pattern	Example pattern	Example match
Start of a string	^	^w+	Start of a string
End of a string	\$	w+\$	End of a string
Case-insensitive match of following string	(?i)	(?i)%0a	%0a or %0A
A single character of: a, b or c	[abc]	[abc]+	a bb ccc
A character except: a, b or c	[^abc]	[^abc]+	Anythingbutabc.
A character in the range: a-z	[a-z]	[a-z]+	Only a-z
A character not in the range: a-z	[^a-z]	[^a-z]+	Anythingbuta-z.
A character in the range of: a-z or A-Z	[a-zA-Z]	[a-zA-Z]+	abc123DEF
Any single character	.	.+	abc
Any whitespace character	\s	\s	anywhitespacecharacter
Any non-whitespace character	\S	\S+	any non-whitespace
Any digit	\d	\d	not 1 not 2
Any non-digit	\D	\D+	not 1 not 2
Zero or one of a	a?	ba?	ba b a
Zero or more of a	a*	ba*	a ba baa aaa ba b
One or more of a	a+	a+	a aa aaa aaaa bab baab
Exactly 3 of a	a{3}	a{3}	a aa aaa aaaa
3 or more of a	a{3,}	a{3,}	a aa aaa aaaa aaaaaa
Between 3 and 6 of a	a{3,6}	a{3,6}	a aa aaa aaaa aaaaaa aaaaa
Period (dot) is a literal character	.	a.b	string.string

## Supported browsers

Contrast is web-based application for HTML5, and the interface is based on React and AngularJS. It works well with the latest version of any modern browser. Contrast actively tests our product in the **current and last major version** of the following browsers:

- Chrome
- Edge
- Firefox
- Safari

Opera browsers or older versions of Internet Explorer, Firefox, or Safari browsers may still work with Contrast, but some features may not display as intended.

## Contrast Beta Terms and Conditions

Contrast beta products and features adhere to these conditions:

- This product is in active development and undergoing continuous improvements.
- These beta products are provided as-is without warranty of any kind.
- Since beta products are still in development, there may be issues. Do not use beta versions in production environments.
- Customers may be required to sign additional agreements in order to use beta products.
- The beta program is for qualified users who want early access to new features and enhancements, and who agree to provide feedback. Please send comments, questions or bug reports about beta products to [support@contrastsecurity.com](mailto:support@contrastsecurity.com).

## Privacy and data collection

It's important that Contrast Security understands how customers are using our products so they can be improved. This information helps Contrast Security resolve problems and fix bugs.

We collect data through:

- [System diagnostics \(page 730\)](#)
- [.NET Framework and .NET Core agent telemetry \(page 172\)](#)
- [Ruby telemetry \(page 395\)](#)
- [Python telemetry \(page 344\)](#)

The collected data is anonymous and does not contain application data. It is collected by Contrast Security, and is never shared. It is governed by [Contrast Security's Privacy Policy](#).

Protecting your privacy is important to us. If you suspect we are collecting sensitive data or the data is being insecurely or inappropriately handled, send an email to [security@contrastsecurity.com](mailto:security@contrastsecurity.com) for investigation.

# Release News

The Release News is published every month with highlights from all Contrast releases.

The latest agent release notes are available here:

[Java \(page 793\)](#)

[.NET Framework \(page 823\)](#)

[.NET Core \(page 845\)](#)

[Node.js \(page 872\)](#)

[Go \(page 936\)](#)

[Python \(page 906\)](#)

[Ruby \(page 924\)](#)

[PHP \(page 945\)](#)

## March (3.10.2)

Contrast 3.10.2 on-premises was released on April 19, 2023. Download a [PDF of the 3.10.2 documentation](#).

### New and improved

- Added Message Queue Support for Java (Kafka). (PROD-2151)
- The Contrast .NET Core agent now supports Azure ServiceBus Triggers in Assess for Azure Functions. (PROD-2158)
- Compliance reports now include the latest standard for PCI DSS v4. (PROD-2387)
- Created an entry in the Contrast Hub for the Software Bill of Materials (SBOM) of the latest EOP release. (PROD-2450)

### Security bug fixes

- Customer IP restrictions applied in Teamserver during Impersonation workflow. (COMP-244)
- Organization administrators can no longer edit a SuperAdmin's user settings if the SuperAdmin is a member of their organization. (COMP-226)

### Bug fixes

- Fixed "Internal Server Failure" when opening the Overview tab of some NodeJS application vulnerabilities. (TS-23973)
- CSV file export from the Route Coverage tab will now honor the currently configured view when filtering by session - so the export will only include routes matching the chosen set of session\_metadata. (TS-23027)
- Fixed display of virtual patch names where the name showed up as "rule.name.null". (TS-23799)
- Fixed the inability to assign licenses to organizations (403 response code) when the license file contained only Assess instances. (TS-23045)
- Fixed error when uninstalling on-premises Contrast instances on Linux. (TS-23044)

## February (3.10.1)

Contrast 3.10.1 on-premises was released on March 15, 2023. Download a [PDF of the 3.10.1 documentation](#).

### New and improved

- The Contrast PHP Agent now supports applications written with the Symfony framework. (PROD-1552)
- The Contrast dashboard's summary elements now link directly to the data they are summarizing. Navigating between the dashboard and its underlying data is simpler and more direct than ever. Beta version. (PROD-1911)

- Route Coverage CSV file export via the API can now include an agentSessionId to allow the export of routes that match a given set of session\_metadata. (TS-22425)
- Try out the new [Projects \(page 537\)](#) experience to run SCA on non-instrumented applications by [installing v2 of the CLI \(page 509\)](#) from npm.

## Security bug fixes

- TeamServer EOP packaged with an updated version of JRE - jdk-v11.0.16+8. (COMP-291)
- SuperAdmins can be removed from an organization by Organization Administrators. (COMP-238)

## Bug fixes

- When on the latest version of a library - display “up to date” instead of the version number. (SCA-608)
- Under some circumstances, if a library had an associated CVE that was subsequently removed, the removal did not take effect in on-premises Contrast installations. (SCA-683)
- Attacks performed against a module of a merged application would show up in the application overview but the target of the corresponding hyperlink only showed attacks against the parent. (TS-20125)

## January (3.10.0)

Contrast 3.10.0 on-premises was released on February 15, 2023. Download a [PDF of the 3.10.0 documentation](#).

## New and improved

- Protect licensing update. Contrast Security will no longer place a cap on Protect licenses and will alert users if they have gone over their purchased amount. The Superadmin will now have to go into the License summary on the Organizations page to allocate licenses. No customer action is required. (PROD-1499)
- The Software Bill of materials (SBOM) report now meets the minimum requirements for the National Telecommunications and Information Administration (NTIA). Information now includes supplier details and component relationships. (PROD-2194)
- Ability to configure the on-premises instance to ensure super admin access even if an LDAP configuration is misconfigured. (TS-18955)

## Security bug fixes

- Upgraded JRE bundle (openjdk11) to v11.0.17 (Oracle’s recommended security baseline for JDK 11). (COMP-291)

## Bug fixes

- Session Metadata filtering in the Route coverage grid will now correctly filter exercised routes to only show those associated with the filter. (TS-22269)
- Host validation would bypass any proxy configuration (on-premises instances only) when configuring webhook integration. The proxy is now correctly honored. (TS-22403)
- Fix to the issue where changes to associated applications for an existing Azure DevOps integration changes were not being saved. (TS-22091)
- Fix to the issue where JIRA integrations did not correctly display “options-with-child” fields. (TS-21666)

## December (3.9.11)

Contrast 3.9.11 on-premises was released on January 18, 2023. Download a [PDF of the 3.9.11 documentation](#).

## New and improved

- Contrast now enables users to filter the applications list by the “Score” field. (PROD-1910)

## Bug fixes

- Fix to occasional 403 when opening a vulnerability in the case where a user is a member of more than one organization. (TS-21471)
- Fix to ensure that active attacks have an “end”. This issue caused searches to produce no results if an old attack didn’t “end” within the search window. (TS-21406)
- Fix to regression that caused bugtracker integrations not to be marked unavailable if an auto-create fails. (TS-21611)

## November (3.9.10)

Contrast 3.9.10 on-premises was released on December 14, 2022. Download a [PDF of the 3.9.10 documentation](#).

Please note that starting with v3.9.10, we will no longer be providing a TeamServer installer that includes the bundled SCA library data. Unbundling the SCA library data significantly reduces the binary size and allows us to offer an improved installation experience.

- For an air-gapped installation, you need to [download this data manually](#).
- If you have internet access, you can configure your system to [update this data automatically](#).

## New and improved

- Added support for the Chi framework in the Go agent for Contrast Assess. (PROD-2312)
- Added `contrast learn` command to Contrast CLI, which launches Contrast’s Secure Code Learning Hub. (PROD-2306)
- Improved handling of tags in the vulnerability list to address readability when the number of tags would otherwise cause the vulnerability name to be obscured. (TS-19594)

## Security fixes

- Authentication and Authorization added to API Playground. (COMP-261)
- Contrast CLI patched for arbitrary command injection. (COMP-249)

## Bug fixes

- Ability to lock or unlock users in Contrast On-Premises installations when SSO is in use. (TS-21171)

## October (3.9.9)

Contrast 3.9.9 on-premises was released on November 18, 2022. Download a [PDF of the 3.9.9 documentation](#).

## New and improved

- Added support for Go 1.19 in the Go agent. (PROD-2299)
- New Contrast CLI with improved SCA (including SBOM) and scan features. (PROD-2275)
- Enabled setting up exclusions for message queues. (PROD-2089)
- Added message queue support for JMS MQ. JMS 2.0, which includes IBM MQ 9.2.x and Spring JMS 2.4. Reach out to your customer service representative to enable it in your environment. (PROD-1846)
- Added support for .NET 7 for the .NET Core agent. (PROD-1819)

- Implemented session metadata filters on Route and Vulnerability grids to view vulnerabilities and route information for a specific branch, build, committer, repository, or any custom session metadata a user selects. (PROD-1698)
- Implemented the ability to create exclusions based on input and URL to suppress events from security analysis in the Ruby and Python agents (NET and Java already support this). This leads to better performance and accuracy. (PROD-1034,PROD-1035)

## Security fixes

- Added feature flag to enable BIRT reporting (TS-20400\_enable\_birt-reporting) - can be disabled (set false) to address potential security concerns in Contrast on-premises. (TS-20400)

## Bug fixes

- Internal Server Error when saving application exclusions. (TS-20557)
- Route Coverage Exclude icon available for users without the necessary permissions leading to a 403 when clicked. (TS-19873)

## September (3.9.8)

Contrast 3.9.8 on-premises was released on October 19, 2022. Download a [PDF of the 3.9.8 documentation](#).

## New and improved

- The .NET Framework and .NET Core agent installers now include Agent Explorer, a separate GUI application that provides high-level information about locally running .NET and .NET Framework agents. Use Agent Explorer to see high-level information such as:
  - application and server reported by the agent
  - agent configuration
  - agent version, language, and runtime
  - list of applications deployed to IIS and/or IIS Express and which are currently instrumented (PROD-2271)
- New [Contrast GitHub Action for SCA](#) that can automatically check open source dependencies on pull requests. (PROD-2126)
- Added a new event for the Generic Webhook integration called `VULNERABILITY_DELETE` that gets triggered whenever a user deletes a vulnerability via API or UI. The support article can be found [here](#). (PROD-2124)
- Contrast SuperAdmin on-premises (EOP) users can now configure proxy settings via JVM arguments during EOP startup. (PROD-1841)
- Added the ability to set secrets for the Generic Webhook integration. The support article can be found [here](#). (PROD-1840)
- For hosted (SaaS) customers, a flag is now available at the organization level to enable and disable Impersonation access. This feature can be modified via the System Administrator or Organization Administrator API. Impersonation is turned off by default. (PROD-1807)
- New APIs were created as of the 3.9.7 and 3.9.8 releases for users to more easily identify application vulnerability and route coverage data associated with a given session. Recall a session requires *session metadata* to be set.
  - **Lookup session by metadata:** <https://github.com/Contrast-Security-OSS/contrast-teamserver-api-docs/blob/main/saas-restapi-v3/metadata/Agent%20Session%20Open%20Api/4b4c0f41069d6785d344869bdb170838.md>
  - **Get most recent session:** <https://github.com/Contrast-Security-OSS/contrast-teamserver-api-docs/blob/main/saas-restapi-v3/metadata/Agent%20Session%20Open%20Api/dd02ffacc13d42936a6667e8429d9bd9.md>

- **Filter application vulnerabilities by agentSessionId:** <https://github.com/Contrast-Security-OSS/contrast-teamserver-api-docs/blob/main/saas-restapi-v3/application/Application%20Vulnerability%20Filtering/9a363fa74f0ebb6dee94af6b2658ad27.md>
- **Pull route coverage metrics by agentSessionId:** <https://github.com/Contrast-Security-OSS/contrast-teamserver-api-docs/blob/main/saas-restapi-v3/coverage/Route%20coverage/58f5d8f0b42bf18432646d37fb05eeee.md>

Ultimately, to return vulnerabilities or route data by session, a user needs the agentSessionId. The IDs can be returned by using the first call or the second call. The first call returns all sessions that correspond to the given session metadata values. Note the user must append the metadata label and values as shown below:

```
% curl -X POST
'https://apptwo.contrastsecurity.com/Contrast/api/ng/organizations/3c3a73d6-78a0-46c7-
-HAccept:application/json \
-H "Content-Type: application/json" \
-HAuthorization:REDACTED \
-HAPI-Key:REDACTED \
-d '{"metadata": [
  {"label": "branchName", "values": ["test-branch"]},
  {"label": "committer", "values": ["Some Dev", "Another Dev"]}
]}'
```

The second call returns the most recent session. It requires no filters. See below:

```
curl
'https://apptwo.contrastsecurity.com/Contrast/api/ng/organizations/3c3a73d6-78a0-46c7-
-HAccept:application/json \
-HAuthorization:REDACTED \
-HAPI-Key:REDACTED
```

Using the agentSessionId, the user can filter the route or vulnerability calls to return data only for that session. These APIs enable easier access to session-based data, which in turn allows users to gate builds or conduct other analyses based on data specific to that build. (PROD-1698)

- The PHP agent now supports PHP 8.1. (PROD-1657)
- Users will now be able to view a dependency tree for merged applications to help locate how vulnerable libraries were introduced for the merged application. (PROD-953)
- Users can now search libraries by CVE number while using the library search bar. (PROD-765)
- The performance of the **Send Vulnerability** window, which is part of the Jira integration, has been improved with a type-ahead solution for the **Reporter** field and **Default Assignee** selection. (CUST-3292)

## Bug fixes

- Change to the method of string concatenation for feature keys (for example vulnerability\_uuid) to prevent heap exhaustion experienced by on-premises customers. (TS-19909)
- Additional style options available when creating custom footers in on-premise installations to provide more control over sizing. (TS-19891)
- Add entry to audit log when severity of a vulnerability is changed in the vulnerabilities grid - previously only logged when changed via the Policy Management options. (TS-19129)
- “How to fix” for Clickjacking vulnerability updated for clarity. (TS-18828)
- Fix to on-premises installer to carry over existing JRE and Memory settings when upgrading. (TS-19726)
- Fix to prevent Protect from being re-enabled if config setting to enable is subsequently removed from the agent configuration file. (TS-17755)

## August (3.9.7)

Contrast 3.9.7 on-premises was released on September 21, 2022. Download a [PDF of the 3.9.7 documentation](#).

### New and improved

- For library remediation, users without Administrator permissions will now require Administrator approval when closing vulnerabilities. (PROD-1939)
- Library results can now be filtered by environment to easily find any vulnerable libraries in Production. (PROD-1884)
- A flag is now available at the organization level to enable and disable Impersonation access. This feature can be modified via the System Administrator or Organization Administrator API. Impersonation is turned off by default. (PROD-1807)
- Library export now contains policy violation indications in the CSV/XML file. (PROD-1771)
- Created a diagnostic tool in the Go agent to help users easily gather and send diagnostics information when submitting a troubleshooting ticket. (PROD-1765)
- Added filters to select vulnerability burndown data across any custom time range up to 12 months to help users view data trends for a set of applications, including details about vulnerabilities and remediations over time. (PROD-1700)
- The PHP agent now supports Drupal versions 8 and 9 for Assess and SCA. (PROD-1527)
- Added a new data visualization module to help users view important data on the number of vulnerabilities closed versus the number of vulnerabilities open over time. This module can be feature flagged ON upon request. Please note that the vulnerability status reflected in the UI will be the same as the data in Contrast, so please ensure that vulnerability management practices (such as manual vulnerability closure or a 2-way bugtracker integration) or auto-verification policies have been adopted. (PROD-897)

### Security fixes

- Improved de-duplication for .NET libraries. (OSS-2156)

### Bug fixes

- API Endpoint / api/ng/<ORGID>/orgtraces/filter?status=CONFIRMED returning a 400 status code. (TS-18720)
- Deletion of merged applications sometimes results in a failure. (TS-18490)
- Missing navigation between vulnerabilities (for example "< 3 of 29 >"). (TS-13528)
- "Error executing request" when bulk deleting vulnerabilities in some cases. (TS-17928)
- Incorrect vulnerability count when filtering by environment. (TS-14346)
- Some Node library details not populated due to a timeout retrieving data from back end. (OSS-3158)
- .NET libraries not included in export. (OSS-3153)

## July (3.9.6)

Contrast 3.9.6 on-premises was released on August 24, 2022. Download a [PDF of the 3.9.6 documentation](#).





## IMPORTANT

Support for MySQL 5.7 will end on August 31, 2022. After that, the Contrast system will require MySQL 8.0.

Contrast Security will no longer support earlier versions of the Contrast server using MySQL 5.7 or fix any critical bugs for those versions.

On-premises customers using their own MySQL installation will need to upgrade to 8.0 prior to upgrading the Contrast server.

On-premises customers using the MySQL instance bundled with the Contrast installer will be automatically upgraded to MySQL 8.0 when running the installer for Linux 3.9.0 and Windows 3.9.3.

If you are using the bundled MySQL on a Linux installation, no action is necessary, but please ensure that your installation platform does not exceed the documented system requirements.

## New and improved

- Enhanced logging available for organization audits on system or super admin level activity.
- Parent applications now show which vulnerabilities and routes are associated with which child application with a filter in the respective grid. This will enable easier triage and analysis of vulnerability and route data associated with child applications.
- New diagnostics tool for .NET that allows you to easily gather and send information from your yaml configuration or environment variables to receive faster support.
- Users now have increased visibility into vulnerability, library, and route details for children of a merged application. Vulnerability and Route Coverage grids add an application filter. (TS-12586, TS-12587, TS-12588)
- Improvements to performance of Application Vulnerabilities tab when vulnerabilities have many sessions with metadata. (TS-17228)

## Security fixes

- Resolved an issue where multifactor-authentication could be bypassed. (TS-17065)
- Resolved IDOR where any user can check the progress of a job if job ID is guessed/known. (TS-17303)

## Bug fixes

- Creating new users failed with “Invalid Form” errors when LDAP or AD is in use, due to a regression. (TS-18612)
- When a server dropped offline, users were notified hourly as opposed to just once. (TS-18094)
- Closing all open vulnerabilities results in the inability to subsequently display them due to a missing drop down option. (TS-17883)
- “Send to Bugtracker” does not work for child applications not configured in connection. (TS-17715)

## Archive

### January - June 2022

#### June (3.9.5)

Contrast 3.9.5 on-premises was released on July 20, 2022. Download a [PDF of the 3.9.5 documentation](#).



#### IMPORTANT

Support for MySQL 5.7 will end on August 31, 2022. After that, the Contrast system will require MySQL 8.0.

Contrast Security will no longer support earlier versions of the Contrast server using MySQL 5.7 or fix any critical bugs for those versions.

On-premises customers using their own MySQL installation will need to upgrade to 8.0 prior to upgrading the Contrast server.

On-premises customers using the MySQL instance bundled with the Contrast installer will be automatically upgraded to MySQL 8.0 when running the installer for Linux 3.9.0 and Windows 3.9.3.

If you are using the bundled MySQL on a Linux installation, no action is necessary, but please ensure that your installation platform does not exceed the documented system requirements.

### New and improved

- Contrast can now create Jira tickets in an optional epic when Contrast is auto-creating tickets.
- Vulnerability statuses are now reported in the correct sequence when route-based auto verification is enabled.
- The Contrast .NET Azure Site Extension now supports Azure Functions.
- Developers can now access Contrast API documentation from <https://api.contrastsecurity.com>.
- The Contrast [GitHub Action for Scan](#) is now available as a [starter workflow](#).

### Security fixes

- Removed logging of LDAP configuration (sensitive information). (TS-17304)
- Added stricter validation to user first/last name. (TS-17357)
- Updated authorization check for several APIs to check for org-level authorization. (TS-17462)
- Updated X-XSS-Protection response header value. (TS-17305)
- Updated dependency Okio to 3.1.0. (TS-16064)

### Bug fixes

- Updating users failed with "Invalid Form" errors due to special characters. (TS-17494)
- Jira integration won't save when assignee field is configured for a user. (TS-17716)
- Attack events are slow to load on some applications. (TS-17565)
- Contrast web interface freezes experienced when selecting libraries from search results. (TS-17405)
- Allow URL exclusions to accept more than three escaping slashes \. (TS-17064)
- EOP installer on Windows fails when setting non-default database directory. (TS-16954)

- `/route/filter` endpoint not returning expected results for `session_metadata`. (TS-16610)
- Add Security Control form not allowing some valid API signatures. (TS-15919)
- Vulnerabilities not accurately filtered by environments in the Contrast web interface. (TS-15470)
- "New Server" notifications were sent for applications not configured in the notifications system. (TS-1415)
- The Server tab is slow to load when there is excessive tagging in the Contrast web interface. (TS-17442)
- Totals in Attack overview are incorrect in the Contrast web interface. (TS-16058)

## May (3.9.4)

Contrast 3.9.4 on-premises was released on June 24, 2022. Download a [PDF of the 3.9.4 documentation](#).



### IMPORTANT

Support for MySQL 5.7 will end on August 31, 2022. After that, the Contrast system will require MySQL 8.0.

Contrast Security will no longer support earlier versions of the Contrast server using MySQL 5.7 or fix any critical bugs for those versions.

On-premises customers using their own MySQL installation will need to upgrade to 8.0 prior to upgrading the Contrast server.

On-premises customers using the MySQL instance bundled with the Contrast installer will be automatically upgraded to MySQL 8.0 when running the installer for Linux 3.9.0 and Windows 3.9.3.

If you are using the bundled MySQL on a Linux installation, no action is necessary, but please ensure that your installation platform does not exceed the documented system requirements.

## New and improved

- The [Contrast GitHub action for Scan](#) can now scan .NET and Javascript projects automatically on every code push or pull request.
- The `standalone_app_name` setting is no longer required to install the Java agent.
- Contrast now checks for any new or updated CVEs every 30 minutes.
- SBOM reports now support SPDX format.
- A cleaner view of route coverage in the web interface shows fewer servers and no longer displays deleted servers in the list of servers.

## Security fixes

- Updated dependency Okio. (TS-16476)
- Resolved session fixation issues. (TS-16447, TS-16684).

## Bug fixes

- Application dashboard's vulnerability tab fails to open. (SUP-3764, SUP-3787)
- Inconsistency in the number of vulnerabilities between application's overview and vulnerability pages. (SUP-3776)

- Error licensing an application with large amounts of vulnerability instances. (SUP-3799)
- Receiving 400 bad response errors using the Contrast Python SDK. (SUP-3721)
- Intermittent 403 errors when logging into Contrast (on-premises). (SUP-3696)
- New vulnerability notifications not being sent in some hosted (SaaS) environments. (SUP-3813)
- On-premises Contrast service crashing due to open file limits. (TS-16887)
- Route deletion appears to function for users with limited permissions. (SUP-3742)
- Microsoft Teams integration not filtering properly by environment. (SUP-3730)
- Score not showing for unlicensed applications. (SUP-3675)
- API documentation not available with on-premises WAR deployments. (SUP-3575)

### April (3.9.3)

Contrast 3.9.3 on-premises was released on May 17, 2022. Download a [PDF of the 3.9.3 documentation](#).

### New and improved

- On-premises Windows users can upgrade to the 3.9.3 version Contrast which also includes embedded MySQL 8.
- You can now configure whether library data should be retained when server clean up runs. On server clean up, if you want to retain the library data, opt in.
- When using the endpoint that allows an exclusion by route ID, or the one that excludes by filtering for multiple routes, you no longer have to close a vulnerability during route exclusions.
- Added a new Assess rule to identify JNDI Injection vulnerability. This gives Assess even more complete coverage to detect Log4j vulnerabilities.
- Triage and analysis of parent and child apps is now easier and more efficient:
  - Individual child-app route coverage, grade, and language information is surfaced.
  - The `/modules` endpoint, that returns information on child apps with “coverage” and “scores” parameters, now also includes parent app information.
  - You will also see a separate column for child-app information under **Route coverage, Vulnerabilities and Applications**.
- CVSS is used to report the severity of CVEs. CVSS 3.1 is the latest standard. Contrast is now compatible with CVSS 3.1. Contact support to request CVSS 3 scoring be enabled and this will immediately update all CVEs.

### Security fixes

- Updated various out-of-date Bouncy Castle crypto libraries. (TS-11188)

### Bug fixes

- Excluded routes shown in API response with `quickFilter` parameter. (SUP-3739)
- Java agent fails to start if the server is deleted and re-enabled. (SUP-3703)
- Unable to send vulnerability to Jira project with a create screen without assignee. (SUP-3553)
- Jira configurations with application importance showing up for non-applicable applications. (SUP-3603)
- YAML file bundled with .NET Framework agent from Windows on-premises has bad linefeeds. (SUP-3689)
- **Servers and Applications** filter in the web interface does not sort alphabetically with merged apps. (SUP-3449)
- API endpoint discovered could sometimes be less than exercised. (SUP-3439)
- Renamed server name does not show up in vulnerability filter. (SUP-3048)

### March (3.9.2)

Contrast 3.9.2 on-premises was released on April 13, 2022. Download a [PDF of the 3.9.2 documentation](#).



## IMPORTANT

- Contrast 3.9.2 on-premises is being released **for Linux only**.
- For latest details around Spring4Shell, a large-scale, high-impact vulnerability, please see this [support bulletin](#). If you have questions or concerns please contact us at [support@contrastsecurity.com](mailto:support@contrastsecurity.com).
- By late summer 2022, the Contrast service will no longer be required for Python, Go, Ruby and Node.js agents. The Contrast Node.js agent version 3.X will EOL in June 2022.

## New and improved

- Contrast now has a [PHP agent \(page 261\)](#).
- [Go agent \(page 936\)](#) users can now [configure the agent \(page 397\)](#) to report directly to Contrast, removing the need to install the Contrast service. In addition to simplifying installation and maintenance of the Contrast agent, this allows support for vulnerability detection for gRPC APIs written with the `google.golang.org/grpc` module.
- The [Java agent \(page 793\)](#) added a new Protect rule, Class Loader Manipulation, to provide additional hardening against exploits like Spring4Shell and others.
- When a LDAP or Active Directory identity store is unavailable due to connectivity issues, SuperAdmin users whose accounts reside in the local Contrast database will now be able to log onto the system.
- Contrast Serverless now has a native [Jira integration \(page 590\)](#) so that you can more consistently remediate vulnerabilities across development teams.
- Now when you run a [report \(page 546\)](#), you can more easily see which vulnerabilities align with the latest OWASP API compliance standards. Additionally, the compliance policy and security standard for the OWASP Top 10 2021 is now visible in the attestation report generator.

## Bug fixes

- Jira integration fails to load when fields are left empty. (TS-15606)
- Excluding all routes for an application in the Contrast web interface removes the ability re-add them. (TS-15299)
- Security standards and attestation reports failing to generate. (TS-15680)
- Some vulnerabilities failing to load in the Contrast web interface due to 500 error codes. (TS-13242)
- Exporting libraries from one application in the Contrast web interface would result and exporting all libraries. (OSS-2632)
- Unable to render application page in Contrast web interface after enabling compliance policies. (TS-13677)
- Two-way integration with Jira not syncing status changes from Jira. (INT-1136)

## Security fixes

- Updated various out-of-date libraries including: `common-compress`, `aws-java-sdk-s3`, `xmlsec`, `jQuery`, `bootstrap`, `tomcat`, `Spring` and more.
- Updated authentication error message to be more vague.
- Removed Elastic Search Library and usage.
- Replaced MySQL Connector.

## February (3.9.1)

Contrast 3.9.1 on-premises was released on March 16, 2022. Download a [PDF of the 3.9.1 documentation](#).



## IMPORTANT

Contrast 3.9.1 on-premises is being released **for Linux only**.

### New and improved

- You can now create a full SBOM report for merged applications.
- Contrast now supports GraphQL APIs when instrumenting your .NET Core application.
- Contrast Verify is a GitHub action that makes sure no new vulnerabilities are introduced with a pull request. It checks against a Job Outcome Policy or an open-vulnerability threshold that you define through an input parameter. Available on the [GitHub Marketplace](#).

### Security bug fixes

- Upgraded `common-compress` library. (TS-14042)
- Upgraded `mysql-connector-java` library. (TS-13173)
- Upgraded `aws-java-sdk-s3` library. (TS-13174)
- Removed unauthorized user system message. (TS-12979)
- Upgraded Tomcat to 9.0.55 for on-premises. (TS-12930)
- ContrastHub upgrades to jQuery, jQuery-UI, and bootstrap libraries (TS-11370)

### Bug fixes

- When the New Asset notification was enabled for specific applications, notifications were being sent for newly onboarded apps outside of that scope. (TS-14150)
- When making API calls with an API-Only user, the Last Login timestamp for that user was not being populated. (TS-13290)
- If the global search field is left populated and specific navigation occurs, the “X” to clear the search field will no longer work. (TS-13519)

### January (3.9.0)

Contrast 3.9.0 on-premises was released on March 1, 2022. Download a [PDF of the 3.9.0 documentation](#).



## IMPORTANT

- Contrast 3.9.0 on-premises is being released **for Linux only**.
- As of 3.9.0, Linux on-premises Contrast supports MySQL 8. All on-premises Linux customers should upgrade to MySQL 8 by summer 2022 when support for MySQL 5.7 ends. [Learn more](#).
- As of July 2022, with the launch of the Contrast Java agent 4.X, Java 6 and 7 will no longer be supported. [Learn more](#).

### New and improved

- A new tool to make installing and configuring agents easier is here in Beta. The [Contrast agent configuration editor](#) helps you create a YAML configuration file from scratch, by checking YAML and recommending the proper settings based on agent type. You can also upload, edit and validate existing YAML or download new files for local use. [Learn more \(page 34\)](#).

- The workflow for installing the .NET Core agent from the Contrast web interface has been updated to clarify language and allow for use of custom fields. Only the .NET Framework and .NET Core agent for IIS installers will be available for download from Contrast. For all other agents, please refer to [each agents' instructions \(page 30\)](#) to learn how to install them with their respective package managers.

## Security bug fixes

- Upgraded `aws-java-sdk-s3` in [Contrast Hub](#) to remediate CVE-2020-28491 in the sub-dependency `jackson-dataformat-cbor` 2.6.7. (TS-13174)
- Upgraded `jquery`, `jquery-ui`, and `Bootstrap` libraries on Contrast Hub to avoid reflected XSS vulnerabilities. (TS-11370)
- Upgraded `commons-compress.jar`. (TS-11190)
- Disabled ability to write to a server's agent log file without restriction. (TS-10262)
- Deprecation of TLS 1.0 on Community Edition and hosted (SaaS) servers. (PROD-341, PROD-1591)

## Bug fixes

- The reflected XSS rule is incorrectly classified as Critical instead of Moderate. (PROD-1350)
- When authenticating a request to Jira, a 401 error is returned. (SUP-3374)
- When hovering over a server in the servers tab, the container may be shown as "unknown". (TS-11544)
- When an organization has a compliance policy enabled, the Application page fails to load. (TS-12607)
- Using the `quick_filter` parameter to filter vulnerabilities returned by the Contrast Python SDK results in a 500 error. (INT-1049)
- When exporting a subset of vulnerabilities to CSV, an incorrect selection of findings are included in the resultant file. (TS-13567, TS-13635)
- When filtering vulnerabilities in an application by environment, vulnerabilities tied to deleted servers are shown incorrectly. (TS-13203)

## July - December 2021

### December Release News (3.8.11)

#### December (3.8.11)

Contrast 3.8.11 on-premises was released on January 11, 2022. Download a [PDF of the 3.8.11 documentation](#).



#### IMPORTANT

All Contrast on-premises (EOP) customers should upgrade to Contrast version 3.8.10.1596449597 or higher and read this [Support Bulletin](#) for latest information on Log4j impact on Contrast applications.

## New and improved

- Contrast Serverless is now generally available! It features dynamic scanning, static scanning, graph visualization, and resource observability for your AWS Lambda environments.
- Contrast Scan now supports client-side JavaScript including jQuery. In addition to scanning Java files, you can now scan your JS files to find vulnerabilities.

- The Java agent now supports Scala applications.
- Both [Python \(page 290\)](#) and [Ruby \(page 344\)](#) agents have updated support to align with the languages' LTS policies.
- You can now use a toggle to group all vulnerabilities in by [sink](#). Fixing the code associated with a particular vulnerable sink can remediate all the vulnerabilities associated with that sink - making it the most efficient way to remediate.

### Bug fixes:

- Early versions of the 3.8.10 on-premises installer failed when connecting to MySQL 8x databases. (TS-13325)
- Exclusion rules for untrusted-deserialization could not be saved correctly in the Contrast web interface. (TS-13144)
- Session-based auto verification was continually marking some vulnerabilities as **remediated - auto verified** and back to **reported**. (TS12947)
- Total URL hits was inaccurate for servers with less than 7 days of activity. (TS-12919)
- Servers were incorrectly showing "Protect is Coming" when Protect was already enabled on the agent. (TS-12424)
- Webhooks were not using proxy settings from the Contrast web interface. (INT-915)
- Vulnerability timeline charts show wrong number of vulnerabilities for merged applications. (TS-10461)
- Vulnerability Mappings not populating from CSV imports. (OSS-2518)

### November (3.8.10)

Contrast 3.8.10 on-premises was released on November 30, 2021. Download a [PDF of the 3.8.10 documentation](#).

### New and improved

- Rules have been updated for Node.js exclusions.
- Ruby, Python and Go installation process has been simplified in the Contrast web interface. Find the latest agent versions in their respective package managers.
- Improved performance for the Contrast Node.js agent with more efficient native functions and dead-zoning.

### Bug fixes

- Vulnerability option "Send to bugtracker" fails to open dialog. (TS-12455)
- **Cannot edit groups** incorrectly throws error "Group name is already taken." (TS-12428)
- Application page fails to load when organization has compliance policies set. (TS-12718)
- Server activity graph is not being populated. (TS-12572)
- Vulnerability tab is not accurately filtering by environment. (TS-12542)
- Edit user page could time-out when user is associated with a large amount of applications. (TS-12456)
- Attestation reports sometimes fail to generate. (TS-11769)
- Protect licenses not applied automatically to servers after automatic server cleanup. (TS-11375)
- Server page loads and searches taking inordinate amount of time with large server counts. (TS-10249)

### October 2021 (3.8.9)

- **On-premises release:** November 2, 2021 (Download a [PDF of 3.8.9.5 documentation](#))
- **Hosted release:** Continuous



## New and improved

- The .NET Core agent now discovers and reports trust boundary violation vulnerability types. This new rule is of medium severity.
- Contrast now offers a default configuration more optimized for performance. For the default, medium severity hard-coded password and hard-coded cryptographic key rules are turned off. You can still enable all rules for more comprehensive security testing when needed.
- The Contrast Node.js agent now supports applications running Node 16 LTS.
- The web interface for adding a Java agent is now improved, making it easier to get and install the Java agent.

## Important notes

- In our [September \(3.8.8\) \(page 769\)](#) release we announced the move to [eight designated IP addresses](#). We are happy to announce those changes are live, but we are extending support for our previous IP addresses while customers update to our new certificate authority, [GlobalSign](#). A certificate authority update may be required to fully implement the fixed IP solution. Please reach out to [support@contrastsecurity.com](mailto:support@contrastsecurity.com) if you have any questions.

## Agent versions released this month

The most recent version shown is bundled with the on-premises release.

- **Java:** [3.8.9.22387 \(page 810\)](#) | [3.8.9.22663 \(page 809\)](#)
- **.NET Framework:** [21.10.1 \(page 835\)](#)
- **.NET Core:** [2.0.2 \(page 861\)](#)
- **Node.js:** [3.11.10 \(page 896\)](#) | [3.11.11 \(page 895\)](#) | [3.11.12 \(page 895\)](#) | [4.3.0 \(page 893\)](#) | [4.4.1 \(page 893\)](#)
- **Python:** [4.13.0 \(page 915\)](#)
- **Ruby:** [4.12.0 \(page 931\)](#)
- **Go:** [2.0.0 \(page 942\)](#)

## Security bug fixes

These security related bugs have been fixed in the past month:

- Security library upgrades. (TS-11185, TS-11190, TS-11191, TS-11189)
- Limited brute-force login issue. (TS-11142)

## Bug fixes

These bugs have been fixed in the past month:

- Attestation reports fail to generate or include custom code vulnerabilities. (TS-12126)
- Resetting application may fail in the Contrast web interface when there are active agents. (TS-11553)
- Vulnerability merge button not selectable. (TS-11571)
- Users experiencing poor performance in vulnerabilities page with large number of items. (TS-10374, TS-9839)
- YAML download failing for Java agent when application metadata is preset. (TS-10132)
- URL count remains zero even when application is exercised. (TS-11939)
- Selecting vulnerability count on an archived application generates a 403 error. (TS-10767)

## September 2021 (3.8.8)

- **On-premises release:** October 5, 2021 (Download a [PDF of 3.8.8.4 documentation](#))
- **Hosted release:** Continuous

## New and improved

- You can now [download a Software Bill of Materials \(SBOM\) \(page 549\)](#) for your applications from the reports menu.
- You can now scan Java applications and automate scanning in a CI pipeline directly from the CLI.
- Just like the .NET Framework agent, the .NET Core agent now also discovers and reports stored XSS vulnerability types in instrumented applications.
- If your Contrast instance is on-premises in an airgap environment, or if you prefer alternate access to documentation, you can now access a versioned PDF of Contrast Documentation from the Release News (above).
- Added support for Go 1.17.

## Important notes

- Beginning September 17th, organization administrators using a hosted instance of Contrast must add the [eight designated IP addresses](#), otherwise agent and user traffic will be interrupted until the required IP addresses are allowed.  
By October 31st all traffic will be going to these address and you will no longer need to allowlist the Amazon IP space.
- The move to bundling MySQL 8 with the Contrast on-premises installer is being further tested to improve transition quality. Previously this was [announced as part of 3.8.8 \(page 772\)](#). It is being delayed to a future release.

## Agent versions released this month

The most recent version shown is bundled with the on-premises release.

- **Java:** [3.8.8.22125 \(page 810\)](#)
- **.NET Framework:** [21.9.2 \(page 834\)](#)
- **.NET Core:** [2.0.1 \(page 862\)](#)
- **Node.js:** [4.2.0 \(page 893\)](#)
- **Python:** [4.12.0 \(page 915\)](#)
- **Ruby:** [4.11.0 \(page 931\)](#)
- **Go:** [1.10.0 \(page 943\)](#) | [1.11.0 \(page 942\)](#)

## Security bug fixes

These security related bugs have been fixed in the past month:

- Failed login attempts that occur in rapid succession are not counted. (COMP-60)
- Teamserver is utilizing outdated and vulnerable libraries: `spring-web-5.2.9.release.jar` and `velocity-engine-core-2.0.jar`. (COMP-54)
- Including the Apache Tomcat version number in error messages provides potential attackers with this information. (COMP-53)
- The application is vulnerable to user enumeration during the login process. (COMP-38)

## Bug fixes

These bugs have been fixed in the past month:

- Changing `master` to `primary` impacts downstream integrations causing breaking changes. (Changes were reverted back to `master`).
- The `buildNumbers` filter is not included in the filter list causing the filter to fail. (TS-11484, 6618)
- Using a version picker custom field when logging tickets from Contrast in Jira results in error message. (INT-853)
- `ServerEnvironment` filter causes a 500 error. (INT-805)
- Error saving settings, when updating sampling for server in Contrast web interface. (TS-10765)
- Rules defaulted to ON cause performance degradation. (TS-7939)

- Attempting to select Attacks causes a 504 error when there is a large number of attacks. (TS-10691)

## August 2021 (3.8.7)

**On-premises release:** September 8, 2021

**Hosted release:** Continuous

### New and improved:

- With [Contrast Scan \(page 441\)](#) you can now test your build artifacts without having to set up a test environment or install an agent. Customers using a hosted version of Contrast can upload a build artifact to test for security vulnerabilities and conduct compliance-based security testing. Start a scan from a [Maven \(page 592\)](#) build integration, the Java SDK, CLI, API or the Contrast web interface.
- You can now filter vulnerabilities at the organization level to [find a subset of vulnerabilities \(from one application or more applications\) that originate from the same sink \(page 524\)](#). From there you can change the status, send multiple vulnerabilities to Jira, or export this set of vulnerabilities to other formats like CSV.
- You can now [exclude specific application routes \(page 438\)](#) from the route coverage calculation. Administrators can also include routes that were previously excluded if the attack surface of the application changes.
- The Ruby agent now offers full web application framework support for Grape.
- You can now define [security controls \(page 601\)](#) for the .NET Framework and .NET Core agents to prevent these agents from reporting a vulnerability on specific untrusted data.
- Customers who use Kenna can try our [Kenna integration](#) and [provide feedback](#).
- Customers who use Azure Sentinel can try our [Azure Sentinel integration](#) and [provide feedback](#).

### Important notes

- Beginning September 17th, organization administrators using a hosted instance of Contrast must add the [eight designated IP addresses](#), otherwise agent and user traffic will be interrupted until the required IP addresses are allowed.  
By October 31st all traffic will be going to these address and you will no longer need to allowlist the Amazon IP space.
- As of Node.js agent version 4.1.0 we no longer support Contrast Node.js agent versions 2.X.
- The move to bundling MySQL 8 with the Contrast on-premises installer is being further tested to improve transition quality. Previously this was [announced as part of 3.8.8 \(page 772\)](#). It is being delayed to a future release.

### Agent versions released this month:

The most recent version shown is bundled with the on-premises release.

- **Java:** [3.8.7.21531 \(page 811\)](#)
- **.NET Framework:** [21.8.1 \(page 834\)](#) | [21.9.1 \(page 834\)](#)
- **.NET Core:** [1.9.9 \(page 862\)](#) | [2.0.0 \(page 862\)](#)
- **Node.js:** [3.11.8 \(page 896\)](#) | [3.11.9 \(page 896\)](#) | [4.1.0 \(page 894\)](#)
- **Python:** [4.11.0 \(page 916\)](#) | [4.11.1 \(page 916\)](#)
- **Ruby:** [4.10.0 \(page 931\)](#)
- **Go:** [1.7.0 \(page 943\)](#) | [1.8.0 \(page 943\)](#) | [1.9.0 \(page 943\)](#)

### Bug fixes:

These bugs have been fixed in the past month:

- Users encounter display issues with the user menu and login pages in the Contrast Web interface. (SUP-2545, SUP-2291)

- Configuring LDAP with Anonymous binding fails with NPE. (SUP-3021)
- When setting up LDAP, entering a URL with a single letter into the Hostname field is disallowed. (SUP-3043)
- Saving a custom notification fails with an "internal server failure." (SUP-2993)
- When an agent re-detected a vulnerability with "Remediated" status, its status did not change to "Reported" if a session based auto-verification policy is set for another application. (SUP-3008)
- Entering a Japanese comment in the Contrast web interface displayed incorrectly in the Slack integration. (SUP-2979)
- Session metadata call has been changed from GET to POST for Python SDK. (SUP-2815)

## July 2021 (3.8.6)

**On-premises release:** August 10, 2021

**Hosted release:** Continuous

### New and improved:

- The Node.js agent release of version 4.0.0 brings improved performance with the Babel rewriter, startup caching, better testing, and required installation of Contrast service.
- Protect applications can now startup with a [default rule configuration \(page 613\)](#) that balances performance impact with security value for common attacks.
- Improve performance for the Python agent, including shorter startup time, reduced latency, and reduced CPU overhead.

### Important notes

- As of Contrast 3.8.8, the MySQL version that is bundled with the on-premises installer will be upgraded to version 8. If you are currently using the bundled MySQL 5.7 in your deployment, you will be upgraded to version 8 for Contrast versions 3.8.8 and later. (If you are using a distributed version of MySQL 5.7 or 8, this will not affect you.)

### Agent versions released this month:

The most recent version shown is bundled with the on-premises release.

- **Java:** [3.8.6.20712 \(page 812\)](#) | [3.8.6.21068 \(page 812\)](#) | [3.8.6.21910 \(page 811\)](#)
- **.NET Framework:** [21.7.1 \(page 834\)](#) | [21.7.2 \(page 834\)](#)
- **.NET Core:** [1.9.7 \(page 863\)](#) | [1.9.8 \(page 863\)](#)
- **Node.js:** [3.11.7 \(page 896\)](#) | [4.0.0 \(page 894\)](#) | [4.0.1 \(page 894\)](#)
- **Python:** [4.9.1 \(page 916\)](#) | [4.10.0 \(page 916\)](#)
- **Ruby:** [4.9.1 \(page 931\)](#)
- **Go:** [1.4.0 \(page 944\)](#) | [1.5.0 \(page 944\)](#)

### Bug fixes:

These bugs have been fixed in the past month:

- When attempting to filter vulnerabilities by module in Contrast, it's not possible to select the **Module** option. (SUP-2997, TS-10179)
- When sending vulnerabilities to an external bugtracker, auto-ticket creation will fail due to a regression. (SUP-2974, INT-734)
- When generating a security standards report, any server-side request forgery (SSRF) findings are erroneously excluded. (SUP-2920, TS-9529)
- When viewing the library stats for a merged application, the breakdown of libraries by **Years Out of Date** shows only libraries of the master application (SUP-2989, OSS-2232)
- When logging back into the Contrast web interface following a session expiration, the user is redirected to a 404 page. (TS-9946)

## January - June 2021

### June 2021

**3.8.5 on-premises release date:** July 13, 2021

#### New and improved:

- With improvements to route coverage in the Contrast web interface, you can delete multiple routes at once.
- Now when you select **Add agent** in the Contrast web interface, the process for installing the Java and .NET Core agents is clearer and simpler.
- The new [.NET Core installer \(page 182\)](#) improves the process for those installing the .NET Core agent for IIS-hosted applications.
- The Go agent is available to on-premises customers as of Contrast version 3.8.5.

#### Agent versions released this month:

- **Java:** [3.8.5.20294 \(page 813\)](#) | [3.8.5.20387 \(page 812\)](#) | [3.8.5.20504 \(page 812\)](#)
- **.NET Framework:** [21.6.1 \(page 836\)](#) | [21.6.2 \(page 836\)](#) | [21.6.3 \(page 836\)](#) | [21.6.4 \(page 835\)](#) | [21.6.5 \(page 835\)](#)
- **.NET Core:** [1.9.2 \(page 864\)](#) | [1.9.3 \(page 864\)](#) | [1.9.4 \(page 864\)](#) | [1.9.5 \(page 864\)](#) | [1.9.6 \(page 864\)](#)
- **Node.js:** [3.11.1 \(page 898\)](#) | [3.11.2 \(page 898\)](#) | [3.11.3 \(page 897\)](#) | [3.11.4 \(page 897\)](#) | [3.11.5 \(page 897\)](#)
- **Python:** [4.9.0 \(page 916\)](#)
- **Ruby:** [4.9.0 \(page 932\)](#)
- **Go:** [1.1.0 \(page 945\)](#) | [1.2.0 \(page 945\)](#) | [1.3.0 \(page 944\)](#)

#### Bug fixes:

These bugs have been fixed in the past month:

- When a user marks a vulnerability **Remediated** in the Contrast web interface, the status is not always changed back to **Reported** if the vulnerability is rediscovered. (SUP-2823, TS-8920)
- When the vulnerability severity breakdown for a merged application is obtained via the API, the response will not include child applications unless the `includeMerged` parameter is set to true. (TS-8352)
- When upgrading to EOP 3.8.4 with a custom Java installation, the Contrast server reverts to using the bundled JRE. (SUP-2906, TS-9319)
- When auto-ticket creation is enabled for the Contrast Jira integration, an incorrect field list will intermittently be used leading to failed ticket creation. (SUP-2901, INT-607)
- When a user visits the Contrast web interface, dates default to Japanese format as opposed to the users' locale. (SUP-2670, TS\_9051)
- When viewing the HTTP Info tab for a vulnerability, text formatting tags are exposed. (SUP-1937, TS-5418)

### May 2021

**3.8.4 on-premises release date:** June 1, 2021

#### New and improved:

- For hosted (SaaS) customers, Contrast now supports applications that use Golang. Support for on-premises customers will be included in the 3.8.5 release. The [Go agent \(page 396\)](#) instruments your application at build-time. It provides visibility into vulnerabilities within your custom code and third-party libraries (including CVEs), and a visualized dependency tree across your libraries and license reporting.

- You can [filter libraries \(page 474\)](#) to find high-risk libraries with a [security score of C or below \(page 483\)](#) and prioritize them for remediation.

#### Agent versions released this month:

- **Java:** [3.8.4.20143 \(page 813\)](#)
- **.NET Framework:** [21.5.1 \(page 837\)](#) | [21.5.2 \(page 837\)](#) | [21.5.3 \(page 836\)](#)
- **.NET Core:** [1.8.5 \(page 865\)](#) | [1.8.6 \(page 865\)](#) | [1.9.0 \(page 865\)](#) | [1.9.1 \(page 865\)](#)
- **Node.js:** [3.10.2 \(page 899\)](#) | [3.10.3 \(page 899\)](#) | [3.11.0](#)
- **Python:** [4.8.0 \(page 917\)](#)
- **Ruby:** [4.7.0 \(page 932\)](#)|[4.8.0 \(page 932\)](#)
- **Go:** [1.0.0 \(page 945\)](#)

#### Important notes:

- In August 2021, Microsoft will [end support for .NET Core 2.1](#). In accordance with Microsoft's support policy, the Contrast .NET Core agent will drop support for .NET Core 2.1 and 3.0 (which is already end of life) in August for hosted (SaaS) users, and for the 3.8.7 on-premises release.

#### Bug fixes:

These bugs have been fixed in the past month:

- When viewing the HTTP request of an attack event in the Contrast web interface, the URL being protected is not shown correctly. (TS-8655, SUP-2745)
- When viewing the OSS dependency tree, not all reported libraries are shown. (OSS-1350, SUP-2587)
- When using the automated server cleanup, a subset of servers remain. (TS-8661, SUP-2764)
- On-premises server opens the JMX port to query queue size and, if the port is blocked, repeatedly throws benign errors. (TS-8616, SUP-2591)
- When selecting **Libraries** in the header, the vulnerability status bar displayed doesn't match the severity of the vulnerabilities tied to the library. (TS-8872, SUP-2788)

### April 2021

**3.8.3 on-premises release date:** May 4, 2021

#### New and improved:

- Contrast Assess now identifies NoSQL injection vulnerabilities for .NET Framework and .NET Core applications running on MongoDB.
- For Python applications using the [Bottle web framework \(page 315\)](#), Assess can now detect vulnerabilities and Protect can now detect and block attacks.
- [Job outcome policies for Jenkins \(page 584\)](#) are now generally available. You can now drive CI/CD policy enforcement, standardize build success criteria across application teams, and improve mean time to remediation. Visit the [Support Portal](#) to learn how to meet key integration use cases and to use the public APIs for job outcome policies with non-Jenkins CI tools.
- A new Secure Code Warrior beta integration embeds links to vulnerability training in vulnerability's **How to fix** section in both the Contrast web interface and in IDE integrations. Visit the [Support Portal](#) and this [GitHub repository](#) to learn more about setting up this new integration. By installing this integration, you agree to the [Contrast Beta Terms and Conditions \(page 754\)](#).
- Contrast will now generate a notification when a new vulnerability is discovered on an existing library. To receive the new alerts, [set a library "New Vulnerability" notification \(page 422\)](#).
- The Contrast database now includes .NET Core and .NET Framework DLLs that are not part of the NuGet package manager. Vulnerabilities that are found in .NET framework DLLs will be reported, and you can view data on latest DLL updates available. These libraries will now also be [considered as part of the overall library score](#) for an application.

- The [dependency tree \(page 483\)](#) has received a number of enhancements including a summary of dependency risks, callouts for total vulnerabilities per library and tree views offering historical context.
- You will now see a warning message if a server is licensed for Protect, but a particular application on that server does not have [Protect enabled \(page 631\)](#).

#### Important notes:

- Node.js agent 4.X, the next major version, will be available in the June release (3.8.5 on-premises release). All Node.js developers should review the upcoming release to become familiar with new capabilities and performance improvements. For the best upgrade experience, please be aware of [these changes in the default behavior](#).

#### Agent versions released this month:

- **Java:** [3.8.3.19470 \(page 814\)](#) | [3.8.3.19749 \(page 814\)](#)
- **.NET Framework:** [21.4.1 \(page 838\)](#) | [21.4.2 \(page 837\)](#)
- **.NET Core:** [1.8.3 \(page 866\)](#)
- **Node.js:** [3.9.1 \(page 899\)](#) | [3.9.2 \(page 899\)](#) | [3.9.3 \(page 899\)](#) | [3.9.4 \(page 899\)](#) | [3.10.1 \(page 899\)](#)
- **Python:** [4.7.0 \(page 917\)](#)
- **Ruby:** [4.6.0 \(page 932\)](#)

#### Bug fixes:

These bugs have been fixed in the past month:

- When logging into Contrast using Azure IDP, a 405 error is sporadically thrown (TS-8083, SUP-2366)
- When calculating the Library Score for an Application, in rare scenarios a library can be scored -1 resulting in a skewed grade (OSS-1977, SUP-2695)
- When adding users through the bulk CSV API, the request fails when one of the users already exists (TS-5688, SUP-2127)
- When installing EOP on Windows, a number of benign warnings are logged to catalina.out (TS-3394, SUP-1478)

### March 2021

**3.8.2 on-premises release date:** April 6, 2021

#### New and improved:

- CSV and XML vulnerability exports will now include all the instances associated with a given vulnerability. You will see a new column labeled **Instance IDs** in the [vulnerability export \(page 532\)](#).
- When [viewing vulnerabilities \(page 523\)](#), you can now select the **Show licensed only** checkbox to filter vulnerabilities to show only those vulnerabilities that are from applications licensed for Assess.
- You can now see the offending URL for all Insecure Authentication Protocol vulnerabilities. Select the vulnerability, and you will see the URL in the **Overview** under **What happened?**
- The Node.js agent added support for the Validator library, the Python agent added support for Bottle, and the .NET Core and .NET Framework agents added support for the async functions for Assess.

#### Agent versions released this month:

- **Java:** [3.8.2.19027 \(page 815\)](#) | [3.8.2.19262 \(page 815\)](#)
- **.NET Framework:** [21.2.1 \(page 839\)](#) | [21.3.1 \(page 839\)](#) | [21.3.2 \(page 839\)](#) | [21.3.3 \(page 838\)](#) | [21.3.4 \(page 838\)](#) | [21.3.5 \(page 838\)](#)
- **.NET Core:** [1.8.1 \(page 866\)](#) | [1.8.2 \(page 866\)](#)
- **Node.js:** [3.8.3 \(page 900\)](#) | [3.8.4 \(page 900\)](#) | [3.8.5 \(page 900\)](#) | [3.8.6 \(page 900\)](#) | [3.9.0 \(page 899\)](#)

- **Python:** [4.5.0 \(page 918\)](#) | [4.6.0 \(page 917\)](#)
- **Ruby:** [4.4.1 \(page 933\)](#) | [4.5.0 \(page 932\)](#)

### Bug fixes:

These bugs have been fixed in the past month:

- When creating a new Pivotal Cloud Foundry Service for Contrast, a 403 error is thrown. (SUP-2677, TS-8134)
- When a server entry is deleted from Contrast and re-onboarded, it retains its previous configuration rather than honoring the latest configuration. (TS-7405, TS-7690)
- When querying the `/applications/filter` API endpoint, the `includeOnlyLicensed` parameter does not take effect. (SUP-2520, TS-7335)
- When an auto-remediation policy is run, vulnerabilities found on servers which have since been deleted from Contrast are not marked as remediated. (SUP-2405, TS-7165)
- When generating an attestation report, the report fails with the error, "The report cannot be accessed at this time." (SUP-2635, TS-7832)

## February 2021

**3.8.1 on-premises release date:** March 9, 2021

### New and improved:

- **Dependency confusion** is a new type of vulnerability where internal libraries may be replaced by potentially malicious libraries from public repositories. The Contrast CLI now warns you of Node.js libraries that are at risk for dependency confusion.  
This improvement is available to all Contrast customers. Further Centralized Dependency Confusion improvements will be available to customers with a Contrast OSS license.  
Learn more about dependency confusion in this [blog](#) or [webinar](#).
- The Contrast CLI was updated with a `--cve_threshold` command ([page 519](#)) to give you more control over when to fail a build.

### Agent versions released this month:

- **Java:** [3.8.1.18696 \(page 816\)](#) | [3.8.1.18814 \(page 815\)](#)
- **.NET Framework:** [21.1.4 \(page 839\)](#)
- **.NET Core:** [1.7.6 \(page 867\)](#) | [1.8.0 \(page 866\)](#)
- **Node.js:** [3.6.1 \(page 901\)](#) | [3.6.4 \(page 900\)](#) | [3.8.0 \(page 900\)](#)
- **Python:** [4.3.1 \(page 918\)](#) | [4.4.0 \(page 918\)](#)
- **Ruby:** [4.3.1 \(page 933\)](#) | [4.3.2 \(page 933\)](#) | [4.4.0 \(page 933\)](#)

### Bug fixes:

These bugs have been fixed in the past month:

- When querying for vulnerability details with the API with the `metadataFilters` parameter, a `NullPointerException` is thrown and a 500 response is returned. (TS-7322, SUP-2511)
- When viewing vulnerabilities in the Visual Studio IDE plugin, `unstyledData` tags are visible in the vulnerability overview. (TS-7239, SUP-2332)
- When sending notifications with the Slack, MS Teams or Generic Webhook integrations, placeholders for the Application name, Server name and other dynamic content are not resolved. (TS-7214, TS-7237, SUP-2389)
- When viewing a vulnerability found on a Server which has since been deleted, no Environment (Dev, QA or Prod) is shown. (TS-7162, SUP-2419)
- After adding a new application to a custom access group, the group may be hidden from Organization Administrators until they log out and log back in to Contrast. (TS-5784, SUP-2113)



## January 2021

**3.8.0 on-premises release date:** February 9, 2021

### Agent versions released this month:

- **Java:** [3.8.0.18219 \(page 817\)](#) | [3.8.0.18457 \(page 816\)](#)
- **.NET Framework:** [21.1.1 \(page 840\)](#) | [21.1.2 \(page 840\)](#) | [21.1.3 \(page 840\)](#)
- **.NET Core:** [1.7.3 \(page 868\)](#) | [1.7.4 \(page 867\)](#)
- **Node.js:** [3.5.1 \(page 901\)](#) | [3.6.0 \(page 901\)](#)
- **Python:** [4.3.0 \(page 919\)](#)
- **Ruby:** [4.3.0 \(page 933\)](#)

### Important notes:

- On June 30, 2021, support for communication to the multi-tenant Contrast SaaS system (<https://app.contrastsecurity.com>) using TLS 1.0 and 1.1 will be deprecated. All future communication will require TLS 1.2 or later. For further information please refer to [this support bulletin](#).

### New and improved:

- It is now possible to run the CLI when multiple configuration files exist. For users with multiple languages, specify the CLI language parameter with the `--language` command ([page 519](#)) in order for the CLI to run.

### Bug fixes:

These bugs have been fixed in the past month:

- When an application is reset in the Contrast web interface, the associated vulnerabilities persist. (TS-7129, SUP-2414)
- When querying for application details through the API, users intermittently receive a 403 response. (TS-6789, SUP-2336)
- When generating an attestation report, the download link is not posted to the notifications icon. (TS-6469, SUP-2258)
- When you use the **Select all** icon to export of the vulnerability list, not all vulnerabilities are exported. (TS-3378, SUP-1332)
- When viewing the **Activity** tab for a vulnerability which has undergone status changes, no activity is shown unless comments have also been added manually. (TS-6522, SUP-2212)

## July - December 2020

### December 2020

**3.7.11 on-premises release date:** January 8, 2021

### Agent versions released this month:

- **Java:** [3.7.11.17934 \(page 817\)](#)
- **.NET Framework:** [20.11.3 \(page 841\)](#) | [20.12.1 \(page 841\)](#) | [20.12.2 \(page 841\)](#)
- **.NET Core:** [1.7.1 \(page 868\)](#) | [1.7.2 \(page 868\)](#)
- **Node.js:** [3.4.1 \(page 901\)](#) | [3.5.0 \(page 902\)](#)
- **Python:** [4.2.0 \(page 919\)](#)
- **Ruby:** [4.2.0 \(page 934\)](#)

### Important notes:

- Beta users can view filtered data in one place, including app rating, route coverage, license usage and a vulnerability histogram by status, type and severity.

**New and improved:**

- You can now [set library policy \(page 628\)](#) on commercial third-party libraries.
- You can now [see which libraries are used \(page 480\)](#) by master applications and their merged applications. Some libraries may only be used in a single merged application while others may be used in several.
- On-premises customers using a proxy can now connect to our central server to get automatic updates for library data. This can be done under [system level proxy settings \(page 730\)](#).
- The Java agent now supports newer versions of Java including 13, 14, and 15.

**Bug fixes:**

These bugs have been fixed in the past month:

- When a user filters the application list to show unlicensed applications, a react error is thrown. (TS-6724, SUP-2316)
- For on-premises users, when a user is removed from a linked LDAP group, they are not removed from the corresponding Contrast access group. (TS-6379, SUP-2231)
- When there are multiple instances of a vulnerability, the detected environment is not correct for all instances. (TS-6451, SUP-2248)
- When a user changes the policy for the “semantic” SQL Injection rules, the agent doesn’t honor these changes.(DOTNET-2390, DOTNET-2431, SUP-2325)

**November 2020**

**3.7.10 on-premises release date:** December 1, 2020

**Agent versions released this month:**

- **Java:** [3.7.10.17525 \(page 818\)](#) | [3.7.10.17657 \(page 818\)](#)
- **.NET Framework:** [20.11.1 \(page 841\)](#) | [20.11.2 \(page 841\)](#)
- **.NET Core:** [1.6.1 \(page 869\)](#) | [1.6.2 \(page 868\)](#)
- **Node.js:** [3.3.0 \(page 902\)](#) | [3.4.0 \(page 902\)](#)
- **Python:** [3.5.1 \(page 920\)](#) | [4.0.0 \(page 920\)](#) | [4.1.0 \(page 920\)](#) | [4.1.1 \(page 919\)](#)
- **Ruby:** [4.0.0 \(page 934\)](#) | [4.1.0 \(page 934\)](#)

**Important notes:**

- As of December 1, 2020, Contrast will support only version 9 of Tomcat. This impacts on-premises customers running Contrast on Tomcat version 7. Customers who use the Contrast-supplied, embedded Tomcat should just upgrade to Contrast version 3.7.10 when it is released in December. Please refer to the [support bulletin](#) for more information.
- As of January 25, 2021, inbound traffic to the Contrast SaaS system will be moved from AWS Application Load Balancer to AWS CloudFront Content Delivery Network (CDN). If you are a hosted customer and have previously added an IP-based rule to your firewall that allows traffic to reach Contrast, you may need to take action. Please refer to the [support bulletin](#) for more information.

**New and improved:**

- [Runtime library usage \(page 480\)](#) has now been extended to include [merged applications \(page 428\)](#).
- Added support for instrumenting applications that use the Java 2 security manager for permissions.
- The .NET Core agent now supports .NET (Core) 5.0.
- Added Java 14 and 15 compatibility.
- Added support for .NET Core CLR instrumentation engine (CIE).

**Bug fixes:**

These bugs have been fixed in the past month:

- When viewing the vulnerability **Overview** and **How to fix** text, code snippets are incorrectly rendered. (TS-6375, SUP-2235)
- Selecting **Vulnerabilities** displays a 500 error in rare cases indicating that an entry exists without a corresponding vulnerability instance entry. (TS-5636, SUP-2178, SUP-2049)
- When using the form to create a library policy, performance is very slow when there are many libraries in the Organization. (TS-2084, SUP-1051)
- When viewing vulnerable libraries, some mapped CVEs are not displayed. (OSS-1465, SUP-2091)

## October 2020

**3.7.9 on-premises release date:** November 3, 2020

### Agent versions released this month:

- **Java:** [3.7.9.17038 \(page 819\)](#) | [3.7.9.17301 \(page 819\)](#)
- **.NET Framework:** [20.9.3 \(page 842\)](#) | [20.10.1 \(page 842\)](#) | [20.10.2 \(page 842\)](#)
- **.NET Core:** [1.5.19 \(page 869\)](#) | [1.5.20 \(page 869\)](#) | [1.5.21 \(page 869\)](#)
- **Node.js:** [3.1.1 \(page 902\)](#) | [3.2.0 \(page 902\)](#)
- **Python:** [3.4.2 \(page 921\)](#) | [3.5.0 \(page 920\)](#)
- **Ruby:** [3.16.0 \(page 934\)](#)

### Important notes:

- As of December 1, 2020, Contrast will support only version 9 of Tomcat. This impacts on-premises/non-SaaS customers running Contrast on Tomcat version 7. Customers who use the Contrast-supplied, embedded Tomcat should just upgrade to Contrast version 3.7.10 when it is released in December. Please refer to the [support bulletin](#) for more information.

### New and improved:

- Contrast OSS now shows more detailed data about libraries. You can see not only *if* a library is used, but *how much* that library is used. You can [analyze runtime library usage \(page 480\)](#) generally under **Libraries**, or in much more detail under **Applications**. Contrast now reports the exact classes that have been used by the application. Runtime library usage has been extended across all languages in our platform. (It was previously limited to Java and .NET Framework.)
- The .NET Framework agent is now compatible with the Azure ApplicationInsight APM tool. The ApplicationInsight agent runs in the Common Instrumentation Engine (CIE) runtime. The CIE is now supported and the Contrast .NET agent can be deployed in all environments alongside ApplicationInsight. This compatibility works out-of-the-box for Azure SaaS deployments when the Contrast .NET site extension is used.
- Added Hibernate 4 and 5 support for Java developers using JPA/JPQL, Hibernate JQL, native SQL and Criteria API data access.
- For Java users, you can now use profiles in a multi-tenant application configuration to apply individual options to each application.

### Bug fixes:

These bugs have been fixed in the past month:

- On-premises instances are unable to connect to Ardy. (TS-5698, SUP-2126)
- ReDoS Protect event causes null pointer exception. (JAVA-1771, SUP-2086)
- Java agent doesn't honor Websphere trust store configuration. (JAVA-742, SUP-772)
- Node.js is not emitting a Protect QUERY event in loopback. (NODE-1063, SUP-2009)
- When deleting route coverage data, transaction times out. (TS-5658, SUP-2064)

## September 2020

**3.7.8 on-premises release date:** September 29, 2020

**Agent versions released this month:**

- **Java:** [3.7.7.16532 \(page 820\)](#) | [3.7.7.16760 \(page 820\)](#)
- **.NET Framework:** [20.9.1 \(page 843\)](#) | [20.9.2 \(page 843\)](#)
- **.NET Core:** [1.5.17 \(page 870\)](#) | [1.5.18 \(page 870\)](#)
- **Node.js:** [3.0.0 \(page 902\)](#) | [3.1.0 \(page 902\)](#)
- **Python:** [3.3.1 \(page 921\)](#) | [3.3.2 \(page 921\)](#) | [3.3.3 \(page 921\)](#) | [3.4.0 \(page 921\)](#) | [3.4.1 \(page 921\)](#)
- **Ruby:** [3.15.0 \(page 934\)](#)

**New and improved:**

- The [Contrast CLI \(page 515\)](#) now returns details of the CVE's found on each library. This output can be [configured by setting a CVE severity threshold \(page 519\)](#) which will limit the output returned. The CLI can also return an exit code which can be used as part of a CI/CD pipeline to prevent vulnerable libraries from being deployed to production. CLI support has also been added for Gradle projects.
- A [Visual Studio Code extension \(page 596\)](#) is now generally available from Microsoft's [Marketplace](#), so you can receive a remediation experience native to your code editor.
- Contrast is now compatible with Java 13.
- [Route coverage \(page 434\)](#) is now available for Servlet API versions 2.4+ and 3.0+ on GlassFish web servers.
- The contrast [extension to Azure DevOps \(page 568\)](#) now has a [release gate \(page 569\)](#), in addition to a build task.
- Improved coverage and support for Spring 5 MVC and Spring Boot 2.X.

**Bug fixes:**

These bugs have been fixed in the past month:

- Liferay CMS accuracy needs improvement. (JAVA-1409, SUP-1663, SUP-1664, SUP-1711)
- .NET service restart causes IIS workers to fail to start. (DOTNET-1928, SUP-1818)
- Insecure Encryption Algorithm reported at incorrect code location. (NODE-1038, SUP-1852)
- Library bulk export failing to filter by application. (TS-5325, SUP-1928)
- On-premises instances replacing `log4j2.xml` on startup. (TS-3354, SUP-1422)

**August 2020**

**3.7.7 on-premises release date:** September 1, 2020

**Agent versions released this month:**

- Java: [3.7.7.16377 \(page 820\)](#) | [3.7.7.16256 \(page 821\)](#)
- .NET Framework: [20.8.4 \(page 843\)](#) | [20.8.2 \(page 838\)](#) | [20.8.1 \(page 843\)](#)
- .NET Core: [1.5.16 \(page 870\)](#) | [1.5.15 \(page 870\)](#) | [1.5.14 \(page 870\)](#) | [1.5.13 \(page 870\)](#)
- Node.js: [2.18.0 \(page 903\)](#) | [2.17.2 \(page 903\)](#) | [2.17.1 \(page 904\)](#)
- Python: [3.3.0 \(page 922\)](#) | [3.2.2 \(page 922\)](#) | [3.2.1 \(page 922\)](#)
- Ruby: [3.14.0 \(page 935\)](#) | [3.13.2 \(page 935\)](#) | [3.13.1 \(page 935\)](#)

**Important notes:**

- For Jenkins users, you can now try out centralized policy configuration. Create consistent build failure policies across teams while eliminating the need to define vulnerability thresholds in the plugin. This public beta feature is available to all Contrast administrators.

**Bug fixes:**

These bugs have been fixed in the past month:

- Organization Administrator unable to load access group details. TS-4745 (SUP-1769)
- Unable to view route coverage for merged child applications. TS-4028 (SUP-1632)
- Hash algorithm shown as “null” in insecure hash findings. TS-3087 (SUP-1407)
- Certain attack events missing from daily email digest. TS-4568 (SUP-1681)

## July 2020

**3.7.6 on-premises release date:** August 4, 2020

### New and improved:

This release brings several improvements that help CLI users collect information on library dependencies early on:

- Applications created using the CLI can now be assigned to an [organization group](#). (page 637)
- TLS now supports client side certificates for authentication.
- [Proxy server support](#) (page 67) has also been added.

### Bug fixes:

These bugs have been fixed in the past month:

- TS-4419 (SUP-1704) Library page was timing out.
- TS-4666, 3123 (SUP-1751, 1339) Vulnerability instance ID being used as opposed to the global vulnerability ID.
- TS-4259 (SUP-1645) Library scoring not refreshing in air-gapped on-premises Contrast installations.
- JAVA-1278 (SUP-1312) Java agent impacting handling of disabled TLS algorithms.
- TS-3647 (SUP-1599) Security Standards PDF report failing due to high number of backend components.

## Java - July 2020

**Language versions currently supported:** Java 1.6 - Java 11

**Agent versions released during the past month:** 3.7.5.15634, 3.7.6.16040

### New and improved:

- Added Spring support for Accessing Relational Data using JDBC.
- You can now access JPA Data with REST in Spring.

### Bug fixes:

These bugs were fixed during the past month:

- jaxrs/Jersey vulnerabilities not triggered due to losing track of tainted data.
- Race condition with CreateApp settings meaning Server level disabled rules are used.
- Protect false negative: Jackson unsafe deserialization (CVE-2017-17485).
- `finding-send` broken due to FrameworkManager bringing in dispatchers from `java.lang`.
- Agent fails to request permission before calling `setAccessible`.
- Command Injection in Protect received false positive from `argparse4j`.
- Agent on WebSphere changes handling of disabled TLS algorithms.
- Spring `PathVariable` is not detected as a source.
- Dataflow is lost through some Spring Util classes.
- False positive unvalidated forward in Tomcat with Spring `DeferredResult`.
- SQLi FP with `HttpClient`'s `RetryExec` with MariaDB
- False positive received with XSS Keyword.
- `-Dcontrast.rootapp` name ignored when `ServletContext.getServletContextName()` returns non-empty value.

## .NET Framework agent - July 2020

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Agent versions released during the past month:** 20.6.6, 20.7.2, 20.7.3, 20.7.4

### New and improved:

- Added `connect` to `contrast-dotnet-diagnostics` to test the agent's ability to connect to Contrast.
- Added `config-keys` to `contrast-dotnet-diagnostics` to display configuration options supported by the agent.
- Added `cert-info` to `contrast-dotnet-diagnostics` to display information about the certificate provided by the value of the `api.url` configuration setting.
- Improved the performance of Protect SQL-Injection detection.
- Improved the performance of Protect against XML-based inputs.
- Added `validate-yaml` to `contrast-dotnet-diagnostics` to verify the agent's `contrast-security.yaml` configuration file.

### Important notes:

- The agent's file analysis rules now execute within the context of the agent's sensors component. These rules will now execute in Azure App Service and Docker deployments. Previously these rules only executed in the agent's background Windows service component.

### Bug fixes:

- When a third-party profiler would be chained with Contrast, that profiler could instrument some internal Contrast methods which lead to some instability. This issue has been fixed now.
- The agent could fail to properly observe some Web API 2 routes. This issue has been fixed now.
- When an OWIN-based application was deployed to Azure App Service, the agent would cause an application error. This issue has been fixed.
- When the agent's background Windows service was shutting down it could sometimes harmlessly crash. This issue has been fixed.

## .NET Core - July 2020

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**Agent versions released during the past month:** 1.5.10, 1.5.11, 1.5.12

### New and improved:

- Added `connect` to `contrast-dotnet-diagnostics` to test the agent's ability to connect to Contrast.
- Added `config-keys` to `contrast-dotnet-diagnostics` to display configuration options supported by the agent.
- Added `cert-info` to `contrast-dotnet-diagnostics` to display information about the certificate provided by the value of the `api.url` configuration setting.
- Improved the performance of Protect SQL-Injection detection.
- Improved the performance of Protect against XML-based inputs.
- Added `validate-yaml` to `contrast-dotnet-diagnostics` to verify the agent's `contrast-security.yaml` configuration file.

## Node.js - July 2020

**Language versions currently supported:** 10 and 12 LTS

**Agent versions released during the past month:** 2.16.1, 2.16.2, 2.16.3, 2.16.4, 2.16.5, 2.16.6, 2.16.7, 2.16.8, 2.17.0

### New and improved:

- Added multiple architecture changes and fixes that improve Assess performance.
- Added support for URL Exclusions when using Assess. In Contrast, you can designate URLs that ignore selected rules or all rules. The agent now respects these settings for Assess rules in the Node.js agent.
- Protect rule modes now default to OFF for best backward and forward compatibility.
- Improved Fastify support to work better with GraphQL and Apollo Server.
- Removed support for Protect Cross-site Request Forgery (CSRF).
- Updated the version of Lodash used by the Node.js agent to 4.17.19 in response to a CVE for Lodash 4.17.15.

#### Important notes:

- Version 3.0.0 of the Node.js agent will be released at the end of August and will introduce these changes:
  - The Node.js agent will be required to run with the [Contrast service \(page 415\)](#) enabled. Currently the service is shipped with the agent but is optional; this change will enable the service by default.
  - The service will provide multiple functional and performance benefits to the Node.js agent.
  - The legacy auto-update policy for the Node.js agent will be deprecated when running with the service enabled.



#### NOTE

You will need to upgrade to Version 3.0.0, because the legacy auto-update feature does not upgrade to a major version. You can update your agent to 3.x with npm (recommended), the [Contrast API](#) or by using the Contrast web interface. Using npm allows version updates by using the customer's application's package.json with semantic versioning.

- All new features will only be available for 3.0.0 and higher. Version 2.18.0 will also be released at the end of August and will be the final version that doesn't require the [Contrast service \(page 415\)](#). This version will continue to be supported for patch releases.
- There are two optional features that may be useful to some customers. Contact your Customer Success Representative if you would like to know more about these:
  - Re-write caching provides faster subsequent start-up times.
  - Performance may improve when you skip (or deadzone) certain modules. For example, if you have modules passing large strings that are irrelevant to security, like logging, you can choose not to instrument them.

#### Bug fixes:

- Node.js agent failed to initialize. Missing gRPC framework was resolved.
- An exception occurred because of a syntax error for Fastify. This was fixed.
- Crash when requiring the aws-s3 module was resolved.

#### Ruby - July 2020

Language versions currently supported: 2.5-2.7

Agent versions released during the past month: 3.12.1, 3.12.2, 3.13.0

#### New and improved:

- Replaced [google-protobuf](#) with [protobuf](#).
- Improved logging to include `Thread Id` as well as `Process Id`.
- Removed custom `Contrast::InternalException` in favor of common exception types to improve error handling.

**Important notes:**

- The change of dependency from google-protobuf to protobuf, removes the need to execute the `bundle config force_ruby_platform true` command before installation.
- In 2020, the [cucumber](#) project forked protobuf for their own use in a way that is incompatible with the main branch. As such, you cannot run any project using [cucumber-messages](#) above version 8.0.0 as it depends on the incompatible [protobuf-cucumber](#).

**Bug fixes:**

- Improved handling of logging to unwritable destinations.
- Improved handling of propagation to children of the String class.
- Improved handling of propagation through Regular Expression where the result of a match is `nil`.

**Python - July 2020**

**Language versions currently supported:** Python 2.7 and 3.5-3.8

**Agent versions released during the past month:** 3.0.1, 3.1.0, 3.1.1, 3.1.2, 3.2.0

**New and improved:**

- Added route coverage support for Django 3.0.
- Added [Falcon 2.0 support \(page 315\)](#).
- Improved accuracy of library file usage.
- Improved propagation through regular expressions in Assess.

**Important notes:**

- The team made significant internal cleanup to Request representation

**Bug fixes:**

- Fixed a bug where regex propagation was throwing an exception under certain conditions.
- Fixed a bug related to agent handling of very short JSON keys and values.
- Updated protobuf dependency requirement in response to incompatibility issues with older versions.
- Fixed an issue where the agent raised an internal exception for applications using certain features of pyasn1.
- Fixed a bug where Django applications were unable to properly parse the Content-Type header if a charset was explicitly provided.
- Improved error handling around stack trace construction.

**January - June 2020****May 2020**

**3.7.4 on-premises release date:** June 2, 2020

**New and improved:**

- For on-premises customers, daily exports of our library data are now available for download. Airgap environments can now update versions without updating the Contrast environment.
- A new integration plugin beta displays vulnerability information directly in Visual Studio Code so developers can quickly and easily learn about security issues found in their application during functional testing, shifting security left.

**Important notes:**

- With this release the .NET Framework agent has forked into two agents. The modern agent will continue to be developed to support recent versions of the .NET Framework, CLR and Windows OS



versions. The legacy agent has all of the current features of the .NET Framework agent and will receive critical bug fixes but otherwise will not be further developed.

- Previously, organizations with very large numbers of Jira users could time out when attempting to set up a Jira integration in Contrast. We have scaled our Jira integration so that this is no longer an issue.

#### **Bug fixes:**

These bugs have been fixed in the past month:

- SUP-549, 1386 (SEC-530, JAVA-455, 1201) Protect was returning false positives and delivering duplicate attack events for some customers.
- SUP-306 (TS-35) When upgrading Contrast, SQL backup files were silently deleted.
- SUP-1426 (TS-3129) Null values in mapping application score triggered error messages.
- SUP-1287, 1432 (JAVA-1191) Customers experienced performance degradation in Protect. This was remedied with significant performance improvements to the CMD Injection, XSS and SQLi rules.

### **Java - May 2020**

**Language versions currently supported:** Java 1.6 - Java 11

**Agent versions released during the past month:** 3.7.4.14937

#### **New features and improvements:**

- Added support for (WebSphere) Route Discovery for Servlet 2.5 Declarative Servlets.
- Increased sensitive data masking coverage, specifically for SQLi, XSS, Command Injection, Path Traversal, CSRF, ReDoS, OGNL Injection.

#### **Bug fixes:**

- XXE vulnerability missed in Assess but flagged as path traversal
- UI displaying blocked and exploited HTTP Method Tampering events
- Protect was receiving false negatives for XSS Bypass via Bug Bounty
- Spring auto binding rule causing false negatives
- Protect Path Traversal False Positive due to base64 null char
- NPE in `ContrastHttpRequestRegistrationWatcherDispatcherImpl`
- `ReportFindings` acceptance test annotation is broken

### **.NET Framework - May 2020**

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Agent versions released during the past month:** 20.5.1

#### **New and improved:**

- Improved detection of dangerous path use in Protect; specifically, when interacting with the file system (`path-traversal-semantic-dangerous-paths` rule) and in arguments to OS commands (`cmd-injection-semantic-dangerous-paths` rule).

#### **Important notes:**

- Beginning with this release, the minimum supported operating system is Windows Server 2012 and the minimum .NET Framework version is .NET 4.7.1.
- The legacy .NET Framework agent maintains support for Windows Server 2008 and older .NET Framework versions. The legacy agent has all of the current features of the .NET Framework agent and receives critical bug fixes but otherwise will not be further developed.

#### **Bug fixes:**

- When an application sent a request to the same URL as the current request, the agent would report an SSRF vulnerability. This is fixed now.
- When the agent would report an `xcontenttype-header-missing` vulnerability, it was rejected due to missing information. The agent now sends all expected information for this vulnerability.

## .NET Core - May 2020

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**Agent versions released during the past month:** 1.5.3

### New and improved:

- Improved detection of dangerous path use in Protect; specifically, when interacting with the file system (`path-traversal-semantic-dangerous-paths` rule) and in arguments to OS commands (`cmd-injection-semantic-dangerous-paths` rule).
- The agent will no longer attempt to load under .NET Core versions less than 2.1 as these versions are not supported.

### Bug fixes:

- When an application sent a request to the same URL as the current request, the agent would report an SSRF vulnerability. This is fixed now.
- When the agent would report an `xcontenttype-header-missing` vulnerability, Contrast would reject the vulnerability report due to missing information. The agent now sends all expected information for this vulnerability.
- When an instrumented application closed the response stream, the agent could cause an application error. This is fixed now.
- When an instrumented application seeked within a response stream, the agent could cause an application error. This is fixed now.

## Node.js - May 2020

**Language versions currently supported:** 10 LTS and 12 LTS

**Agent versions released during the past month:** 2.15.0

### Important notes:

- New recommendations for [installing and running the Node.js agent \(page 224\)](#) have been released.

### Bug fixes:

- The customer application would fail to start when all Assess rules were disabled. This is fixed now.
- The customer application would fail to start because worker threads would hang and generate multiple processes with the same pid. This is fixed now.
- The agent would not output the security log to stdout (or stderr). This is fixed now.
- Duplicated vulnerabilities were being reported for unique routes. This is fixed so that TeamServer displays distinct findings for each request uri.
- An out-of-memory error caused by a regex match resulted in an infinite loop. This has been fixed.
- Node.js agent's migration to npm and incorrectly bundled modules made it seem like the agent was missing two dependencies. This has been resolved.

## Python - May 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

**Agent versions released during the past month:** 2.10.0

### New and improved:

- Added support for Django Rest Framework
- Added copyright to all agent files
- Removed the agent's external dependency on the wrapt package
- Improved INFO level logging for easier tracking of applications with multiple processes

**Bug fixes:**

- When running the agent with protobuf-3.6.1 sometimes the application crashed, which has now been resolved with a newer protobuf version.

**Ruby - May 2020**

**Language versions currently supported:** 2.5 - 2.7

**Agent versions released during the past month:** 3.10.1, 3.10.2, 3.11.0

**New and improved:**

- Improved Stack Trace capturing
- Improved library analysis performance leading to a decrease in first request penalty

**Important notes:**

- The Agent now supports TRACE level logging. Those running with DEBUG logging should see a significant decrease in logged events

**June 2020**

**3.7.5 on-premises release date:** July 7, 2020

**New and improved:**

- There is a new **Vulnerability Instances** section under the **Notes** tab on a vulnerability's detail page. Here you can see associated vulnerability instances with links that navigate to them. Vulnerability instances are listed by ID in descending order based on when they were first found, with the most recently found vulnerability (**Last Detected**) at the top.
- The library grid will now sort by library score as the default. This ensures libraries with the most risk are clearly visible. Library version information is now more clearly reported and includes if the library in use is the latest version.
- Contrast Documentation is still available at [docs.contrastsecurity.com](https://docs.contrastsecurity.com) but with a new cleaner look, an improved search, and content organized by user role. [Give us your feedback](#) to help us keep improving.

**Bug fixes:**

These bugs have been fixed in the past month:

- TS-3091 (SUP-1267, 1286) Some servers were appearing offline erroneously.
- TS-3272 (SUP-1443) On-premises upgrade was requiring a java.security adjustments. This is no longer required.
- DOTNET-1738 (SUP-1471,1491) .NET agent would crash when overly complex typesec was encountered.
- NODE-904 (SUP-1634) Node.js agent was requiring the gRPC module which caused the agent to crash.
- TS-2778 (SUP-1269) Searching for a vulnerability by ID was causing a global search timeout.
- TS-2641 (SUP-1215) Attestation report was failing to generate when requested.
- TS-3403 (SUP-1530) On-premises contrast-server.service was failing to restart after upgrade.

**Java - June 2020**

**Language versions currently supported:** Java 1.6 - Java 11

**Agent versions released during the past month:** 3.7.5.15634, 3.7.5.15480

**New and improved:**

- Provided route coverage support for the Servlet API.
- Implemented Sensitive Data Masking with the `mask_attack_vector`.
- Added Assess support for DynamoDB.

**Bug fixes:**

- Protect caches input no matter the size potentially leading to OOMs for large requests
- Undertow Resource Handlers Should Not Trigger Path Traversal Attacks
- Path Traversal False Positive Due to Spring's ServletContextResource
- Race condition in App Inventory along with Protect Struts CVE rules
- Log4j2 instrumentation fails on Log4j2 2.13.1
- Agent Reports Incorrect HTTP Protocol Version on Servlet Containers
- Protect SQLi SimpleOrSearcher has poor performance on large inputs
- Assess CSRF Detection Fails When Request Uses form-data/multipart
- SSRF detection must not take use of tainted path as a SSRF vulnerability
- Java Agent does not provide a findings field for PathTraversalSemanticDTM
- Agent Prevents Graceful JVM Shutdown
- Fix performance metric reporting for Acceptance Tests
- StringUtil methods for case sensitive string comparison are wrong for non alphabet inputs

**.NET Framework - June 2020**

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Agent versions released during the past month:** 20.6.1, 20.6.3, 20.6.4

**New and improved:**

- Improved the Assess analysis used to identify SSRF vulnerabilities to reduce the number of false positives reported by the agent.
- Improved the Protect analysis used to analyze user inputs for potential SQL injection attacks to improve accuracy and performance.
- Added support for OWIN based-hosting and self-hosted Web API applications outside of IIS.
- The agent will now clean up old logs in Azure App Service and Docker-based deployments.
- Improved logging and reliability around the agent's auto-upgrade process.
- Improved performance of Protect XSS.
- Added support for route-based coverage of WCF services using Unity interception.

**Bug fixes:**

- When the agent would report vulnerabilities for four response-based Assess rules related to CSP and HSTS, the report would be rejected by Contrast due to missing information. The agent now sends all expected information for these rules.
- When an instrumented application defined a type using a large number of nested generic types, the agent could cause a StackOverflow error. This has now been fixed.
- When a user would disable multiple Protect rules through the 'protect.disabled\_rules' setting in the yaml file, the agent would not respect this setting. The agent will now respect this configuration setting.
- When the agent's service would restart IIS with Contrast sensors on an overloaded server, the service could start receiving messages from those sensors before it was ready to handle them which lead to the sensors failing to initialize. This issue has been fixed now.
- When a user would set up profiler chaining with AppDynamics in an Azure App Service environment, the AppDynamics profiler would fail to load. This has now been fixed.

## .NET Core - June 2020

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**Agent versions released during the past month:** 1.5.5, 1.5.7, 1.5.8, 1.5.9

### New and improved:

- Improved the Assess analysis used to identify SSRF vulnerabilities to reduce the number of false positives reported by the agent.
- Improved the Protect analysis used to analyze user inputs for potential SQL injection attacks to improve accuracy and performance.
- The agent will now clean up old logs.
- Removed the dependency on Microsoft.Extensions.Caching.Memory.
- Improved performance of Protect XSS.
- Improved performance of Protect SQL-Injection.

### Bug fixes:

- When the agent would report vulnerabilities for four response-based Assess rules related to CSP and HSTS, the report would be rejected by Contrast due to missing information. The agent now sends all expected information for these rules.
- When an instrumented application defined a type using a large number of nested generic types, the agent could cause a StackOverflow error. This has now been fixed.
- When a user would disable multiple Protect rules through the 'contrast.protect.disabled\_rules' setting in the yaml file, the agent would not respect this setting. The agent will now respect this configuration setting.
- When a user would disable logging, the agent's profiler component would still log high level information during initialization. The profiler will no longer create a log when logging is disabled.

## Node.js - June 2020

**Language versions currently supported:** 10 LTS and 12 LTS

**Agent versions released during the past month:** 2.15.1, 2.15.2, 2.15.3, 2.15.4, 2.15.5, 2.16.0, 2.16.1, 2.16.2, 2.16.3, 2.16.4

### New and improved:

- Multiple architecture and performance improvements.
- New gRPC communication protocol between the agent service improves performance.
- Removed name and value cookie sources for reflected XSS per updated guidance for both Assess and Protect.
- Added a sensor for SQLite for Protect.
- Added support for Koa version 2.12.
- Reflected XSS is now not reported if Content-Type is allowlisted as safe.

### Important notes:

- A major version release for the Node.js agent is planned for late July or August 2020. Node.js agent version 3.0.0 will introduce breaking changes for customers using the 2.x.x version of the agent and service.

### Bug fixes:

- Implemented multiple bug fixes due to the introduction of the gRPC communication protocol between the JavaScript agent and the agent service
- Implemented fixes to resolve route coverage issues that surface when using GraphQL, Apollo Server, and Fastify

- Resolved a false positive issue when correctly using Sequelize to escape strings.
- Resolved exception when fastify.route is called with an uppercase verb.
- Resolved an issue that manifested as reporting duplicate routes when using the Express framework.

## Python - June 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

**Agent versions released during the past month:** 2.10.0

### New and improved:

- [Falcon 2.0 \(page 315\)](#) is supported and is in beta
- Upgraded Contrast Service to 2.8.1

## Ruby - June 2020

**Language versions currently supported:** 2.5-2.7

**Agent versions released during the past month:** 3.12.0

### New and improved:

- Caching of settings to improve performance and reduce memory impact

### Important notes:

- Deprecation of CSRF Assess and Protect rules

## April 2020

**3.7.3 on-premises release date:** May 8, 2020

### New and improved:

- In addition associating vulnerabilities, you can now also **associate both discovered and exercised routes** to build numbers, application versions, branches or repositories **using session metadata**. This means you can also query route information with a public API endpoint. With a single call to a public endpoint you can get detailed information on how much of an application has been exercised and where the critical vulnerabilities are.
- You now have a choice to receive individual policy violation emails or to consolidate them into a single email. Find this option under **Organization Settings > Notifications**.
- Your AppSec team can more easily assess library security risk and prioritize work with changes to surface CVE severity and make libraries easier to find. Select **Libraries** to see a **filterable list of libraries with visual display of CVE severity** for each one.

### Important notes:

- To improve security, the Contrast JRE version has been updated to Java 11 for both hosted and on-premises customers. This should not affect end users.

### Bug fixes:

These significant bugs have been fixed in the past month:

- SUP-1244 (TS-2697, TS-1494) 3.7.2 on-premises upgrade caused Contrast server and mysqld to attempt to run as the wrong user.
- SUP-1153 (JAVA-1051) RBAV was incorrectly auto-verifying vulnerabilities.
- SUP-1172 (JAVA-1060, JAVA-1061, JAVA-1062) Protect input after a rule change caused false positives.
- SUP-1231 (DOTNET-1458) .NET agent failed to initialize after upgrade.

- UP-1156 (TS-2526) Inconsistent authorization redirected user to login and then an unauthorized page.
- SUP-1074, 1234, 1312 (JAVA-1085) WebSphere LDAP/SAML authentication broke with newer versions of Contrast.

## Java - April 2020

**Language versions currently supported:** Java 1.6 - Java 11

**Agent versions released during the past month:** 3.7.3.14727, 3.7.3.14657

### New and improved:

- Contrast Assess more accurately detects Path Traversal vulnerabilities. Contrast Assess and Protect more accurately detect vulnerabilities and attacks respectively in Apache Struts based applications. Contrast Protect more accurately detects SQL Injection attacks.

### Important notes:

- This release includes breaking changes to Contrast Assess route coverage reporting when used with on-premise Contrast servers version 3.7.2 and older.

### Bug fixes:

- When WebSphere users configured their WebSphere services with custom TLS certificates, the Contrast Java agent prematurely initialized WebSphere's certificate manager as a side-effect. This caused the WebSphere TLS connections to fail unexpectedly. This issue has been resolved by adding a special exception for WebSphere to Contrast's TLS initialization whereby Contrast will use an isolated `SSLSocketFactory` instead of the Java runtime's default system socket factory.
- When users configure their application with a session-based vulnerability auto-verification policy, and the user does not configure their Contrast agent with an explicit session\_id configuration parameter, then Contrast wrongfully auto-verifies vulnerabilities. We resolved this issue by fixing a race condition, so we can ensure that auto-verification will work as expected when the user has configured their agent to use the `contrast.agent.java.standalone_app_name` configuration.

## .NET Framework - April 2020

**Language versions currently supported:** .NET Framework: 3.5, 4.0, 4.5, 4.5.1, 4.5.2, 4.6, 4.6.1, 4.6.2, 4.7, 4.7.1, 4.7.2, 4.8

**Agent versions released during the past month:** 20.4.1, 20.4.2, 20.4.3

### New and improved:

- Improved handling of scenarios where the agent would write repeated errors to log files, creating larger than necessary log files.
- The agent will now log unknown configuration keys at startup. This should help with troubleshooting configuration issues (for example, invalid yaml).

### Important notes:

- The agent's auto-update feature will no longer update the agent when running on Windows Server 2008 or servers with .NET Framework 4.7.0 or older. This change is in preparation for the upcoming fork of the Contrast .NET Framework agent. See below for more details.
- The **next** release of the .NET Framework agent will raise the minimum supported operating system to Windows Server 2012 and raise the minimum .NET Framework version to .NET 4.7.1. Support for Windows Server 2008 and older versions of the .NET Framework will be maintained via a fully featured legacy .NET Framework agent. This legacy agent will have all of the current features of the .NET Framework agent and will receive critical bug fixes but otherwise will not be the focus for future .NET development.

**Bug fixes:**

- When an application hosted on IIS was (mis)configured without a virtual path, the agent's background Windows service would crash. The agent's background Windows service now properly handles this configuration.
- A race condition around requests for configuration values that did not have default values could lead to a crash of the agent's background Windows service. The race condition has been fixed, default configuration values have been provided for all configuration options, and missing default configuration values are now properly handled.

**.NET Core - April 2020**

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**Agent versions released during the past month:** 1.4.0, 1.5.0

**New and improved:**

- **Added support for Linux Azure App Service.**
- **Added support for Alpine.**
- Improved handling of scenarios where the agent would write repeated errors to log files, creating larger than necessary log files.
- The agent will now log unknown configuration keys at startup. This should help with troubleshooting configuration issues (for example invalid yaml).

**Bug fixes:**

- When applications redirected to a URL that had been validated using `Url.IsLocalUrl`, the agent would still report an unvalidated redirect vulnerability. The agent will now respect the `Url.IsLocalUrl` validator.
- A race condition around requests for configuration values that did not have default values could lead to an unhandled error in the agent. The race condition has been fixed, default configuration values have been provided for all configuration options, and missing default configuration values are now properly handled.

**Node.js - April 2020**

**Language versions currently supported:**

**Agent versions released during the past month:** 2.8.1, 2.8.2, 2.8.3, 2.9.0

**New and improved:**

- **Fastify framework support:** Fastify 2.x is now a supported framework for the Contrast Node.js agent.
- **NPM availability:** The Contrast Node.js agent can now be installed directly from the [Contrast Security public NPM repository](#)
- **Pre-load capabilities:** The Node.js agent can now be run as a pre-load module using the `-r` flag. This is also now the recommended method of running the Contrast Node.js agent.

**Important notes:**

- Running the node agent as a runner will now generate a deprecation message. This is the deprecated syntax:

```
node-contrast<app-main>
```

The agent will continue to function when executed as a runner. However, we encourage customers to migrate to the new method of running the Contrast Node.js agent as this is no longer recommended.



**Bug fixes:**

- After architecture improvements were made to the agent, some applications were prevented from starting with the agent. This has been resolved and users should no longer receive error messages like these:

```
cls.run() => {  
  ^  
TypeError: Cannot read property 'run' of undefined
```

OR

```
/usr/src/app/node_modules/node_contrast/lib.asar/AsyncStorage/index.js:188  
  if (ns.active) {  
  
TypeError: Cannot read property 'active' of undefined
```

**Python - April 2020**

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

**Agent versions released during the past month:** 2.8.1, 2.8.2, 2.8.3, 2.9.0

**New and improved:**

- Added initial support for Stored XSS rule in Assess for `django` framework.
- Added Unvalidated Redirect support for Assess for `pyramid` and `webob` objects.
- Made updates to reduce number of false positives from Reflected XSS rule in Assess.
- Removed the agent's external dependency on the `six` package.

**Bug fixes:**

- When running the agent under Python 2.7 on Ubuntu 16.10 some instrumentation failed to apply, which has now been resolved.
- When applications used `str.format` in certain edge cases, the agent lost dataflow propagation, which has now been resolved.

**Ruby - April 2020**

**Language versions currently supported:** 2.4 - 2.7

**Agent versions released during the past month:** 3.8.1, 3.8.2, 3.8.3, 3.8.4, 3.8.5, 3.9.0

**New and improved:**

- Enhanced module definition detection using TracePoint

**Important notes:**

- This will be the last on-premises release bundled with a gem that supports Ruby 2.4.
- It is recommended to use RubyGems at this point.

## Java agent release notes

At this time, the agent release notes are only available in English.

**Java 5.0.0**

**Release date:** March 29, 2023

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19

**New and improved:**

- Non-http sources for Kafka. (JAVA-5235)
- Spring Boot 3 Support & Spring 6. (JAVA-6089)
- Untangled circular dependency between ProtectManager, InstrumentationAwareRaspRule, and Dispatchers. (JAVA-245)
- Hardcoded Password Improvement. (JAVA-5440)
- Deadzone Liquidbase MD5 usage method. (JAVA-6012)
- JarAnalyzer Uses Bugged ZipInputStream. (JAVA-6351)
- Consolidate exceptions in fluent Reflect API. (JAVA-6411)

**Bug fixes:**

- Fixed issue where ExternalDirectoryLibraryFinder logged errors instead of debug. (JAVA-5327)
- Fixed java.lang.NullPointerException: Cannot invoke java.util.Set.add(Object) because of the return value of java.util.Map.get(Object). (JAVA-6120)
- Fixed JAVA-AGENT-59 - java.util.ConcurrentModificationException issue. (JAVA-6145)
- Fixed Adaptive Optimisation dead zones method triggering vulnerabilities. (JAVA-6151)
- The instrumentation code was not null-safe when dispatchers return values. (JAVA-6210)
- Fixed a java.util.NoSuchElementException issue. (JAVA-6232)
- Missing policies for OWASP's ESAPI library. (JAVA-6260)
- Path traversal false negative for JDK resource lookups. (JAVA-6237)
- Fixed a java.lang.ClassNotFoundException: com.contrastsecurity.agent.plugins.frameworks.j2ee.e\$\$Lambda\$1849/0x000000002000f520 issue. (JAVA-6284)
- Agent scans agent jar. (JAVA-6289)
- Fixed a java.lang.NullPointerException issue. (JAVA-6290)
- Fixed java.lang.IllegalArgumentException: URLDecoder: Incomplete trailing escape (%\ pattern. (JAVA-6357)
- Fixed a java.util.ConcurrentModificationException issue. (JAVA-6360)
- FP when tainted data flows through ObjectInputStream#readObject. (JAVA-6369)
- Fixed Spring Boot Route Discovery not working for WAR deployed in Tomcat. (JAVA-6372)
- Flawed determination of application path for Spring Boot apps. (JAVA-6375)
- Fixed a java.lang.IllegalStateException: Expected BEGIN\_OBJECT but was STRING at line 1 column 1 path \$ issue. (JAVA-6401)
- Fixed agent was not validating the API URL from configuration not ending with "/". (JAVA-6431)
- Ignore Safe Usages of getRuntimeMxBean in ELInjectionRule. (JAVA-6433)

## Java 4.13.1

**Release date:** March 16, 2023

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19

**New and improved:**

- Xerces ACCESS\_EXTERNAL\_DTD set to file bypasses Protect filters. (JAVA-2430)
- Reduced ( Dedupe ) Route Observation. (JAVA-6282)

**Bug fixes:**

- Java agent did not ignore Dynatrace classes for primordial transformations. (JAVA-6288)
- Updated XSS Patterns. (JAVA-6341)

## Java 4.13.0

**Release date:** March 3, 2023

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19

### New and improved:

- Added support for Java 18 and 19. (JAVA-1845)
- Added support for Websphere Liberty. (JAVA-5362)
- Added support for Quarkus RestEasy. (JAVA-5555)
- Improved Asses data flow policies for Jackson. (JAVA-5725)
- Added support for vulnerability submissions for ephemeral JVMs (JAVA-5880)
- Removed support for the `contrast.useconfig` property to prevent unwanted behavior. (JAVA-5894)
- Improved handling of issues with proxy dispatchers and stack overflows. (JAVA-6057)
- Changed logging level of the log message, `App marked as unwanted on the server, it may have been archived`, to INFO. (JAVA-6241)
- Removed PIDS-XSS-251 (JAVA-6307)

### Bug fixes:

- Fixed an issue that caused this exception error: `java.lang.IllegalStateException: onRequestEnd must never be called before onRequestStart`. (JAVA-6164)
- Fixed an issue that caused Contrast to report an Eclipse JAXBUnmarshaller false positive. (JAVA-6176)
- Fixed an issue that caused this exception error: `java.util.ConcurrentModificationException`. (JAVA-6184)
- Fixed an issue that caused Spring Boot Json node to return an empty iterator. (JAVA-6224)
- Fixed an issue that caused Contrast to report a SQL Injection false negative for a SQL UNION operation. (JAVA-6238)
- Fixed an issue where route discover was blocking application deployments. (JAVA-6263)
- Removed an override of the `requiresSavingInContext` method in `CmdInjectionProtectRule`. (JAVA-6264)

## Java 4.12.2

**Release date:** February 15, 2023

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

### New and improved:

- Added support for configuration of instrumentation exclusions. (JAVA-6098)
- Added Dynatrace support to package exceptions. (JAVA-6103)
- Decreased the number of shutdown threads so that shutdown only uses as many threads as necessary. (JAVA-6217)

### Bug fixes:

- Fixed an issue with duplicate log messages for `J2EEHttpResponse`. (JAVA-5280)
- Removed an unnecessary precondition check for `ELParsingEvent`. (JAVA-5479)
- Legacies properties that included profile in the name was causing agent crashes. (JAVA-6114)
- Log42 was throwing SecurityExceptions when Security Manager was enabled. (JAVA-6152)
- Fixed an issue with handling evens when parent ID and object ID were the same. (JAVA-5633)
- Fixed a race condition with dynamic servlet registration. (JAVA-5939)
- Agents were trying to recall HTTP methods when an application was deployed to a Glassfish server to which the agent was attached. (JAVA-5939)

- Fixed a JDBC Class Verify error that occurred with instrumentation of optimized classes. Instrumentation of these classes is now supported. (JAVA-5951).
- Prometheus dead zone did not work if Prometheus agent was already loaded. (JAVA-5969)
- Fixed an issue that caused this exception error: `com.contrastsecurity.third-party.org.objectweb.asm.MethodTooLargeException: Method too large: org/apache/jsp/main\_jsp.\_jspService \(\Ljavax/servlet/http/HttpServletRequest;Lja...` (JAVA-6013)
- Fixed an issue that caused this exception error: `java.lang.NullPointerException`. (JAVA-6014)
- Crypto-Bad-Mac findings from AppDynamics are now suppressed. (JAVA-6027)
- Fixed an issue that caused this exception error: `java.lang.IllegalStateException: Illegal access: this web application instance has been stopped already. Could not load \[org/grail...` (JAVA-6049)
- Fixed an issue that caused this exception error: `java.lang.NullPointerException: Cannot invoke "java.security.CodeSource.getLocation\(\)" because the return value of "com.contrasts...` (JAVA-6166)
- Fixed an issue that caused this exception error: `java.lang.IllegalArgumentException: string parameter cannot be empty`. (JAVA-6101)
- Fixed an issue that caused this exception error: `java.lang.NullPointerException`. (JAVA-6106)
- Fixed an instrumentation issue so that Contrast calls `ContrastELInjectionDispatcher.onParseExpression`. This change ensures that the agent successfully blocks all ELExpressions. (JAVA-6107)
- Fixed an issue that caused this exception error: `com.contrastsecurity.third-party.org.objectweb.asm.MethodTooLargeException: Method too large: org/apache/jsp/main\_jsp.\_jspService \(\Ljavax/servlet/http/HttpServletRequest;Lja...` (JAVA-6108)
- Fixed an issue where double slashes were used in endpoint URIs. (JAVA-6118)
- Reduced the performance impact caused by fetching Netty classes with `onChannelRead`. (JAVA-6108)
- Fixed reporting of false positives on DataDog and CgroupReader. (JAVA-6135)
- Fixed an issue that caused an exception when parsing a valid file path. (JAVA-6149)
- Fixed an issue that caused this exception error: `java.lang.IllegalArgumentException: string parameter cannot be empty`. (JAVA-6150)
- Fixed an issue that caused this exception error: `java.nio.charset.IllegalCharsetNameException: UTF-8; action="urn:receiveDocumentResponse"`. (JAVA-6169)
- Fixed an issue that caused this exception error: `java.lang.NullPointerException: Null sensitiveDataReplaced`. (JAVA-6175)
- Fixed an issue that caused this exception error: `java.lang.ArrayIndexOutOfBoundsException: Index 0 out of bounds for length 0`. (JAVA-6179)
- Fixed an issue that caused this exception error: `java.lang.IllegalArgumentException`. (JAVA-6186)
- Fixed an issue where the agent did not set the document type for `UserInputDTM`. (JAVA-6227)

## Java 4.12.1

**Release date:** January 31, 2023

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

### Bug fixes:

- Fixed multiple internal bugs.

## Java 4.12

**Release date:** January 31, 2023

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**New and improved:**

- Added support for Tomcat 10. (Java-6075)

**Bug fixes:**

- Fixed the performance impact of fetching Netty classes with `onChannelRead`. (Java -6131)

### Java 4.11.1

**Release date:** January 20, 2023

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**Bug fixes:**

- Contrast was not reporting vulnerabilities (and their observed routes) that have `header-map` sources. (JAVA-6111)

### Java 4.11.0

**Release date:** January 18, 2023

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**New and improved:**

- Path traversal semantic analysis from other agent's code no longer trigger false positive events. (JAVA-5959)
- Significantly Improved performance for code exclusions. (JAVA-5962)
- Improved compatibility with Instana APM agent (JAVA-5962)

**Bug fixes:**

- Fixed an issue where the agent didn't ignore proxies for different JREs and reported a `java.lang.VerifyError: Bad local variable type on JDK 17` error. (JAVA-5857)
- When instrumenting WildFly, the agent no longer throws an exception for every request when an Undertow supporter is enabled. (JAVA-5864)
- Agent was interfering with the `AbstractRolloverStrategy` transformation for `log4j 2.17.x` files. (JAVA-5890)
- Fixed a null pointer exception for `ScalaPlaySupporter`. (JAVA-5994)
- Fixed an issue with Java 19 and ASM instrumentation that caused a `java.lang.IllegalArgumentException: Unsupported class file major version 63` error. (JAVA-5998)
- Protect was unnecessarily creating sessions in J2EE, JavaEE, and JakartaEE apps. (JAVA-6036)
- `OSGiFriendlyClassWriter` reported common ancestry failures as errors. (JAVA-6061)

## Archive

### July - December 2022

#### Java 4.10.0

**Release date:** December 15, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**New and improved:**

- Added support for Assess RestEasy framework. (JAVA-5369)
- The agent now protects against a vulnerability where it was possible to obtain a reference to `Class.getClassLoader()` or `Module.getClassLoader()` by calling `findVirtual` to obtain a `MethodHandle` and then invoke it. (JAVA-5906)

**Bug fixes:**

- Fixed an issue where a previous WebSphere TLS Poisoning fix no longer worked with the latest IBM JRE. (JAVA-5891)
- The agent was incorrectly reporting CGLIB and other classes as observed classes. (JAVA-5904)
- Fixed a gap in Input Validator support. (JAVA-5910)
- Fixed a false positive report for Prometheus Path Traversal. (AVA-5958)
- Observed route reporting was failing when Assess was enable from only the Contrast web interface. (JAVA-5966)

**Java 4.9.0**

**Release date:** November 30, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**New and improved:**

- Removed the deprecated property `contrast.assess.threshold.period` setting
- Removed the deprecated `contrast.timeout` setting
- Updated the agent to handle map of HTTP Headers for `reflected-xss` false positives
- Added the `ClassLoader Manipulation` rule to block malicious attempts to use the `java.lang.invoke` API to invoke the `Class.getClassLoader()` and `Module.getClassLoader()` methods.
- Protect is optimised to skip rules that are disabled by an immutable configuration.

**Bug fixes:**

- The agent was transforming classes, unnecessarily, which introduced risks. This issue is now fixed. (JAVA-5538)
- Java agent was enabling route coverage when Contrast Assess was disabled. (JAVA-5610)
- The agent crashed when current working directory could not be listed. (JAVA-5720)
- `ApplicationArchitecture` was leaking memory and never removed its `ArchitectureComponents` component (JAVA-5763)
- The agent was not sending the agent version and language in the `User-Agent` header. (JAVA-5768)
- Delayed Grizzly application discovery causes false negatives. (JAVA-5816)
- Fixed `java.lang.NullPointerException: Null sensitiveDataReplaced`. (JAVA-5847)
- `HardcodedKeyRule` and `HardcodedPasswordRule` instrumentation was being skipped. Instrumentation now works correctly (JAVA-5855)
- Path traversal semantic analysis was not logging results as expected. It is now correctly reported as `SUSPICIOUS` or `BLOCKED`. (JAVA-5883)

**Java 4.8.0**

**Release date:** November 14, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**New and improved:**

- Added the ability to identify whether or not opaque URIs in lookups are safe and if they are from the same origin as the provider.
- Removed the beta label from JNDI Injection Rule.

- CVE-2022-41852 - XPath RCE.

**Bug fixes:**

- WildFly route coverage no longer includes the context path in observed routes. (JAVA-5688)
- Fixed issue where unshared scoping causes multiple requests to occur. (JAVA-5690)
- Fixed issue where `ProtectDisablingDispatcherDecorator` fails to handle exceptions with `ProtectManager`. (JAVA-5703)
- Fixed a `java.lang.NullPointerException: Null sensitiveDataReplaced` issue. (JAVA-5777)
- Fixed issue where a Path Traversal false positive appeared for DataDog accessing cgroups. (JAVA-5813)
- Fixed issue where new log4j version caused a problem in agent 4.7.0. (JAVA-5819)

**Java 4.7.1**

**Release date:** November 4, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**Bug fixes:**

- Fixed an issue where the Java agent was logging a vulnerability for itself when rolling log files. (JAVA-5806)

**Java 4.7.0**

**Release date:** October 27, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**New and improved:**

- Added the ability to retry the PhoneHome behaviour for the agent until a retry timeout is met.
- Added support for non-http sources for JMS 2.0
- Added support for http4k 4.x in Assess
- Updated the Apache Commons Text library to address a vulnerability
- Added support for regex exclusion for JMS message queue services in Assess
- Add protection against CVE-45046 to JNDI Rule in Protect
- Updated log4j to v2.17.1 or later
- Updated Apache CXF application to use JAX-RS `ContainerRequestFilter`

**Bug fixes:**

- Fixed a `PrivilegedActionException` in `com.contrastsecurity.agent.type.Type` (JAVA-5771)
- Fixed a `java.lang.NullPointerException` (JAVA-5729)
- Log4j2 CveShield was failing due to shading of agent obfuscation (JAVA-5724)
- Improved slower startup performance with latest agent (JAVA-5715)
- RESTEasy JAX-RS route coverage now includes context path in the observed route URI (JAVA-5689)
- CSRF false positive was occurring with JSF protected pages (JAVA-5609)
- Cloning was failing when you used custom sanitizers (JAVA-5571)

**Java 3.18.2**

**Release date:** October 27, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

**New and improved:**

- Added protection against CVE-45046 to JNDI Rule in Protect.

**Java 4.6.0**

**Release date:** October 18, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**New and improved:**

- Added support in the YAML configuration file to configure retry actions when the agent's initial connection to Contrast times out.

**Bug fixes:**

- Wildfly 14 and later was unable to deploy an enterprise archive (EAR) file with Enterprise Java Beans (EJB). (JAVA-5634)
- The `ContextPassingTest` occasionally failed due to build changes. (JAVA-5587)
- The Java agent did not limit log size in all conditions. (JAVA-5578)
- An issue existed when creating a target directory in `contrast-maven-plugin`. (JAVA-5531)

**Java 4.5.0**

**Release date:** September 28, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**Bug fixes:**

- Protect logging was too verbose due to a failure when parsing request bodies (JAVA-5575)
- Asynchronous `WebSphereApp` event caused a race condition (JAVA-5563)
- Route coverage was executing when disabled (JAVA-5487)
- Agent handling of failure with YAML configuration file parsing was unclear (JAVA-5445)

**Java 4.4.0**

**Release date:** September 9, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**Bug fixes:**

- `JNDIInjectionProtectRule` defaulted to **Monitor** instead of **Off**. (JAVA-5529)
- A `ClassLoader Manipulation` event from the `describe` method for Apache BeanUtils v1.x no longer reports a false positive result. (JAVA-5453)

**New and improved:**

- `SpringBootDispatcher` calls `EnvironmentPrepared` only once.
- Added ECIES encryption to the Insecure Encryption Algorithm rule so it is seen as safe.
- Removed the ReDoS rule for Contrast Protect.

**Java 4.3.1**

**Release date:** September 9, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**Bug fixes:**



- Removed unnecessary calls to app object `hashCode` methods. (JAVA-5521)

### Java 4.3.0

**Release date:** September 1, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

#### New and improved:

- Support for JDK HTTP Server - HTTP Modeling
- Enhanced support for JNDI injection rule
- `EventHelper` calls `hashCode()` on objects
- WebSphere doesn't on pipelines
- Classification metadata for skipped tests defined and implemented
- Fixed behavior of `String.contains` with an empty string
- Converted Protect XML patterns to JSON and removed associated XML loading code

#### Bug fixes:

- Avoid adding `DiscoveredRoute` if no URL patterns (JAVA-5451)
- Annotate Log4j2 plugins with `@DontObfuscate` (JAVA-5435)
- Agent creates redundant applications leading to heap exhaustion (JAVA-5433)
- Failed to parse JDBC URL while profiling database (JAVA-5430)
- `DefaultObjectSnapshotFactory` calls `toString()` on objects (AVA-5422)

### Java 4.2.2

**Release date:** August 30, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

#### Bug fixes:

- Analyze log action incorrectly identifies Contrast request type (JAVA-5455)
- Assess performance regression discovered in version 4.1.0.24 (JAVA-5438)

### Java 4.2.1

**Release date:** August 30, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

#### Bug fixes:

- Agent creates redundant applications leading to heap exhaustion (JAVA-5433)

### Java 4.2.0

**Release date:** August 17, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

#### New and improved:

- Support Assess http4k 4.x response body detection - various response body vulnerabilities.
- Denylist `IGNORED` and `ANALYZED_IGNORED` classes for http4k 4.x

#### Bug fixes:

- Jersey route coverage inconsistent between standalone and multi-app. (JAVA-5388)

- Input Exclusion for input type `BODY` does not work for deserialization. (JAVA-5342)
- Analyze Websphere Liberty support on jdk 8. (JAVA-5353)

### Java 4.1.0

**Release date:** August 3, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

#### New and improved:

- Support http4k 4.x route coverage.
- Support Assess http4k 4.x response header detection - various header vulnerabilities.
- Support Assess http4k 4.x GET request and form Submission - XSS, HTTP header injection vulnerabilities.
- `stderr ContrastProperty` now available.

#### Bug fixes:

- File backups max not limited to 100. (JAVA-5333)
- Protect can incorrectly match the empty string with other strings triggering an attack. (JAVA-5331)
- ClassLoader Manipulation - FP. (JAVA-5319)
- BreadCrumbs limit can grow beyond the limit. (JAVA-5315)
- NullPointerException possibility in ArchitectureComponent. (JAVA-5314)
- Providing an empty hostname to the sysloger disables it. (JAVA-5285)

### Java 4.0.0

**Release date:** July 20, 2022

**Language versions currently supported:** Java 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

#### New and improved:

- Glassfish deployments no longer require `standalone_app_name` for features like Route Coverage. The agent will automatically detect the application on startup instead of first request without additional configuration.
- Netty deployments no longer require `standalone_app_name` for features like Route Coverage. The agent will automatically detect the application on startup instead of first request without additional configuration.
- Grizzly deployments no longer require `standalone_app_name` for features like Route Coverage. The agent will automatically detect the application on startup instead of first request without additional configuration.
- Dropping support for Java 6 and 7.
- Add counters for semantic `PathTraversal` and `CmdInjection` analysis.
- Realtime Reporting: Implement Failure Handling for Recoverable Network and HTTP Errors.

#### Bug fixes:

- `ContrastSpringArchitectureDispatcher` can produce NPE on undefined URI scheme. (JAVA-5293)
- CXF Path-traversal FP on `AbstractHTTPDestination`. (JAVA-5286)
- Providing an invalid host name to the sysloger causes the app to crash. (JAVA-5270)

### Java 3.18.1

**Release date:** July 8, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

#### New and improved:

- Improved OWASP Benchmark testing.

### Java 3.18.0

**Release date:** July 6, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

#### New and improved:

- Discover Struts 2 routes without standalone app name.
- Discover Struts 1 routes without standalone app name.
- Discover Jersey routes without standalone app name.
- Add Spring Boot 2.4, 2.5, 2.6, 2.7 test.

#### Bug fixes:

- Protect misses numeric SQL Injection containing JDBC escape chars.
- Breadcrumbs size should be bounded.
- Protect XXE Bypass on WebGoat.

## January - June 2022

### Java 3.17.0

**Release date:** June 29, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

#### New and improved:

- Adjusted environment variables for telemetry opt-out.

#### Bug fixes:

- Netty - onSourceEventDetected throws Unsupported when non-array buffer is used. (JAVA-5215)
- Grizzly NPE reported by Contrast on Glassfish 4 applications. (JAVA-5172)
- Denylist Apache CXF CglibProxyHelper. (JAVA-5167)
- Preload Contrast agent classes for temperamental WebSphere on IBM z/Linux. (JAVA-5085)
- Needless `toString` calls on customer domain objects. (JAVA-4790)

### Java 3.16.0

**Release date:** June 9, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

#### New and improved:

- Telemetry is now enabled by default.
- WildFly, JBoss and Tomcat applications are now eagerly identified when the application/server is created.

#### Bug fixes:

- Agent stops working when getting a 404 response. (SUP-3560)
- Agent tries to startup despite failure of `classInjection.inject`. (JAVA-5152)
- Insecure hash algorithm findings in Datadog. (SUP-3729)
- `ApplicationClassEventListener` is prone to deadlocks. (JAVA-5095)
- `ClassCircularityError` found on Jetty 7. (JAVA-5146)

### Java 3.15.0

**Release date:** May 25, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

#### New and improved

- Improved performance to Elastic APM

#### Bug fixes:

- Assess tag functionality is inconsistent across different environments. (SUP-3775)
- Java agent uses a vulnerable version of `jsoup` library. (SUP-3789)
- False positive path traversal: `java.base/java.io.File.createTempFile` (SUP-3589)
- Agent fails to transform AWS ScanRequest class. (SUP-3667)

### Java 3.14.0

**Release date:** May 11, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

#### New and improved:

- Improved support for multi-app route coverage and discovery on Websphere traditional.
- You can now use the config property to get the agent version in `AgentVersionClassification-TestWatcher`.

#### Bug fixes:

- The OGNL injection rule can report the same attack as being **Probed** and either **Blocked/Exploited**. (SUP-3731)
- One request yields multiple calls to URI activity and `ContrastHttpServletDispatcher#onFirstRequestHandlerInvoked`. (JAVA-5009)
- Protect ignores exclusions for URIs when excluded for all Protect rules. (SUP-3660)
- Java agent fails to start if server does not exist on Contrast server. (SUP-3703, 3587)

### Java 3.13.0

**Release date:** April 27, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

#### New and improved:

- Improved application identity support on WebLogic.
- Improved application identity support on Jetty.
- Resin server servlet support on Assess.
- `JarAnalyzer` should handle buffer growth more efficiently.

#### Bug fixes:

- `VerifyError` for log enhancer. (JAVA-5014)
- `JndiInjectionReporter` incorrectly truncates stack trace. (JAVA-4993)
- Header names are not properly modeled as case-insensitive. (JAVA-2186)

### Java 3.12.1

**Release date:** April 13, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**New and improved:**

- Improved accuracy of the Protect padding Oracle rule.
- No `standalone_app_name` is required for route coverage for Spring Boot executable JARs.
- Improved memory utilization when analyzing customer webapp libraries for Protect.

**Bug fixes:**

- XSS Keyword/Pattern causing false positives for Protect. (SUP-3275)

**Java 3.12.0**

**Release date:** April 7, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**New and improved:**

- Adds a new Protect rule, Class Loader Manipulation, that provides additional hardening against exploits like Spring4Shell and others. The new rule guards against attacker attempts to gain access to and manipulate a class loader. Manipulating a class loader is a common way that attackers exploit the reflection code in expression language injection and mass assignment vulnerabilities to escalate to remote code exploitation.
- Improves the accuracy of the Protect Cross-Site Scripting (XSS) rule.
- Improves the accuracy of the Assess Log Injection rule so that it also detects this vulnerability when untrusted data enters log statements through logger formatter parameters (in addition to untrusted data in the formatting string itself).
- Improves the robustness of our exercised route reporting in applications with large numbers of applications and exercised routes.

**Bug fixes:**

- When running the Contrast agent alongside the Datadog agent, Contrast Protect reports a path traversal attack in Datadog's `datadog.common.container.ContainerInfo` class. This false positive has been fixed.

**Java 3.11.0**

**Release date:** March 30, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**Bug fixes:**

- False positive path traversal: `java.base/java.io.File.createTempFile(String, String)` (JAVA-4868)
- False positive path traversal: Spring Web MVC (JAVA-4777)
- Async request handling triggers arbitrary server side forward. (JAVA-4392)

**Java 3.9.0.24156**

**Release date:** January 19, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

**New and improved:**

- Support for route coverage on Spring Boot 2.5 and 2.6.
- Support for Kotlin tagging/encoding utilities, Spring XSS and co-routine APIs.
- Support for library discovery for Scala Akka HTTP 10.2.X.

**Bug fixes:**

- `AdaptiveOptimizationManagerTest` has an unnecessary 1 minute delay. (JAVA-4383)
- Defining an abstract method causes `java.lang.ClassFormatError`. (JAVA-4325)
- `PercentCodec` does not decode multibyte characters properly . (JAVA-4307)
- XXE false negative: XML parsers are considered secure even if `XInclude` is enabled. (JAVA-4233)

**Java 3.9.0.23897**

**Release date:** January 5, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

**New and improved:**

- Support for Scala 2.13, Scala Play JSON Parsing Utilities and String Utilities.
- Support for Kotlin tagging/encoding utilities, Spring XSS and co-routine APIs.
- Protect CVE shield for Log4j CVE-2021-44228

**Bug fixes:**

- Policy classes removed but policy remains in XML. (JAVA-4311)
- Netty support instruments Spring WebFlux client requests/responses as sources of untrusted data causing false positives and performance degradation. (JAVA-4285)
- Caching `ContrastPolicy` causes `ArrayIndexOutOfBoundsException` . (JAVA-4262)
- GET Request bodies can be used to bypass Protect. (JAVA-4226)
- `PropagatorAdaptiveOptimizerImpl.getCallerHistory`, and `AdaptiveOptimizationManager.isSourceIdentityAllowed` are not thread safe. (JAVA-4207, JAVA-4206)
- JAXB Unmarshalling is missing for DOM nodes. (JAVA-4200)
- XXE false positive: XML parsers considered insecure when `XMLConstants.ACCESS_EXTERNAL_DTD` disabled. (JAVA-2691)
- False negative for source `javax.servlet.http.Part.getHeaderNames()` on Websphere. (JAVA-2437)

**Java 3.9.1.24653**

**Release date:** February 2, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

**New and improved:**

- Additional support for Assess Scala: Akka HTTP 10.2.x redirect/forward - unvalidated redirect, arbitrary server side forwards vulnerabilities, GET request and form submission for XSS, HTTP header injection vulnerabilities.
- The Contrast Java agent now fully supports server-side Kotlin applications.
- Added a configurable limit for request body capture size (default `Integer.MAX`).
- Added denylist `IGNORED` and `ANALYZED_IGNORED` classes for Scala 2.13 language/SDK.
- Added XXE test case for XML parsers secured by enabling `XMLConstants.FEATURE_SECURE_PROCESSING`.

**Bug fixes:**

- Protect path traversal false positive in Infinispan CPU detection. (JAVA-4406)
- Prevent OOM from large request bodies collected for `ApplicationActivityDTM`. (JAVA-4321)
- Servlet route coverage fails on embedded Tomcat. (JAVA-4313)
- `DataFlowEventHistory` may overflow affecting adaptive optimization. (JAVA-4208)
- Adaptive Optimization is not specific in deadzoning. (JAVA-4194)

## Java 3.9.1.25108

**Release date:** March 2, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17



### IMPORTANT

Beginning with this release, the Contrast agent now supports Java 17.

#### New and improved:

- The `java.sql` module/package is no longer required for the Java agent.
- Added support for Assess Kotlin: 1.5 Dynamic Database Sources - Stored XSS and 1.5 Reflection Injection
- Added enhanced support for GlassFish JSP.

#### Bug fixes:

- Untrusted deserialization attacks wrongly include Contrast code in stack trace (JAVA-4599)
- WebSphere OSGI classloading behavior results in `NoClassDefFoundError`. (JAVA-4591)
- Semantic path traversal fails to catch `Paths.get` usage on J8. (JAVA-4459)
- Protect unsafe file upload false positive from test JAR. (JAVA-4455)
- JarAnalyzer reads bytes for ZipEntry even if not required. (JAVA-4453)
- XXE false-negative: TransformerFactory parser considered secure with only `ACCESS_EXTERNAL_STYLESHEET` disabled. (JAVA-4340)
- XXE false-positive: Axiom StAX parser with secondary controls (`StAXParserConfiguration.STANDALONE`) enabled. (JAVA-4339)
- Potential leaks in hierarchy scanners. (JAVA-4300)
- Netty `EmptyByteBuf` false positive. (JAVA-4204)
- Field name not set for triggered events in Apache CXF. (JAVA-524)

## Java 3.10.0

**Release date:** March 16, 2022

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17



### IMPORTANT

With this release, the Contrast Java agent is starting to move to a new versioning system. In some locations you may see this release labeled "3.10.0.25482".

3.X versions support Java 6 and 7. Future 4.X versions will support Java 8+.

See this [FAQ](#) for more information.

#### New and improved:

- Added support for Scala-Play log injection

**Bug fixes:**

- Error messaging around Contrast profiles shows incorrect case sensitivity. (JAVA-4859)
- Java agent not creating or linking to application when standalone app name is used. (SUP-3587)
- JarAnalyzer loads bytes of entire jar into memory. (JAVA-4813)
- False negative in UncheckedRedirectRule. (JAVA-2742)

**July - December 2021****Java 3.9.0.23825**

**Release date:** December 14, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

**New and improved:**

- Upgraded CVE-2021-44228 shield to respect shaded packages of Log4j2. Improved reporting of attack events. (JAVA-4301)

**Java 3.9.0.23776**

**Release date:** December 14, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

**Bug fixes:**

- Added Protect CVE shield for Log4j CVE-2021-44228 (JAVA-4301)

**Java 3.8.11.23624**

**Release date:** December 8, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

**New and improved:**

- Added further support for Kotlin Assess (Beta).
- Enhanced support on configuration properties.

**Bug fixes:**

- Spring framework method/actuator displayed as a route signature. (SUP-3001)

**Java 3.8.11.23445**

**Release date:** November 24, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

**New and improved:**

- Added support for Kotlin (Beta).
- Enhanced support on configuration properties.

**Bug fixes:**

- Creating an application reports a race condition (JAVA-4248)
- BeanCreationException error when running with Java agent. (SUP-3302)
- Java application doesn't start with Contrast Assess agent, but looks for all.json file instead. (SUP-3287)



- Unable to exercise routes when using Spring Cloud/Zuul (SUP-3185)
- When running with multiple profiles for the java agent, it breaks when the contrast.profile is set to anything with uppercase letters. (SUP-3267)

### Java 3.8.10.23155

**Release date:** November 10, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

#### Bug fixes:

- Java agent throws a null pointer exception when sending request containing XXE with Protect. (JAVA-3956)
- Protect does not apply path traversal to Headers. (JAVA-3957)
- Adaptive optimization causes response delays. (JAVA-2322)

### Java 3.8.10.22888

**Release date:** October 27, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

#### New and improved:

- Added support for kotlin.concurrent APIs.
- Added application discovery support for Kotlin 1.5 and Spring 5.
- Added support for Assess Scala-Play vulnerabilities: XPath injection, XXE, unvalidated redirect, arbitrary server-side forwards, response header detection.
- Added support for Assess Mulesoft 4.3 unvalidated redirect, arbitrary server-side forwards, response header detection.

#### Bug fixes:

- XXE produces false positive `DisallowDocTypeReader`. (JAVA-3732)
- Potential for invalid request body to be returned when reporting a finding. (JAVA-3561)

### Java 3.8.9.22663

**Release date:** October 13, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

#### New and improved:

- Performance improvement to reduce memory allocation in the agent.

#### Bug fixes:

- Cached Body may be regenerated incorrectly causing finding to contain wrong body. (JAVA-3918)
- Agent logs out obfuscated decoy decrypt code. (JAVA-3915)
- Unnecessary logging when the Java agent is disabled. (JAVA-3914)
- Big request body content might cause `RequestMemoryBuffer` allocation to malfunction. (JAVA-3870)
- Java Agent instruments JDK jmap CLI Tool. (JAVA-3836)
- Oracle ADF Path-traversal false positive. (JAVA-3773)
- Oracle ADF XXE false positive. (JAVA-3771)
- `ConcurrentModificationEx` with Assess CSRF rule. (JAVA-3549)
- `JVMUtils.checkKeyStore` kicks in too late. (JAVA-2368)
- Attack reporting erroneously HTML encodes request body. (JAVA-1671)

- XXE attack reporting fails to render entity. (JAVA-1668)
- Propagation events not triggered as expected for javax propagator rules. (JAVA\_448)

### Java 3.8.9.22387

**Release date:** September 29, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

#### **New and improved:**

- Added Assess Rules (SQLi, Cookies, File Upload) for Mulesoft 4.3 beta support.
- Investigated implementing StAX for Protect XML parsing.
- Ensured `HttpUtil.toNormalizedURI` does not trigger vulns.

#### **Bug fixes:**

- CentOS 8 Java RPM package missing from RPM repository. (JAVA-2422)
- Response delays caused by adaptive optimization bug. (JAVA-2322)

### Java 3.8.8.22125

**Release date:** September 15, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

#### **New and improved:**

- Support Mulesoft 4.3 route observation.
- Handle generating/caching strings for findings efficiently.

#### **Bug fixes:**

- Assert all positive values in `ScopeAssess.decrementScope`. (JAVA-3688)
- Contrast agent attempts to instrument AppDynamics. (JAVA-3649)
- `NoClassDefFoundError` instrumenting Liferay built-in CXFEndpointPublisher. (JAVA-3621)
- Cross-site scripting (XSS) FP writing client-side state to JSF pages. (JAVA-3541)
- Protect scanning of request body involves excessive allocation. (JAVA-3106)

### Java 3.8.8.21828

**Release date:** October 5, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

#### **New and improved:**

- Added Assess beta support for MuleSoft 4.3
- Added SAST missing policies for `java.util.Optional`
- `SnapshotFactory` now limits snapshot size dynamically.
- Thread-unsafe `SimpleDateFormat` may now be used by multiple threads

#### **Bug fixes:**

- Add missing policies for JSON Web Tokens. (JAVA-3593)
- WebGoat 7.1 produces `NoClassDefFoundError`. (JAVA-3649)
- Syslog heartbeat message logged every time config changes. (JAVA-3621)
- Rules disabled while application is running still appear in preflight report. (JAVA-3541)
- `LogLevel` cannot be set by server level features. (JAVA-3106)

### Java 3.8.7.21531

**Release date:** August 19, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

#### New and improved:

- Added Application Discovery Support for Mulesoft 4.3.
- Enhanced support for untrusted forward in Liferay 7.2+.

#### Bug fixes:

- Missing propagators in Spring policies. (Java-3571)
- Protect `AccessControlException` for NanoXML. (JAVA-3548)
- Java Assess: `java.lang.NumberFormatException` when uploading a huge file. (JAVA-3545)
- Java Agent doesn't respect configuration provided via system properties file. (JAVA-2495)
- WebGoat 7.1 server type detection. (JAVA-2458)
- DB flowmap regression in 3.7.10.17525+ agent. (JAVA-2313)
- OOM: Protect rebuilds a masked body for each attack in a single request. (JAVA-1646)
- Assess must limit size of `RequestBuffer`. (JAVA-3272)
- `RequestMemoryBuffer` copies all bytes for the request body again. (JAVA-3107)

### Java 3.8.7.21291

**Release date:** August 4, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

#### New and improved:

- Added sensitive data masking support for Liferay namespaced parameters.
- Enhanced Liferay 7.2+ LDAP injection and path traversal.
- Refactored Hibernate entry points that use functional interfaces.
- Extracted rule evaluation metadata from being hardcoded in `SignatureBasedRules`.
- Improved performance of Liferay Check in `UnvalidatedForwardCheck`.

#### Bug fixes:

- Fix Typo in `USE_RUNTIME_CACHE`. (Java-3518)
- Incorrectly parsed uncommon query string results in incorrect behavior. (JAVA-3305)
- Assess must limit size of `RequestBuffer`. (JAVA-3272)
- `RequestMemoryBuffer` copies all bytes for the request body again. (JAVA-3107)
- Compare agent defined Protect rules with Contrast's supplied rules. (JAVA-2629)
- Failure to discover libraries in EAR deployed to WebSphere 8.5 on IBM Java 1.8. (JAVA-2122)

### Java 3.8.6.21910

**Release date:** August 5, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

#### Bug fixes:

- NPE with `ContrastPlugin.isDisabledUri`. (Java-3536)
- MuleSoft Jetty bad operand on stack. (JAVA-3553)
- Incorrectly parsed uncommon query string results in incorrect behavior. (JAVA-3305)
- Assess must limit size of `RequestBuffer`. (JAVA-3262)
- `RequestMemoryBuffer` copies all bytes for the request body again. (JAVA-3107)

- Compare agent defined Protect rules with TS supplied rules. (JAVA-2629)
- Fails to discover libraries in EAR Deployed to WebSphere 8.5 on IBM Java 1.8. (JAVA-2122)
- Add Sensitive Data Masking Support for Liferay Namespaced Parameters. (JAVA-3007)
- Liferay 7.2+ Path Traversal false-positives. (JAVA-2920)

### Java 3.8.6.21068

**Release date:** July 22, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

#### Bug fixes:

- Screener Micro failures due to update to newest artifact. (JAVA-3381)
- GitHub runner does not have access to ECR. (JAVA-3379)
- Cross-site scripting (XSS) false negative in SpringBoot 1.0+. (JAVA-3362)
- Regex Scan Policy Targets the Wrong API. (Java-3358)
- Agent acts differently when started with proxy enabled. (JAVA-3268)
- `UrlExcusions` with all rules off are not applied before capturing request body. (JAVA-3108)
- Request MemoryBuffer threadlocal never releases any memory allocated. (JAVA-3014)
- Umbrella is not discovering an entry point in the Java IO Test. (JAVA-2529)

### Java 3.8.6.20712

**Release date:** July 8, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

#### Bug fixes:

- Umbrella is not discovering and entry point in the Java IO Test. (JAVA-2529)

## January - June 2021

### Java 3.8.5.20504

**Release date:** June 24, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

#### New and improved:

- Added support for Oracle ADF 12c.
- Remove JAXB from Contrast SDK.

#### Bug fixes:

- `-Dcontrast.assess.save_results=OnError` not saving vuln data locally when agent is unable to connect to Teamserver. (JAVA-3267)
- Agent fails to obtain settings from Teamserver after starting with no connectivity. (JAVA-3148)
- Correct server detection for JBoss EAP and Wildfly post 19. (JAVA-3110)
- Struts 2 route coverage does not function without the spring-struts-plugin. (JAVA-1947)

### Java 3.8.5.20387

**Release date:** June 10, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

#### New and improved:

- Add technology sensor for MyBatis.
- Make overly-long session timeout check log messages less noisy on `DEBUG`.
- Use Final Release of `java-launcher.jar` instead of `SNAPSHOT` version.
- Added Scan to OWASP benchmark.

**Bug fixes:**

- XXE False Positive when `XMLStreamReader` is configured to be safe. (JAVA-3118)
- Java Agent detects JBoss EAP 7.3 (WildFly 18) as JBoss AS 7.1 (which is JBoss EAP 6.0). (JAVA-2832)
- Agent sends invalid `internalDate` for libraries. (JAVA-272)
- WebSphere 8.5.5 yields `NoSuchFieldException`. (JAVA-86)

**Java 3.8.5.20294**

**Release date:** May 27, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15, 16

**New and improved:**

- Added full support for JDK 16.
- `OpenJDK16` XXE tests with `InaccessibleObjectException`.
- XXE False Positive when attribute `ACCESS_EXTERNAL_STYLESHEET` is configured to be safe.

**Bug fixes:**

- `ContrastNettyDispatcherImpl` uses `ClassCastException` for control flow. (JAVA-2888)
- `DataMasker` handling of Request Body does not work for multi-part requests. (JAVA-2681)
- Reflected cross-site scripting (XSS) detection race condition. (JAVA-2619)
- Merge of `AppActivity` with concurrent modification causes `ConcurrentModificationException`. (JAVA-2457)
- `AssessmentContext` use of `WeakHashMap` causes deadlocks. (JAVA-2431)

**Java 3.8.4.20143**

**Release date:** May 13, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15

**New and improved:**

- Added support for Trinidad 2.0+ `ResponseWriters` and HTML escaping utilities tagging/deadzones.
- Added Support for Mojarra 2.0+ `HtmlResponseWriter` and `HtmlUtils` tagging/deadzones.
- ADF File Upload Support for cross-site scripting (XSS) in Assess.
- Trinidad JSP Support for cross-site scripting (XSS) and Path Traversal in Assess.
- Added support for ADF Business Components (SQLi) in Assess.
- Added support for ADF Facelets cross-site scripting (XSS) and Path Traversal in Assess.
- Added Static Application Security Testing (SAST) tests for `java.xml` and `java.beans`.
- Added Static Application Security Testing (SAST) tests for `java.util`.
- Added Static Application Security Testing (SAST) tests for `java.lang`.

**Bug fixes:**

- False positive Path Traversal null byte. (JAVA-2768)
- Slow primordial transformation time for J11. (JAVA-2761)
- Java code formatting is not being applied/checked in acceptance test application project. (JAVA-2716)

- Vulnerabilities not sent for Jersey acceptance test app. (JAVA-2645)
- `ArrayIndexOutOfBoundsException` with `PurgeThread` on TS. (JAVA-2589)
- XXE False Positive when `TransformerFactory` is configured to be safe. (JAVA-2534)
- Umbrella Lambda Entrypoint Signatures are confusing. (JAVA-2526)
- Fix team module race condition when adding new developers. (JAVA-2256)
- Remove `javax.net.ssl.keyStorePassword` from contrast log. (JAVA-538)

### Java 3.8.3.19749

**Release date:** April 15, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14, 15

#### New and improved:

- Reduced object allocation in input canonicalization of Protect for increased performance and lower memory usage.
- Added support for WebLogic's DocumentBuilder XML implementations in Assess.
- Changed Protect XSS rule from **Probed** to **Suspicious** when in monitoring mode.

#### Bug fixes:

- When using a `PemPrivateKey` in Netty, the agent would report a Hardcoded Key vulnerability. (JAVA-2616)
- When using Jersey JAX-RS, the agent could get caught in a race condition during route observation. (JAVA-2425)
- When using an older version of ESAPI with Protect enabled, the agent could throw a null-pointer exception. We removed the deprecated User Attack Attribution feature to fix this issue. (JAVA-66)

### Java 3.8.3.19470

**Release date:** April 1, 2021

**Language versions currently supported:** Java 1.6, 1.7, 8, 9, 10, 11, 12, 13, 14 and 15

#### New and improved:

- Fixed cross-site scripting (XSS) false-positives in Oracle ADF views.
- The agent now reports effective instrumentation mode on Application create.

#### Bug fixes:

- When trying to identify ReDos vulnerabilities in Spring, the agent could report a false positive in `UriComponentsBuilder`. (JAVA-2599)
- When instrumenting AWS DynamoDB with Assess, a null-pointer exception is thrown in `ScanRequest` if a null is passed as a parameter. (JAVA-2525)
- When the agent tries to instrument Apache Xiom, the Java agent can not confirm whether `XMLInputFactory` supported external entities Apache Xiom API. (JAVA-2499)
- When Assess is disabled, the agent will still report discovered routes. (JAVA-2494)
- When the `CorsFilter` is enabled in Spring, the agent could falsely report a Header Injection vulnerability in Assess. (JAVA-2492)
- When custom security controls with **All Rules** are enabled in Contrast, Assess data flow rules do not respect custom-encoded tags. (JAVA-2217)
- When trying to deploy the agent to Pivotal Cloud Foundry (now VMWare Tanzu), libraries in external directories are not recognized. (JAVA-2178)
- When trying to identify Assess vulnerabilities in Apache Xiom, an external entity injection (XXE) false positive could be reported. (JAVA-2118)
- When using ESAPI Validators for files in application code, the agent could report path traversal false positives. (JAVA-967)

- When using Websphere, the agent would generate a vulnerability for insecure cookies when not part of an HTTP request. (JAVA-755)
- When using `java.io.ObjectInputStream#readObject`, the agent would not report untrusted deserialization vulnerabilities on the deserialization of Base64 encoded objects. (JAVA-719)

### Java 3.8.2.19262

**Release date:** March 18, 2021

**Language versions currently supported:** Java 1.6 - Java 11, 12, 13, 14 and 15

#### New and improved:

- The Java agent is now compatible with the latest Java 16 release candidate.

#### Bug fixes:

- When attempting to block a ReDos attack with Protect, application settings for the rule from Contrast were ignored. (JAVA-1959)
- When Assess is enabled in a Websphere server, sending a SOAP request could report an XXE false positive. (JAVA-2273)
- When using Netty, the agent could cause the request cookies to become malformed. (JAVA-2439)
- When using Apache, the agent is reporting WebService architecture components with invalid URL values. (JAVA-2449)

### Java 3.8.2.19027

**Release date:** March 4, 2021

**Language versions currently supported:** Java 1.6 - Java 11, 12, 13, 14 and 15

#### New and improved:

- Downgraded "Failed to Update Immutable Collection" log message from ERROR to DEBUG.

#### Bug fixes:

- When running Protect, rules that only block at the perimeter do not report attacks at the perimeter when in monitoring mode. (JAVA-58)
- When trying to scan for Spring Boot libraries on startup, the agent fails if `JBOSS_HOME` is set. (JAVA-2027)
- When trying to monitor the number of queries executed, the agent could incorrectly report a much higher number of queries. (JAVA-1970)
- When running Assess in WebSphere, the agent could falsely report a XXE vulnerability in XLXP2. (JAVA-2387)
- When attempting to decode Javascript in Protect, the agent could throw a `NullPointerException` on a specific input. (JAVA-2456)

### Java 3.8.1.18814

**Release date:** February 18, 2021

**Language versions currently supported:** Java 1.6 - Java 11, 12, 13, 14 and 15

#### New and improved:

- Updated list of secure encryption algorithms for the insecure encryption algorithm Assess rule.

#### Bug fixes:

- When Websphere is run with the agent in suite B mode, a `java.lang.IllegalArgumentException` is thrown, regardless of whether TLS1.2 is set as a system property. (JAVA-1813)

- When running a Dropwizard service that doesn't expose anything on the default servlet context, we log repeatedly after failing to obtain servlet context. We updated this to only log once. (JAVA-2272)
- When trying to discover architectural components on start up, the agent could accidentally report a negative number. We've defaulted to certain ports based on HTTP scheme. (JAVA-2294)
- When using the agent with Assess enabled, the agent could have a memory leak due to keeping all transformed class names. (JAVA-2310)

### Java 3.8.1.18696

**Release date:** February 2, 2021

**Language versions currently supported:** Java 1.6 - Java 11, 12, 13, 14 and 15

#### Bug fixes:

- Rule mode configurations were hidden by the agent but are now visible. (JAVA-3)
- When checking for command chaining in SQL injection with Protect, a false positive could occur if `BEGIN` and `END` were used. (JAVA-53)
- Fixed configuration documentation for `inventory.library_dirs` property to specify correct delimiter per OS. (JAVA-962)
- When using Grizzly, the agent did not properly handle insecure cookies set with `setHeader`. (JAVA-1785)
- When using Assess, the agent could report incorrect security control tags in data flow. (JAVA-2216)
- When using Protect, analysis of form metadata could result in a false positive. (JAVA-2274)

### Java 3.8.0.18457

**Release date:** January 21, 2021

**Language versions currently supported:** Java 1.6 - Java 11, 12, 13, 14 and 15

#### Important notes:

- The Contrast agent no longer enables Synapse-related policies by default. Support for Synapse is in Beta.

#### New and improved:

- Added support for JPQL for JPA 2.0-2.2 in Protect.
- Removed cookie name and value as valid sources for Reflected XSS in Apache CXF, Grizzly, JAX-RS on Jersey, J2EE/Servlets, and Netty.

#### Bug fixes:

- When a user supplies an empty session ID configuration value, Contrast rejects vulnerabilities. The Java agent no longer allows empty session ID configuration. (JAVA-1120)
- When scanning for overly-long session timeout vulnerabilities, the agent can match on XML nodes that were commented out. The agent now parses `web.xml` when looking for overly-long session timeout instead of using a String match. (JAVA-1912)
- When inventory is disabled (`-Dcontrast.inventory.enable=false`) the agent still reports application inventory data. (JAVA-1968)
- When inventory is disabled, Protect attack reports can be disrupted. (JAVA-1971)
- The Java agent no longer considers application path for application ID. (JAVA-2055)
- When Protect is enabled the agent considers binary data for multipart value inputs. It will now only consider non-binary data. (JAVA-2103)
- Removed an Assess SQL injection false positive finding within MariaDB. (JAVA-2106)
- When using Synapse, tags are not duplicated for Apache headers and static strings. (JAVA-2117)



## Java 3.8.0.18219

**Release date:** January 8, 2021

**Language versions currently supported:** Java 1.6 - Java 11, 12, 13, 14 and 15

### New and improved:

- The Java agent will now be disabled after 404 response from Contrast on startup.
- Added Assess and Protect support for the MyBatis framework.
- Agent now sends heartbeat messages to Contrast.
- Improved Protect Base64 optimization when using exclusions or disabling rules.

### Bug fixes:

- False positive is associated with WebSphere when Protect is enabled. (JAVA-1897)
- Loading static content with Websphere triggers a false positive Path Traversal vulnerability. (JAVA-1910)
- Insecure Authentication Protocol Rule can cause false positives. (JAVA-1913)
- Agent loses tainted object when Undertow's `PartImpl#getHeaders` is called more than once. (JAVA-1932)
- Datadog Protect Path Traversal caused false positives. Repaired by deadzoning certain classes. (JAVA-2057)
- Agent `HierarchyCache` leaks file handles. (JAVA-2062)
- Loading static content with Wildfly triggers a false positive Path Traversal vulnerability. (JAVA-2064)

## July - December 2020

### Java 3.7.11.17934

**Release date:** December 10, 2020

**Language versions currently supported:** Java 1.6 - Java 11, 12, 13, 14 and 15

### New and improved:

- Java 13, 14 and 15 are now supported.
- Updated `PropagationEvent` and `SourceEvent` with more modern design patterns.
- Updated agent to no longer send invalid `ArchitectureComponentDTM`.
- Fixed invalid LDAP url in architecture components.
- `ObservedRoute` URL is being passed to Contrast with an empty value.
- Improved performance of Base64 encoding detection.
- Moved padding oracle Protect rule to Beta.
- Added feature flag for web service response tracking (which is disabled by default) to ignore external HTTP responses as sources.
- Improved performance by making changes to MarkOfTheBeast instrumentation.
- Added new SQL Injection whitespace separators to Protect keywords.
- Decreased Base64 decoding in Protect for performance improvements.

### Bug fixes:

- Protect malformed-header rule must include exceptional logic for multipart/related Content-Type's. (JAVA-1020)
- Zombie Background Service error. Use `ScheduledExecutorService` instead of `Thread.sleep`. (JAVA-1911)
- `StackOverflowException` occurred from `CodeEventBuilder.getMethod()`. (JAVA-1960)
- The `spring-unchecked-autobinding` rule is not supported in Spring 4. (JAVA-69)

- Agent reports vulnerabilities before taking library inventory. (JAVA-1265)
- Wildfly session ID is null when redirected to another servlet in tests. (JAVA-1300)
- An `AppCreate` message is never sent if library inventory is disabled. (JAVA-1817)
- False attack reported when using Hadoop 3.2.1. Deadzone added to prevent this. (JAVA-1866)
- Protect showed performance issues when analyzing deserialized objects. (JAVA-1871)
- Server name defaults to null if lookup fails and not set by config. (JAVA-1894)
- Propagators were causing false positives and negatives. Removed `FileInputStream.<init>` propagators to prevent false positives. Added `FileInputStream.<init>` as a path traversal sink to prevent false negatives. (JAVA-1914, JAVA-1915)

### Java 3.7.10.17657

**Release date:** November 12, 2020

**Language versions currently supported:** Java 1.6 - Java 11

#### New and improved:

- Java 2 Security Manager support is now out of beta and available for general use.
- Added agent compatibility for Java 14 and 15.
- Refactored and improved parts of application initialization to prevent rare errors.
- Added OWASP Benchmark to automated test pipeline.
- Updated SQL Injection whitespace separators for Protect.
- Added a debug log statement after primordial retransformation.
- The agent can now detect programmatic setting of Session Timeout for applications without a *web.xml*.
- Updated padding oracle, ReDos, and ZIP file overwrite Protect rules to include **Suspicious** attack labels.

#### Bug fixes:

- Some Struts CVE shields don't check for vulnerable libraries before reporting attacks. (JAVA-153)
- Moved CSP header analysis context so it is specific to the current request, rather than applying to all requests. (JAVA-1609)

### Java 3.7.10.17525

**Release date:** October 29, 2020

**Language versions currently supported:** Java 1.6 - Java 11

#### New and improved:

- Java 2 Security Manager support is now out of beta and available for general use.
- Removed the auto-license configurations from the Java agent.
- Enabled reporting of enhanced library usage feature by default.
- Added support for `JEP 325` switch expressions.
- Updated agent to prevent redacting important error information from the logs.
- Changed inaccurate warning when application name cannot be found.
- Added Expression Language injection vulnerability support for Thymeleaf in Spring.
- Updated agent to default Protect rule modes to `off`.

#### Bug fixes:

- Assess XXE getting false negative with JAXP StAX Parsers. (JAVA-757)
- GlassFish classloader occasionally fails to load contrast dispatcher types. (JAVA-1595)
- CSP header analysis referrer is misspelled. (JAVA-1611)

- ReDoS event causes application to fail to start. (JAVA-1771)
- DataDog Protect path traversal shows false positive. (JAVA-1791)
- Redundant `onApplicationInventoried` callbacks cause performance degradation. (JAVA-1822)

### Java 3.7.9.17301

**Release date:** October 15, 2020

**Language versions currently supported:** Java 1.6 - Java 11

#### Important notes:

In this release, the Java agent changed the behavior of the `api.timeout_ms` config parameter. Previously this parameter, while titled as milliseconds, was interpreted by the Java agent as seconds. This behavior has been corrected to be milliseconds across this board. The legacy behavior using seconds is not available via a YAML config, but is configurable with the `-Dcontrast.timeout` flag. [Contact Support](#) if you were negatively impacted by this change and need assistance.

#### New and improved:

- You can now use profiles in a multi-tenant application configuration to apply individual options to each application.
- Verified Protect blocks untrusted deserialization on `commons-collections` and `c3p0`.
- Liferay Suppression now uses `UnvalidatedForwardCheck` and not `stack denylist`.
- You will now see WARN if the YAML configuration file contains invalid syntax when parsing or if required configuration to connect to the Contrast application is missing.
- Log full configuration state including environment, command line, and YAML values.

#### Bug fixes:

- False positive on hardcoded key in Assess. (JAVA-710)
- Missing deadzone caused NewRelic path traversal. (JAVA-891)
- SHA-1 false positive found in WebSphere LTPA token generation. (JAVA-1594)
- SHA3-256 incorrectly identified as bad crypto algorithm. (JAVA-1603)
- False negatives due to missing `java.io.InputStream.read` propagators. (JAVA-1633)
- Analyze-log tool crashes when missing second argument. (JAVA-1670)
- Agent fails to deserialize `ApplicationResponse` with modules. (JAVA-1687)
- Common config `api.timeout_ms` value is actually in seconds, not milliseconds. (JAVA-1694)
- Use `StackCapture.traceWithoutContrastCode` over complex stack frame depth calculations. (JAVA-1697)
- Suppress `crypto-bad-mac` vulnerability from within Hibernate. (JAVA-1707)
- In some cases on Java 13+ with Assess enabled, `string.replace` fails. (JAVA-1722)
- Remove double colon from Proxy URL configuration description. (JAVA-1773)
- Netflix Zuul is throwing a header-injection false positive. (JAVA-1632)

### Java 3.7.9.17038

**Release date:** October 1, 2020

**Language versions currently supported:** Java 1.6 - Java 11

#### New and improved:

- Separated semantic analysis rules out into new rules.
- Spring `ClientHttpResponse#getStatusText` is no longer being filled in with Spring Boot 1.4+.
- Lowered `DocumentScanningManager` log statement to `DEBUG`.
- Added support for Spring `RestTemplate`.

- Added Assess support for Hibernate HQL, JPA/JPQL and Criteria API vulnerabilities.
- Included GlassFish support for servlet route coverage.

**Bug fixes:**

- `ContrastDynamicSourceDispatcherImpl` throws unnecessary error. (JAVA-1709)
- Path traversal false positive in Grails application due to `AssetPipelineFilter`. (JAVA-1473)
- Grizzly Propagator incidentally ignored by agent. (JAVA-1635)

**Java 3.7.7.16760**

**Release date:** September 16, 2020

**Language versions currently supported:** Java 1.6 - Java 11

**New and improved:**

- Introduced Java 13 compatibility.
- Added support for `Matcher#appendReplacement` and `String#replace`.
- Added support for Java Security Manager on WebSphere and WebLogic with Java 6 through 8.
- Added support for `contrast.profile` properties.

**Bug fixes:**

- False positive path traversal in Liferay `DynamicCSSFilter` (JAVA-1402)
- Assess rule `cookie-flags-missing` suppression logic fails at `addHeader` and `setHeader` sinks (JAVA-1521)
- `ContrastMarkOfTheBeastDispatcherImpl` does not handle null strings (JAVA-1678)

**Java 3.7.7.16532**

**Release date:** September 2, 2020

**Language versions currently supported:** Java 1.6 - Java 11

**New and improved:**

- Added JBoss servlet route coverage support.
- Add sanitizers for URL encoding from Liferay 7.X.
- Added `HttpInputMessage#getBody` and `HttpMessage#getHeaders` as sources
- Updated retrieval of headers from `RestTemplate` causing path traversal false negative.
- Updated Assess arbitrary server-side forwards detection.

**Bug fixes:**

- Possible path traversal false positive on PDF file upload. (JAVA-1312, SUP-1486)
- False positive on server-side forward with Liferay `ComboServlet`. (JAVA-1400)
- False positive on arbitrary server-side forward with Liferay `VirtualHostFilter`. (JAVA-1410)
- Untrusted deserialization investigation in Weblogic `DeploymentService`. (JAVA-1476)
- Probed events not reported when exception causes request to end in Jersey. (JAVA-1485)
- Observed routes never appear for some applications in Contrast. (JAVA-1549)
- Java Protect false positive in path traversal pattern 10B. (JAVA-1622)
- Regression with Protect response times in 3.7.7.16256. (JAVA-1626)

**Java 3.7.7.16377**

**Release date:** August 19, 2020

**Language versions currently supported:** Java 1.6 - Java 11

**New and improved:**

- Introduced Java 12 compatibility.
- Updated denylist and allowlist naming conventions.
- Improved detection for `@PathVariable` with `-Dcontrast.inspect.allclasses=false` in Spring 4 and 5.

**Bug fixes:**

- Agent ignores WebSphere Trust Store config (JAVA-742)
- `Cve_2014_0114` false positive when user patches `commons-beanutils` (JAVA-1143)
- Path traversal FP for Struts 2 default static file handler (JAVA-1398)
- False positive unvalidated forward for `ServletContext#getRequestDispatcher` (JAVA-1403)
- Handle nulls in J2EE profilers with null checks instead of exceptions (JAVA-1495)
- `AttackBlockedException` caught and not re-thrown resulting in attack not being blocked (JAVA-1504)
- Remove `ClassLoader` types from Contrast ignored class list. (JAVA-1602)

**Java 3.7.7.16256**

**Release date:** August 5, 2020

**Language versions currently supported:** Java 1.6 - Java 11

**New and improved:**

- Added support for uploading files with Spring.
- Updated support for accessing data with JPA in Spring.
- Jetty is now supported for servlet route coverage.
- Removed log redaction from our data masking feature.
- Removed line count from agent.

**Bug fixes:**

- SQLi false positive when making `RaspSimulator` field non-static. (JAVA-7)
- Spring Boot 2.0+ are not yielding Path Traversal vulnerability. (JAVA-1467)
- Protect Analysis Cache does not account for input type. (JAVA-29)
- Protect Analysis cache doesn't take into account source of input. (JAVA-821)
- Insecure-socket-factory reported due to SNI not explicitly set. (JAVA-988)
- WebLogic detection is unreliable when domain-info file is missing. (JAVA-1399)
- Re-implement of `spring-unchecked-autobinding` logic. (JAVA-1427)
- `-Dcontrast.rootapp` name ignored when `ServletContext.getServletContextName()` returns non-empty value. (JAVA-1453)
- Assess tracks propagation events in agent logging. (JAVA-1487)

**Java - July 2020**

**Language versions currently supported:** Java 1.6 - Java 11

**Agent versions released during the past month:** 3.7.5.15634, 3.7.6.16040

**New and improved:**

- Added Spring support for Accessing Relational Data using JDBC.
- You can now access JPA Data with REST in Spring.

**Bug fixes:**

These bugs were fixed during the past month:

- jaxrs/Jersey vulnerabilities not triggered due to losing track of tainted data.
- Race condition with CreateApp settings meaning Server level disabled rules are used.
- Protect false negative: Jackson unsafe deserialization (CVE-2017-17485).
- `finding-send` broken due to FrameworkManager bringing in dispatchers from `java.lang`.
- Agent fails to request permission before calling `setAccessible`.
- Command Injection in Protect received false positive from `argparse4j`.
- Agent on WebSphere changes handling of disabled TLS algorithms.
- Spring `PathVariable` is not detected as a source.
- Dataflow is lost through some Spring Util classes.
- False positive unvalidated forward in Tomcat with Spring `DeferredResult`.
- SQLi FP with HttpClient's `RetryExec` with MariaDB
- False positive received with XSS Keyword.
- `-Dcontrast.rootapp` name ignored when `ServletContext.getServletContextName()` returns non-empty value.

## January - June 2020

### Java - June 2020

**Language versions currently supported:** Java 1.6 - Java 11

**Agent versions released during the past month:** 3.7.5.15634, 3.7.5.15480

#### New and improved:

- Provided route coverage support for the Servlet API.
- Implemented Sensitive Data Masking with the `mask_attack_vector`.
- Added Assess support for DynamoDB.

#### Bug fixes:

- Protect caches input no matter the size potentially leading to OOMs for large requests
- Undertow Resource Handlers Should Not Trigger Path Traversal Attacks
- Path Traversal False Positive Due to Spring's `ServletContextResource`
- Race condition in App Inventory along with Protect Struts Cve rules
- Log4j2 instrumentation fails on Log4j2 2.13.1
- Agent Reports Incorrect HTTP Protocol Version on Servlet Containers
- Protect SQLi SimpleOrSearcher has poor performance on large inputs
- Assess CSRF Detection Fails When Request Uses form-data/multipart
- SSRF detection must not take use of tainted path as a SSRF vulnerability
- Java Agent does not provide a findings field for `PathTraversalSemanticDTM`
- Agent Prevents Graceful JVM Shutdown
- Fix performance metric reporting for Acceptance Tests
- `StringUtil` methods for case sensitive string comparison are wrong for non alphabet inputs

### Java - May 2020

**Language versions currently supported:** Java 1.6 - Java 11

**Agent versions released during the past month:** 3.7.4.14937

#### New features and improvements:

- Added support for (WebSphere) Route Discovery for Servlet 2.5 Declarative Servlets.
- Increased sensitive data masking coverage, specifically for SQLi, XSS, Command Injection, Path Traversal, CSRF, ReDoS, OGNL Injection.

#### Bug fixes:

- XXE vulnerability missed in Assess but flagged as path traversal
- UI displaying blocked and exploited HTTP Method Tampering events
- Protect was receiving false negatives for XSS Bypass via Bug Bounty
- Spring auto binding rule causing false negatives
- Protect Path Traversal False Positive due to base64 null char
- NPE in `ContrastHttpRequestRegistrationWatcherDispatcherImpl`
- `ReportFindings` acceptance test annotation is broken

## Java - April 2020

**Language versions currently supported:** Java 1.6 - Java 11

**Agent versions released during the past month:** 3.7.3.14727, 3.7.3.14657

### New and improved:

- Contrast Assess more accurately detects Path Traversal vulnerabilities. Contrast Assess and Protect more accurately detect vulnerabilities and attacks respectively in Apache Struts based applications. Contrast Protect more accurately detects SQL Injection attacks.

### Important notes:

- This release includes breaking changes to Contrast Assess route coverage reporting when used with on-premise Contrast servers version 3.7.2 and older.

### Bug fixes:

- When WebSphere users configured their WebSphere services with custom TLS certificates, the Contrast Java agent prematurely initialized WebSphere's certificate manager as a side-effect. This caused the WebSphere TLS connections to fail unexpectedly. This issue has been resolved by adding a special exception for WebSphere to Contrast's TLS initialization whereby Contrast will use an isolated `SSLSocketFactory` instead of the Java runtime's default system socket factory.
- When users configure their application with a session-based vulnerability auto-verification policy, and the user does not configure their Contrast agent with an explicit `session_id` configuration parameter, then Contrast wrongfully auto-verifies vulnerabilities. We resolved this issue by fixing a race condition, so we can ensure that auto-verification will work as expected when the user has configured their agent to use the `contrast.agent.java.standalone_app_name` configuration.

## .NET Framework agent release notes

At this time, the agent release notes are only available in English.

### .NET Framework 51.0.2

**Release date:** April 12, 2023

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

The Contrast Upgrade Service, which is installed alongside the .NET Framework for IIS agent by default, does not upgrade across major versions by default. Set `enable_major_version_upgrade` to `true` in the upgrade service's configuration file in `C:\ProgramData\Contrast\upgrade-service\` by default if you want to enable upgrades across major versions.

### New and improved:

- Agent disables itself with a 404 message only if the response body includes an invalid application message
- The agent now uses the `agent-lib` library by default

- Fixed localization text in the installer
- Log clean up is now done by one instance of the agent, thereby reducing resource consumption on start up
- The agent has better logging if it cannot get the per-user config in certain cases
- The diagnostics CLI displays an error message if it tried to create a dump file, but failed
- Agent Explorer displays a better message for applications that are not instrumented due to an application allowlist or denylist
- Installer no longer hangs if IIS is not installed and it tries to run `AppCmd`
- Agent no longer reports crypto-weak-randomness when certain database clients are used

## .NET Framework 51.0.0

**Release date:** March 21, 2023

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

The Contrast Upgrade Service, which is installed alongside the .NET Framework for IIS agent by default, does not upgrade across major versions by default. Set `enable_major_version_upgrade` to `true` in the upgrade service's configuration file in `C:\ProgramData\Contrast\upgrade-service\` by default if you want to enable upgrades across major versions.



### IMPORTANT

#### Important improvements:

- **Installer:** Changed the directories where the profiler and native modules are installed to: `%ProgramFiles%\Contrast\dotnet\sensors\runtimes\<platform>\native\`.
- **Site Extension:** Changed the directories where the profiler is installed to: `content\ContrastAppService-51.x.x.x\runtimes\<platform>\native\`.
- **NuGet Package:** Changed the directories where the profiler is installed to: `content\contrastsecurity\runtimes\<platform>\native\`.
- Changed the name of the profiler DLL to `ContrastProfiler.dll`.
- The agent now supports layered configurations.
- Contrast Tray is no longer installed. Upgrading to 51.x.x removes it.

#### Other improvements:

- The agent now uses the `agent-lib` library by default
- Improved documentation for the diagnostics `'memory-usage'` verb.
- Offset starting background jobs in agent to reduce start up resource usage.

## .NET Framework 50.1.14

**Release date:** March 15, 2023

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### New and improved:

- Profiler no longer attaches to `Contrast.AgentExplorer.exe`.
- Improved performance for log cleanup.



- `DotnetAgentService` no longer consumes 100% of CPU if the communication between it and Profiler gets into a bad state.

### **.NET Framework 50.1.13**

**Release date:** March 1, 2023

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- The agent now supports chaining with Aternity.
- The agent will now report Redis database connections to FlowMap for connections using the Stack-Exchange Redis driver.
- The installer bootstrapper does not block bundle downgrades on silent installations.
- The Contrast Assess untrusted deserialization `FormatterValidator` does not treat use of non-null binder as safe.
- The agent processes [ASP.NET](#) page directives with comment lines correctly.

### **.NET Framework 50.1.10**

**Release date:** January 12, 2023

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- Improved agent reporting of View components for FlowMaps in the Contrast web interface.
- Added the `agent.dotnet.file_analysis_report_full_path` configuration flag with a default value of `false`.  
If you set the value to `true`, the agent reports the full file path (rather than a relative path) for Assess vulnerabilities discovered during file analysis (for example: weak or vulnerable configurations in `web.config` or `.aspx` files.). This setting can result in the Contrast web interface displaying duplicate vulnerabilities if you deploy the same application to multiple servers with different physical paths.

## **Archive**

### **Legacy agent**

#### **.NET Framework 20.4.8 (legacy)**

**Release date:** March 1, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- This is a new release of the [.NET Framework \(legacy\) agent](#).

#### **Bug fixes:**

- Protect semantic SQL injection rules cannot be disabled individually. (SUP-2325)

#### **.NET Framework 20.4.7 (legacy)**

**Release date:** February 23, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- This is a new release of the [.NET Framework \(legacy\) agent](#).

**Bug fixes:**

- URL exclusions are not respected by Protect semantic SQL injection rules. (SUP-2325)

**July - December 2022****.NET Framework 50.1.9**

**Release date:** December 14, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- This release includes a new version of Agent Explorer with several bug fixes and user interface improvements.

**.NET Framework 50.1.8**

**Release date:** December 12, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- The invariant culture is now used when writing Protect events to `syslog`. (DOTNET-4661)

**.NET Framework 50.1.7**

**Release date:** November 21, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Bug fixes:**

- The agent will now more reliably detect and report databases to Flow Map. (DOTNET-3924)

**.NET Framework 50.1.6**

**Release date:** November 8, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Agent Explorer now shows statistics on number of vulnerabilities, number of attacks, and external services observed by agents, as well as information on libraries seen and number of classes used by each library.

**Bug fixes:**

- Assess could sometimes report vulnerabilities involving data flow using interned strings. This has been fixed. (DOTNET-4589)

**.NET Framework 50.1.5**

**Release date:** November 2, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Further reduced the number of allocations that Contrast Assess uses to track dataflow through `StringBuilder.Replace` APIs.

### **.NET Framework 50.1.4**

**Release date:** October 31, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- Significantly improved performance, particularly for allocations that Assess uses to track dataflow through `StringBuilder.Replace` APIs.

#### **Bug fixes:**

- Diagnostics connect command failed with an unexpected error under .NET Framework. This issue is now fixed. (DOTNET-4634)

### **.NET Framework 50.1.3**

**Release date:** October 18, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- In Agent Explorer, the detailed view of an agent now displays why a degraded or faulted agent is in a bad state.

#### **Bug fixes:**

- In Agent Explorer, the Summary tab now shows a consistent number of agents across different components. (DOTNET-4580)

### **.NET Framework 50.1.2**

**Release date:** October 13, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **Bug fixes:**

- Applications could crash when running with Dynatrace OneAgent when an environment variable was changed to a null value. This has been fixed. (DOTNET-4594)  
This issue was incorrectly reported as fixed in .NET Framework 50.1.1
- In .NET Framework 50.1.1, the installed agent's background service failed to start. This issue is now fixed.

### **.NET Framework 50.1.1**

**Release date:** October 13, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **Bug fixes:**

- Applications could crash when running with Dynatrace OneAgent when an environment variable was changed to a null value. This issue is now fixed. (DOTNET-4594)
- Assess would incorrectly report a vulnerability when the value of the content-length header was used in a sink such as a database query. This issue is now fixed. (DOTNET-4537)

## **.NET Framework 50.1.0**

**Release date:** October 5, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### **New and improved:**

- The .NET Core agent for IIS installer now includes Agent Explorer, a separate GUI application that provides high-level information about locally running .NET and .NET Framework agents. Use Agent Explorer to see high-level information such as:
  - Applications and servers that the agent reports
  - Agent configuration
  - Agent version, language, and runtime
  - List of applications that are currently deployed to IIS and/or IIS Express and instrumented.

### **Bug fixes:**

- Protect now reports the IP address of an attack in more scenarios.
- Protect previously reported an untrusted-deserialization attack when the ASPNET `RoleProvider` feature deserialized a `RolePrincipal` object from an encrypted cookie value. This issue is now fixed. (DOTNET-4570)

## **.NET Framework 50.0.23**

**Release date:** September 27, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### **New and improved:**

- Input exclusions now have full regular expression support.

## **.NET Framework 50.0.22**

**Release date:** September 1, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### **Bug fixes:**

- Fixed a reported issue where the diagnostics executable would crash with the error, `Contrast.AgentLib was not found`.

## **.NET Framework 50.0.21**

**Release date:** August 29, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### **Bug fixes:**

- Agent upgrades would fail when an agent was installed with a custom data directory. This issue has been fixed. (DOTNET-4453)
- Validated agent support for .NET Framework 4.8.1

## **.NET Framework 50.0.20**

**Release date:** August 8, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### **Bug fixes:**

- The Agent Upgrade Service would only check for updates after restarting a second time, this has now been fixed. (DOTNET-4318)

### **.NET Framework 50.0.19**

**Release date:** August 1, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- On Windows Server 2012, the IIS installer will now warn users to install VC++ redistributable package necessary for the agent's upgrade service.
- Diagnostic `check-process` now has limited support for 32-bit processes.

#### **Bug fixes:**

- The agent would fail to clean up rolled over log files from native components. This has been fixed. (DOTNET-4314)

### **.NET Framework 50.0.18**

**Release date:** July 12, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **Bug fixes:**

- Assess `hsts-header-missing` previously checked the presence and value of the `strict-transport-security` header for requests made over TLS only. The rule will now also check for the `strict-transport-security` header if the `X-Forwarded-Proto` header indicates the request was made over TLS but TLS was terminated before reaching the application.
- Diagnostics now offers a `read-config` option that will report on the effective configuration of currently running instrumented applications on the server.
- Improved the accuracy of Protect XXE detection, fixing a false negative.
- Assess previously reported the usage of a weak hash algorithm within Microsoft's Application Insight's snapshot collector. This will no longer be reported. (DOTNET-4252)

## **January - June 2021**

### **.NET Framework 50.0.17**

**Release date:** June 28, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **Bug fixes:**

- The agent would fail to report agent initialization errors to Contrast. This has been fixed.

### **.NET Framework 50.0.16**

**Release date:** June 21, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **Bug fixes:**

- Assess analysis would report an unvalidated-redirect when redirected to a string originating from `HttpRequest.Path`. The agent will now only report unvalidated-redirect if `HttpRequest.Path` does not start with a slash. (DOTNET-3950)

## **.NET Framework 50.0.15**

**Release date:** June 13, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### **Bug fixes:**

- Protect will now detect unsafe file uploads using Telerik's RadAsyncUpload control, effectively blocking exploits of CVE-2017-11317.
- The agent did not send `assess.tags` with the "preflight" vulnerability check (but did send this information with the vulnerability report.) The agent now sends the expected information with both messages. (DOTNET-4157)
- The agent can now repeatedly scan static files such as `web.config` and `.aspx` files for vulnerabilities by configuring `agent.dotnet.file_analysis_time_ms`. Previously the agent would scan these files at application startup. Note that re-deploying an application or modifying `web.config` will typically cause a new application instance to be created, replacing the older instance. Any static files in this new instance would automatically be scanned by Contrast.
  - When `agent.dotnet.file_analysis_time_ms` is set to a positive value, the agent will repeat the process of finding and analyzing all static files for an application on the interval specified.

## **.NET Framework 50.0.14**

**Release date:** May 26, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### **New and improved:**

- Added Assess sanitizers for mganss' HtmlSanitizer APIs. (DOTNET-4033)
- Reduced the amount of memory used by the runtime for all libraries not instrumented by the agent. This has resulted in 5-10% reduction in process memory.
- Agent's windows service will no longer generate `system-info.yaml` file in the agent's logs directory by default. Creation of this file can be enabled by setting `agent.dotnet.enable_dvnr: true`. (DOTNET-4147)

## **.NET Framework 50.0.13**

**Release date:** May 17, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### **New and improved:**

- Improved Assess taint tracking for validation methods.
- Protect will now block more untrusted deserialization attacks using `JavaScriptSerializer`, including those associated with CVE-2019-18935.

## **.NET Framework 50.0.12**

**Release date:** May 10, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### **Bug fixes:**

- Improved accuracy of Assess URL character tracking to exclude the port number. (DOTNET-4093)

## **.NET Framework 50.0.11**

**Release date:** April 27, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Minor performance improvements to the cost of calling into Contrast sensors from instrumented code.
- Added diagnostics `check-access` option to test that a Windows user has access to agent profiler and sensor components.
- Improved cookie value parsing logic to avoid reporting that an invalid cookie is missing `HttpOnly` or `secure` flags.

**.NET Framework 50.0.10**

**Release date:** April 14, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Added Assess `verb-tampering` rule.

**Bug fixes:**

- Assess would report XSS when an application used WebForms' `__LASTFOCUS` field. (DOTNET-3982)
- Protect untrusted deserialization did not respect URL exclusions. (DOTNET-4019)
- Assess would report header-injection against ASPNET MVC applications using the Web API 2 compatibility layer. (DOTNET-4015)
- The agent installer would remove any profiling environment variables upon uninstall, which could disable other profiler-based products such as APM tools. The uninstaller will now only remove those environment variables if they are set to Contrast values (DOTNET-4025).

**.NET Framework 50.0.9**

**Release date:** March 24, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Expanded APIs used to detect unvalidated redirect vulnerabilities under Assess.
- Diagnostics `validate-yaml` will now validate `application.metadata` and `application.session_metadata` values follow expected format.
- Added new deep-connect diagnostics command to help troubleshoot agent communication with Contrast.

**Bug fixes:**

- Semantic Path Traversal attacks would be detected and blocked by the agent but failed to report to Contrast. (DOTNET-3978)

**.NET Framework 50.0.8**

**Release date:** March 16, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Diagnostics `cert-info` command's validation of certificates now more closely matches the agent's `HttpClient`'s certificate validation.

**Bug fixes:**

- The Azure App Service Site Extension's XDT in version 50.0.7 included a bad transform that caused the App Service instance to crash. This has been fixed. (DOTNET-3983)

### **.NET Framework 50.0.7**

**Release date:** March 14, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- Improved reporting of library class names to exclude compiler-generated types.
- Added the Assess overly permissive cross domain policy rule.
- Diagnostics `config-keys` will now provide descriptions for special Contrast environment variables that can be used to configure specific agent behavior (e.g., `CONTRAST_CONFIG_PATH` to set the path of the agent's configuration file.)

#### **Bug fixes:**

- In some rare cases, the Azure App Service Site Extension could fail to cleanly upgrade because the agent's profiler component was locked. Agent components within the site extension are now housed in a version-specific directory. Note that users that have manually specified the path to agent components will need to update these paths. This should not be common as the Site Extension automatically sets the environment variables with the correct paths necessary to load the agent.

### **.NET Framework 50.0.6**

**Release date:** February 28, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- Assess potential sanitizers and validators will now be automatically reported to Contrast by default.
- The installed agent now enables profiler chaining by default.

### **.NET Framework 50.0.5**

**Release date:** February 10, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- Improved performance by reducing cost of jumping from instrumented code to Contrast sensors.
- Route discovery of `.aspx` and `.asmx` routes will no longer discover child application's routes for applications hosted in IIS.

### **.NET Framework 50.0.4**

**Release date:** January 25, 2022

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **Bug fixes:**

- The agent's sensors component did not respect a custom data directory set during install. (DOTNET-3739)
- Diagnostics' `system-info` command failed to gather information about IIS application pools and applications. (DOTNET-3670)

### **.NET Framework 50.0.3**

**Release date:** January 11, 2022



**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Improved performance of Assess and Protect analysis by reducing the cost of calling into Contrast code from instrumented code.
- Improved performance of Assess analysis of application code with data flow within LINQ where clauses.

**Bug fixes:**

- Fixed an issue where agent logs indicated an error due to a missing default configuration value. (DOTNET-3633)
- Fixed an issue where the agent's Upgrade Service component could crash when instrumented by the Contrast .NET Core agent earlier than 2.1.0. Note that this would only occur if a user set global environment variables to add the Contrast .NET Core agent's profiler. (DOTNET-3689)

## July - December 2021

### .NET Framework 50.0.2

**Release date:** December 14, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- The agent should only restart IIS during installation. Restarting the agent's background Windows service will no longer restart IIS. The agent can still be disabled by the `enable: false` configuration setting.

### .NET Framework 50.0.1

**Release date:** November 9, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Improved agent's ability to follow WCF message processing across multiple threads.

### .NET Framework 50.0.0

**Release date:** November 2, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Dependencies of the agent diagnostics tool (`contrast-dotnet-diagnostics.exe`) could be removed during the upgrade process and not installed, causing the diagnostics tool to immediately crash when run. This has been resolved.
- Fixed an escalation of privilege issue where a low-privilege user could remove the agent's logs directory. This has been fixed.
- This version moves the .NET Framework agent to semantic versioning. Semantic versioning started with version 50.0.0 in order to maintain the agent's auto-upgrade capability and clearly differentiate this release from the current calendar-based versioning scheme.

**Bug fixes:**

- The installed .NET Framework agent's service did not respect `server.path` configuration. (DOTNET-3507)

### **.NET Framework 21.7.1**

**Release date:** July 12, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Reduced the amount of memory used by the agent's profiler component.

**Bug fixes:**

- Agent did not respect URL-based exclusions for Assess response-based rules. (DOTNET-3161)
- Agent could fail to initialize when it failed to inspect the main module of the current process. (DOTNET-3162)

### **.NET Framework 21.7.2**

**Release date:** July 22, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Tray now provides a link to the data directory specified at install time.
- Further reduced memory usage of the agent's profiler component.

### **.NET Framework 21.8.1**

**Release date:** August 16, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- The agent will no longer report weak hash algorithm used by the Azure Storage client SDK.

### **.NET Framework 21.9.1**

**Release date:** September 1, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Further reduced the amount of memory used by the agent's profiler component.
- Reduced agent's overhead on each request.

### **.NET Framework 21.9.2**

**Release date:** September 22, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Improved detection of database connections of an unknown type (i.e., not SQL, ODBC, OleDb, MySQL, ...).

**Important notes:**

- The Contrast .NET Framework agent will switch to use semantic versioning in a future version. Semantic versioning will start with version 50.0.0 in order to maintain the agent's auto-upgrade capability and clearly differentiate the future release from the current calendar-based versioning scheme.

## **.NET Framework 21.10.1**

**Release date:** October 6, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### **New and improved:**

- Fixed an escalation of privilege vulnerability in the agent's auto-upgrade feature by moving the .NET Framework agent to use the Agent Upgrade Service. The new Agent Upgrade Service does not suffer from this same vulnerability.

### **Important notes:**

- The .NET Framework agent now includes a separate [Agent Upgrade Service \(page 134\)](#) that can be used to keep the .NET Framework and .NET Core agents up to date. Auto-upgrade has been removed from the agent itself. The Agent Upgrade Service downloads the latest .NET framework agent from the configured NuGet repository. The Agent Upgrade Service has a configuration file for each installed agent to control the behavior of upgrading each agent.
- The next version of the .NET Framework agent will move to semantic versioning, starting with version 50.0.0.

## **January - June 2021**

### **.NET Framework 21.10.2**

**Release date:** October 21, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### **New and improved:**

- The agent will no longer log errors to the Windows Event Log when an application pool was excluded from instrumentation by application allow-list/deny-list.
- Implemented Assess event limits to improve performance.

### **.NET Framework 21.6.5**

**Release date:** June 30, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### **New and improved:**

- Protect will no longer report semantic SQL findings on queries constructed safely using EF 6.
- Profiler will now log all profiler settings, not just settings from the YAML file.
- Profiler will no longer instrument diagnostics/powershell/powershell core.
- Improved Assess coverage of APIs that return task.

### **.NET Framework 21.6.4**

**Release date:** June 22, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### **New and improved:**

- Protect will no longer report semantic SQL chaining on queries constructed safely using LINQ 2 SQL.
- Protect will no longer report use of dangerous functions on queries constructed safely using Entity Framework.

### **Bug fixes:**

- Assess will no longer report untrusted deserialization against `JsonNET JsonSerializerProxy`. (DOTNET-3031)
- Protect will no longer report untrusted deserialization within `System.Web.Services.Protocols.SoapHttpClientProtocol..ctor()`. (DOTNET-3042)

### **.NET Framework 21.6.3**

**Release date:** June 14, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **Bug fixes:**

- Protect false negative against model-binding inputs in ASP.NET MVC applications when Assess was disabled. (DOTNET-3026)
- Protect false negative against post parameter inputs in ASP.NET Web Forms applications when Assess was disabled. (DOTNET-3036)
- Assess false positive when using `JsonSerializerProxy` with `Json.NET` deserialization (DOTNET-3031)

### **.NET Framework 21.6.2**

**Release date:** June 10, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- Protect semantic SQL Injection chaining will no longer report on safe queries generated by Entity Framework.

#### **Bug fixes:**

- Agent did not send `sessionId` when reporting routes. (DOTNET-3021)

### **.NET Framework 21.6.1**

**Release date:** June 2, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- Improved performance of calling into Contrast code from instrumented methods.

### **.NET Framework 21.5.4**

**Release date:** May 25, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **Bug fixes:**

- The agent would report a different route for discovery and observation of some ASPX pages with an inline class. (DOTNET-2928)
- The agent would report untrusted deserialization when `BinaryFormatter` was used to copy an object with a string property set to untrusted data. (DOTNET-2905)

### **.NET Framework 21.5.3**

**Release date:** May 13, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Expanded Assess sql-injection coverage of NHibernate.

**.NET Framework 21.5.2**

**Release date:** May 12, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- When instrumenting an application targeting .NET 4.0 through .NET 4.6.2, the agent will now report to Contrast via a separate application domain in order to support communication with Contrast over TLS 1.2.
- Reduced memory used by agent to capture stack traces.
- Improve performance of capturing repeated stack traces under Protect.

**Bug fixes:**

- Agent could cause intermittent application crashes due to storing a reference to the [ASP.NET](#) `HttpApplication` and calling `Dispose` multiple times. (DOTNET-2902)

**.NET Framework 21.5.1**

**Release date:** May 5, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Diagnostics check-process will now inspect logs in the logs directory specified by environment variable (if set).
- Agent will now report agent errors to telemetry.
- Agent now recognizes the HTML sanitization APIs from the AntiXSS library (previously the agent recognized the encoding methods primarily).
- Agent now recognizes `Path.GetFileName` as a sanitizer for path-traversal.
- Agent will no longer attempt to auto-upgrade if there is another install in progress on the server.

**Bug fixes:**

- Agent could fail to identify Assess sources when inspecting a model bound object that mixed `JsonObject` type within a `POCO` type. (DOTNET-2810)
- Library reporting could fail on obfuscated assemblies. (DOTNET-2846)
- Agent reported sql-injection within the SQL query generation of `Oracle.DataAccess` assembly. (DOTNET-2842)

**.NET Framework 21.4.2**

**Release date:** April 19, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Improved logging when both CLR and CoreCLR are in the same process.
- Added telemetry for installer failures.
- Improved instrumentation performance under CLR Instrumentation Engine (CIE).
- Implemented Assess NoSQL Injection rule.

**Bug fixes:**

- Fixed an error in parsing certain SQL queries in Protect semantic SQL rules. (DOTNET-2807)

### **.NET Framework 21.4.1**

**Release date:** April 13, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- Agent initialization will now log the final resolved value for `assess.enable` and `protect.enable`.
- Improved agent performance when using the Common Instrumentation Engine (CIE).

#### **Bug fixes:**

- .NET Framework agent hangs on async tasks. (SUP-2667)
- In some cases, the agent could report data from the same application for two servers with slightly different paths. (SUP-2700)

### **.NET Framework 21.3.5**

**Release date:** March 25, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- Improved route discovery for Model View Controller (MVC).
- Improved startup performance by removing XML serialization during startup.

### **.NET Framework 21.3.4**

**Release date:** March 15, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **Bug fixes:**

- Fixed an Untrusted Deserialization false positive condition when running as OWIN self-hosted. (SUP-2613, SUP-2468)
- Fixed the agent using excessive memory when registering routes with JSON.net. (SUP-2624)

### **.NET Framework 21.3.3**

**Release date:** March 10, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### **New and improved:**

- The agent's profiler component will no longer keep its log file locked after deciding not to instrument a process.
- Improved accuracy for `async` APIs under Assess.
- Added support for `server.path` configuration.
- The agent will now report the host of Web Service components.
- The agent's background service (*DotNetAgentService.exe*) will now run under its own virtual service account.
- The agent will now identify database components for applications using the Oracle database driver.

### **.NET Framework 20.8.2**

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Bug fixes:**

- Virtual patches for QueryString parameters do not work if the values contain structured data. (SUP-1763)

**.NET Framework 21.3.2**

**Release date:** March 4, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Bug fixes:**

- When attempting to upgrade the agent, the uninstall fails and rolls back creating a loop. (DOT-NET-2685)

**.NET Framework 21.3.1**

**Release date:** March 2, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Improved agent performance.
- Improved Assess data propagation on async methods.
- Improved Assess detection of unsafe cryptographic algorithms.
- The agent will now report the verb and URL template for discovered routes for Web API, WCF, and ASMX applications.

**Bug fixes:**

- Agent does not handle valid `tls_versions` configuration: `tls|tls11|tls12` (DOTNET-2551)

**.NET Framework 21.2.1**

**Release date:** February 10, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Improved application archiving capabilities. Once an application is archived in the Contrast web interface, the .NET Framework agent will be disabled without needing an IIS restart.
- When auto-update is enabled, the installer will be placed in a secure directory and executed with elevated permissions.

**Bug fixes:**

- False positive reported for path traversal when MVC internal code is used. (SUP-2403)
- Different signatures for the same dataflow reports duplicate routes. (SUP-2345)
- False positive reported when using XMLSerializer. (SUP-2361)

**.NET Framework 21.1.4**

**Release date:** February 2, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Important note:**

- All agent configuration settings referring to the terms `blacklist` and `whitelist` have been changed to `denylist` and `allowlist`, respectively. For example, `agent.dot-`

`net.app_pool_whitelist` is now `agent.dotnet.app_pool_allowlist`. The agent will continue to respect the old configuration names until August 2nd, 2022.

#### New and improved:

- Added greater flexibility in how the agent can be configured. Applications within an application pool can be configured individually via their `web.config` or a `contrast_security.yaml` file in the root directory. There is an [order of precedence \(page 31\)](#) where properties set for an application override those set at the server.
- The .NET Contrast tray will now display the application name used by IIS until the application has been loaded. Any application name customizations will be reflected in the tray once the application has been loaded by IIS.
- The agent's Windows service will now start, even if it is unable to communicate with Contrast.
- The agent installer now has an option, enabled by default, to restrict access to the installed `contrast_security.yaml` file. The option can be disabled if needed at install time.
- Protect will now [mask sensitive data \(page 628\)](#) in the attack vector if enabled in the Contrast web interface.

#### Bug fixes:

- Protect path traversal in monitoring mode will now report a path-traversal probe when an attack goes through a "path resolution API" such as `Path.GetFullPath`. (SUP-2190)

### .NET Framework 21.1.3

**Release date:** January 19, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### New and improved:

- Temporarily brought back legacy `web.config` settings.

### .NET Framework 21.1.2

**Release date:** January 13, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### New and improved:

- The .NET Framework auto-update feature will now verify that downloaded updates have a valid signature and are signed by Contrast.

#### Bug fixes:

- When auto-update is enabled, the .NET agent doesn't verify the signature of the newly downloaded installer.
- When running with New Relic, the .NET agent runs into exceptions. (SUP-2318)

### .NET Framework 21.1.1

**Release date:** January 11, 2021

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

#### New and improved:

- Added checkpoints to ensure semantic SQL rules are not reported by the agent when the rule is disabled in the Contrast web interface.
- Removed the `agent.dotnet.enable_runtimeid_callbackhandler` configuration setting.



**Bug fixes:**

- Session-based auto-verification policies didn't change vulnerability status in version 20.11.2. (SUP-2365)
- Applications excluded from the allowlist continue to show on the agent's tray. (SUP-1551)
- Windows 10 machines running in German cause the .NET Framework agent installer for Windows to crash. (SUP-2279)
- Fixed a path traversal false positive when running with MVC. (SUP-2265)

**January - December 2020****.NET Framework 20.12.2**

**Release date:** December 21, 2020

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Bug fixes:**

- Protect Semantic SQL Injection rules do not respect URL exclusions. (SUP-2325)

**.NET Framework 20.12.1**

**Release date:** December 10, 2020

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Bug fixes:**

- Installer launches .NET Contrast tray with elevated user permissions. (DOTNET-2279)

**.NET Framework 20.11.3**

**Release date:** December 1, 2020

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Bug fixes:**

- .NET Framework agent has a problem on startup when an application specified a custom NLog configuration file. (SUP-2220)

**.NET Framework 20.11.2**

**Release date:** November 16, 2020

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- The agent now reports names of classes used as part of enhanced library usage.

**Bug fixes:**

- The agent was reporting misleading route observation predictions upon route discovery. (DOTNET-2227)
- The agent fails to start when Contrast provided a syslog configuration with messages at "INFO" level. (DOTNET-2310)
- Agent reported path traversal within the FriendlyUrls library's routing logic. (DOTNET-2311)

**.NET Framework 20.11.1**

**Release date:** October 29, 2020

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Added support for route coverage of Web Site Projects (WSP).
- Deprecated and removed `CONTRAST__AGENT__DOTNET__CONTAINER`. The configuration flag has no effect. All environments that required it, no longer require the flag to function.
- Reduced the size of the Azure App Service Site Extension by removing diagnostics from the download. Diagnostics is still available for other deployment types.
- XXE will now correctly be detected when running under OWIN in .NET Framework quirks mode.

**Bug fixes:**

- Agent sensors logged a `NullReferenceException` when evaluating some instrumented methods for Assess XXE under OWIN-hosted applications. The null reference has been fixed. (DOTNET-2261)
- The agent's background Windows service had to be restarted when Contrast configuration settings in `web.config` were changed. This issue has been fixed so that changes in `web.config` will automatically be detected and applied. (DOTNET-2254)
- There was a race condition for IIS detection where the Contrast tray's IIS tab would sometimes not be displayed. This issue has been fixed. (DOTNET-2251)

**.NET Framework 20.10.1**

**Release date:** October 8, 2020

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- File Analysis rules now report relative path for files.

**Bug fixes:**

- Service crashes under .NET Framework 4.7.1 for users in 20.9.3. (DOTNET-2192)
- SystemWeb OWIN Web API instrumentation results in duplicate events in response stream. (SUP-1917)

**.NET Framework 20.10.2**

**Release date:** October 20, 2020

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Fixed `PathToYaml` installer option to support relative paths.

**Bug fixes:**

- Found memory leak in correlation tasks. (SUP-2065)

**.NET Framework 20.9.3**

**Release date:** September 30, 2020

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**New and improved:**

- Improved accuracy by supporting `Uri.Escape` URL-encoding methods.
- Agent can now discover WebForms Routes in pre-compiled applications.

## .NET Framework 20.9.2

**Release date:** September 17, 2020

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### New and improved:

- Made the .NET Framework Contrast tray window resizable.
- Improved ASMX route detection and handling of sources from deserialization.

## .NET Framework 20.9.1

**Release date:** September 3, 2020

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Telemetry is now enabled (page 172) in the .NET Core agent in order to gather valuable data about the agent's functionality. The data is all anonymous, no personal information is collected.**

### New and improved:

- [Telemetry is now enabled \(page 172\)](#) in the .NET Framework agent in order to gather valuable data about the agent's functionality. The data is all anonymous, no personal information is collected.
- Azure Service Fabric is supported as a deployment type for the .NET Framework agent.
- Cleaned up text in the [Contrast tray \(page 169\)](#).

### Bug fixes:

- .NET service restart causes IIS workers to fail to start. (SUP-1818)
- There is a null reference in `FileAnalysisEngine.FindVulnerabilities` parameter.

## .NET Framework 20.8.4

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

### Bug fixes:

- Tray crashes on startup. (SUP-1891)
- Agent fails to startup properly when application is archived. (SUP-1849)

## .NET Framework 20.8.1

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

## .NET Framework agent - July 2020

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Agent versions released during the past month:** 20.6.6, 20.7.2, 20.7.3, 20.7.4

### New and improved:

- Added `connect` to `contrast-dotnet-diagnostics` to test the agent's ability to connect to Contrast.
- Added `config-keys` to `contrast-dotnet-diagnostics` to display configuration options supported by the agent.
- Added `cert-info` to `contrast-dotnet-diagnostics` to display information about the certificate provided by the value of the `api.url` configuration setting.
- Improved the performance of Protect SQL-Injection detection.
- Improved the performance of Protect against XML-based inputs.
- Added `validate-yaml` to `contrast-dotnet-diagnostics` to verify the agent's `contrast-security.yaml` configuration file.

### Important notes:

- The agent's file analysis rules now execute within the context of the agent's sensors component. These rules will now execute in Azure App Service and Docker deployments. Previously these rules only executed in the agent's background Windows service component.

**Bug fixes:**

- When a third-party profiler would be chained with Contrast, that profiler could instrument some internal Contrast methods which lead to some instability. This issue has been fixed now.
- The agent could fail to properly observe some Web API 2 routes. This issue has been fixed now.
- When an OWIN-based application was deployed to Azure App Service, the agent would cause an application error. This issue has been fixed.
- When the agent's background Windows service was shutting down it could sometimes harmlessly crash. This issue has been fixed.

**.NET Framework - June 2020**

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Agent versions released during the past month:** 20.6.1, 20.6.3, 20.6.4

**New and improved:**

- Improved the Assess analysis used to identify SSRF vulnerabilities to reduce the number of false positives reported by the agent.
- Improved the Protect analysis used to analyze user inputs for potential SQL injection attacks to improve accuracy and performance.
- Added support for OWIN based-hosting and self-hosted Web API applications outside of IIS.
- The agent will now clean up old logs in Azure App Service and Docker-based deployments.
- Improved logging and reliability around the agent's auto-upgrade process.
- Improved performance of Protect XSS.
- Added support for route-based coverage of WCF services using Unity interception.

**Bug fixes:**

- When the agent would report vulnerabilities for four response-based Assess rules related to CSP and HSTS, the report would be rejected by Contrast due to missing information. The agent now sends all expected information for these rules.
- When an instrumented application defined a type using a large number of nested generic types, the agent could cause a StackOverflow error. This has now been fixed.
- When a user would disable multiple Protect rules through the 'protect.disabled\_rules' setting in the yaml file, the agent would not respect this setting. The agent will now respect this configuration setting.
- When the agent's service would restart IIS with Contrast sensors on an overloaded server, the service could start receiving messages from those sensors before it was ready to handle them which lead to the sensors failing to initialize. This issue has been fixed now.
- When a user would set up profiler chaining with AppDynamics in an Azure App Service environment, the AppDynamics profiler would fail to load. This has now been fixed.

**.NET Framework - May 2020**

**Language versions currently supported:** .NET Framework: 4.7.1, 4.7.2, 4.8

**Agent versions released during the past month:** 20.5.1

**New and improved:**

- Improved detection of dangerous path use in Protect; specifically, when interacting with the file system (path-traversal-semantic-dangerous-paths rule) and in arguments to OS commands (cmd-injection-semantic-dangerous-paths rule).

**Important notes:**

- Beginning with this release, the minimum supported operating system is Windows Server 2012 and the minimum .NET Framework version is .NET 4.7.1.
- The legacy .NET Framework agent maintains support for Windows Server 2008 and older .NET Framework versions. The legacy agent has all of the current features of the .NET Framework agent and receives critical bug fixes but otherwise will not be further developed.

**Bug fixes:**

- When an application sent a request to the same URL as the current request, the agent would report an SSRF vulnerability. This is fixed now.
- When the agent would report an `xcontenttype-header-missing` vulnerability, it was rejected due to missing information. The agent now sends all expected information for this vulnerability.

**.NET Framework - April 2020**

**Language versions currently supported:** .NET Framework: 3.5, 4.0, 4.5, 4.5.1, 4.5.2, 4.6, 4.6.1, 4.6.2, 4.7, 4.7.1, 4.7.2, 4.8

**Agent versions released during the past month:** 20.4.1, 20.4.2, 20.4.3

**New and improved:**

- Improved handling of scenarios where the agent would write repeated errors to log files, creating larger than necessary log files.
- The agent will now log unknown configuration keys at startup. This should help with troubleshooting configuration issues (for example, invalid yaml).

**Important notes:**

- The agent's auto-update feature will no longer update the agent when running on Windows Server 2008 or servers with .NET Framework 4.7.0 or older. This change is in preparation for the upcoming fork of the Contrast .NET Framework agent. See below for more details.
- The **next** release of the .NET Framework agent will raise the minimum supported operating system to Windows Server 2012 and raise the minimum .NET Framework version to .NET 4.7.1. Support for Windows Server 2008 and older versions of the .NET Framework will be maintained via a fully featured legacy .NET Framework agent. This legacy agent will have all of the current features of the .NET Framework agent and will receive critical bug fixes but otherwise will not be the focus for future .NET development.

**Bug fixes:**

- When an application hosted on IIS was (mis)configured without a virtual path, the agent's background Windows service would crash. The agent's background Windows service now properly handles this configuration.
- A race condition around requests for configuration values that did not have default values could lead to a crash of the agent's background Windows service. The race condition has been fixed, default configuration values have been provided for all configuration options, and missing default configuration values are now properly handled.

**.NET Core agent release notes**

At this time, the agent release notes are only available in English.

**.NET Core 4.0.3**

**Release date:** April 20, 2023

**Language versions currently supported:** .NET Core: 3.1 (limited support), .NET 5.0 (limited support), 6.0, 7.0

The Contrast Upgrade Service, which is installed alongside the .NET Core for IIS agent by default, does not upgrade across major versions by default. Set `enable_major_version_upgrade` to `true` in the upgrade service's configuration file in `C:\ProgramData\Contrast\upgrade-service\` by default if you want to enable upgrades across major versions.

#### Bug fixes:

- Fixed an issue that caused the Agent Explorer to crash on startup

### .NET Core 4.0.2

**Release date:** April 12, 2023

**Language versions currently supported:** .NET Core: 3.1 (limited support), .NET 5.0 (limited support), 6.0, 7.0

The Contrast Upgrade Service, which is installed alongside the .NET Core for IIS agent by default, does not upgrade across major versions by default. Set `enable_major_version_upgrade` to `true` in the upgrade service's configuration file in `C:\ProgramData\Contrast\upgrade-service\` by default if you want to enable upgrades across major versions.

#### New and improved

- Agent disables itself with a 404 message only if the response body includes an `invalid application` message
- Fixed localization text in the installer
- Log clean up is now done by one instance of the agent, thereby reducing resource consumption on start up
- The agent has better logging if it cannot get the per-user config in certain cases
- Agent Explorer displays a better message for applications that are not instrumented due to an application allowlist or denylist
- Installer no longer hangs if IIS is not installed and it tries to run `AppCmd`
- Agent no longer reports crypto-weak-randomness when certain database clients are used

### .NET Core 4.0.0

**Release date:** March 21, 2023

**Language versions currently supported:** .NET Core: 3.1 (limited support), .NET 5.0 (limited support), 6.0, 7.0

The Contrast Upgrade Service, which is installed alongside the .NET Core for IIS agent by default, does not upgrade across major versions by default. Set `enable_major_version_upgrade` to `true` in the upgrade service's configuration file in `C:\ProgramData\Contrast\upgrade-service\` by default if you want to enable upgrades across major versions.



## IMPORTANT

### Important improvements:

- **Installer:** Changed the directories where the profiler and native modules are installed to: `%ProgramFiles%\Contrast\dotnet-core\sensors\runtimes\&lt;platform&gt;\native\`
- **Site Extension:** Changed the directory where the profiler is installed to: `content\ContrastNetCoreAppService-4.x.x.x\runtimes\&lt;platform&gt;\native\`
- Changed the name of the profiler DLL to: `ContrastProfiler.dll`.
- The agent now supports layered configurations.

### Other improvements:

- The agent now uses the `agent-lib` library by default.
- Improved the documentation for the diagnostics 'memory-usage' verb.
- Offset starting background jobs in the agent to reduce startup resource usage.
- Service Bus gRPC endpoints are no longer found during Azure Functions route discovery.

## .NET Core 3.0.3

**Release date:** March 15, 2023

**Language versions currently supported:** .NET Core: 3.1 (limited support), .NET 5.0 (limited support), 6.0, 7.0



## IMPORTANT

With the release of the .NET Core agent version 3.0.0, Contrast support for .NET 5.0 and .NET Core 3.1 enters limited support. Under limited support, Contrast solves only the problems that we can reproduce under supported language versions

Microsoft support for .NET 5.0 ended on May 10th, 2022 . Contrast support for .NET 5.0 will EOS in December 2022. Also, support for .NET Core 3.1 ended on December 13th, 2022. The Contrast Upgrade Service, which is installed alongside the .NET Core for IIS agent by default, will not upgrade across major versions by default. Set `enable_major_version_upgrade` to `true` in the upgrade service's configuration file in `C:\ProgramData\Contrast\upgrade-service\` by default if you want to enable upgrades across major versions.

Contrast strongly recommends upgrading your applications to a newer, supported version of .NET.

### New and improved:

- Profiler no longer attaches to `Contrast.AgentExplorer.exe`.
- Improved performance for log cleanup.

## .NET Core 3.0.2

**Release date:** March 1, 2023

**Language versions currently supported:** .NET Core: 3.1 (limited support), .NET 5.0 (limited support), 6.0, 7.0



### IMPORTANT

With the release of the .NET Core agent version 3.0.0, Contrast support for .NET 5.0 and .NET Core 3.1 enters limited support. Under limited support, Contrast solves only the problems that we can reproduce under supported language versions

Microsoft support for .NET 5.0 ended on May 10th, 2022 . Contrast support for .NET 5.0 will EOS in December 2022. Also, support for .NET Core 3.1 ended on December 13th, 2022. The Contrast Upgrade Service, which is installed alongside the .NET Core for IIS agent by default, will not upgrade across major versions by default. Set `enable_major_version_upgrade` to `true` in the upgrade service's configuration file in `C:\ProgramData\Contrast\upgrade-service\` by default if you want to enable upgrades across major versions.

Contrast strongly recommends upgrading your applications to a newer, supported version of .NET.

#### New and improved:

- Agent now supports chaining with Aternity.
- Agent now reports Redis database connections to FlowMap for connections using the StackExchange Redis driver.
- Azure Function apps are named after the assembly rather than the host.
- The installer bootstrapper does not block bundle downgrades on silent installations.

### .NET Core 3.0.1

**Release date:** February 3, 2023

**Language versions currently supported:** .NET Core: 3.1 (limited support), .NET 5.0 (limited support), 6.0, 7.0



### IMPORTANT

With the release of the .NET Core agent version 3.0.0, Contrast support for .NET 5.0 and .NET Core 3.1 enters limited support. Under limited support, Contrast solves only the problems that we can reproduce under supported language versions

Microsoft support for .NET 5.0 ended on May 10th, 2022 . Contrast support for .NET 5.0 will EOS in December 2022. Also, support for .NET Core 3.1 ended on December 13th, 2022. The Contrast Upgrade Service, which is installed alongside the .NET Core for IIS agent by default, will not upgrade across major versions by default. Set `enable_major_version_upgrade` to `true` in the upgrade service's configuration file in `C:\ProgramData\Contrast\upgrade-service\` by default if you want to enable upgrades across major versions.

Contrast strongly recommends upgrading your applications to a newer, supported version of .NET.



**New and improved:**

- Assess and Protect now detect SQL-injection vulnerabilities for PostgreSQL databases that use the Npgsql library.
- Agent now reports PostgreSQL database connections to FlowMap for connections using the Npgsql library.
- Expanded the `ValueStringBuilder` support for some propagation signatures.

**.NET Core 3.0.0**

**Release date:** January 25, 2023

**Language versions currently supported:** .NET Core: 3.1 (limited support), .NET 5.0 (limited support), 6.0, 7.0

**IMPORTANT**

With the release of the .NET Core agent version 3.0.0, Contrast support for .NET 5.0 and .NET Core 3.1 enters limited support. Under limited support, Contrast solves only the problems that we can reproduce under supported language versions

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Also, support for .NET Core 3.1 ended on December 13th, 2022. The Contrast Upgrade Service, which is installed alongside the .NET Core for IIS agent by default, will not upgrade across major versions by default. Set `enable_major_version_upgrade` to `true` in the upgrade service's configuration file in `C:\ProgramData\Contrast\upgrade-service\` by default if you want to enable upgrades across major versions.

Contrast strongly recommends upgrading your applications to a newer, supported version of .NET.

**New and improved:**

- Expanded Assess coverage of `String.Normalize` APIs.
- Attacks that Protect detects now include the parameter names for attacks originating from model-bound values set from parameters sources.

**.NET Core 2.4.4**

**Release date:** January 12, 2023

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0, 7.0

**IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

**New and improved:**

- Improved agent reporting of View components for FlowMaps in the Contrast web interface.

## Archive

### July - December 2022

#### **.NET Core 2.4.3**

**Release date:** December 14, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0, 7.0



#### **IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

#### **New and improved:**

- This release includes a new version of Agent Explorer with several bug fixes and UI improvements.

#### **.NET Core 2.4.2**

**Release date:** December 12, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0, 7.0



#### **IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

#### **New and improved:**

- The agent now reports web service components that the application uses to populate the Contrast Flow Map.
- The agent now supports attaching a debugger to .NET 6 applications without requiring the `DOTNET_EXTERNAL_DebuggerLaunchDisablesCodeVersioning=0` environment variable.
- The invariant culture is now used when writing Protect events to `syslog`. (DOTNET-4661)

#### **Bug fixes:**

- When both the agent package and the installed agent were deployed to the same server, the agent package's instrumentation would load the installed agent's sensors component. This issue is now fixed. (DOTNET-4683)

#### **.NET Core 2.4.1**

**Release date:** November 21, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0, 7.0

**IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

**Bug fixes:**

- Assess would report an XSS when ASPNET Core MVC used the URL, encoded by the framework when necessary, in generated form actions. This has been fixed. (DOTNET-4623)
- The agent will now more reliably detect and report databases to Flow Map. (DOTNET-2199)

**.NET Core 2.4.0**

**Release date:** November 8, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0, 7.0

**IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

**New and improved:**

- Added support for .NET 7.

**.NET Core 2.3.6**

**Release date:** November 9, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

**IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

**New and improved:**

- Agent Explorer now shows statistics for the number of vulnerabilities, number of attacks, and external services that agents observe, as well as information for libraries seen and number of classes that each library uses.

**Bug fixes:**

- Assess could sometimes report vulnerabilities involving data flow using interned strings. This issue is now fixed. (DOTNET-4589)

### **.NET Core 2.3.5**

**Release date:** November 2, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0



#### **IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

#### **New and improved:**

- Further reduced the number of allocations that Contrast Assess uses to track dataflow through `StringBuilder.Replace` APIs.

### **.NET Core 2.3.4**

**Release date:** October 31, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0



#### **IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

#### **New and improved:**

- Significantly improved performance, particularly for allocations that Assess uses to track dataflow through `StringBuilder.Replace` APIs.

### **.NET Core 2.3.3**

**Release date:** October 18, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0



#### **IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

**New and improved:**

- In Agent Explorer, the detailed view of an agent now displays why a degraded or faulted agent is in a bad state.

**Bug fixes:**

- In Agent Explorer, the Summary tab now shows a consistent number of agents across different components. (DOTNET-4580)
- Agents running within .NET Core 3.1 applications failed to report to Agent Explorer. This issue is now fixed. (DOTNET-4579)

**.NET Core 2.3.2**

**Release date:** October 13, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

**IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

**Bug fixes:**

- Applications could crash when running with Dynatrace OneAgent when an environment variable was changed to a null value. This issue is now fixed. (DOTNET-4594)  
This issue was incorrectly reported as fixed in .NET Core 2.3.1.

**.NET Core 2.3.1**

**Release date:** October 13, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

**IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

**Bug fixes:**

- Applications could crash when running with Dynatrace OneAgent when an environment variable was changed to a null value. This issue is now fixed. (DOTNET-4594)
- Assess would incorrectly report a vulnerability when the value of the content-length header was used in a sink such as a database query. This issue is now fixed. (DOTNET-4537)

**.NET Core 2.3.0**

**Release date:** October 5, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0



### IMPORTANT

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

#### New and improved:

- The .NET Core agent for IIS installer now includes Agent Explorer, a separate GUI application that provides high-level information about locally running .NET and .NET Framework agents. Use Agent Explorer to see high-level information such as:
  - Applications and servers that the agent reports
  - Agent configuration
  - Agent version, language, and runtime
  - List of applications that are currently deployed to IIS and/or IIS Express and instrumented.

#### Bug fixes:

- Protect now reports the IP address of an attack in more scenarios.
- The .NET Core for IIS agent now supports running alongside Dynatrace in both in-process and out-of-process modes. Previously the agent only supported running alongside Dynatrace when using in-process hosting. (DOTNET-4572)

### .NET Core 2.2.0

**Release date:** September 27, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0



### IMPORTANT

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

#### new and improved:

- .NET 7 RC1 is now supported.
- Input exclusions now have full regular expression support.

### .NET Core 2.1.21

**Release date:** August 29, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

#### Bug fixes

- Fixed a reported issue where the diagnostics executable would crash with an error `Contrast.AgentLib was not found`.

- The agent would observe admin routes within Azure Functions that are only executed by the Azure Functions internals. The agent no longer reports these admin routes (DOTNET-4464).

### **.NET Core 2.1.20**

**Release date:** August 23, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

#### **Bug fixes**

- Agent upgrades for the installed IIS agent would fail when an agent was installed with a custom data directory. This issue has been fixed. (DOTNET-4453)

### **.NET Core 2.1.19**

**Release date:** August 8, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0



#### **IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

#### **Bug fixes:**

- The Agent Upgrade Service would only check for updates after restarting a second time, this has now been fixed. (DOTNET-4318)

### **.NET Core 2.1.18**

**Release date:** August 1, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0



#### **IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

#### **New and improved:**

- Agent will now report SMTP Injection vulnerabilities under Assess.
- On Windows Server 2012, the IIS installer will now warn users to install VC++ redistributable package necessary for the agent's upgrade service.

#### **Bug fixes:**

- The agent would fail to clean up rolled over log files from native components. This has been fixed. (DOTNET-4314)

## .NET Core 2.1.17

**Release date:** July 12, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0



### IMPORTANT

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

#### Bug fixes:

- Assess `hsts-header-missing` previously checked the presence and value of the `strict-transport-security` header for requests made over TLS only. The rule will now also check for the `strict-transport-security` header if the `X-Forwarded-Proto` header indicates the request was made over TLS but TLS was terminated before reaching the application.
- Diagnostics now offers a `read-config` option that will report on the effective configuration of currently running instrumented applications on the server.
- Improved the accuracy of Protect XXE detection, fixing a false negative.
- Assess previously reported the usage of a weak hash algorithm within Microsoft's Application Insight's snapshot collector. This will no longer be reported. (DOTNET-4252)

## January - June 2022

### .NET Core 2.1.16

**Release date:** June 28, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0



### IMPORTANT

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

#### Bug fixes:

- Agent could cause an application error when capturing the application's response when the HTTP context was null at the end of the request. This has been fixed. (DOTNET-4219)
- Resolved a performance regression only present in version 2.1.15.

### .NET Core 2.1.15

**Release date:** June 21, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0



**IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

**New and improved:**

- Improved Assess response capture, especially with regards to reducing the agent's impact to response streaming.
- Improved detection of when the agent is running in an Azure Functions environment.

**.NET Core 2.1.14**

**Release date:** June 13, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

**IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

**Bug fixes:**

- The agent did not send `assess.tags` with the "preflight" vulnerability check (but did send this information with the vulnerability report.) The agent now sends the expected information with both messages. (DOTNET-4157)
- Assess analysis did not include ASPNET Core MVC model-bound path parameters. The agent will now correctly find vulnerabilities originating from a model-bound path parameter. (DOTNET-4163)

**.NET Core 2.1.13**

**Release date:** May 26, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

**IMPORTANT**

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

**New and improved:**

- Added Assess sanitizers for mganss' HtmlSanitizer APIs. (DOTNET-4033)
- Reduced the amount of memory used by the runtime for all libraries not instrumented by the agent. This has resulted in 5-10% reduction in process memory.

## .NET Core 2.1.12

**Release date:** May 17, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0



### IMPORTANT

Microsoft support for .NET 5.0 ended on May 10th, 2022. Contrast support for .NET 5.0 will EOS in December 2022. Upgrade your application to a newer, supported version of .NET.

#### New and improved:

- Improved Assess taint tracking for validation methods.
- Assess will no longer propagate on `HttpRequest.PathBase`. (DOTNET-4117)

## .NET Core 2.1.11

**Release date:** May 10, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

#### New and improved:

- Improved accuracy of Assess URL character tracking to exclude the port number. (DOTNET-4093)
- Assess will no longer report path traversal on Linux systems when [ASP.NET Core](#) reads time zone info from the file system. (DOTNET-4062)

## .NET Core 2.1.10

**Release date:** April 27, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

#### New and improved:

- Minor performance improvements to the cost of calling into Contrast sensors from instrumented code.
- Added diagnostics `check-access` option to test that a Windows user has access to agent profiler and sensor components.
- Improved cookie value parsing logic to avoid reporting that an invalid cookie is missing `HttpOnly` or `secure` flags.

## .NET Core 2.1.9

**Release date:** April 14, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

#### Bug fixes:

- Protect untrusted deserialization did not respect URL exclusions. (DOTNET-4019)
- Agent failed to detect web service flow map components when an application used .NET Core's dependency injection (i.e., `services.AddHttpClient`). (DOTNET-4023)

## .NET Core 2.1.8

**Release date:** March 24, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

**New and improved:**

- Agent will now report web service components which can be viewed on the application's flow map diagram. (This item mistakenly appeared in release notes for 2.1.6)
- Expanded APIs used to detect unvalidated redirect vulnerabilities under Assess.
- Diagnostics `validate-yaml` will now validate `application.metadata` and `application.session_metadata` values follow expected format.
- Added new `deep-connect` diagnostics command to help troubleshoot agent communication with Contrast.

**Bug fixes:**

- Semantic Path Traversal attacks would be detected and blocked by the agent but failed to report to Contrast. (DOTNET-3978)

**.NET Core 2.1.7**

**Release date:** March 16, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

**New and improved:**

- Diagnostics `cert-info` command's validation of certificates now more closely matches the agent's `HttpClient`'s certificate validation.

**Bug fixes:**

- The Azure App Service Site Extension's XDT in version 2.1.6 included a bad transform that caused the App Service instance to crash. This has been fixed. (DOTNET-3983)

**.NET Core 2.1.6**

**Release date:** March 14, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

**New and improved:**

- Improved reporting of library class names to exclude compiler-generated types.
- Added Protect support for GraphQL inputs.
- Agent will now report web service components which can be viewed on the application's flow map diagram.
- Diagnostics `config-keys` will now provide descriptions for special Contrast environment variables that can be used to configure specific agent behavior (e.g., `CONTRAST_CONFIG_PATH` to set the path of the agent's configuration file.)

**Bug fixes:**

- Agent instrumentation of `Utf8JsonReader` lead to an application crash under 32-bit processes.
- In some rare cases, the Azure App Service Site Extension could fail to cleanly upgrade because the agent's profiler component was locked. Agent components within the site extension are now housed in a version-specific directory. Note that users that have manually specified the path to agent components will need to update these paths. This should not be common as the Site Extension automatically sets the environment variables with the correct paths necessary to load the agent.

**.NET Core 2.1.5**

**Release date:** February 28, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

**New and improved:**

- Improved performance of Assess analysis, especially with regards to methods with internal implementations that make heavy use of Span APIs.
- Assess potential sanitizers and validators will now be automatically reported to Contrast by default.
- .NET Core for IIS agent now enables profiler chaining by default.

**.NET Core 2.1.4**

**Release date:** February 10, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

**New and improved:**

- Assess now supports GraphQL sources and route coverage for graphql-dotnet library versions 4.0.1+.
- Improved performance by reducing cost of jumping from instrumented code to Contrast sensors.

**.NET Core 2.1.3**

**Release date:** January 24, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

**New and improved:**

- Improved performance of Assess analysis of `System.Text.Json` API calls.

**Bug fixes:**

- The agent's sensors component did not respect a custom data directory set during install. (DOTNET-3739)
- Diagnostics' system-info command failed to gather information about IIS application pools and applications. (DOTNET-3670)

**.NET Core 2.1.2**

**Release date:** January 11, 2022

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

**New and improved:**

- Improved performance of Assess and Protect analysis by reducing the cost of calling into Contrast code from instrumented code.
- Improved performance of Assess analysis of application code with data flow within LINQ where clauses.

**Bug fixes:**

- Fixed an issue where agent logs indicated an error due to a missing default configuration value. (DOTNET-3633)
- Fixed an issue where the agent's Upgrade Service component could crash when instrumented by the Contrast .NET Core agent earlier than 2.1.0. Note that this would only occur if a user set global environment variables to add the Contrast .NET Core agent's profiler. (DOTNET-3689)
- Routes included the application's virtual path when deployed to IIS. (DOTNET-3632)

## July - December 2021

### .NET Core 2.1.1

**Release date:** December 14, 2021

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

#### New and improved:

- Now supports profiler chaining with AppDynamics.
- Now supports Assess log-injection.

#### Bug fixes:

- When an instrumented application used a static DI container with cookie options then the agent would cause the application to fail to start. (DOTNET-3630)

#### Important note:

Starting with version 2.0.0, the Contrast .NET Core agent no longer supports .NET Core 2.1 and .NET Core 3.0. The agent continues to support .NET Core 3.1, 5.0, and 6.0. This follows Microsoft's EOL for .NET Core 2.1 on August 22, 2021 and .NET Core 3.0 on March 3, 2020.

### .NET Core 2.1.0

**Release date:** November 9, 2021

**Language versions currently supported:** .NET Core: 3.1, .NET 5.0, 6.0

#### New and improved:

- .NET Core 2.1.0 adds support for applications targeting .NET 6.
- Improved Assess data flow analysis through APIs using `Span`, `Memory`, `ValueTask`, `ValueStringBuilder`, and `StringSegment` types.
- Agent now recognizes specific `DateOnly` and `TimeOnly` APIs as validators for Assess.
- Added route coverage support for .NET 6's minimal API structure.

#### Important note:

Starting with version 2.0.0, the Contrast .NET Core agent no longer supports .NET Core 2.1 and .NET Core 3.0. The agent continues to support .NET Core 3.1 and 5.0. This follows Microsoft's EOL for .NET Core 2.1 on August 22, 2021 and .NET Core 3.0 on March 3, 2020.

### .NET Core 2.0.2

**Release date:** October 6, 2021

**Language versions currently supported:** .NET Core: 3.0, 3.1, 5.0



#### NOTE

Starting with version 2.0.0, the Contrast .NET Core agent no longer supports .NET Core 2.1 and .NET Core 3.0. The agent continues to support .NET Core 3.1 and 5.0. This follows Microsoft's EOL for .NET Core 2.1 on August 22, 2021 and .NET Core 3.0 on March 3, 2020.

#### New and improved:

- The .NET Core agent now supports Assess Stored XSS and Trust Boundary Violation rules.
- Minor performance improvements.
- Improved security of the agent upgrade service.

**Bug fixes:**

- `NullReferenceException` when agent attempted to determine the version of .NET Core from an unusual command line. (DOTNET-3454)
- Assess SQL Injection false positive when numeric values were safely used by Entity Framework Core internally. (DOTNET-3435)

**.NET Core 2.0.1**

**Release date:** September 22, 2021

**Language versions currently supported:** .NET Core: 3.0, 3.1, 5.0

**NOTE**

Starting with version 2.0.0, the Contrast .NET Core agent no longer supports .NET Core 2.1 and .NET Core 3.0. The agent continues to support .NET Core 3.1 and 5.0. This follows Microsoft's EOL for .NET Core 2.1 on August 22, 2021 and .NET Core 3.0 on March 3, 2020.

**New and improved:**

- Improved Assess data flow coverage through `String.Format` and `JsonEncodedText.Encode`.
- Added Assess and Protect handling for when `System.Text.Json` serialization is set as the formatter/model-binder for [ASP.NET Core](#).

**.NET Core 2.0.0**

**Release date:** September 1, 2021

**Language versions currently supported:** .NET Core: 3.0, 3.1, 5.0

**NOTE**

Starting with version 2.0.0, the Contrast .NET Core agent no longer supports .NET Core 2.1 and .NET Core 3.0. The agent continues to support .NET Core 3.1 and 5.0. This follows Microsoft's EOL for .NET Core 2.1 on August 22, 2021 and .NET Core 3.0 on March 3, 2020.

**New and improved:**

- Further reduced the amount of memory used by the agent's profiler component.
- Reduced agent's overhead on each request.

**.NET Core 1.9.9**

**Release date:** August 16, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**NOTE**

An upcoming version (2.0) of the .NET Core agent will drop support for .NET Core 2.1 and 3.0. This follows Microsoft's support policy with .NET Core 2.1 support ending on August 22nd. (.NET Core 3.0 EOL was March 3, 2020)

**New and improved:**

- The installed .NET Core for IIS agent now includes an auto-upgrade service that, if enabled in the service's configuration, will automatically upgrade the agent to the latest version on NuGet.
- Improved Assess coverage APIs involving `Span<T>`, `Range`, and `Index` parameters.
- The agent will no longer report weak hash algorithm used by the Azure Storage client SDK.

**Bug fixes:**

- The agent would fail to discover routes declared using ASPNET Core MVC 3+ endpoint-style routing. (DOTNET-3265)

**.NET Core 1.9.8**

**Release date:** July 22, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**NOTE**

An upcoming version (2.0) of the .NET Core agent will drop support for .NET Core 2.1 and 3.0. This follows Microsoft's support policy with .NET Core 2.1 support ending on August 22nd. (.NET Core 3.0 EOL was March 3, 2020)

**New and improved:**

- Further reduced memory usage of the agent's profiler component.
- Improved Assess coverage of `Memory<T>` and `MemoryExtension` APIs.
- Added official support for RHEL 7 and 8.

**Bug fixes:**

- The agent could fail to report discovered routes to Contrast. (DOTNET-3234)

**.NET Core 1.9.7**

**Release date:** July 12, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**New and improved:**

- Reduced the amount of memory used by the agent's profiler component.
- Improved Assess coverage of `Memory<T>` and `Span<T>` APIs.

**Bug fixes:**

- Agent did not respect URL-based exclusions for Assess response-based rules. (DOTNET-3161)

## January - June 2021

### .NET Core 1.9.6

**Release date:** June 30, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

#### New and improved:

- Protect will no longer report semantic SQL findings on queries constructed safely using EF Core 2.1/3.1/5.0.
- Profiler will now log all profiler settings, not just settings from the YAML file.
- Profiler will no longer instrument diagnostics/powershell/powershell core.
- Improved Assess coverage of APIs that return task.

### .NET Core 1.9.5

**Release date:** June 21, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

#### New and improved:

- Protect will no longer report semantic SQL chaining on queries constructed safely using LINQ 2 SQL.
- Protect will no longer report use of dangerous functions on queries constructed safely using Entity Framework.

#### Bug fixes:

- Agent's interaction with ASPNET Core's DI container could cause applications built on top of a Boilerplate template to not start up. (DOTNET-3038)
- Assess will no longer report untrusted deserialization against `JsonNET JsonSerializerProxy`. (DOTNET-3031)

### .NET Core 1.9.4

**Release date:** June 14, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

#### Bug fixes:

- Assess false positive when using `JsonSerializerProxy` with `Json.NET` deserialization. (DOTNET-3031)

### .NET Core 1.9.3

**Release date:** June 10, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

#### Bug fixes:

- Agent did not send `sessionId` when reporting routes. (DOTNET-3021)

### .NET Core 1.9.2

**Release date:** June 2, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0



**New and improved:**

- Improved performance of calling into Contrast code from instrumented methods.
- Improved agent startup performance.
- Will now discover and observe health check routes.
- Will now observe endpoint routing routes (discovery was implemented in a previous version).

**.NET Core 1.9.1**

**Release date:** May 25, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**New and improved:**

- Agent will now discover endpoint routing routes.

**.NET Core 1.9.0**

**Release date:** May 20, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**New and improved:**

- Improved memory usage of logging communication with Contrast.
- Agent will now discover and observe routes used by routing middleware handlers.

**.NET Core 1.8.6**

**Release date:** May 12, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**New and improved:**

- Reduced memory used by agent to capture stack traces.
- Improve performance of capturing repeated stack traces under Protect.
- Improved Assess coverage of ref struct objects when using the Common Instrumentation Engine (CIE).
- Improved Assess sql-injection coverage of EF Core APIs.

**.NET Core 1.8.5**

**Release date:** May 5, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**New and improved:**

- Expanded coverage of Protect cmd-injection rule.
- Will now discover health check routes.
- Diagnostics now offers `create-script` to create deployment "scripts" for the local machine. Currently supports PowerShell, bash, launch settings, and web.config.
- Diagnostics `check-process` will now inspect logs in the logs directory specified by environment variable (if set).
- Agent will now report agent errors to telemetry.

**Bug fixes:**

- Agent could fail to identify Assess sources when inspecting a model bound object that mixed `Job-object` type within a POCO type. (DOTNET-2534)

- Library reporting could fail on obfuscated assemblies. (DOTNET-2846)

### **.NET Core 1.8.4**

**Release date:** April 19, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

#### **New and improved:**

- Improved logging when both CLR and CoreCLR are in the same process.
- Improved instrumentation performance under CLR Instrumentation Engine (CIE).
- Improved logging for unsupported .NET Core runtime versions.
- Added verb + url reporting for .NET Core Razor Pages discovered routes.

#### **Bug fixes:**

- Fixed an error in parsing certain SQL queries in Protect semantic SQL rules. (DOTNET-646)
- Fixed a memory leak. (DOTNET-2771)

### **.NET Core 1.8.3**

**Release date:** April 13, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

#### **New and improved:**

- Agent initialization will now log the final resolved value for `assess.enable` and `protect.enable`.
- Improved route discovery for controller actions using convention or pattern-based routing.

#### **Bug fixes:**

- .NET Core agent hangs on async tasks. (SUP-2667)

### **.NET Core 1.8.2**

**Release date:** March 25, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

#### **New and improved:**

- Improved accuracy for `async` APIs under Assess.
- Accurate reporting of the verb and URL parameters for unexercised routes when using the NetCore framework.

### **.NET Core 1.8.1**

**Release date:** March 10, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

#### **New and improved:**

- Added support for `server.path` configuration.
- The agent will now report the host of Web Service components.

### **.NET Core 1.8.0**

**Release date:** March 2, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**New and improved:**

- Improved agent performance by alleviating common agent hot spots.
- Improved Assess data propagation on asynchronous methods.
- Improved Assess detection of unsafe cryptographic algorithms.

**Bug fixes:**

- Agent does not properly handle valid `tls_versions` configuration: `tls|tls11|tls12` (DOTNET-2551)
- The agent's profiler component chooses not to instrument a process when .NET Framework runtime was loaded first but the environment variable indicated .NET Core. (SUP-2225)

**.NET Core 1.7.6**

**Release date:** February 10, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**New and improved:**

- Improved application archiving capabilities. Once an application is archived in the Contrast web interface, the .NET Core agent will be disabled without needing an IIS restart.

**Bug fixes:**

- Different signatures for the same dataflow reports duplicate routes. (SUP-2345)

**.NET Core 1.7.5**

**Release date:** February 2, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**Important note:**

- All agent configuration settings referring to the terms `blacklist` and `whitelist` have been changed to `denylist` and `allowlist`, respectively. For example, `agent.dotnet.app_pool_whitelist` is now `agent.dotnet.app_pool_allowlist`. The agent will continue to respect the old configuration names until August 2nd, 2022.

**New and improved:**

- Protect will now mask sensitive data in the attack vector if enabled in the Contrast web interface.
- Refined crypto-bad-mac rule to ignore .NET Core library code.
- Added support for additional .NET Core deployment types (self-contained and framework dependant executables).

**Bug fixes:**

- Protect path traversal in monitoring mode will now report a path-traversal probe when an attack goes through a "path resolution API" such as `Path.GetFullPath`. (SUP-2190)

**.NET Core 1.7.4**

**Release date:** January 13, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**New and improved:**

- Self-contained .NET Core deployments are now supported.

### **.NET Core 1.7.3**

**Release date:** January 11, 2021

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**New and improved:**

- Added checkpoints to ensure semantic SQL rules are not reported by the agent when the rule is disabled in the Contrast web interface.
- Added support for framework dependent executables.
- Removed `agent.dotnet.enable_runtimeid_callbackhandler` configuration.

**Bug fixes:**

- Session based auto-verification policies didn't change the vulnerability status. (SUP-2365)

### **July - December 2020**

#### **.NET Core 1.7.2**

**Release date:** December 8, 2020

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**New and improved:**

- The profiler will now log to syslog in the event of a major error or exception.

#### **.NET Core 1.7.1**

**Release date:** December 1, 2020

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**Bug fixes:**

- .NET Core agent has a problem on startup when an application specified a custom NLog configuration file. (SUP-2220)

#### **.NET Core 1.7.0**

**Release date:** November 19, 2020

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1, 5.0

**New and improved:**

- The agent now supports .NET Core 5.

#### **.NET Core 1.6.2**

**Release date:** November 16, 2020

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1

**New and improved:**

- The agent now reports names of classes used as part of enhanced library usage.

**Bug fixes:**

- The agent was reporting misleading route observation predictions upon route discovery. (DOT-NET-2213)

- The agent fails to start when Contrast provided a syslog configuration with messages at `INFO` level. (DOTNET-2310)
- The agent caused an error during agent initialization if the console was disabled. (DOTNET-2283)

### **.NET Core 1.6.1**

**Release date:** October 29, 2020

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1

#### **Important notes:**

#### **New and improved:**

- With this release, the CLR Instrumentation Engine (CIE) is fully supported. Custom CIE environment variables are no longer required and can be removed. (You may have to reinstall the site extension.)
- Officially deprecated and removed `CONTRAST__AGENT__DOTNET__CONTAINER`. The configuration flag has no effect. All environments that required it, no longer require the flag to function.
- Reduced the size of the Azure App Service Site Extension by removing diagnostics from the download. Diagnostics is still available for other deployment types.
- Minor performance improvements under Protect's XSS.

#### **Bug fixes:**

- When agent sensors failed to initialize under Windows, they would crash the IIS process with an "IOException: The handle is invalid." exception. (DOTNET-2253)

### **.NET Core 1.5.21**

**Release date:** October 20, 2020

**Language versions currently supported:** .NET Core: 2.1, 3.0, 3.1

#### **Important notes:**

- We will no longer support .NET Core 2.2 beginning with this version. This is keeping up with Microsoft's support policy, and their announcement to end support for .NET Core 2.2 by Dec 23, 2019. If you are using .NET Core 2.2, please make sure to use the .NET Core agent version 1.5.20 or lower until you can upgrade your application's .NET Core runtime.

#### **New and improved:**

- The .NET Core agent now supports logging to stdout for managed code.

#### **Bug fixes:**

- Found memory leak in correlation tasks. (SUP-2065)

### **.NET Core 1.5.20**

**Release date:** October 8, 2020

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

#### **Bug fixes:**

- Agent causes 500 if the app changes the maximum request body size. (SUP-2032, workaround available)

### **.NET Core 1.5.19**

**Release date:** September 30, 2020

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**New and improved:**

- Telemetry now reports application framework and profiler chaining configurations.

### **.NET Core 1.5.18**

**Release date:** September 17, 2020

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**New and improved:**

- Azure Service Fabric is supported as a deployment type for the .NET Core agent.

**Bug fixes:**

- The agent does not respect the `api.certificate.ignore_cert_errors` configuration property.

### **.NET Core 1.5.17**

**Release date:** September 3, 2020

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**New and improved:**

- [Telemetry is now enabled \(page 172\)](#) in the .NET Core agent in order to gather valuable data about the agent's functionality. The data is all anonymous, no personal information is collected.

### **.NET Core 1.5.16**

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**Bug fixes:**

- Agent fails to startup properly when application is archived. (SUP-1849)

### **.NET Core 1.5.15**

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**Bug fixes:**

- Type scanning may throw an exception. (SUP-1671)

### **.NET Core 1.5.14**

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**New and improved:**

- Improved logging around Virtual Patch usage.

**Bug fixes:**

- Virtual patches for QueryString parameters do not work if the values contain structured data. (SUP-1763)

### **.NET Core 1.5.13**

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**New and improved:**

- Improved logging around non-graceful shutdowns.

## **.NET Core - July 2020**

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**Agent versions released during the past month:** 1.5.10, 1.5.11, 1.5.12

### **New and improved:**

- Added `connect` to `contrast-dotnet-diagnostics` to test the agent's ability to connect to Contrast.
- Added `config-keys` to `contrast-dotnet-diagnostics` to display configuration options supported by the agent.
- Added `cert-info` to `contrast-dotnet-diagnostics` to display information about the certificate provided by the value of the `api.url` configuration setting.
- Improved the performance of Protect SQL-Injection detection.
- Improved the performance of Protect against XML-based inputs.
- Added `validate-yaml` to `contrast-dotnet-diagnostics` to verify the agent's `contrast-security.yaml` configuration file.

## **Jan - June 2020**

### **.NET Core - June 2020**

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**Agent versions released during the past month:** 1.5.5, 1.5.7, 1.5.8, 1.5.9

### **New and improved:**

- Improved the Assess analysis used to identify SSRF vulnerabilities to reduce the number of false positives reported by the agent.
- Improved the Protect analysis used to analyze user inputs for potential SQL injection attacks to improve accuracy and performance.
- The agent will now clean up old logs.
- Removed the dependency on `Microsoft.Extensions.Caching.Memory`.
- Improved performance of Protect XSS.
- Improved performance of Protect SQL-Injection.

### **Bug fixes:**

- When the agent would report vulnerabilities for four response-based Assess rules related to CSP and HSTS, the report would be rejected by Contrast due to missing information. The agent now sends all expected information for these rules.
- When an instrumented application defined a type using a large number of nested generic types, the agent could cause a StackOverflow error. This has now been fixed.
- When a user would disable multiple Protect rules through the `'contrast.protect.disabled_rules'` setting in the yaml file, the agent would not respect this setting. The agent will now respect this configuration setting.
- When a user would disable logging, the agent's profiler component would still log high level information during initialization. The profiler will no longer create a log when logging is disabled.

## **.NET Core - May 2020**

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**Agent versions released during the past month:** 1.5.3

### **New and improved:**

- Improved detection of dangerous path use in Protect; specifically, when interacting with the file system (path-traversal-semantic-dangerous-paths rule) and in arguments to OS commands (cmd-injection-semantic-dangerous-paths rule).
- The agent will no longer attempt to load under .NET Core versions less than 2.1 as these versions are not supported.

**Bug fixes:**

- When an application sent a request to the same URL as the current request, the agent would report an SSRF vulnerability. This is fixed now.
- When the agent would report an `xcontenttype-header-missing` vulnerability, Contrast would reject the vulnerability report due to missing information. The agent now sends all expected information for this vulnerability.
- When an instrumented application closed the response stream, the agent could cause an application error. This is fixed now.
- When an instrumented application seeked within a response stream, the agent could cause an application error. This is fixed now.

**.NET Core - April 2020**

**Language versions currently supported:** .NET Core: 2.1, 2.2, 3.0, 3.1

**Agent versions released during the past month:** 1.4.0, 1.5.0

**New and improved:**

- **Added support for Linux Azure App Service.**
- **Added support for Alpine.**
- Improved handling of scenarios where the agent would write repeated errors to log files, creating larger than necessary log files.
- The agent will now log unknown configuration keys at startup. This should help with troubleshooting configuration issues (for example invalid yaml).

**Bug fixes:**

- When applications redirected to a URL that had been validated using `Url.IsLocalUrl`, the agent would still report an unvalidated redirect vulnerability. The agent will now respect the `Url.IsLocalUrl` validator.
- A race condition around requests for configuration values that did not have default values could lead to an unhandled error in the agent. The race condition has been fixed, default configuration values have been provided for all configuration options, and missing default configuration values are now properly handled.

## Node.js agent release notes

At this time, the agent release notes are only available in English.

### Contrast Protect only

#### Node.js 5.5.0 - Contrast Protect

**Release date:** April 3, 2023

**Language versions currently supported:** 14, 16, and 18 LTS

**New and improved:**

- Added support for detecting `nosql-injection` attacks for MarsDB in Protect mode.



## Node.js 5.4.2 - Contrast Protect

**Release date:** February 20, 2023

**Language versions currently supported:**14,16, and 18 LTS

### Bug fixes:

- This release fixed a bug when receiving the `nosql-injection` rule settings from Contrast and the agent not respecting that setting.

## Node.js 5.4.1 - Contrast Protect

**Release date:** February 9, 2023

**Language versions currently supported:**14,16, and 18 LTS

### New and improved:

- `security_logger` is getting the correct default values.

## Node.js 5.4.0 - Contrast Protect

**Release date:** February 9, 2023

**Language versions currently supported:**14,16, and 18 LTS

### New and improved:

- NoSQL Injection Mongo - added support for `$accumulator` operator.
- The RegExp now detects a vulnerable string with single and double quotes around the URI of the targeted file.
- Bumped agent-lib version in Node agent v5 to v5.3.0.

## Node.js 5.3.0 - Contrast Protect

**Release date:** January 31, 2023

**Language versions currently supported:**14,16, and 18 LTS

### New and improved:

- NoSQL Injection Mongo - added support for `$function` operator.
- Migrated shared hooks to instrumentation layer: `http`, `https`, `http2`, `spdy`.
- Reduced code duplication in existing Protect hooks.
- CVE-2022-46175 node-require-hook Prototype Pollution in JSON5 via Parse Method.

### Bug fixes:

- `NODE_OPTIONS` environment for `pino` worker-thread does not get cleared of `--require @contrast/....` (NODE-2882)

## Node.js 5.2.0 - Contrast Protect

**Release date:** January 17, 2023

**Language versions currently supported:**14,16, and 18 LTS

### New and improved:

- Provided `npm` command to config-diagnostics and output results.

### Bug fixes:

- Fixed issue where `@contrast/protect-agent` does not install. (NODE-2803)

### **Node.js 5.1.0 - Contrast Protect**

**Release date:** January 10, 2023

**Language versions currently supported:**14,16, and 18 LTS

#### **New and improved:**

- CVE-2022-46175 Prototype Pollution in JSON5 via Parse Method.
- Internal Protect data structure changes.

### **Node.js 5.0.1 - Contrast Protect**

**Release date:** December 8, 2022

**Language versions currently supported:**14,16, and 18 LTS

#### **New and improved:**

- Performance improvement for capturing stack traces. (NODE 2760)

### **Node.js 5.0.0 - Contrast Protect**

**Release date:** December 5, 2022

**Language versions currently supported:**14,16, and 18 LTS

#### **New and improved:**

- Contrast Security Node.js Protect-only Agent. See [npm: @contrast/protect-agent](#)

### **Node.js 4.32.5**

**Release date:** April 19, 2023

**Language versions currently supported:** 12, 14,16, and 18 LTS

#### **New and improved:**

- CVE-2023-24538 Bump SpeedRacer to v 2.28.26 for v4.

#### **Bug fixes:**

- Fixed the RegExp for detecting XXE vulnerabilities in Protect mode. (NODE-2887)

### **Node.js 4.32.4**

**Release date:** April 14, 2023

**Language versions currently supported:** 12, 14,16, and 18 LTS

#### **New and improved:**

- CVE-2023-0842 (DevDependency) - xml2js is vulnerable to prototype pollution.
- CVE-2019-10790 (DevDependency) - TaffyDB in jsdoc.

#### **Bug fixes:**

- Fix bugs in `csp-header-insecure` rule for both v4 and v5. (NODE-2971)

### **Node.js 4.32.3**

**Release date:** April 14, 2023

**Language versions currently supported:** 12, 14,16, and 18 LTS

**Bug fixes:**

- Fixed issue with Fastify XSS payload check. (NODE-2974)

### **Node.js 4.32.2**

**Release date:** April 5, 2023

**Language versions currently supported:** 12, 14,16, and 18 LTS

**Bug fixes:**

- Implemented improved logging. The agent does not rewrite all files at start-up. (NODE-2944)

### **Node.js 4.32.1**

**Release date:** April 3, 2023

**Language versions currently supported:** 12, 14,16, and 18 LTS

**New and improved:**

- Bump SpeedRacer to 2.28.25.

### **Node.js 4.32.0**

**Release date:** March 16, 2023

**Language versions currently supported:** 12, 14,16, and 18 LTS

**New and improved:**

- New config option for conditional running the agent when called through `NODE_OPTIONS`.

### **Node.js 4.31.2**

**Release date:** March 14, 2023

**Language versions currently supported:** 12, 14,16, and 18 LTS

**New and improved:**

- Bump SpeedRacer for v4
- Improved log message for node version compatibility
- CVE-2023-22578 (DevDependency) - Sequelize - Default support for “raw attributes” when using parentheses
- Enhancements to logging surrounding errors when starting the agent

**Bug fixes:**

- Fixed Hapi implementation for `reflected-xss` detection. (NODE-2757)
- Fixed Fastify implementation for `reflected-xss` detection. (NODE-2756)
- Added hardening to `getAllParents` method. (NODE-2931)

### **Node.js 4.31.1**

**Release date:** February 27, 2023

**Language versions currently supported:** 12, 14,16, and 18 LTS

**New and improved:**

- Improved support for `Express.static()`. (SUP-4451)
- Improved support for XXS detection when using the Fastify framework.
- Improved logging surrounding errors when starting the agent.

## Node.js 4.31.0

**Release date:** January 31, 2023

**Language versions currently supported:** 12, 14,16, and 18 LTS

### New and improved:

- Instrumented the `serve-static` module to act as a custom sanitizer.

## Node.js 4.30.1

**Release date:** January 20, 2023

**Language versions currently supported:** 12, 14,16, and 18 LTS

### Bug fixes:

- Config-diagnostics fails to create a configuration file if the logger path refers to a file descriptor.

## Node.js 4.30.0

**Release date:** January 17, 2023

**Language versions currently supported:** 12, 14,16, and 18 LTS

### New and improved:

- Included the docker container ID in the `system-info.json` when running `system-diagnostics`.
- CVE-2022-46175 node-agent Prototype Pollution in JSON5 via Parse Method.

### Bug fixes:

- Prevent crashing when the `req` is undefined. (NODE-2867)

## Node.js 4.29.1

**Release date:** December 21, 2022

**Language versions currently supported:** 12, 14,16, and 18 LTS

### Bug fixes:

- Fix issues with `system-diagnostics` reporting under Windows env. (NODE-2780)
- Config utility reads the wrong remote value for `syslog` settings. (NODE-2781)

## Node.js 4.29.0

**Release date:** December 19, 2022

**Language versions currently supported:** 12, 14,16, and 18 LTS

### New and improved:

- CVE-2022-24999 - `qs` vulnerable to Prototype Pollution.
- Added support for the Microsoft SQL Server database.

## Node.js 4.28.1

**Release date:** December 9, 2022

**Language versions currently supported:** 12, 14,16, and 18 LTS

**New and improved:**

- New Contrast Service version - v2.28.23 is now bundled with the v4 agent.

**Bug fixes:**

- Defensive code in system diagnostics when finding package.json. (SUP-4357)
- Added defensive code around checking the express router handler's length. (SUP-4314)
- System info gets output when running config-diagnostics - this was incorrect behavior.

**CVE patch:**

- CVE-2022-24999 (devDependency). version 4.x agent

## Node.js 4.28.0

**Release date:** December 2, 2022

**Language versions currently supported:** 12, 14,16, and 18 LTS

**New and improved:**

- Provide `npm` command to read system info and output results. (NODE-2629)

## Node.js 4.27.2

**Release date:** November 25, 2022

**Language versions currently supported:** 12, 14,16, and 18 LTS

**New and improved:**

- Made `_contrast_toString` a non-enumerable property of `Function.prototype` to resolve compatibility issues with `@sap/cds`. (NODE-2752)

## Node.js 4.27.1

**Release date:** November 21, 2022

**Language versions currently supported:** 12, 14,16, and 18 LTS

**New and improved:**

- Removed Fastify2 from NodeTestBenches.

**Bug fixes:**

- Fixed contrast-diagnostics script that did not support running when not adjacent to the agent installation location. (NODE-2748)

## Node.js 4.27.0

**Release date:** November 9, 2022

**Language versions currently supported:** 12, 14,16, and 18 LTS

**New and improved:**

- New troubleshooting functionality to write to a file the effective configuration seen by the agent. (NODE-2632)

## Node.js 4.26.0

**Release date:** October 27, 2022

**Language versions currently supported:** 12, 14,16, and 18 LTS

**Bug fixes:**

- Memory-leak surfaced for apps running with the agent for over 12 hours. (NODE-2715)

**CVE remediation:**

- CVE-2022-3517 upgrade dependencies with minimatch so use v3.0.5 or greater. (NODE-2717)

## Node.js 4.25.5

**Release date:** October 19, 2022

**Language versions currently supported:** 12, 14,16, and 18 LTS

**Bug fixes:**

- Memory leak introduced in 4.25.0. (NODE-2698)

## Node.js 4.25.4

**Release date:** October 13, 2022

**Language versions currently supported:** 12, 14 ,16, and 18 LTS

**Bug fixes:**

- "TypeError: undefined is not a function" when spawning a child process with Assess. (NODE-2694)

## Node.js 4.25.3

**Release date:** October 11, 2022

**Language versions currently supported:** 12, 14 ,16, and 18 LTS

**Bug fixes:**

- Memory leak being caused by Assess CallContext stacktraces. (NODE-2681)
- npm not found and library not reported when the Node.js runtime is installed in the Program Files directory on Windows OS. (NODE-2691)

## Node.js 4.25.2

**Release date:** October 7, 2022

**Language versions currently supported:** 12, 14 ,16, and 18 LTS

**Bug fixes:**

- NPM commands used in the agent for library reporting/listing will now work on Windows machines. (NODE-2676)

## Node.js 4.25.1

**Release date:** September 30, 2022

**Language versions currently supported:** 12, 14 ,16, and 18 LTS

**Bug fixes:**

- Fixed an issue where the agent was not starting the Contrast Service when running on Windows OS. (NODE-2677)

## Node.js 4.25.0

**Release date:** September 27, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

### New and improved:

- Updated v4 and v5 agents to be compatible with Node 18.
- The `originalUrl` property is now tagged in Express.

### Bug fixes:

- Corrected issue where `req.path` was not tracked and not considered untrusted data. (NODE-2637)

## Node.js 4.24.2

**Release date:** September 7, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

### New and improved:

- CVE-no-CVE-ID - Bump moment-timezone from 0.5.34 to 0.5.37.

### Bug fixes:

- Node agent only instruments MongoDB API methods that are susceptible to expansion or injections. (NODE-2040)

## Node.js 4.24.1

**Release date:** August 31, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

### Bug fix:

- For agent v16.17 and above, we now explicitly signal a short circuit in our load hook for ESM support (NODE-2620).

## Node.js 4.24.0

**Release date:** August 26, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

### New and improved:

- Added instrumentation for the `DynamoDB.scan()` command and the `FilterExpression` key AWS v2.
- Added support for MongoDB NoSQL Injection highlighting in Contrast UI when multiple arguments are present.

## Node.js 4.23.1

**Release date:** August 17, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

### New and improved:

- Improved express instrumentation by having the body-parser library and all its parsing methods directly patched/instrumented.
- Added support for the `mongodb v4.x` driver for the agent in Protect mode.

**Bug fixes:**

- The `JSON.stringify()` propagator handles when the argument (or subset of argument) is a deserialization membrane. (NODE-2598)
- Autocomplete missing rule data is serialized properly into protobuf message. (NODE-2589)

**Node.js 4.23.0**

**Release date:** August 8, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- CVE-2022-2564 - Bump Mongoose version to 6.4.6.

**Bug fix:**

- The `JSON.stringify()` propagator handles when the argument (or subset of argument) is a deserialization membrane. (NODE-2598)

**Node.js 4.22.1**

**Release date:** August 1, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Bug fix:**

- Aws-sdk version 2 for DynamoDB does not respect abstract attribute types. (NODE-2532)

**Node.js 4.21.1**

**Release date:** July 25, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Bug fixes:**

- When processing large strings in docker and using node crypto module to encrypt data, the calls `distinguish.getProperties` were causing segmentation fault issues. (NODE-2564)

**Node.js 4.21.0**

**Release date:** July 18, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Added support for `isEmail` and `isDate` validators in ValidatorJS.

**Bug fixes:**

- Joi validation not recognized if the schema specified in "options" for a hapi route. (NODE-2544)

**Node.js 4.20.2**

**Release date:** July 12, 2022



**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Remediated CVE-2022-31129 for inefficient regular expression complexity in moment.
- Add hardening to prevent app crash if NPM is not installed.

### **Node.js 4.20.1**

**Release date:** July 4, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- When a MongoDB update method has multiple attack vectors, the Node.js Agent accurately reports NoSQL Injections that were previously false negatives.

## **Archive**

**Node.js 4.X only: January - June 2022**

### **Node.js 4.19.7**

**Release date:** June 28, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Remediated CVE-2020-7596 by removing the `codecov` dependency from node-agent (DEV Dependency).

### **Node.js 4.19.6**

**Release date:** June 25, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Added improved logging when an unsupported version of npm is installed in the app being instrumented.

**Bug fixes:**

- Decrease highlighting to just tainted string when reported sink argument is a query object. (SUP-3889)

### **Node.js 4.19.5**

**Release date:** June 13, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Added improved logging when an unsupported version of npm is installed in the app being instrumented.

**Bug fixes:**

- When Protect mode is enabled, multipart/form-data throws exception when headers are removed. (SUP-3817)

### Node.js 4.19.4

**Release date:** June 3, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Remediated CVE-2021-43138 by updating `ejs` to a safe version in `node-agent`, this was a DEV Dependency and was not a true vulnerability. (NODE - 2352)

### Node.js 4.19.3

**Release date:** June 1, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Removed `winston-syslog` from the agent's bundled dependencies, this was being flagged as having a CVE.

**Bug fixes:**

- Fixed false-negative of Server-Side Request Forgery (SSRF) for `request` npm package. (SUP-3829)

### Node.js 4.19.2

**Release date:** May 27, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Bug fixes:**

- Incorrect highlighting displayed for Node.js vulnerabilities under **Overview** in the Contrast web interface. (SUP-3717, 2927)

### Node.js 4.19.1

**Release date:** May 19, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Bug fixes:**

- When running an application with `pm2` on cluster mode and the `CONTRAST_CONFIG_PATH` provided as an environment variable, the agent reads the `CONTRAST_CONFIG_PATH` value from `contrast_security.yaml` instead of the environment variable.

### Node.js 4.19.0

**Release date:** May 17, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Implemented support for the `ref()` function when Joi validation is unknown because of untracked target
- The hooks for `mongodb-core` are “replicated” to hook `mongodb` from version 3.3.0 and later

### Node.js 4.18.0

**Release date:** May 12, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Added support for PM2 running in both fork and cluster modes.
- New config option `assess.enable_lazy_tracking` for Contrast Node.js 4.X. The default is `true` and must be set to `false` to use Fastify http/2.

### **Node.js 4.17.1**

**Release date:** April 29, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Bug fixes:**

- Rewriter not wrapping file contents in "module wrap" IIFE. (SUP-3732)
- The `lib/util/trace-util getRequest` always returns undefined if sampling is disabled. (NODE-2351)

### **Node.js 4.17.0**

**Release date:** April 21, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Custom fastify-static allowedPath path-traversal validator.
- Remediated CVE-2021-43138 (Prototype Pollution in async Winston bump).

**Bug fixes:**

- `__import` methods can cause an error when the imported module is not yet resolved. (NODE-2341)
- ESM loader hooks still operate when agent is disabled. (NODE-2340)

### **Node.js 4.16.2**

**Release date:** April 14, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Remediated CVE-2021-43138 (update async dev dependency to a safe version in node-agent).

### **Node.js 4.16.1**

**Release date:** April 11, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Remediated CVE-2022-24785 (update moment dependency to a safe version in node-agent, remediating path traversal vulnerability).

### **Node.js 4.16.0**

**Release date:** April 8, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Added support for DyanmoDB PartiQL (Assess only).

**Bug fixes:**

- Fixed deadlinks in NPM agent readme. (Node-2297)

**Node.js 4.15.1**

**Release date:** March 31, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Node.js 4.15.0**

**Release date:** March 29, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Contrast Service updated to 2.28.19. This resolves CVE-2021-38561.
- Remediated CVE-2021-44906 (for minimalist npm library).
- Added support for `validator.matches()` as a custom validator.
- Upgraded to `agent-lib 2.2.4`.

**Node.js 4.14.0**

**Release date:** March 23, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**IMPORTANT**

As part of a recent bug fix a setting name has changed. If you are using `agent.trust_custom_validator`, please update to `assess.trust_custom_validator`.

**New and improved:**

- Added support for MySQL2 library 2.0.0 and later.

**Bug fixes:**

- False negative occurs when SQL query template contains untrusted data. (SUP-3568)

**Node.js 3.11.22**

**Release date:** March 29, 2022

**Language versions currently supported:** 10, 12 and 14 LTS

**IMPORTANT**

The Contrast Node.js agent version 3.X will EOL in June 2022. You can upgrade to the latest version 4.x of the Node.js agent available from [npm](#).

**New and improved:**

- Remediated CVE-2021-44906 (for minimalist npm library).

**Node.js 3.11.21**

**Release date:** March 25, 2022

**Language versions currently supported:** 10, 12 and 14 LTS

**IMPORTANT**

The Contrast Node.js agent version 3.X will EOL in June 2022.

**New and improved:**

- Contrast Service updated to 2.28.17.
- Remediated CVE-2021-44906 (for minimalist npm library).

**Node.js 4.13.1**

**Release date:** March 17, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Bug fixes:**

- Path traversal false negative. (SUP-3558)
- Agent tries to rewrite ESM files twice. (NODE-2217)

**Node.js 4.13.0**

**Release date:** March 14, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Remediated CVE-2022-0536 (follow-redirects to a safe version in node-agent)
- Remediated CVE-2022-0686 (url-parse to a safe version in node-agent)
- Added warning message to CLI-rewriter logging (or stdout)
- Added support for hardcoded-key and hardcoded-password vulnerabilities when using CLI-rewriter feature.
- Support for ESM syntax (import statements) for Node.js 14 and 16 LTS
- New Protect native input analysis processing with:
  - YAML: `agent.node.native_input_analysis: true`
  - Environment variable: `CONTRAST__AGENT__NODE__NATIVE_INPUT_ANALYSIS=TRUE`

**Node.js 4.12.2**

**Release date:** March 14, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Bug fixes:**

- Agent is occasionally throwing error: `TypeError: Cannot read property 'getAllParents' of null.` (SUP-3611)

**Node.js 4.12.1**

**Release date:** March 10, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Bug fixes:**

- Rewrite cache path is built incorrectly when mode isn't explicitly set in config. (NODE-2180)
- Proxy authentication information showing in logs. (SPEED-1056)

**Node.js 4.12.0**

**Release date:** February 25, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Node.js 4.11.0**

**Release date:** February 22, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Node.js 4.10.6**

**Release date:** February 17, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**IMPORTANT**

You can no longer download the Node.js agent from Contrast. You should [use these instructions \(page 224\)](#) to download and install the agent from npm.

**Bug fixes:**

- ReThinkDB results in SQLi false negative due to failed instrumentation during propagation. (NODE-2150)

**Node.js 4.10.5**

**Release date:** February 15, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Bug fixes:**

- False negative causing Server Side Request Forgery. (NODE-2130)

**Node.js 4.10.4**

**Release date:** February 15, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Bug fixes:**

- When parsing the body on the Sails framework, the agent occasionally hangs indefinitely on post requests. (NODE-2125)

### **Node.js 4.10.3**

**Release date:** February 7, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

New and improved:

- Upgraded Contrast service 2.28.12 is bundled with this agent version.
- Added support for custom Assess data validation using Mongoose or Joi.
- Added support for MongoDB key object expansion Protect rule.

**Bug fixes:**

- During CLI transpilation, the Node agent no longer logs data if there is no network connectivity or connection to Contrast. (NODE-2083)

### **Node.js 4.10.2**

**Release date:** February 1, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Bug fixes:**

- When working with large JSON objects, users experience significant Assess performance regressions introduced in Node.js agent 4.9.1. (NODE-2086)

### **Node.js 4.10.1**

**Release date:** January 31, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Contrast Service version 2.28.9 is now bundled with the Node.js agent.

**Bug fixes:**

- When the local YAML configuration and environment variables are set, the Contrast service does not prioritize configuration values as indicated in the order of precedence. (NODE-2084)

### **Node.js 4.10.0**

**Release date:** January 28, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Bug fixes**

- When rewrite caching is enabled, the stack trace no longer repeats and writes the correct filename. (NODE-2065)

### **Node.js 4.9.1**

**Release date:** January 19, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**New and improved:**

- Contrast Node.js agent version 4.9.0 was non-installable due to a build dependency that requires `package-lock.json` file. Version 4.9.1 is patched not to require that dependency.

## Node.js 4.9.0



### NOTE

This version has been deprecated, please use 4.9.1 or later.

**Release date:** January 19, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

### Node.js 4.8.0

**Release date:** January 6, 2022

**Language versions currently supported:** 12, 14 and 16 LTS

**Node.js 3.X only: January - June 2022**

### Node.js 3.11.27

**Release date:** June 28, 2022

**Language versions currently supported:** 10, 12 and 14 LTS



### IMPORTANT

This is the last release of 3.x.x of the Node.js agent - the version 3 branch has reached end-of-life status.

#### New and improved:

- Remediated CVE-2020-7596 by removing **codecov** dependency from the node-agent (DEV Dependency).

### Node.js 3.11.26

**Release date:** May 18, 2022

**Language versions currently supported:** 10, 12 and 14 LTS



### IMPORTANT

The Contrast Node.js agent version 3.X will EOL in June 2022.

### Node.js 3.11.25

**Release date:** April 21, 2022

**Language versions currently supported:** 10, 12 and 14 LTS



**IMPORTANT**

The Contrast Node.js agent version 3.X will EOL in June 2022. You can upgrade to the latest version 4.x of the Node.js agent available from [npm](#).

**New and improved:**

- Remediated CVE-2021-43138 (Prototype Pollution in async Winston bump).

**Node.js 3.11.24**

**Release date:** April 14, 2022

**Language versions currently supported:** 10, 12 and 14 LTS

**IMPORTANT**

The Contrast Node.js agent version 3.X will EOL in June 2022. You can upgrade to the latest version 4.x of the Node.js agent available from [npm](#).

**New and improved:**

- Remediated CVE-2021-43138 (update async dev dependency to a safe version in node-agent).

**Node.js 3.11.23**

**Release date:** April 12, 2022

**Language versions currently supported:** 10, 12 and 14 LTS

**IMPORTANT**

The Contrast Node.js agent version 3.X will EOL in June 2022. You can upgrade to the latest version 4.x of the Node.js agent available from [npm](#).

**New and improved:**

- Remediated CVE-2022-24785 (update moment dependency to a safe version in node-agent, remediating path traversal vulnerability).

**Node.js 3.11.22**

**Release date:** March 29, 2022

**Language versions currently supported:** 10, 12 and 14 LTS

**IMPORTANT**

The Contrast Node.js agent version 3.X will EOL in June 2022. You can upgrade to the latest version 4.x of the Node.js agent available from [npm](#).

**New and improved:**

- Remediated CVE-2021-44906 (for minimalist npm library).

**Node.js 3.11.21**

**Release date:** March 25, 2022

**Language versions currently supported:** 10, 12 and 14 LTS

**IMPORTANT**

The Contrast Node.js agent version 3.X will EOL in June 2022.

**New and improved:**

- Contrast Service updated to 2.28.17.
- Remediated CVE-2021-44906 (for minimalist npm library).

**Node.js 3.11.20**

**Release date:** February 25, 2022

**Language versions currently supported:** 10, 12 and 14 LTS

**IMPORTANT**

The Contrast Node.js agent version 3.X will EOL in June 2022.

**Node.js 3.11.19**

**Release date:** February 7, 2022

**Language versions currently supported:** 10, 12 and 14 LTS

**IMPORTANT**

The Contrast Node.js agent version 3.X will EOL in June 2022.

**New and improved:**

- Upgraded Contrast service 2.28.12 is bundled with this agent version.

### **Node.js 3.11.18**

**Release date:** January 31, 2022

**Language versions currently supported:** 10, 12 and 14 LTS



#### **IMPORTANT**

The Contrast Node.js agent version 3.X will EOL in June 2022.

#### **New and improved:**

- Contrast service version 2.28.9 is now packaged with the Node.js agent.

#### **Bug fixes:**

- When the local YAML configuration and environment variables are set, the Node.js agent does not prioritize configuration values as indicated in the order of precedence. (NODE-2084)

### **Node.js 3.11.17**

**Release date:** January 19, 2021

**Language versions currently supported:** 10, 12 and 14 LTS



#### **IMPORTANT**

The Contrast Node.js agent version 3.X will EOL in June 2022.

#### **New and improved:**

- Contrast service version 2.28.4 packaged with the Node.js agent

### **Node.js 4.X only: July - December 2021**

#### **Node.js 4.7.1**

**Release date:** December 23, 2021

**Language versions currently supported:** 12, 14 and 16 LTS

#### **Node.js 3.11.15**

**Release date:** December 3, 2021

**Language versions currently supported:** 12, 14



#### **IMPORTANT**

As of Node 3.11.15, the agent will be bundled with Contrast Service version 2.28.0

**New and improved:**

- Added Joi support for `ref()` where reference target is an object.

**Node.js 4.7.0**

**Release date:** December 3, 2021

**Language versions currently supported:** 12, 14 and 16 LTS

**IMPORTANT**

As of Node 4.7.0, the agent will be bundled with Contrast Service version 2.28.0

**New and improved:**

- The stacktrace limit default was set to 10 (previously it was set to 25).
- Added Joi support for `ref()` where reference target is an object.
- Added support for Dust.js template engine.

**Bug fixes:**

- Implicit tagging of numeric input causes false negatives. (Node-2005)
- Refactored logic around sanitizers that causes wrong tags.

**Node.js 4.6.0**

**Release date:** November 18, 2021

**Language versions currently supported:** 12, 14, 16 LTS

**Bug fixes:**

- When an application has been rewritten with Babel and the `@babel/runtime` helpers have been injected, the application fails to start. (Node-1956)

**Node.js 4.5.2**

**Release date:** November 10, 2021

**Language versions currently supported:** 12, 14, 16 LTS

**New and improved:**

- Added AWS-SDK version 3 DynamoDB to the flow map.
- Improved tracking of vulnerabilities through `path` functions.

**Node.js 4.5.1**

**Release date:** November 2, 2021

**Language versions currently supported:** 12, 14, 16 LTS

**IMPORTANT**

As of Node 4.5.1, the agent will be bundled with Contrast Service version 2.27.3

**Bug fixes:**

- Bluebird is causing vulnerabilities to be attributed to the incorrect route. (NODE-1892)

**Node.js 4.5.0**

**Release date:** October 21, 2021

**Language versions currently supported:** 12, 14, 16 LTS

**New and improved:**

- Support for Mustache template engine version 4.x. (version 3 and version 4 of agent)
- Specify module supported versions explicitly as a WARN in logs.

**Bug fixes:**

- Fixes to the `path.normalize` Assess functionality. (NODE-1830)

**Node.js 4.4.1**

**Release date:** October 13, 2021

**Language versions currently supported:** 12, 14, 16 LTS

**New and improved:**

- Node 16 LTS support.
- New configuration flag for “turbo” protect performance.

**Bug fixes:**

- When there are NoSQL vuln on GET requests from two routes, the vulnerability is not reported. (NODE-1900)
- "Propagator micro-optimizations" causes performance issue. (NODE-1913)

**Node.js 4.3.0**

**Release date:** September 29, 2021

**Language versions currently supported:** 12 and 14 LTS

**New and improved:**

- CVE-2021-3795 upgrade `semver-regex` to latest (v3.1.3) in `node-require-hook`
- CVE-2021-3795 upgrade `semver-regex` to latest (v3.1.3) in `node-fn-inspect`
- CVE-2021-3807 bump `ansi-regex` dependency in `node-agent` repo (from 2.1.1 to 6.0.1)
- CVE-2020-26301 bump `ssh2` to latest version (v1.4.0) in the `node-agent` repo (v3 and v4)

**Bug fixes:**

- XXE Assess causes false negatives with the DVNA application. (NODE-1810)

**Node.js 4.2.0**

**Release date:** September 23, 2021

**Language versions currently supported:** 12 and 14 LTS

**Known issue:**

There may be some message loss between the agent and the Contrast service if you are NOT using the optional gRPC protocol. This version will be deprecated once a fix is provided in the 4.2.1 release.

**New and improved:**

- Significant Assess performance improvements for use cases where there is a large JSON body in the inbound request.
- Improved reporting/UX to Contrast where there is a vulnerability identified in large JSON body in the inbound request.
- The MongoDB 4.X driver is now supported along with versions 3.5.0 and later.
- CVE-2021-3749 - node-agent - bump 'axios' from 0.21.1 to 0.21.2
- CVE-2021-37713 bump tar dependency in 'distinguish' repo from 4.4.15 to 4.4.19
- CVE-2021-37713 bump tar dependency in 'node-fn-inspect' repo from 4.4.15 to 4.4.19

**Node.js 4.1.0**

**Release date:** August 28, 2021

**Language versions currently supported:** 12 and 14 LTS

**NOTE**

As of Node.js 4.1.0, we no longer support Contrast Node.js agent versions 2.X.

**New and improved:**

- CVE-2021-3664 - node-agent - Bump url-parse from 1.5.1 to 1.5.3.
- CVE-2021-23343 - node-agent - Bump path-parse from 1.0.6 to 1.0.7.
- SNYK-JS-TAR-1536758 - node-agent - Bump tar from 6.1.4 to 6.1.10.
- CVE-2021-32803 - contrast-protobuf-api - Bump tar from 4.4.13 to 4.4.15 (or 4.4.19).

**Bug fixes:**

- Node.js agent failing silently in Protect mode if unsupported Node.js LTS version. (NODE-1757)
- When reporting libraries "\_requiredBy" or "dependents" field not populated. (NODE-1718)
- Sequelize propagators do not add Propagation events to dataflow history, causing possible NoSQL injection false positives. (NODE-1746)

**Node.js 4.0.1**

**Release date:** July 28, 2021

**Language versions currently supported:** 12 and 14 LTS

**Node.js 4.0.0**

**Release date:** July 8, 2021

**Language versions currently supported:** 12 and 14 LTS

**New and improved:**

- Significant performance refactoring completed for both Protect and Assess functionality.
- CLI rewriter for startup performance improvements.
- Set Babel as sole rewriter - removed Esprima.
- Updating Contrast Service is mandatory.
- Added support for `agent.logger.backups` and `agent.logger.roll_size` properties.

**Bug fixes:**

- Agent unable to detect installed libraries on Windows. (NODE-1622)
- Bluebird callbacks run in `NO_INSTRUMENTATION` scope causing accuracy issues. (NODE 1643)
- `Koa: Router.use` reported as `Router.undefiend`. (NODE-1628)
- Logger not logging all entries to debug file. (NODE-1654)
- HTTP body missing for multipart/form-data POST requests. (NODE-1620)
- Agent fails to start with infinite loop when unable to write contrast-service socket file. (NODE-1657)
- Screener tests fail because of non-existent rewrite-babel file. (NODE-1682)
- Tag ranges off when `Array.join` is called with empty string. (NODE-1673)
- Trim prerelease from reported agent version. (NODE-1693)

## Node.js 3.X only: July 2021 - December 2021

### Node.js 3.11.14

**Release date:** November 18, 2021

**Language versions currently supported:** 12, 14 LTS

#### New and improved:

- Resolved CVEs against these dev dependencies: CVE-2021-3765, CVE-2021-3807.

### Node.js 3.11.13

**Release date:** November 3, 2021

**Language versions currently supported:** 12, 14 LTS



### IMPORTANT

As of Node.js 3.11.13, the agent will be bundled with Contrast Service version 2.27.3.

#### Bug fixes:

- Bluebird causes vulnerabilities to be attributed to the incorrect route. (Node-1892)

### Node.js 3.11.12

**Release date:** October 13, 2021

**Language versions currently supported:** 12 and 14 LTS

#### Bug fixes:

- When there are NoSQL vuln on `GET` requests from two routes, the vulnerability is not reported. (NODE-1900)

### Node.js 3.11.11

**Release date:** October 7, 2021

**Language versions currently supported:** 12 and 14 LTS

#### Bug fixes:

- Agent maintenance version 3.x does not ship with prebuilt dependencies for Node 10. (NODE-1905)

## Node.js 3.11.10

**Release date:** September 29, 2021

**Language versions currently supported:** 12 and 14 LTS

### New and improved:

- CVE-2021-3795 upgrade `semver-regex` to latest (v3.1.3) in `node-require-hook`
- CVE-2021-3795 upgrade `semver-regex` to latest (v3.1.3) in `node-fn-inspect`
- CVE-2021-3807 bump `ansi-regex` dependency in `node-agent` repo (from 2.1.1 to 6.0.1)
- CVE-2020-26301 bump `ssh2` to latest version (v1.4.0) in the `node-agent` repo (v3 and v4)

## Node.js 3.11.9

**Release date:** August 26, 2021

**Language versions currently supported:** 12 and 14 LTS

### New and improved:

- CVE-2021-3664 - `node-agent` - Bump `url-parse` from 1.5.1 to 1.5.3.
- CVE-2021-23343 - `node-agent` - Bump `path-parse` from 1.0.6 to 1.0.7.
- SNYK-JS-TAR-1536758 - `node-agent` - Bump `tar` from 6.1.4 to 6.1.10.
- CVE-2021-32803 - `contrast-protobuf-api` - Bump `tar` from 4.4.13 to 4.4.15 (or 4.4.19).

### Bug fixes:

- Node.js agent failing silently in Protect mode if unsupported Node.js LTS version. (NODE-1757)
- Sequelize propagators do not add Propagation events to dataflow history, causing possible NoSQL injection false positives. (NODE-1746)
- When reporting libraries, `"_requiredBy"` or `"dependents"` fields not populated. (NODE-1718)

## Node.js 3.11.8

**Release date:** August 13, 2021

**Language versions currently supported:** 12 and 14 LTS

### Bug fixes:

- Resolves a breaking change regression and reenables the agent to run on Node.js 10 LTS, even though that Node.js LTS version has reached its end-of-life (EOL). (NODE-1748)
- The agent can successfully instrument any application using Bluebird. (NODE-1742)
- Resolved an issue where the agent was not correctly tracking data through several Sequelize functions. (NODE-1746)

## Node.js 3.11.7

**Release date:** July 29, 2021

**Language versions currently supported:** 12 and 14 LTS

## Node.js 3.11.6

**Release date:** July 8, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

### Bug fixes:

- Agent fails to start with infinite loop when unable to write `contrast-service` socket file. (NODE-1657)



- Improved the agent's deadzoning ability to correctly skip instrumentation of dependent modules of deadzoned modules. (NODE-1449)

## Node.js 3.11.5



### NOTE

This version has been deprecated, please use 3.11.6 or later.

**Release date:** July 6, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### Bug fixes:

- Addressed bug that prevented logging some entries into debug file. (NODE-1654)
- HTTP body missing for multipart/form-data POST requests. (NODE-1620)

## January - June 2021

### Node.js 3.11.4



### NOTE

This version has been deprecated, please use 3.11.6 or later.

**Release date:** June 25, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### Bug fixes:

- `Router.use` reported as `Router.undefined` in Koa. (NODE-1628)

### Node.js 3.11.3



### NOTE

This version has been deprecated, please use 3.11.6 or later.

**Release date:** June 25, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### Bug fixes:

- Agent unable to detect installed libraries on Windows. (NODE-1622)
- Bluebird callbacks run in `NO_INSTRUMENTATION` scope causing accuracy issues. (NODE-1643)

## Node.js 3.11.2



### NOTE

This version has been deprecated, please use 3.11.6 or later.

**Release date:** June 11, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### Bug fixes:

- Logger methods called before initialization. (NODE-1625)
- Mongodb collection methods not triggering post hooks. (NODE-1603)

## Node.js 3.11.1



### NOTE

This version has been deprecated, please use 3.11.6 or later.

**Release date:** June 08, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### Bug fixes:

- When user is using express-session middleware, `res.end` does not report cross-site scripting (XSS). (SUP-2796)
- `AsyncStorage` loses context in mysql query operations. (SUP-2861)
- Fixed an issue where the customer app crashes but does not throw an exception to the Docker container and write to `stdout/stderr`. (NODE-1511)

## Node.js 3.10.3

**Release date:** May 21, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### Bug fixes:

- To resolve a ReDoS CVE (CVE-2021-23362) we need to update the `hosted-git-info` library included as a dependency.

## Node.js 3.10.2

**Release date:** May 17, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

### Node.js 3.10.1

**Release date:** April 28, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

**New and improved:**

- Runtime performance improvements by improving JSON stringify tracking capabilities.
- Added support for the Joi validator library, version 17+.

### Node.js 3.9.4

**Release date:** April 19, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

### Node.js 3.9.3

**Release date:** April 13, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

**New and improved:**

- Runtime performance improvement by disabling membrane wrapping for certain functions.

### Node.js 3.9.2

**Release date:** April 2, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

**Bug fixes:**

- RangeError thrown on startup when traversing a router mounted on itself in Express. (SUP-2723)

### Node.js 3.9.1

**Release date:** March 31, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

**Bug fixes:**

- False positive Hardcoded Key finding reported. (SUP-2636)
- If the Service is enabled, the `application.path` isn't reported correctly. (SUP-2669)

### Node.js 3.9.0

**Release date:** March 26, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

**New and improved:**

- Added support for the Validator library, which can be used to sanitize and validate common vulnerability categories.
- Improved logging when an incorrect `package.json` is used.

**Bug fixes:**

- Prevent a catch when an async storage object can't be parsed. (SUP-2685)
- Fixed how the agent contextualizes async data when koa-bodyparser is used (SUP-2627)

- Fixed cases where Express vulnerabilities aren't reported to the UI correctly (SUP-2509, SUP-1558)

### **Node.js 3.8.6**

**Release date:** March 18, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### **Bug fixes:**

- When using a MongoDB SCRAM-SHA-256 authentication configuration, an exception is thrown at server startup. (SUP-2653)

### **Node.js 3.8.5**

**Release date:** March 15, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

### **Node.js 3.8.4**

**Release date:** March 9, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### **Bug fixes:**

- Upgraded lodash from 4.17.20 to 4.17.21 due to two known CVEs found in version 4.17.20 (CVE-2020-28500, CVE-2021-23337).
- Upgraded amqplib from 0.6.0 to 0.7.1 due to a known CVE found in version 0.6.0 (CVE-2021-27515).

### **Node.js 3.8.3**

**Release date:** March 8, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### **Bug fixes:**

- When a querystring is included in a MongoDB connection string, the agent can't parse the URL. (SUP-2594)

### **Node.js 3.8.0**

**Release date:** March 1, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### **New and improved:**

- Kraken 2.3.0 is now supported.

#### **Bug fixes:**

- Loading the agent with an ESM loader produces an error. (SUP-2504)
- DynamoDB hook for flowmap crashes up without 'endpoint' in config (SUP-2475)

### **Node.js 3.6.4**

**Release date:** February 26, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### **Bug fixes:**

- Library usage causes errors on Windows when application loads add-on. (SUP-2536, NODE-1328)
- Juice-Shop does not run when Assess is enabled on Windows. (SUP-2521, NODE-1317)

### **Node.js 3.6.1**

**Release date:** February 11, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### **Bug fixes:**

- DynamoDB hook for flowmap crashes agent when 'endpoint' is not specified in configuration. (SUP-2475, NODE-1286)
- Users running `esm.mjs` receive an error because it is not being packaged. (SUP-2478, NODE-1288)

### **Node.js 3.6.0**

**Release date:** January 29, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### **New and improved:**

- Loopback 4 is now supported.
- Fastify 3 is now supported.

#### **Bug fixes:**

- False negative path traversal finding in Express. (SUP-2412)
- Agent not detecting remote code execution (RCE) with certain input values. (SUP-2433)
- Highlighted text in the UI is off by one character. (SUP-2384)

### **Node.js 3.5.1**

**Release date:** January 28, 2021

**Language versions currently supported:** 10, 12 and 14 LTS

#### **Bug fixes:**

- The application may throw an error if the cache-controls header is an array. (SUP-2416)
- Agent incorrectly exiting on SIGPIPE when the Contrast Service is used. (SUP-2421)

## **July - December 2020**

### **Node.js 3.5.0**

**Release date:** December 18, 2020

**Language versions currently supported:** 10, 12 and 14 LTS

#### **New and improved:**

- Input exclusions for Assess are supported. You can exclude findings based on input type or name.
- Optimized performance when `sourcemaps` is enabled.
- Flowmaps now have better accuracy in reporting architectural components.

### **Node.js 3.4.1**

**Release date:** December 7, 2020

**Language versions currently supported:** 10, 12 and 14 LTS

#### **Bug fixes:**

- Certain types of XML uploads result in an XXE false negative. (SUP-2287)

### **Node.js 3.4.0**

**Release date:** November 20, 2020

**Language versions currently supported:** 10, 12 and 14 LTS

#### **New and improved:**

- Node.js 14 is now supported.
- Improved accuracy of line number reporting for vulnerabilities with source mapping.

#### **Bug fixes:**

- Agent fails to instrument in Node 14 running on Windows. (SUP-2230)

### **Node.js 3.3.0**

**Release date:** October 28, 2020

**Language versions currently supported:** 10 and 12 LTS

### **Node.js 3.2.0**

**Release date:** October 23, 2020

**Language versions currently supported:** 10 LTS and 12 LTS

#### **New and improved:**

- Added support for sequelize sql-string format methods.

#### **Bug fixes:**

- Found false negative with Node.js loopback in Protect mode. (SUP-2009)

### **Node.js 3.1.1**

**Release date:** September 25, 2020

**Language versions currently supported:** 10 LTS and 12 LTS

#### **Bug fixes:**

- Need to add support for `fs.createWriteStream` as a Protect sink. (SUP-2013)

### **Node.js 3.1.0**

**Release date:** September 18, 2020

**Language versions currently supported:** 10 LTS and 12 LTS

#### **New and improved:**

- Restify 8 framework support is now available.

#### **Bug fixes:**

- An Insecure Encryption Algorithm finding reports an incorrect code location. (SUP-1852)
- FastifyFramework did not emit all headers in 'send' event.

### **Node.js 3.0.0**

**Release date:** September 10, 2020

**Language versions currently supported:** 10 LTS and 12 LTS

**New and improved:**

- The 3.X version of the agent sets the default behavior to communicate and report to Contrast using the Contrast service.
- The new `rewrite_cache` property will cache the app code rewritten by Contrast on startup and can improve subsequent startup time. This property is disabled by default but can be enabled.

**Important notes:**

- With the 3.X version of the Node.js agent, the Contrast service is enabled by default but can still be disabled. Because of this, you will need to download the new 3.X agent binary [through npm](#) (recommended) or through Contrast.. Please [contact Support](#) if you have any questions about this change.

**Bug fixes:**

- Tracking strings which include the + operator create a performance issue. (SUP-1975)

## Node.js 2.18.0

**Language versions currently supported:**10 LTS and 12 LTS

**New and improved:**

- This release sets default behavior of the Node.js agent to communicate and report to Contrast directly, without using the Contrast Service. This undoes a breaking change that was introduced in the 2.x.x branch back in February of 2020.
- New performance diagnostic features are now available for Contrast Customer Success to help diagnose performance issues.
- Added the capability to track untrusted data through the `node.js url.domainToASCII` and `url.domainToUnicode` functions.
- The `agent.node.unsafe.deadzones` option will now trim whitespace around each option.

**Important notes:**

- This version marks the last new release for the 2.x.x branch. Only patch releases will be provided going forward for the 2.18.x branch.  
Customers will be required to upgrade to version 3.x.x (available September 2020) to gain additional capabilities in the Node.js agent. Version 3.0.0 of the Contrast Node.js agent will have potentially impactful changes which should be assessed by each customer for their specific application.

**Bug fixes:**

- The `server.path config` option is not being passed to Contrast when using the Contrast service for communication. (SUP-1838)
- Node agent Lodash dependency updated to 4.17.20 to resolve CVE-2020-8203. (SUP-1883)
- Resolve `TypeError: replacer.replace is not a function.` (SUP-1888)

## January - June 2020

### Node.js 2.17.2

**Language versions currently supported:**10 LTS and 12 LTS

**Bug fixes:**

- Agent breaks expected `express-async-errors` behavior. (SUP-1801)

## Node.js 2.17.1

Language versions currently supported: 10 LTS and 12 LTS

## Node.js - July 2020

Language versions currently supported: 10 and 12 LTS

Agent versions released during the past month: 2.16.1, 2.16.2, 2.16.3, 2.16.4, 2.16.5, 2.16.6, 2.16.7, 2.16.8, 2.17.0

### New and improved:

- Added multiple architecture changes and fixes that improve Assess performance.
- Added support for URL Exclusions when using Assess. In Contrast, you can designate URLs that ignore selected rules or all rules. The agent now respects these settings for Assess rules in the Node.js agent.
- Protect rule modes now default to OFF for best backward and forward compatibility.
- Improved Fastify support to work better with GraphQL and Apollo Server.
- Removed support for Protect Cross-site Request Forgery (CSRF).
- Updated the version of Lodash used by the Node.js agent to 4.17.19 in response to a CVE for Lodash 4.17.15.

### Important notes:

- Version 3.0.0 of the Node.js agent will be released at the end of August and will introduce these changes:
  - The Node.js agent will be required to run with the [Contrast service \(page 415\)](#) enabled. Currently the service is shipped with the agent but is optional; this change will enable the service by default.
  - The service will provide multiple functional and performance benefits to the Node.js agent.
  - The legacy auto-update policy for the Node.js agent will be deprecated when running with the service enabled.



### NOTE

You will need to upgrade to Version 3.0.0, because the legacy auto-update feature does not upgrade to a major version. You can update your agent to 3.x with npm (recommended), the [Contrast API](#) or by using the Contrast web interface. Using npm allows version updates by using the customer's application's package.json with semantic versioning.

- All new features will only be available for 3.0.0 and higher. Version 2.18.0 will also be released at the end of August and will be the final version that doesn't require the [Contrast service \(page 415\)](#). This version will continue to be supported for patch releases.
- There are two optional features that may be useful to some customers. Contact your Customer Success Representative if you would like to know more about these:
  - Re-write caching provides faster subsequent start-up times.
  - Performance may improve when you skip (or deadzone) certain modules. For example, if you have modules passing large strings that are irrelevant to security, like logging, you can choose not to instrument them.

### Bug fixes:

- Node.js agent failed to initialize. Missing gRPC framework was resolved.
- An exception occurred because of a syntax error for Fastify. This was fixed.
- Crash when requiring the aws-s3 module was resolved.



## Node.js - June 2020

**Language versions currently supported:**10 LTS and 12 LTS

**Agent versions released during the past month:** 2.15.1 2.15.2, 2.15.3, 2.15.4, 2.15.5, 2.16.0, 2.16.1, 2.16.2, 2.16.3, 2.16.4

### New and improved:

- Multiple architecture and performance improvements.
- New gRPC communication protocol between the agent service improves performance.
- Removed name and value cookie sources for reflected XSS per updated guidance for both Assess and Protect.
- Added a sensor for SQLite for Protect.
- Added support for Koa version 2.12.
- Reflected XSS is now not reported if Content-Type is allowlisted as safe.

### Important notes:

- A major version release for the Node.js agent is planned for late July or August 2020. Node.js agent version 3.0.0 will introduce breaking changes for customers using the 2.x.x version of the agent and service.

### Bug fixes:

- Implemented multiple bug fixes due to the introduction of the gRPC communication protocol between the JavaScript agent and the agent service
- Implemented fixes to resolve route coverage issues that surface when using GraphQL, Apollo Server, and Fastify
- Resolved a false positive issue when correctly using Sequelize to escape strings.
- Resolved exception when fastify.route is called with an uppercase verb.
- Resolved an issue that manifested as reporting duplicate routes when using the Express framework.

## Node.js - May 2020

**Language versions currently supported:**10 LTS and 12 LTS

**Agent versions released during the past month:** 2.15.0

### Important notes:

- New recommendations for [installing and running the Node.js agent \(page 224\)](#) have been released.

### Bug fixes:

- The customer application would fail to start when all Assess rules were disabled. This is fixed now.
- The customer application would fail to start because worker threads would hang and generate multiple processes with the same pid. This is fixed now.
- The agent would not output the security log to stdout (or stderr). This is fixed now.
- Duplicated vulnerabilities were being reported for unique routes. This is fixed so that TeamServer displays distinct findings for each request uri.
- An out-of-memory error caused by a regex match resulted in an infinite loop. This has been fixed.
- Node.js agent's migration to npm and incorrectly bundled modules made it seem like the agent was missing two dependencies. This has been resolved.

## Node.js - April 2020

**Language versions currently supported:**

**Agent versions released during the past month:** 2.8.1, 2.8.2, 2.8.3, 2.9.0

**New and improved:**

- **Fastify framework support:** Fastify 2.x is now a supported framework for the Contrast Node.js agent.
- **NPM availability:** The Contrast Node.js agent can now be installed directly from the [Contrast Security public NPM repository](#)
- **Pre-load capabilities:** The Node.js agent can now be run as a pre-load module using the `-r` flag. This is also now the recommended method of running the Contrast Node.js agent.

**Important notes:**

- Running the node agent as a runner will now generate a deprecation message. This is the deprecated syntax:

```
node-contrast<app-main>
```

The agent will continue to function when executed as a runner. However, we encourage customers to migrate to the new method of running the Contrast Node.js agent as this is no longer recommended.

**Bug fixes:**

- After architecture improvements were made to the agent, some applications were prevented from starting with the agent. This has been resolved and users should no longer receive error messages like these:

```
cls.run(() => {  
  ^  
TypeError: Cannot read property 'run' of undefined
```

OR

```
/usr/src/app/node_modules/node_contrast/lib.asar/AsyncStorage/index.js:188  
  if (ns.active) {
```

```
TypeError: Cannot read property 'active' of undefined
```

## Python agent release notes

At this time, the agent release notes are only available in English.

### Python 5.20.0

**Release date:** April 11, 2023

**Language versions currently supported:** Python 3.7 - 3.11

**New and improved:**

- Removed all bottle-specific logic from BottleMiddleware.
- Updated `RuntimeError` in `setup.py` to include a workaround for aarch/arm systems.
- Removed quart-specific middleware.
- Added a lock for agent state initialization.
- Added support for the latest FastAPI (0.93.\*).
- Changed the `AgentLib` log level.
- Integrated the Protect Library.

**Bug fixes:**

- Fixed `AttributeError: Constant object had no elts attribute.` (PYT-2740)
- Fixed `UnicodeDecodeError: utf-8 codec could not decode byte 0xff in position 0: invalid start byte.` (PYT-2725)
- Fixed `TypeError: module, class, method, function, traceback, frame, or code object was expected, got partial.` (PYT-2664)
- Fixed `SystemError: <built-in function in_scope> returned a result with an error set.` (PYT-2659)
- Fixed flaky pipeline step for server activity. No more flaky failures in `flask-agent-direct-team-server-response`. (PYT-2651)

## Python 5.19.2

**Release date:** March 30, 2023

**Language versions currently supported:** Python 3.7 - 3.11

### Bug fixes:

- When trying to identify the current platform on startup, the agent raised an exception. (PYT-2777)

## Python 5.19.1

**Release date:** March 20, 2023

**Language versions currently supported:** Python 3.7 - 3.11

### Bug fixes:

- When instrumenting Bottle and Falcon applications, middlewares closer to the application than `ContrastMiddleware` were bypassed. (PYT-2727)

## Python 5.19.0

**Release date:** March 15, 2023

**Language versions currently supported:** Python 3.7 - 3.11

### New and improved:

- Upgraded external `wrapt` from 1.14.1 to 1.15.0.
- Upgraded `agent-lib` to 0.5.2
- Added propagation policy for `posixpath` (`os.path`)
- Bump pinned version of `contrast-agent-lib` to v0.4.0
- Updated copywrite message
- Removed the `bypass` option for messages
- Updated `flask-sqlalchemy` to 3.0.\*
- Added support for Quart 0.18 / Werkzeug 2.2
- When app server exits, Telemetry will send any messages in queue
- Deprecated SR
- Added support for Python 3.11

### Bug fixes:

- `AttributeError: 'Settings' object has no attribute 'last_update_service'.` (PYT-2563)
- `AttributeError: 'NoneType' object has no attribute 'disabled_assess_rules'.` (PYT-2559)
- `AttributeError: 'NoneType' object has no attribute 'reportable_format'.` (PYT-2552)

## Python 5.18.9

**Release date:** March 15, 2023

**Language versions currently supported:** Python 3.7 - 3.10

**No updates**

## Python 5.18.8

**Release date:** March 13, 2023

**Language versions currently supported:** Python 3.7 - 3.10

**Bug fixes:**

- When the regex split result contains None, an exception occurs in the propagator. (PYT-2644)
- When unicode-escape is used as encoding, LookupError occurs in path-traversal sink. (PYT-2553)

## Python 5.18.7

**Release date:** March 9, 2023

**Language versions currently supported:** Python 3.7 - 3.10

**New and improved:**

- Bump contrast-agent-lib version to 0.5.2.

## Python 5.18.6

**Release date:** March 1, 2023

**Language versions currently supported:** Python 3.7 - 3.10

**Bug fixes:**

- When too many assess regex propagation events occurred in a single request, the agent continued to propagate regardless of assess.max\_propagation\_events. (PYT-2676)

## Python 5.18.5

**Release date:** February 15, 2023

**Language versions currently supported:** Python 3.7 - 3.10

**Bug fixes:**

- When evaluating the protect deserialization rule for pickled data, the agent easily found false positives. (PYT-2646)

## Python 5.18.4

**Release date:** January 23, 2023

**Language versions currently supported:** Python 3.7 - 3.10

**Bug fixes:**

- When performing Django's safe\_join on a PosixPath object, the agent raised a TypeError. (PYT-2592)

## Python 5.18.3

**Release date:** January 18, 2023

**Language versions currently supported:** Python 3.7 - 3.10

**Bug fixes:**

- When the Contrast Service was too slow to start on server startup, the Agent failed to instrument the application. (PYT-2582)

## Python 5.18.2

**Release date:** January 11, 2023

**Language versions currently supported:** Python 3.7 - 3.10

### Bug fixes:

- When the agent failed to connect to the Contrast Service, it raised an `AttributeError` when handling the first request to the application. (PYT-2574)

## Python 5.18.1

**Release date:** January 6, 2023

**Language versions currently supported:** Python 3.7 - 3.10

### Bug fixes:

- When untrusted data was safely passed to subprocess functions using `shell=False`, the agent incorrectly reported a command injection vulnerability. (PYT-2557)

## Python 5.18.0

**Release date:** November 17, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### New and improved:

- Added support for URL exclusions when communicating directly with Contrast.
- Added configuration support for input exclusions directly from Contrast.
- Integrated AgentLib Request End for `contrast_c::check_cmd_injection_query`
- Upgraded external typing extensions to latest version.

### Bug fixes:

- When ASGI websocket endpoints are used with the agent enabled, the app crashes. (PYT-2517)

## Python 5.17.0

**Release date:** October 31, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### Bug fixes:

- When starting the Contrast Service without a path, the Agent defaults to `STDOUT` rather than the default file path. (PYT-2505)
- Reduced frequency of server activity messages. (PYT-2484)

## Python 5.16.1

**Release date:** October 19, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### Bug fixes:

- When attempting to rewrite the target of an `append`, the agent incorrectly passes `self` rather than the *original* Attribute. (PYT-2496)

## Python 5.16.0

**Release date:** October 18, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### New and improved:

- Added support for FastAPI 0.85. (PYT-2456)
- Implemented PII masking in the agent. (PYT-2462)
- Added a `CONTRAST__AGENT__PYTHON__REWRITE` option that disables rewriting. (PYT-2485)

## Python 5.15.4

**Release date:** October 3, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### Bug fixes:

- When running the agent, getting specifications in rewriter throws `AttributeError`. (PYT-2480)

## Python 5.15.3

**Release date:** September 28, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### Bug fixes:

- When running the agent, rewriter cannot find specifications path. (PYT-2476)

## Python 5.15.2

**Release date:** September 21, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### Bug fixes:

- Fixed issue for when an agent receives a websocket request and a `KeyError` was returned. (PYT-2470)

## Python 5.15.1

**Release date:** September 20, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### Bug fixes:

- Fixed issue where an application instrumented with the agent in an environment without `lxml` installed crashed. (PYT-2464)

## Python 5.15.0

**Release date:** September 1, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### New and improved:

- Falcon ASGI support is now available in Python agent 5.14.0.
- Added support for Django 4.

**Bug fixes:**

- When attempting to rewrite code for instrumentation, certain code patterns result in infinite loops, resulting in application crashes. (PYT-2444)

**Python 5.14.1**

**Release date:** July 11, 2022

**Language versions currently supported:** Python 3.7 - 3.10

**Bug fixes:**

- When `agent.service.logger` was configured to log to an unwritable path, the Contrast Service wrote `DEBUG` logs to `stdout` regardless of the configured log level.

**Archive****January - June 2022****Python 5.14.0**

**Release date:** June 21, 2022

**Language versions currently supported:** Python 3.7 - 3.10

**Python 5.13.0**

**Release date:** June 13, 2022

**Language versions currently supported:** Python 3.7 - 3.10

**Bug fixes:**

- When sampling settings are translated from Contrast, a String vs Enum mismatch causes them to be improperly applied. (PYT-2286)
- When `sqli protect` rule isn't enabled, a `NoneType` error is logged (Telemetry-reported Error). (PYT-2311)

**Python 5.12.2**

**Release date:** June 7, 2022

**Language versions currently supported:** Python 3.7 - 3.10

**Python 5.12.1**

**Release date:** May 30, 2022

**Language versions currently supported:** Python 3.7 - 3.10

**Python 5.12.0**

**Release date:** May 27, 2022

**Language versions currently supported:** Python 3.7 - 3.10

**Python 5.11.0**

**Release date:** May 25, 2022

**Language versions currently supported:** Python 3.7 - 3.10

**New and improved:**

- Telemetry exceptions - production issues from live customer environments will be reported to our servers to help remediate bugs.

### **Python 5.10.0**

**Release date:** April 14, 2022

**Language versions currently supported:** Python 3.7 - 3.10

#### **New and improved:**

- Expanded FastAPI support to version 0.75.\*.

#### **Bug fixes:**

- When assess configuration specifies `sampling.baseline`, the agent incorrectly analyzes fewer baseline requests than expected. (PYT-2238)

### **Python 5.9.1**

**Release date:** April 11, 2022

**Language versions currently supported:** Python 3.7 - 3.10

#### **Bug fixes:**

- When an assess-instrumented function throws any exception, the agent logs it at ERROR level even when recoverable. (PYT-2234)

### **Python 5.9.0**

**Release date:** April 7, 2022

**Language versions currently supported:** Python 3.7 - 3.10

#### **New and improved:**

- Modified the agent to better support asynchronous functionality added by event.

### **Python 5.8.0**

**Release date:** April 5, 2022

**Language versions currently supported:** Python 3.7 - 3.10

#### **New and improved:**

- Introduction of the Assess Sampling feature to facilitate performance tuning.

#### **Bug fixes:**

- When a Django request's path is missing a required `"/`, the agent does not mark the route as observed. (PYT-2222)

### **Python 5.7.0**

**Release date:** March 30, 2022

**Language versions currently supported:** Python 3.7 - 3.10

#### **Bug fixes:**

- When Django creates a redirect response to append a trailing `"/` to the URL path, the agent incorrectly finds an unvalidated redirect (PYT-2218)



## Python 5.6.0

**Release date:** March 28, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### Bug fixes:

- When the agent encounters an issue during assess dataflow tracking, an error level, rather than debug, log message is created, potentially filling log tools. (PYT-2196)

## Python 5.5.0

**Release date:** March 23, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### Bug fixes:

- When processing a request without a context, a missing `None` check results in an `AttributeError`. (PYT-2168)
- When Protect is disabled either locally or in Contrast, the agent disables it. (PYT-2186)

## Python 5.4.0

**Release date:** March 16, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### Bug fixes:

- When a Django app serves a jinja template, the agent consumes the response (PYT-2166)
- When an aiohttp application in Protect mode receives a `ContrastServiceException`, an error that crashed the app occurs (PYT-2167)
- When an aiohttp, Fastapi, or Bottle app is onboarded, an incorrect framework name is reported (PYT-2171)

## Python 5.3.0

**Release date:** March 1, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### New and improved:

- The Python agent now supports FastAPI 0.74.

## Python 5.2.0

**Release date:** February 16, 2022

**Language versions currently supported:** Python 3.7 - 3.10

### New and improved:

- Added web application framework support for AioHttp.

## Python 5.1.0

**Release date:** February 11, 2022

**Language versions currently supported:** Python 3.7 - 3.9

### New and improved:

- Support for asynchronous web application framework - AioHTTP.

### Python 5.0.2

**Release date:** February 1, 2022

**Language versions currently supported:** Python 3.7 - 3.9

#### Bug fixes:

- When a protect-instrumented method receives non-UTF-8 encoded bytes, the agent fails to perform protect analysis. (PYT-2028)

### Python 5.0.1

**Release date:** January 13, 2022

**Language versions currently supported:** Python 3.7 - 3.9

#### Bug fixes:

- When an application calls an instrumented method with a keyword-argument named "self", the agent throws an exception. (PYT-1998)

### Python 5.0.0

**Release date:** January 7, 2022

**Language versions currently supported:** Python 3.7 - 3.9



#### NOTE

Python versions 2.7.X, 3.5.X and 3.6.X are no longer supported after the Python agent 4.14.3.

## July - December 2021

### Python 4.14.3

**Release date:** December 15, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9



#### NOTE

Python versions 2.7.X, 3.5.X and 3.6.X are no longer supported after the Python agent 4.14.3.

### Python 4.14.2

**Release date:** December 6, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

#### Bug fixes:

- When handling many concurrent requests in Protect mode, the agent failed to perform path-traversal postfilter analysis. (PYT-1964)

### Python 4.14.1

**Release date:** November 30, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9



#### NOTE

As of Python 4.14.1, the agent will be bundled with Contrast Service version 2.27.2.

### Python 4.14.0

**Release date:** November 23, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

#### New and improved:

- Expanded web application framework support for Pyramid 2.
- [Telemetry \(page 344\)](#) is now enabled in the Python agent in order to gather valuable data about the agent's functionality. The data is all anonymous, no personal information is collected.

### Python 4.13.1

**Release date:** November 18, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

#### New and improved:

- We no longer report vulnerabilities when the value of `url_scheme` is used in a trigger.
- The Python agent now supports the web framework FastAPI.

### Python 4.13.0

**Release date:** October 21, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

#### New and improved:

- Expanded web server support for uWSGI.
- Expanded web server support for gUnicorn.
- Expanded web server support for Uvicorn.
- Architectural improvements for propagation and associated extension hooks.

### Python 4.12.0

**Release date:** September 16, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

#### Bug fixes:

- When the agent was installed in Python 2.7, the latest version of the protobuf dependency caused agent startup failure as it dropped support for older Python versions. (PYT-1757)

### Python 4.11.1

**Release date:** September 1, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

**Bug fixes:**

- When a Bottle or Django app received a request with certain encoded chars in the path, the agent raised a `UnicodeEncodeError`. (PYT-1742)

### Python 4.11.0

**Release date:** August 24, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

**New and improved:**

- Implemented event limit specifications to improve performance.

**Bug fixes:**

- When the agent tried to detect the application framework, it always picked the default one. (PYT-1707)

### Python 4.10.0

**Release date:** July 29, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

**New and improved:**

- Performance improvements from refactoring and other optimizations.

### Python 4.9.1

**Release date:** July 8, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

**Bug fixes:**

- When a framework test was executed in an environment in which the agent was installed, then load ordering between the test code and agent code causes an inability to track some objects. (PYT-1574)

### Python 4.9.0

**Release date:** July 1, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

**New and improved:**

- Remove specific support of the Pylons framework given its merger with the Pyramid framework.
- Expand support of the Flask framework to include the new 2.X major version.

**Bug fixes:**

- When a vulnerability payload is too large, TeamServer cannot process the finding and rejects it. (PYT-1488)

## January - June 2021

### Python 4.8.0

**Release date:** May 21, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

#### New and improved:

- Added support for built-in sanitization and validation in the Falcon 2.X and Pyramid Web Application Frameworks to improve vulnerability detection when Assess is enabled.
- The agent now reports all dependencies used by the application, even those without Python files.
- The agent now supports TRACE level logging to assist with diagnostic investigations.
- The agent has been refactored to provide performance improvement during vulnerability detection and reporting when Assess is enabled.
- The agent now supports MarkupSafe 2.0 as used for cross-site scripting (XSS) vulnerability protection when observing data flow when Assess is enabled.

### Python 4.7.1

**Release date:** April 28, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

#### Bug fixes:

- When customer uploads large file to instrumented falcon route, agent performs too much analysis, causing request to fail to complete. (PYT-1476)

### Python 4.7.0

**Release date:** April 21, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

#### Important note:

- The Python agent now supports the web framework Bottle.

#### New and improved:

- Incremental changes were made to reduce memory usage when Assess is enabled.
- Added Assess support through `pathlib.Path` objects.
- Pycassa library is no longer supported by the agent.
- Added additional Assess support for Command Injection vulnerabilities in `os` and `subprocess` modules.
- Added additional Assess support for `marshal` and `shelve` modules.
- Added additional Assess support for Path Traversal vulnerabilities in `os`, `pathlib`, and `shutil` modules.
- Added `os.path.basename` as sanitizer for Path Traversal.

#### Bug fixes:

- When propagating through string methods with the KEEP action, Assess fails internally on length - 1 return values. (PYT-1466)
- When running Assess on some alpine docker containers, the agent fails to instrument string methods, preventing application startup. (PYT-1450)

### Python 4.6.0

**Release date:** March 25, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

**New and improved:**

- The agent now propagates through `str` multiplication.
- The `PyramidMiddleware` is now a WSGI-based middleware.
- User input that is later encoded as Base64 will now have proper dataflow context.

**Bug fixes:**

- When attempting to instrument strings in Assess, not enough memory is allocated in some environments. (PYT-1350)

### Python 4.5.0

**Release date:** March 16, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

**New and improved:**

- Refactored the patch manager for better instrumentation.
- The agent will now fully shutdown if told to do so by the service.
- Improved agent startup time and memory usage when Assess is enabled.
- The agent now reports its effective instrumentation mode to the service.
- Upgraded bundled service in the agent to the latest version.

**Bug fixes:**

- When casting an object with a `__str__` method to a non-str, the agent would lose propagation through the cast propagator. (PYT-1312)
- When trying to instrument an application using `SQLAlchemy`, an error would be thrown if `MySQLdb` had no attribute called `Cursor`. (PYT-1332)
- When trying to retrieve properties for an object, exceptions could be thrown if the agent attempted retrieval in an unsafe manner. (PYT-1333)

### Python 4.4.0

**Release date:** February 25, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

**New and improved:**

- Refactored the agent's approach for handling objects with attached properties.
- Updated Django support to prevent over tagging of path values within a request.
- Upgraded service version bundled within the agent.
- Updated dataflow action to prevent potentially unsafe propagation of tags.

**Bug fixes:**

- When reporting a vulnerability while using legacy Django middleware, the agent would not run its final tasks if a trigger raises an error. (PYT-1257)
- When trying to track dataflow through an action on a `bytes` object, the agent could fail. (PYT-1281)

### Python 4.3.1

**Release date:** February 5, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

**Bug fixes:**

- When trying to format to lowercase hex, the format propagator would fail. We fixed this edge case. (PYT-1227)

**Python 4.3.0**

**Release date:** January 29, 2021

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

**Important note:**

- Support for Python 2.7 will be deprecated in 2021.

**New and improved:**

- Added support for the Assess ReDoS rule.
- Reduced the calls to retrieving Python loaded modules to improve performance.
- Improved representation of dataflow with events containing keyword arguments.

**Bug fixes:**

- The agent failed to process GET requests when handing user input from requests containing non-UTF-8 strings. Updated string handling to account for this. (PYT-1242)
- When users uploaded files in a Flask application, the amount of resultant dataflow events in internal web framework code caused significant performance degradation. Given the lack of risk for exploitation with this method, we expanded ignored methods for Flask, preventing these events and subsequent degradation. (PYT-1247)

**July - December 2020****Python 4.2.0**

**Release date:** December 17, 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.9

**New and improved:**

- Added support for Python 3.9.
- Agent does not unpack method arguments when passing them into Assess rules.
- Agent now ignores `.so` files from loaded modules when patching.
- Added route coverage support for `DjangoRestFramework` routers.
- Added capability of deadzoning methods to improve accuracy.
- Assess stacktraces can now be configured with `assess.stacktraces`.
- Corrected possible string tracker age off `KeyError` on key deletion.

**Python 4.1.1**

**Release date:** November 20, 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

**Bug fixes:**

- Service and agent were using different environment variable to set the `config.path`. Updated `CONTRAST_CONFIG_PATH` value parsing to look for a file and not a directory with the YAML file. (SUP-2257, PYT-1161)

## Python 4.1.0

**Release date:** November 20, 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

### New and improved:

- Added additional debug logging on request start and finish.
- Improved library analysis support to include parsing `SOURCES.txt`.
- Updated timing of logging of the environment of an application.
- Added logging of configuration values on any logger change.
- Fixed propagation scope leak for generators.

### Bug fixes:

- Agent crashed in a scenario where `free()` could be called twice because of patching by Gevent.. (PYT-1164)

## Python 4.0.0

**Release date:** November 4, 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

### New and improved:

- The agent now reports enhanced library usage on startup and at the end of each request. After a request is received by the agent, we report new files loaded for an installed package.
- The agent will not report unsupported distribution types for packages.
- Updated the heartbeat thread to no longer accidentally propagate and cause an error.

## Python 3.5.1

**Release date:** October 28, 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

### New and improved:

- Added configurable Django Rest Framework (DRF) response-rendering deadzone to fix timeout errors in DRF applications.

## Python 3.5.0

**Release date:** October 23, 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

### New and improved:

- Improved NoSQL Injection support for Assess and Protect.
- NoSQLi now handles MongoDB `ObjectID` types.
- Added `html.escape` as a sanitizer in Assess.
- Added WARN level logging if the configuration required to connect to the Contrast Service is missing.
- Added INFO level configuration state logging, including ENV and YAML values.
- Added YAML validation and, if invalid syntax is detected, WARN level logging indicating such.
- Added INFO level application identification logging
- Removed strict compiler flags from extension build.
- Reduced latency in Django Rest Framework's response handling.
- Investigated excessive `DB_WRITE` propagation.



## Python 3.4.2

**Release date:** October 5, 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

### Bug fixes:

- Failed to repatch module due to `__dict__` changing size while iterating over it. (PYT-1085)

## Python 3.4.1

**Release date:** September 21, 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

### Bug fixes:

- Inability to patch held references to older versions of modules prevents instrumentation of referenced, rather than directly invoked, methods, such as in Werkzeug version 0.16.0.

## Python 3.4.0

**Release date:** September 17, 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

### New and improved:

- Added support for Assess rules:
  - HttpOnly cookie flag disabled
  - Session cookie has no secure flag
  - Overly long session timeout
  - XPath injection rule
  - Trust boundary violation rules in Django, Flask, Pyramid and Pylons
- Removed HTTP request methods as a dataflow source.
- Added support for Assess configurations `assess.enable_scan_response` and `assess.rules.disabled_rules`.

## Python 3.3.3

**Release date:** September 1, 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

### Bug fixes:

- Unable to instrument applications on OSX using locally built Python versions due to maxprot setting. (PYT-1025)

## Python 3.3.2

**Release date:** August 31, 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

### Bug fixes:

- Hardcoded analysis rules were accidentally disabled. (PYT-1027)

## Python 3.3.1

**Release date:** August 25, 2020

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

**Bug fixes:**

- When the agent was disabled, attempting to start without the Contrast service, resulted in application crash in Flask applications. (PYT-1012)

**Python 3.3.0**

**Release date:** August 24, 2020

**Language versions currently supported:** Python 2.7 and 3.5-3.8

**New and improved:**

- Instrument compile as part of the Unsafe Code Execution rule.
- Decouple `ServiceClient` from `SettingsState`
- Use `normalized_response_headers` in DTM instead of `response_headers`.
- Refactored XSS postfilter logic for checking allowed content type.
- Updated MongoDB `update_methods` to account for all arguments.
- Replaced FlowMap Technology Analysis.
- Verified that SR handles empty observed route url.
- Merge all rules `apply_rule` into one implementation.
- Do not report handled exceptions in INFO/ERROR logs
- Upgraded Python agent to use SR 2.11.x.

**Bug fixes:**

- Fix and update regex used for protect XXE rule (PYT-94)
- Fix error in DB write propagator. (PYT-971)
- Agent fails to identify itself with new SR instance after the original SR instance goes down. (PYT-715)

**Python 3.2.2**

**Language versions currently supported:** Python 2.7 and 3.5-3.8

**Bug fixes:**

- List `pip` and `pkg_resources` as dependencies and/or include as external modules. (PYT-974)

**Python 3.2.1**

**Language versions currently supported:** Python 2.7 and 3.5-3.8

**Bug fixes:**

- Do not report observed route if signature is missing/empty. (PYT-970)

**Python - July 2020**

**Language versions currently supported:** Python 2.7 and 3.5-3.8

**Agent versions released during the past month:** 3.0.1, 3.1.0, 3.1.1, 3.1.2, 3.2.0

**New and improved:**

- Added route coverage support for Django 3.0.
- Added [Falcon 2.0 support \(page 315\)](#).
- Improved accuracy of library file usage.
- Improved propagation through regular expressions in Assess.

**Important notes:**

- The team made significant internal cleanup to Request representation

**Bug fixes:**

- Fixed a bug where regex propagation was throwing an exception under certain conditions.
- Fixed a bug related to agent handling of very short JSON keys and values.
- Updated protobuf dependency requirement in response to incompatibility issues with older versions.
- Fixed an issue where the agent raised an internal exception for applications using certain features of pyasn1.
- Fixed a bug where Django applications were unable to properly parse the Content-Type header if a charset was explicitly provided.
- Improved error handling around stack trace construction.

**January - June 2020****Python - June 2020**

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

**Agent versions released during the past month:** 2.10.0

**New and improved:**

- [Falcon 2.0 \(page 315\)](#) is supported and is in beta
- Upgraded Contrast Service to 2.8.1

**Python - May 2020**

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

**Agent versions released during the past month:** 2.10.0

**New and improved:**

- Added support for Django Rest Framework
- Added copyright to all agent files
- Removed the agent's external dependency on the wrapt package
- Improved INFO level logging for easier tracking of applications with multiple processes

**Bug fixes:**

- When running the agent with protobuf-3.6.1 sometimes the application crashed, which has now been resolved with a newer protobuf version.

**Python - April 2020**

**Language versions currently supported:** Python 2.7 and 3.5 - 3.8

**Agent versions released during the past month:** 2.8.1, 2.8.2, 2.8.3, 2.9.0

**New and improved:**

- Added initial support for Stored XSS rule in Assess for `django` framework.
- Added Unvalidated Redirect support for Assess for `pyramid` and `webob` objects.
- Made updates to reduce number of false positives from Reflected XSS rule in Assess.
- Removed the agent's external dependency on the `six` package.

**Bug fixes:**

- When running the agent under Python 2.7 on Ubuntu 16.10 some instrumentation failed to apply, which has now been resolved.

- When applications used `str.format` in certain edge cases, the agent lost dataflow propagation, which has now been resolved.

## Ruby agent release notes

At this time, the agent release notes are only available in [English](#).

### Ruby 7.1.0

**Release date:** April 13, 2023

**Language versions currently supported:** 3.0 - 3.2

#### New and improved:

- Added custom internal parsing in order to support non-standard JSON gem installs version 1.8+.
- All sources of configuration are now included in the configuration report.
- Improved logging with exceptions and exception reporting.

### Ruby 7.0.0

**Release date:** April 3, 2023

**Language versions currently supported:** 3.0 - 3.2

#### New and improved:

- Ruby 2.7 EOL as of March 31, 2023, with agent version 6.15.3. Updated [supported technologies \(page 345\)](#).
- Added warning for applications instrumented with Contrast when the application starts in a version of Ruby less than 3.0.0.
- Implemented Sorbet for static and runtime checks.
- Upgraded `Vulneruby_Engine` push images script.

### Ruby 6.15.3

**Release date:** March 8, 2023

**Language versions currently supported:** 2.7 - 3.1

#### Bug fixes:

- When calculating finding uniqueness, URI is used even when a route signature is available. (RUBY-2025)

### Ruby 6.15.2

**Release date:** February 22, 2023

**Language versions currently supported:** 2.7 - 3.1

#### Bug fixes:

- When running the rake task with the agent disabled and no configuration, a *stack level too deep* error occurs cycling between Agent's worker threads' connection initialization and telemetry logger. (RUBY-2027)

### Ruby 6.15.1

**Release date:** February 22, 2023

**Language versions currently supported:** 2.7 - 3.1

## No updates

### Ruby 6.15.0

**Release date:** February 16, 2023

**Language versions currently supported:** 2.7 - 3.1

#### New and improved:

- Cleaned the Protect rules by merging `Contrast::Agent::Protect::Rule::BaseService` with `Contrast::Agent::Protect::Rule::Base` class.
- Updated `contrast-agent-lib` to v.1.1.1.

### Ruby 6.14.0

**Release date:** January 27, 2023

**Language versions currently supported:** 2.7 - 3.1

#### New and improved:

- Autogenerate new stencil config file on agent's gem install.

### Ruby 6.13.0

**Release date:** January 20, 2023

**Language versions currently supported:** 2.7 - 3.1

#### New and improved:

- Added Ruby 3.2.0 Support.
- When Regexp timeout is set and Redos is enabled, then the agent checks the timeout set and warns if timeout is infinity.
- Updated AgentLib project Gemspec to support any version of Ruby below 3.3.0.

### Ruby 6.12.0

**Release date:** January 11, 2023

**Language versions currently supported:** 2.7 - 3.1

#### New and improved:

- Updated connection diagnostic to new specifications.
- Refactored `Contrast::Api::Communication::ConnectionStatus` and `Telemetry`.
- Added input exclusions to Protect.

#### Bug fixes:

- When setting `CONTRAST__SERVER__NAME` environment variable, the application crashes. (RUBY-2014)
- When error handling occurs in `to_controlled_hash`, required data is missing. (RUBY-1992)
- When recording the last time settings were updated, the agent conflates Server update time with Application update time. (RUBY-1999)
- When Rails/ActiveSupportAliases settings are used, a lack of warning from Rubocop is in place. (RUBY-2007)

### Ruby 6.11.0

**Release date:** November 9, 2022

**Language versions currently supported:** 2.7 - 3.1

**Bug fixes:**

- When sending observed routes with empty signature or URL, TS auth error occurs. (RUBY-1983)

## **Ruby 6.10.0**

**Release date:** November 2, 2022

**Language versions currently supported:** 2.7 - 3.1

**New and improved:**

- Updated protect security analysis to honor log levels set by the user in the Contrast web interface.
- When the application starts, then the Agent will begin polling Contrast for `ServerFeatures`.
- When an event is being reported to TeamServer, then that data is validated before being sent.
- Expanded NoSQLI triggers when `Mongo::Collection` is used.

**Bug fixes:**

- Fixed Telemetry Sentry error where it was unable to connect to Contrast. (RUBY-1846)

## **Ruby 6.9.0**

**Release date:** October 7, 2022

**Language versions currently supported:** 2.7 - 3.1

**New and improved:**

- Improved report deduplication to improve performance.
- Tune reporting to improve performance.

## **Ruby 6.8.0**

**Release date:** September 12, 2022

**Language versions currently supported:** 2.7 - 3.1

**New and improved:**

- Removed the Protobuf dependency.
- Enhanced reporting capabilities for routes, libraries, and applications.
- Enhanced and updated Protect rules.

## **Ruby 6.7.0**

**Release date:** August 31, 2022

**Language versions currently supported:** 2.7 - 3.1

**New and improved:**

- Enabled URL and Input (Assess) exclusions.

**Bug fixes:**

- Instrumented applications no longer return 502. (RUBY-1775)

## **Ruby 6.6.5**

**Release date:** August 4, 2022

**Language versions currently supported:** 2.7 - 3.1

**Bug fixes:**

- When attempting to read custom configuration, some attributes are unable to be set. (RUBY-1785)

## **Ruby 6.6.4**

**Release date:** July 21, 2022

**Language versions currently supported:** 2.7 - 3.1

**New and improved:**

- Update internal URL parsing to be more compatible with third-party APM monitoring of outbound connections to Contrast web interface.

## **Ruby 6.6.3**

**Release date:** July 19, 2022

**Language versions currently supported:** 2.7 - 3.1

**Bug fixes:**

- When reading database configuration objects such as `ActiveRecord::DatabaseConfigurations::HashConfig`, the agent may be unable to properly parse connection settings.

## **Ruby 6.6.2**

**Release date:** July 15, 2022

**Language versions currently supported:** 2.7 - 3.1

**Bug fixes:**

- When parsing a SQL statement in MySQL, the Agent may incorrectly identify a boundary overrun resulting in an improper attack evaluation. (RUBY-1770)

## **Ruby 6.6.1**

**Release date:** July 14, 2022

**Language versions currently supported:** 2.7 - 3.1

**Bug fixes:**

- When running in trace mode, a dynamically generated method wrapper may conflict with other middleware. (RUBY-1760)

## **Ruby 6.6.0**

**Release date:** July 13, 2022

**Language versions currently supported:** 2.7 - 3.1

**Bug fixes:**

- When redirecting through OmniAuth, the Agent incorrectly reports a security vulnerability. (RUBY-1758)

## **Ruby 6.5.1**

**Release date:** July 1, 2022

**Language versions currently supported:** 2.7 - 3.1

**Bug fixes:**

- When `ActiveRecord::StatementCache::BindMap#execute` is used, the agent incorrectly flags the query executed as unsafe.

## Archive

### January - June 2022

#### Ruby 6.5.0

**Release date:** June 29, 2022

**Language versions currently supported:** 2.7 - 3.1

**New and improved:**

- Update to our internal policies and corresponding policy tests.
- Performance improvements from bug fixes: Ruby-1740, Ruby-1742.

**Bug fixes:**

- When we try to extract routes from `ActionDispatch::Routing::RouteSet::Dispatcher`, an exception that may cause CPU spikes or server outages occurs. (RUBY-1737)
- When `contrast_post_patch` was being called twice during applying patches, it caused performance issues and other various bugs. (Ruby-1740)
- When calling `to_sym` on a string, the propagation breaks. (Ruby-1741)
- When evaluating Assess rule violation, sometimes multiple events were created. (Ruby-1742)
- When the Ruby Agent has large memory usage, it crashes since `PROPERTIES_HASH` is not getting cleaned up. (Ruby-1747)

#### Ruby 6.4.0

**Release date:** June 9, 2022

**Language versions currently supported:** 2.7 - 3.1

**Bug fixes:**

- When added to an application with `google-protobuf`, a namespace collision prevents installation. (RUBY-1736)

#### Ruby 6.3.0

**Release date:** June 6, 2022

**Language versions currently supported:** 2.7 - 3.1

#### Ruby 6.2.0

**Release date:** May 27, 2022

**Language versions currently supported:** 2.7 - 3.1

**New and improved:**

- Telemetry exceptions - production issues from live customer environments will be reported to our servers to help remediate bugs.
- New diagnostic executable to help troubleshoot settings, connectivity, and configuration lookup.

**Bug fixes:**



- When multiple exceptions are queued for reporting, translating them to JSON may cause the agent to bloat application memory usage. (RUBY-1698)
- When body of type `Rack::Files` or `Rack::Files::Iterator` is passed, the agent is not able to handle that body type and throws an error. (RUBY-1710)

### Ruby 6.1.2

**Release date:** May 12, 2022

**Language versions currently supported:** 2.7 - 3.1

#### Bug fixes:

- When given a non-standard database connection string, the agent raises a handled exception during parsing. (Ruby-1697)

### Ruby 6.1.1

**Release date:** May 12, 2022

**Language versions currently supported:** 2.7 - 3.1

#### Bug fixes:

- When creating a stack trace for telemetry reporting, the agent pushes a potentially uninitialized instance variable. (Ruby-1694)

### Ruby 6.1.0

**Release date:** May 5, 2022

**Language versions currently supported:** 2.7 - 3.1

#### Bug fixes:

- When the Contrast Service is not running, the agent queues up messages to send infinitely, creating a memory leak. (RUBY-1667)

### Ruby 6.0.0

**Release date:** April 4, 2022

**Language versions currently supported:** 2.7 - 3.1

#### New and improved:

- Added support for Ruby 3.1.
- Removed support for Ruby 2.6.

#### Bug fixes:

- When reporting Stored XSS findings, the agent is omitting the database table and column of origin (Ruby-1548)

### Ruby 5.3.0

**Release date:** March 3, 2022

**Language versions currently supported:** 2.6 - 3.0

#### Bug fixes:

- When running in an environment without Rails, the agent may cause a require error. (RUBY-1551)

## Ruby 5.2.0

**Release date:** February 28, 2022

**Language versions currently supported:** 2.6 - 3.0

### Bug fixes:

- When another dependency overrides the `Kernel#exec` method with a `prepend`, then the agent can cause an infinite loop. (RUBY-1246)

## Ruby 5.1.0

**Release date:** January 24, 2022

**Language versions currently supported:** 2.6 - 3.0

### Bug fixes:

- When the agent is installed in an environment running `rspec-rails` on a Ruby version less than 3.0.0, a collision with `ActiveSupport::Concern#included` method. (Ruby-1500)

## Ruby 5.0.0

**Release date:** January 6, 2022

**Language versions currently supported:** 2.6 - 3.0



### NOTE

Ruby 2.5 is no longer supported after the Ruby agent 4.14.1.

## July - December 2021

### Ruby 4.14.1

**Release date:** December 20, 2021

**Language versions currently supported:** 2.5 - 3.0



### NOTE

Ruby 2.5 is no longer supported after the Ruby agent 4.14.1.

### Ruby 4.14.0

**Release date:** December 7, 2021

**Language versions currently supported:** 2.5 - 3.0

### Ruby 4.13.1

**Release date:** November 19, 2021

**Language versions currently supported:** 2.5 - 3.0

**Bug fixes:**

- When attempting to write to the filesystem, if the directory is inaccessible, then an uncaught exception may cause a crash. (RUBY-1420)

**Ruby 4.13.0**

**Release date:** November 11, 2021

**Language versions currently supported:** 2.5 - 3.0

**New and improved:**

- Support for Puma web server.
- Support for Thin web server.
- [Telemetry \(page 395\)](#) is now enabled in the Ruby agent in order to gather valuable data about the agent's functionality. The data is all anonymous, no personal information is collected.

**Ruby 4.12.0**

**Release date:** October 14, 2021

**Language versions currently supported:** 2.5 - 3.0

**Bug fixes:**

- When a fork is called in a Rails application that has hooked ActiveSupport::ForkTracker, it conflicts between aliasing and prepending result in `no superclass method \fork'`, causing the rails application to fail during agent start-up. (RUBY-1352)
- When looking up cached strings prior to Ruby 2.7, cache collisions could cause the wrong representation to be reported. (RUBY-1325)

**Ruby 4.11.0**

**Release date:** September 23, 2021

**Language versions currently supported:** 2.5 - 3.0

**Bug fixes:**

- When determining if a closed stream should be copied, an IOError is raised. (RUBY-1318)
- When the agent logs patching a class extending ActiveRecord model with `has_and_belongs_to_many` before `c` is determined, then `table_name` is permanently set to `'`'. (RUBY-1322)

**Ruby 4.10.0**

**Release date:** August 26, 2021

**Language versions currently supported:** 2.5 - 3.0

**New and improved:**

- Improved agent performance, reducing impact to instrumented application.
- Support for Grape application framework.

**Ruby 4.9.1**

**Release date:** July 15, 2021

**Language versions currently supported:** 2.5 - 3.0

**Bug fixes:**

- When a Rake task was executed for an application instrumented with Contrast, an erroneous include prevented the loading of Contrast tasks. (RUBY-1247)

## January - June 2021

### Ruby 4.9.0

**Release date:** June 24, 2021

**Language versions currently supported:** 2.5 - 3.0

#### New and improved:

- Improved runtime performance and round-trip time by optimizing dynamic components.

### Ruby 4.8.0

**Release date:** May 20, 2021

**Language versions currently supported:** 2.5 - 3.0

#### New and improved:

- Added support for built-in sanitization and validation in the Rails and Sinatra Web Application Frameworks to improve vulnerability detection when Assess is enabled.

### Ruby 4.7.0

**Release date:** May 10, 2021

**Language versions currently supported:** 2.5 - 3.0

#### Bug Fixes:

- When a user tries to install the agent in an application requiring Parser 3.0 or later, then a dependency conflict prevents installation. (RUBY-1195)

### Ruby 4.6.0

**Release date:** April 22, 2021

**Language versions currently supported:** 2.5 - 3.0

#### New and improved:

- Various updates are included in this release to improve memory usage and all around performance when Assess is enabled.

### Ruby 4.5.0

**Release date:** March 25, 2021

**Language versions currently supported:** 2.5 - 2.7

#### New and improved:

- The agent now has improved stacktrace reporting.
- Added `[] = Hash Equals` key tracking for Ruby 3.0.
- The Ruby Agent now reports its effective instrumentation mode.
- The agent will now ignore methods for `ActionDispatch::Http::URL`.
- Updated patching for `:+` patching in Ruby 3.0.
- Updated copyright to 2021.

#### Bug fixes:

- When reading overrides for the mode of individual Protect rules from local configuration, a translation error prevented rules from enabling Blocking mode. (RUBY-1134)

### Ruby 4.4.1

**Release date:** March 10, 2021

**Language versions currently supported:** 2.5 - 2.7

#### Bug fixes:

- When trying to startup a Rails application, an exception is thrown in `ActionController::Railties::Helper::ClassMethods` if it is missing the inherited method. (RUBY-1127)

### Ruby 4.4.0

**Release date:** February 25, 2021

**Language versions currently supported:** 2.5 - 2.7

#### New and improved:

- The agent now determines Sinatra routes from `Middleware#call` instead of `Sinatra::Base`.

#### Bug fixes:

- When the ReDos Assess rule is disabled, the vulnerability could still be reported. (RUBY-1113)

### Ruby 4.3.2

**Release date:** February 12, 2021

**Language versions currently supported:** 2.5 - 2.7

#### New and improved:

- Upgraded the service for latest updates.

### Ruby 4.3.1

**Release date:** February 5, 2021

**Language versions currently supported:** 2.5 - 2.7

#### Bug fixes:

- When rendering a template with `ActionView`, a patched method would cause issues in the rendering process. We removed this patching to solve this issue. (RUBY-1102)

### Ruby 4.3.0

**Release date:** January 29, 2021

**Language versions currently supported:** 2.5 - 2.7

#### Important note:

- Support for Ruby 2.5 will be deprecated in April 2021.

#### New and improved:

- Modified `String#split` Assess dataflow analysis to improve performance of String tracking operations.
- Added the ability to configure capturing Assess stack traces with `assess.stacktraces`.

- The agent now does library discovery in a background thread to improve startup performance.
- Modified dataflow tracking in Assess to short circuit sooner, avoiding the need to create intermediate objects when processing non-user input data.
- The agent now ignores certain methods for dataflow in Rails to improve performance.

**Bug fixes:**

- When a dataflow event occurs, a memory leak happens when we track data. We fixed the duplicated key stop the leak. (RUBY-1081)

**July - December 2020****Ruby 4.2.0**

**Release date:** December 18, 2020

**Language versions currently supported:** 2.5 - 2.7

**New and improved:**

- Improved `array.rb` tracking performance when Assess is enabled.
- Improved application context tracking performance when Assess is enabled.

**Ruby 4.1.0**

**Release date:** November 20, 2020

**Language versions currently supported:** 2.5 - 2.7

**New and improved:**

- Improved stability and accuracy of Assess and Protect rules

**Ruby 4.0.0**

**Release date:** November 5, 2020

**Language versions currently supported:** 2.5 - 2.7

**New and improved:**

- Added Assess propagation and tracking for `MatchData#string`.
- The agent now reports enhanced library usage on startup and at the end of each request. After a request is received by the agent, we report new files loaded for an installed package.
- Added configuration to disable library analysis.
- Improved performance of scanning based rules like Hardcoded Key/Password.

**Ruby 3.16.0**

**Release date:** October 23, 2020

**Language versions currently supported:** 2.5 - 2.7

**New and improved:**

- Added WARN level logging if the configuration required to connect to the Contrast service is missing.
- Added INFO level application identification logging.
- Improved agent detection of hardcoded password/cryptographic key for non-literal hardcoded values.

**Ruby 3.15.0**

**Release date:** September 17, 2020

**Language versions currently supported:** 2.5 - 2.7

**New and improved:**

- Added support for Unicorn 4 and 5.
- Improved Object tracking to account for frozen Objects.
- Improved gemspec filtering to prevent precompiled files from being packaged in the gem.
- Added warning if common config YAML contains invalid syntax when parsing.
- Agent now logs full configuration state including ENV and YAML values.

**Ruby 3.14.0**

**Release date:** August 24, 2020

**Language versions currently supported:** 2.5 - 2.7

**New and improved:**

- Added logging for request start.
- Added logging for request end.
- Updated Unsafe File Upload detection to correctly handle auto-generated `Rack::Multipart::tempfile`.
- Added support for Rails engine routes for route coverage.
- Removed the `Kernel#require` tracker.
- Refactored dataflow tracing to function along side of, rather than directly on, String instances, reducing pollution of existing name and method spaces.
- Updated RuboCop compliance.

**Ruby 3.13.2**

**Release date:** July 29, 2020

**Language versions currently supported:** 2.5 - 2.7

**Bug fixes:**

- False positive in our usage of `rack.session` cookie in Sinatra applications (RUBY-959)

**Ruby 3.13.1**

**Release date:** July 24, 2020

**Language versions currently supported:** 2.5 - 2.7

**New and improved:**

- Updated Speedracer version to `2.9.5/20200723-1734.d8d4139` (RUBY-957)

**Ruby - July 2020**

**Language versions currently supported:** 2.5-2.7

**Agent versions released during the past month:** 3.12.1, 3.12.2, 3.13.0

**New and improved:**

- Replaced `google-protobuf` with `protobuf`.
- Improved logging to include `Thread Id` as well as `Process Id`.
- Removed custom `Contrast::InternalException` in favor of common exception types to improve error handling.

**Important notes:**

- The change of dependency from google-protobuf to protobuf, removes the need to execute the `bundle config force_ruby_platform true` command before installation.
- In 2020, the [cucumber](#) project forked protobuf for their own use in a way that is incompatible with the main branch. As such, you cannot run any project using [cucumber-messages](#) above version 8.0.0 as it depends on the incompatible [protobuf-cucumber](#).

**Bug fixes:**

- Improved handling of logging to unwritable destinations.
- Improved handling of propagation to children of the String class.
- Improved handling of propagation through Regular Expression where the result of a match is `nil`.

**January - June 2020****Ruby - June 2020**

**Language versions currently supported:** 2.5-2.7

**Agent versions released during the past month:** 3.12.0

**New and improved:**

- Caching of settings to improve performance and reduce memory impact

**Important notes:**

- Deprecation of CSRF Assess and Protect rules

**Ruby - May 2020**

**Language versions currently supported:** 2.5 - 2.7

**Agent versions released during the past month:** 3.10.1, 3.10.2, 3.11.0

**New and improved:**

- Improved Stack Trace capturing
- Improved library analysis performance leading to a decrease in first request penalty

**Important notes:**

- The Agent now supports TRACE level logging. Those running with DEBUG logging should see a significant decrease in logged events

**Ruby - April 2020**

**Language versions currently supported:** 2.4 - 2.7

**Agent versions released during the past month:** 3.8.1, 3.8.2, 3.8.3, 3.8.4, 3.8.5, 3.9.0

**New and improved:**

- Enhanced module definition detection using TracePoint

**Important notes:**

- This will be the last on-premises release bundled with a gem that supports Ruby 2.4.
- It is recommended to use RubyGems at this point.

## Go agent release notes

At this time, the agent release notes are only available in English.



## Go 4.2.0

**Release date:** November 14, 2022

**Language versions currently supported:** Go: 1.18, 1.19

### New and improved:

- Added support for Chi framework

## Go 4.1.0

**Release date:** October 25, 2022

**Language versions currently supported:** Go: 1.18, 1.19

### New and improved:

- Added route discovery and observation for the julienschmidt/httprouter routing library.

### Bug fixes:

- Fixed a configuration options merge issue that unintentionally disabled Assess under some conditions. (GO-1567)
- Updated routes deduplication algorithm. (GO-1528)

## Go 2.3.0

**Release date:** January 11, 2022

**Language versions currently supported:** Go: 1.16, 1.17

### New and improved:

- Use main package path as default application name.

### Bug fixes:

- Minor bug fixes and improvements.

## Go 4.0.0

**Release date:** October 12, 2022

**Language versions currently supported:** Go: 1.18, 1.19

### New and improved:

- Go Agent 4.0 uses direct communication with the Contrast web interface. The dependency on Contrast service is removed from the agent and the option to use Contrast service for communication is no longer supported.
- gRPC support is out of preview status and is now generally available.
- Added support for go1.19 language features.
- Improved accuracy of gRPC message tracking.

### Bug fixes:

- Fixed swagger route discovery failure.

## Go 3.6.0

**Release date:** September 8, 2022

**Language versions currently supported:** Go: 1.17, 1.18

**New and improved:**

- Reduced instrumentation overhead and improved agent performance.
- Improved accuracy of gRPC message tracking.

### **Go 3.5.0**

**Release date:** August 26, 2022

**Language versions currently supported:** Go: 1.17, 1.18

**New and improved:**

- Added X-Powered-By-Set Assess response analysis

**Bug fixes:**

- Agent failed to start in case of config option misconfiguration (GO-1497)
- Fixed a race condition in concurrent map access that might result in a crash (GO-1467)

### **Go 3.4.0**

**Release date:** August 19, 2022

**Language versions currently supported:** Go: 1.17, 1.18

**New and improved:**

- Log diagnostic data to JSON file at agent startup
- Fixed logs inconsistency in cached build logs
- Added process ID to the log entires

### **Go 3.3.0**

**Release date:** August 5, 2022

**Language versions currently supported:** Go: 1.17, 1.18

**Bug fixes:**

- Fixed a crash condition that occurred when all required fields were missing from the configuration (GO-1446)
- Improved code instrumentation when encountering shadowed type names (GO-1472)

### **Go 3.2.0**

**Release date:** August 2, 2022

**Language versions currently supported:** Go: 1.17, 1.18

**Bug fixes:**

- `contrast-go` build failed in 1.18 modules when `any` is redeclared. (GO-1464)

### **Go 3.1.0**

**Release date:** July 28, 2022

**Language versions currently supported:** Go: 1.17, 1.18

**Bug fixes:**

- Agent only reported routes for one service in gRPC apps with multiple services. (GO-1465)
- Agent caused a memory leak in certain scenarios where an instrumented application spawns a long-running `goroutine`. (GO-1461)

## Go 3.0.0

**Release date:** July 7, 2022

**Language versions currently supported:** Go: 1.17, 1.18



### WARNING

- The Go agent now defaults to communicating directly with Contrast, rather than indirectly through the Contrast service.
  - This change will break environments where an instrumented app is running in a separate network than the Contrast service and the instrumented app is not configured to communicate with Contrast.
 

We encourage users to update the instrumented app's network to allow direct communication, and to remove the Contrast service. Alternately, you may choose to continue to use the Contrast service by setting `agent.service.bypass=false` in YAML configuration or setting `CONTRAST_AGENT_SERVICE_BYPASS=false` as an environment variable.
- The `contrast-go` rewriter and Go agent no longer support `go1.16`
  - Users should update to the latest version of `go1.17` or `go1.18`, or continue to use `contrast-go v2.8.0` if they choose to stay on `go1.16`

### New and improved:

- The Go agent now supports log rotation. Log rotation can be configured using the following options:

```
agent:
  logger:
    rotate:
      enable: true # defaults to false
      max_size_mb: 10 # defaults to 1. sets the maximum size of an individual log file
      backup_count: 3 # defaults 10. sets the number of backup files to retain
      compress: false # defaults to false. enables compression of rotated files
```

It can also be configured through environment variables. Backups are stored in `agent.logger.path` with a timestamp appended to the base of the filename.

- The Go agent now drops route observations reports under high load to improve application request throughput.
- The Go agent short circuits more instrumentation when disabled, resulting in lower memory usage.

## January - June 2022

### Go 2.8.0

**Release date:** June 9, 2022

**Language versions currently supported:** Go: 1.16, 1.17, 1.18

### New and improved:

- Improvements to vulnerability rendering.
- Log messages now use a user-friendly time format rather than Unix epochs.

**Bug fixes:**

- Agent now correctly reports routes discovered for applications written with the go-swagger framework (GO-1377).
- Agent now correctly reports library usage data for applications written with the Gin framework (GO-1292).

**Go 2.7.0**

**Release date:** April 25, 2022

**Language versions currently supported:** Go: 1.16, 1.17, 1.18

**New and improved:**

- Support for Go 1.18.

**Bug fixes:**

- Various minor fixes.

**Go 2.6.1**

**Release date:** April 14, 2022

**Language versions currently supported:** Go: 1.16, 1.17

**New and improved:****Bug fixes:**

- Update to include Go security fixes in Golang release 1.17.9.

**Go 2.6.0**

**Release date:** April 14, 2022

**Language versions currently supported:** Go: 1.16, 1.17

**New and improved:**

- Support for `go-swagger` APIs.
- Route discovery and observation for gRPC APIs written with `google.golang.org/grpc`.

**Bug fixes:**

- gRPC trace titles are now reported more uniquely for different inputs. (GO-1272)

**Go 2.5.0**

**Release date:** March 25, 2022

**Language versions currently supported:** Go: 1.16, 1.17

**New and improved:**

- The agent now supports vulnerability detection for gRPC APIs written with the `google.golang.org/grpc` module. The functionality is enabled via the following configuration settings:

```
agent :  
  go :
```

```
preview:
  grpc: true
service:
  bypass: true
```

Alternately, the same feature can be enabled using environment variables:

```
CONTRAST__AGENT__GO__PREVIEW__GRPC=true
CONTRAST__AGENT__SERVICE__BYPASS=true
```

### Bug fixes:

- The agent now correctly reports server tags when bypassing the service. (GO-1256)
- The agent now reports unvalidated redirects under the appropriate vulnerability category. (GO-1265)
- `contrast-go` now correctly accepts build flags with double dashes. (GO-1258)

## Go 2.4.0

**Release date:** March 7, 2022

**Language versions currently supported:** Go: 1.16, 1.17

### New and improved:

- Go agent users can now configure the agent to report directly to Contrast, removing the need to install `contrast-service`, by using the `bypass` setting in their `contrast_security.yaml` file:

```
agent:
  service:
    bypass: true
```

Alternately, the same feature can be enabled using an environment variable:

```
CONTRAST__AGENT__SERVICE__BYPASS=true
```

### Bug fixes:

- When running the agent with `contrast-go run main.go`, the application name was reported as 'command-line-arguments'. It now reports the correct package name when possible. (GO-1188)
- Exercised routes erroneously appeared as new routes due to a mismatch in how trailing slashes were interpreted by discovered vs exercised routes. Exercised routes now handle trailing slashes identically to discovered routes. (GO-1210)

## May - December 2021

### Go 2.2.0

**Release date:** December 9, 2021

**Language versions currently supported:** Go: 1.16, 1.17

### New and improved:

- Support for `bufio` buffered I/O.

### Bug fixes:

- Distributing bullseye package for Debian. (GO-1141)
- Report path traversal vulnerability for `os.Rename` with user controlled new file name. (GO-1078)
- Fix `fmt` handling of complex types. (GO-1146)

- Tracking no longer fails when reading directly from a request body to a []byte. (GO-1147)
- Fixed a false negative caused by merging multiple vulnerabilities discovered on the same route. (GO-1149)

### Go 2.1.0

**Release date:** November 17, 2021

**Language versions currently supported:** Go: 1.16, 1.17

#### New and improved:

- Support for the [Gin](#) web framework.

#### Bug fixes:

- The `io/fs.Open` function now correctly triggers the path traversal finding. (GO-1072)
- `contrast-go run` now supports running programs that take arguments. (GO-1016)

### Go 2.0.0

**Release date:** October 18, 2021

**Language versions currently supported:** Go: 1.16, 1.17

#### Bug fixes:

- When calling `bufio/bytes` methods on interfaces instead of concrete types, the agent won't propagate. (GO-1019)
- When custom types are printed to a `http.ResponseWriter`, they aren't analyzed for XSS (False Negative). (GO-1053)



#### WARNING

This release will no longer support GoLang version 1.15.

### Go 1.12.0

**Release date:** September 28, 2021

**Language versions currently supported:** Go: 1.15, 1.16, 1.17

#### New and improved:

- Golang major language version 1.17 support.

#### Bug fixes:

- When converting from strings to named byte slices or byte slices to named strings, the agent loses data flow. (GO-1005)

### Go 1.11.0

**Release date:** September 22, 2021

**Language versions currently supported:** Go: 1.15, 1.16

#### Bug fixes:

- When an application nests `http.Handlers`, the agent reports route observation and responses multiple times. (GO-999)
- When triggering dataflow rules, sink events do not correctly set up parent history. (GO-1027)
- When reporting route observation, the request pointer changes which breaks assess sources. (GO-1028)

### Go 1.10.0

**Release date:** September 15, 2021

**Language versions currently supported:** Go: 1.15, 1.16

#### **New and improved:**

- Allow for custom `go` commands to be passed through our `contrast-go` executable.

#### **Bug fixes:**

- When reporting sinks with multiple sources, the agent does not correctly attribute which fields/sources triggered the corresponding finding. (Go-950)
- When rewriting a slice operation on a named byte slice type with methods, the build fails. (Go-991)
- When appending data, the agent incorrectly detects if the data is tracked, resulting in no finding when reporting to TeamServer. (Go-993)
- When dataflow events happen concurrently, the runtime panics and crashes the application. (Go-1023)

### Go 1.9.0

**Release date:** September 1, 2021

**Language versions currently supported:** Go: 1.15, 1.16

#### **Bug fixes:**

- When the application starts, the agent spawns ticker routines which continuously leak more tickers. (GO-995)
- When sending enhanced class usage, the agent never releases previous reports and spends unnecessary resources on de-duping. (GO-996)

### Go 1.8.0

**Release date:** August 23, 2021

**Language versions currently supported:** Go: 1.15, 1.16

#### **Bug fixes:**

- When an application calls a pointer method with a value, the rewritten code copies by value not reference, changing the runtime behavior. (GO-989)

### Go 1.7.0

**Release date:** August 17, 2021

**Language versions currently supported:** Go: 1.15, 1.16

#### **New and improved:**

- Improve performance of rewritten code.

#### **Bug fixes:**

- When propagating through bytes `Buffer/Reader.Read`, no propagation event is shown in the finding trace. (GO-993)
- When rewriting go function literals with returns, the rewriter omits the returns and breaks builds. (GO-937)
- When an error occurs during initialization of the logger, the agent shuts itself off. (GO-952)
- When a slice of a tainted byte slice reaches a sink, the sink is not triggered (false negative). (GO-983)

### Go 1.6.0

**Release date:** August 6, 2021

**Language versions currently supported:** Go: 1.15, 1.16

#### **New and improved:**

- Enhanced data flow tracking, which improves agent accuracy.

#### **Bug fixes:**

- When propagating through a circular buffer, the agent caused a stack overflow. (GO-982)

### Go 1.5.0

**Release date:** July 22, 2021

**Language versions currently supported:** Go: 1.15, 1.16

#### **New and improved:**

- When an error occurs during agent initialization, more specific/detailed error messages are logged.

### Go 1.4.0

**Release date:** July 8, 2021

**Language versions currently supported:** Go: 1.15, 1.16

#### **Bug fixes:**

- When using `getTypeName`, the rewriter failed to safely handle errors and did not inject correct packages. (GO-884)
- When comparing types, the rewriter incorrectly compared by pointer rather than by type. (GO-885)

### Go 1.3.0

**Release date:** June 17, 2021

**Language versions currently supported:** Go: 1.15, 1.16

#### **New and improved:**

- Update the rewriter to only emit on exported functions, reducing the performance overhead of the rewriter itself.

#### **Bug fixes:**

- When replacing expressions with `callexprs`, the agent may break addressability, resulting in a failed build. (GO-873)
- When creating caches for rewrite, the reported tool version is not included, resulting in caches that will not be rebuilt despite agent changes. (GO-875)
- When rewriting string slices, shadowed type names do not prevent casts from being injected, resulting in code that will not build. (GO-883)



## Go 1.2.0

**Release date:** June 15, 2021

**Language versions currently supported:** Go: 1.15, 1.16

### New and improved:

- Updated the rewriter functionality of the agent to rely on Go's `toolexec` to allow for the instrumentation of a larger set of Go applications.

### Bug fixes:

## Go 1.1.0

**Release date:** June 14, 2021

**Language versions currently supported:** Go: 1.15, 1.16

### New and improved:

- Add custom SSRF sink for `net/http Client.PostForm`.

### Bug fixes:

## Go 1.0.0

**Release date:** May 28, 2021

**Language versions currently supported:** Go: 1.15, 1.16

### New and improved:

- Added the ability to rewrite Go code including compiler directive comments, such as `//go:embed`, `//go:nosplit` and `//go:noescape` and others.
- OSS and Assess feature support for the Go standard library.

### Bug fixes:

- Update `agent.logger.path` and `agent.logger.level` config settings to those from remote settings. (GO-844)

## PHP agent release notes

At this time, the agent release notes are only available in English.

## PHP 1.12.0

**Release date:** April 17, 2023

**Language versions currently supported:** PHP 7.4, 8.0, 8.1

### New and improved:

- Added Jammy as a Debian distribution package.

## PHP 1.11.0

**Release date:** March 30, 2023

**Language versions currently supported:** PHP 7.4, 8.0, 8.1

### New and improved:

- Detection of Symfony framework and version.
- Added instrumentation for Doctrine when using Symfony.

**Bug fixes:**

- Updated the copyright date for the license file.
- Ensured that group, metadata, and session\_metadata values from the configuration file are properly parsed for automatic application onboarding.

**PHP 1.10.0**

**Release date:** February 17, 2023

**Language versions currently supported:** PHP 7.4, 8.0, 8.1

**New and improved:**

- Added support for Symfony framework.

**PHP 1.9.0**

**Release date:** January 26, 2023

**Language versions currently supported:** PHP 7.4, 8.0, 8.1

**New and improved:**

- Added SCA analysis for custom Drupal modules (not installed via Composer).

**Bug fixes:**

- Fixed a potential crash in the agent when encountering PHP code that consists of a coalesce call and a closure.
- Updated the data provided to TeamServer to ensure that it contains a valid stack trace.
- Eliminated some potential false positive reflected-xss reports from request headers.

**PHP 1.8.0**

**Release date:** November 14, 2022

**Language versions currently supported:** PHP 7.4, 8.0, 8.1

**New and improved:**

- Identify Drupal modules not installed via Composer.
- Added support for PHP 8.0.

**Bug fixes:**

- Use the web server root directory as the working directory when running with PHP-FPM on Red Hat Enterprise. (PHP-679)

**PHP 1.7.0**

**Release date:** September 20, 2022

**Language versions currently supported:** PHP 7.4., 8.1

**New and improved:**

- Initial support for PHP 8.1.

## PHP 1.6.0

**Release date:** August 30, 2022

**Language versions currently supported:** PHP 7.4

**New and improved:**

- Added initial Assess support for Drupal 8 and 9.
- Added SCA support for Drupal 8 and 9 when installing modules using Composer packages.

## PHP 1.5.0

**Release date:** June 28, 2022

**Language versions currently supported:** PHP 7.4

**New and improved:**

- Added support for LDAP injection rules.
- Added support for NoSQL injection rules for MongoDB and Redis.

## PHP 1.4.1

**Release date:** June 13, 2022

**Language versions currently supported:** PHP 7.4

**Bug fixes:**

- Fixes minor issue with route discovery logs.

## PHP 1.4.0

**Release date:** June 06, 2022

**Language versions currently supported:** PHP 7.4

**New and improved:**

- Initial triggers for `redos` rule.
- Provides packages for `arm64/aarch64`.

**Bug fixes:**

- Includes fixes previously released in 1.3.1 and 1.3.2.

## PHP 1.3.2

**Release date:** May 26, 2022

**Language versions currently supported:** PHP 7.4

## PHP 1.3.1

**Release date:** May 25, 2022

**Language versions currently supported:** PHP 7.4

**Bug fixes:**

- Better error handling for request shutdown hook. (PHP-576)

## PHP 1.3.0

**Release date:** May 24, 2022

**Language versions currently supported:** PHP 7.4

**New and improved:**

- Initial support for `nosql-injection` rule: initial support is for the Datastax Cassandra CQL driver for PHP.
- Support for capturing full stack traces and relevant common configuration options.

**Bug fixes:**

- Fixed issue when using relative agent log path. (PHP-540)
- Fixed issue with route discovery when running under `php-fpm`. (PHP-528)

## PHP 1.2.0

**Release date:** May 11, 2022

**Language versions currently supported:** PHP 7.4

**New and improved:**

- Agent is now disabled by default with PHP command-line interface (CLI) in order to prevent accidental analysis of PHP scripts and commands.
- Added diagnostic script `contrast-php-util` to agent package along with experimental commands for enabling/disabling agent to ease onboarding.
- Added support for `reflection-injection` rule.

**Bug fixes:**

- Contains fixes for configuration of Assess and API certificates that were included in previous individual bugfix releases.

## PHP 1.1.2

**Release date:** April 26, 2022

**Language versions currently supported:** PHP 7.4

**New and improved:**

- Add certificate configuration option for Contrast API.

## PHP 1.1.1

**Release date:** April 25, 2022

**Language versions currently supported:** PHP 7.4

**Bug fixes:**

- Agent now defers to Contrast web interface setting for enabling Assess if omitted from configuration. Previously the agent required Assess to be explicitly enabled locally as well.

## PHP 1.1.0

**Release date:** April 21, 2022

**Language versions currently supported:** PHP 7.4

**New and improved:**

- Improvements to trace event rendering in the Contrast web interface.

- Added coverage to `unsafe-code-execution` for `extract` function.

**Bug fixes:**

- Fixed issue with configuration file discovery paths. (PHP-496)
- Fixed issue with `json_decode` propagation. (PHP-482)

**PHP 1.0.0**

**Release date:** April 4, 2022

**Language versions currently supported:** PHP 7.4

**New and improved:**

- Assess and SCA feature support for PHP applications.
- Support for the Laravel framework.