Micro Focus
Fortify Jenkins Plugin

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Installation and Usage Guide

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- Software Version number
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Preface

Contacting Micro Focus Fortify Customer Support

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About the Documentation Set

The Fortify Software documentation set contains installation, user, and deployment guides for all Fortify Software products and components. In addition, you will find technical notes and release notes that describe new features, known issues, and last-minute updates. You can access the latest versions of these documents from the following Micro Focus Product Documentation website:

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Change Log

The following table lists changes made to this document. Revisions to this document are published between software releases only if the changes made affect product functionality.

Software Release / Document Version	Changes
18.20	Updated to describe the new capability that enables you to scan projects with Fortify Static Code Analyzer as part of the build.
18.10	Updated: • Minor edits to incorporate branding changes • "Preparing Fortify Software Security Center to Work with the Fortify Jenkins Plugin" on page 9 - Updated the token type and the instructions for how to create an authentication token
17.20	Updated: • Minor edits Removed: • "Creating a Jenkins Token Type" - This is now provided automatically with Micro Focus Fortify Software Security Center

Fortify Jenkins Plugin

Use the Fortify Jenkins Plugin in your continuous integration builds to identify security issues in your source code with Micro Focus Fortify Static Code Analyzer. After the Fortify Static Code Analyzer analysis is complete, you can optionally upload the results to a Micro Focus Fortify Software Security Center server. This also enables you to view the analysis result details within Jenkins. It also provides metrics for each build and an overview of the results, without the need to log into Fortify Software Security Center.

With the Fortify Jenkins Plugin, you can integrate Fortify Static Code Analyzer with the following build tools:

- Gradle
- Maven
- MSBuild
- Visual Studio (devenv)

You can also scan your source code directly without a build tool.

This document provides instructions on how to prepare Fortify Software Security Center to work with the Fortify Jenkins Plugin, and how to install, configure, and use the plugin.

Software Requirements

The Fortify Jenkins Plugin works with the software packages listed in the following table. Your specific requirements depend on the build tools you are using. This table also provides information to help you prepare for the configuration of your Bamboo plan.

Software	Version	Notes
Jenkins server	2.121.2 or later	
Micro Focus Fortify Static Code Analyzer (Optional)	18.20 or later	To scan your project with Fortify Static Code Analyzer, you must either have the path to the Fortify Static Code Analyzer installation directory or make sure that the PATH environment variable includes the sourceanalyzer executable.

Software	Version	Notes
Micro Focus Fortify Software Security Center (Optional)	18.20 or later	To upload scan results to Fortify Software Security Center, make sure that you have: • The Fortify Software Security Center URL • A Fortify Software Security Center authentication token of type CIToken (see "Preparing Fortify Software Security Center to Work with the Fortify Jenkins Plugin" on page 9)
Maven	3.x	To integrate the scan with Maven, you must install the Fortify Maven plugin, which is available when you install Fortify SCA and Apps. Fortify recommends that you use the same Fortify Maven Plugin version as the Fortify Static Code Analyzer version and that you install the source version of the Fortify Maven Plugin rather than the binary version. You must install the Fortify Maven Plugin for the same user who is running Jenkins. If you use a proxy, then you need to configure proxy settings for the Fortify Maven Plugin. For information, see the Settings Reference at https://maven.apache.org . For more information about build integration

Software	Version	Notes
		with the Fortify Maven Plugin, see the *Micro Focus Fortify Static Code Analyzer User Guide*.
MSBuild	4.x, 12.0, 14.0, 15.0	
Visual Studio (devenv)	2013, 2015, 2017	To scan .NET projects, Fortify recommends that the system have a full installation of Visual Studio and the Fortify Visual Studio Extension for your specific version of Visual Studio.

Installing the Fortify Jenkins Plugin

To install the Fortify Jenkins Plugin, you must have Jenkins installed on your system. See the *Micro Focus Fortify Software System Requirements* document for the supported Jenkins versions.

Note: These instructions describe a third-party product and might not match the specific, supported version you are using. See your product documentation for the instructions for your version.

To install the Fortify Jenkins Plugin:

1. From Jenkins, select **Manage Jenkins > Manage Plugins**.
2. On the **Plugin Manager** page, click the **Advanced** tab.
3. Under **Upload Plugin**, click **Choose File**, and then locate and select `Fortify_Jenkins_Plugin_<version>.hpi`.
4. Click **Upload**.
5. Restart Jenkins.

For more information about how to install Jenkins plugins, see the Jenkins website.

Verifying the Fortify Jenkins Plugin Installation

To verify that the Fortify Jenkins Plugin is installed:

1. Open a browser window and navigate to `http://<jenkins_server_url>:8080`.
2. From the Jenkins menu, select **Manage Jenkins > Manage Plugins**.
3. On the **Plugin Manager** page, click the **Installed** tab.
4. Verify that **Fortify Jenkins Plugin** is included in the list of installed plugins.

Preparing Fortify Software Security Center to Work with the Fortify Jenkins Plugin

To upload Fortify Static Code Analyzer results to Fortify Software Security Center or to view Fortify Static Code Analyzer results from Jenkins, you need to have an authentication token of type CIToken created in Fortify Software Security Center. You will use this authentication token to configure the Fortify Jenkins Plugin to communicate with Fortify Software Security Center.

You can generate the authentication token from either the Administration view in Fortify Software Security Center or from the command-line with the fortifyclient utility.

Note: If you generate the token from Fortify Software Security Center, use the decoded token to configure the Fortify Jenkins Plugin.

The following instructions describe how to create the authentication token with the fortifyclient utility. For information about how to create an authentication token from Fortify Software Security Center, see the *Micro Focus Fortify Software Security Center User Guide*.

To create an authentication token of type CIToken using the fortifyclient utility:

1. From the `<ssc_install_dir>/Tools/fortifyclient/bin` directory, run the following:

   ```
   fortifyclient token -gettoken CIToken -url <ssc_url> -user <user_name>
   [-daysToLive <number_of_days>]
   ```

   Note: Find the `Tools` folder in the directory where the Fortify Software Security Center WAR file was extracted.

   where:

   - *<ssc_url>* includes both the port number and the context path `/ssc`. For example, `http://<hostname>>:<port>/ssc`.
   - *<user_name>* is the Fortify Software Security Center username of an account that has the required privileges to read or write information from or to Fortify Software Security Center.
   - *<number_of_days>* is the number of days before the token expires. The default is 365.

   You are prompted for a password.
2. Type the password for *<user_name>*.
   The fortifyclient utility displays a token of the general form:
   `cb79c492-0a78-44e3-b26c-65c14df52e86`.
3. Copy the returned token to use when you configure the Fortify Jenkins Plugin (see "Configuring the Fortify Jenkins Plugin" on the next page).

Configuring the Fortify Jenkins Plugin

To configure your Jenkins server so that it can analyze your project, update Fortify security content, and upload results to Fortify Software Security Center using the Fortify Jenkins Plugin:

1. Open a browser window and navigate to `http://<jenkins_server_url>:<port_number>`.
2. From the Jenkins menu, select **Jenkins > Manage Jenkins > Configure System**.
3. To analyze your project with Fortify Static Code Analyzer or to update Fortify security content as part of your build, create an environment variable to specify the location of the Fortify Static Code Analyzer executables. In **Global properties**, create the following environment variable:
   - **Name:** `FORTIFY_HOME`
   - **Value:** `<sca_install_dir>`

     where `<sca_install_dir>` is the path where Fortify Static Code Analyzer is installed. For example, on Windows the default installation location is `C:\Program Files\Fortify\Fortify_SCA_and_Apps_18.20`.

     Note: If the Fortify Jenkins Plugin cannot find the executables (sourceanalyzer and fortifyupdate) using the `FORTIFY_HOME` variable, then it uses the `PATH` environment variable to find them. Fortify recommends that you specify the full path in Jenkins on Unix systems.

     You can also set the environment variable on a per-node basis (**Jenkins > Manage Jenkins > Manage Nodes > *<node_name>***).
4. To upload results to Fortify Software Security Center, scroll down to the **Fortify Assessment** section, and then do the following:
   a. In the **SSC URL** box, type the Fortify Software Security Center server URL.

      The correct format for the Fortify Software Security Center URL is: `http://<host_IP>:<port>/ssc`.
   b. To connect to Fortify Software Security Center with a proxy server, select **Use Proxy for SSC**, and then specify the proxy information.

      Note: Use the following format for the **Proxy server host:port**: `<address>:<port_number>`
   c. In the **Authentication token** box, type the authentication token generated for the Fortify Software Security Center server.

      See "Preparing Fortify Software Security Center to Work with the Fortify Jenkins Plugin" on the previous page.
   d. Click **Advanced settings**, and then click **Test Connection**.

      The Fortify Jenkins Plugin populates the **Issue Template** list with available Fortify Software Security Center issue templates. Fortify Software Security Center uses the selected issue template when it creates new applications.

The issue template optimizes the categorization, summary, and reporting of the application version data.

e. From the **Issue template** list, select the appropriate issue template for your projects.

Note: There is no need to specify a value in the **Issue breakdown page size** box at this time. You can change this setting later. This setting controls the **Issue Breakdown** table view. The default is 50 issues per page.

5. Click **Save**.

Configuring a Build Step to use the Fortify Jenkins Plugin

To configure a build step for your project to use the Fortify Jenkins Plugin:

1. From Jenkins, select an existing job to view or create a new job.

   The Fortify Jenkins Plugin supports Freestyle and Multi-configuration projects.

   If you selected an existing job, click **Configure** on the job page.
2. In the **Post-build Actions** section, click **Add post-build action**, and then select **Fortify Assessment**.
3. In the **Build ID** box, type a unique identifier for the scan.
4. In the **Results file** box, type a name for the Fortify results file (FPR). For example, `MyAudit.fpr`.

   Note: You do not need to specify the `.fpr` file extension.

   Specifying the results file name is optional. If you do not provide a name:

   - If you are running a Fortify SCA scan, the analysis results are written to `scan.fpr` in the workspace.

     Note: If this file already exists, it will be overwritten.

   - If you are not running a Fortify SCA scan and you are uploading results to Fortify Software Security Center, Fortify Jenkins Plugin searches "./**/*.fpr" in the workspace for the FPR file with the latest modified date.
5. (Optional) In the **Maximum heap memory** box, specify the maximum heap memory as an integer only.

   For example, to specify 48 GB, type `48000`. By default, Fortify Static Code Analyzer enables automatic allocation of memory based on the physical memory available on the system. If you specify an amount of memory in this field, it overrides the default automatic memory allocation.
6. (Optional) In the **Additional JVM options** box, you can add additional JVM commands.
7. To download Fortify security content before the scan, select the **Update Fortify Security Content** check box, and specify the following:
   a. In the **Update server URL** box, type the URL for the Fortify Rulepack update server.

      The default Fortify Rulepack update server URL is https://update.fortify.com.

b. To connect to the Fortify Rulepack update server with a proxy server, select the **Configure update server proxy** check box, and then specify the proxy information.

8. To remove any temporary files from a previous scan for the specified build ID, select the **Run Fortify SCA Clean** check box.

   Fortify recommends that you run the clean phase before each translation unless, for example, you are translating several projects with the same build ID to perform one scan for all the projects and generate a single FPR file.

9. To run translation, select the **Run Fortify SCA translation** check box, and then specify the translation settings.

   You might want to skip the translation if, for example, the security content has changed but the source code has not. If you do skip the translation, make sure that you do not run a Fortify SCA clean.

   Note: Enclose each option and parameter in double quotes in boxes where you can specify multiple values.

   For example: `"-build-label" "label" "-disable-source-bundling"`

   a. Select whether you want to use the basic or advanced configuration.

      Select **Advanced** if you are familiar with the Fortify Static Code Analyzer command-line interface or you want to specify all the translation options without any guidance. Specify all the Fortify Static Code Analyzer translation options including source files, if needed. See the *Micro Focus Fortify Static Code Analyzer User Guide* for detailed information about the translation options.

      Select **Basic** to be prompted to provide the typical information to scan Java or .NET code or to run a Maven 3, or a Gradle build to perform the translation. The configuration fields dynamically change based on your selection.

      Note: The Fortify Jenkins Plugin uses the PATH environment variable to find the executable for gradle, maven, devenv, and msbuild.

      For each of the basic translation configurations, you can exclude files or directories from the translation by including them in the **Exclude list** box. The following table provides instructions for each application type in the basic configuration.

Application Type	Description
Java	See the *Micro Focus Fortify Static Code Analyzer User Guide* for more detailed information about the Java translation options.
.NET	i. From the **Scan type** list, select whether to perform a project solution or a source code scan. ii. To translate a solution: A. From the **Build type** list, select **devenv** or **MSBuild**. B. In the **Projects** box, type the solution file name (or the path to the solution file).

Application Type	Description
	C. Specify any additional devenv or MSBuild options, based on the build type you are using. iii. To translate source code: A. In the **.NET framework version** box, specify the .NET framework version used to compile the code. B. In the **Libdirs** box, specify a semicolon-separated list of directories where referenced system or third-party DLLs are located. C. In the **Fortify SCA translation options** box, specify any additional Fortify Static Code Analyzer translation options and the source files. See the *Micro Focus Fortify Static Code Analyzer User Guide* for detailed information about the translation options.
Maven 3	i. If you did not run the build previously, then in the **Maven options** box, type `package`. Otherwise, leave this box empty. **Note:** The translation log is located in the /target directory that is created when the "package" runs from Maven. Any log file location specified in the Fortify Jenkins Plugin is ignored when the Fortify Maven Plugin performs the translation.
Gradle	i. To use a Wrapper, select **Use Gradle Wrapper**. ii. In the **Gradle tasks** box, type the Gradle tasks required for your project. iii. In the **Gradle options** box, type the Gradle options required for your project.
Other	This is very similar to the advanced configuration. You must manually provide all the Fortify Static Code Analyzer translation options in the **Fortify SCA translation options** box. Specify the source code to scan in the **Includes list** box.

b. (Optional) Enable the debug or verbose options.

c. (Optional) Specify a custom location for the Fortify Static Code Analyzer log file, specify a file name (or a full path) in the **Log file location** box.

By default, the log file is written to the workspace in `/.fortify/sca<version>/log`.

10. To run a scan, select the **Run Fortify SCA scan** check box, and then specify the scan settings:

a. (Optional) In the **Custom Rulepacks** box, specify custom rules (XML files).

b. (Optional) Specify any additional scan options.

Note: Enclose each option and parameter in double quotes.

In the following example, two analyzers and quick scan mode are enabled for the scan: `"-analyzers" "controlflow,dataflow" "-quick"`.

c. (Optional) Enable the debug or verbose options.

d. (Optional) Specify a custom location for the Fortify Static Code Analyzer log file, specify a file name (or a full path) in the **Log file location** box.

   By default, the log file is written to the workspace in `/.fortify/sca<version>/log`.

11. To upload the scan results to Fortify Software Security Center, select the **Upload Fortify SCA scan results to Fortify Software Security Center** check box, and then specify the upload settings:

    a. (Optional) Specify a filter set to use when reading the FPR. If no value is specified, the Fortify Jenkins Plugin uses the Quick View filter set.

       The fail condition and the Normalized Vulnerability Score (NVS) calculation depend on the issues filtered by the filter set. For example, if a "Critical Exposure" filter is applied to the project issues (and no issues are found), then the fail condition determines that there is no reason to set this build to "unstable" and NVS is set to zero. The graph summary also shows zero.

    b. To trigger a build failure based on scan results, type a search query in the **Build failure criteria** box.

       For example, the following search query causes the build to fail if any critical issues exist in the scan results:

       ```
       [fortify priority order]:critical
       ```

       See the *Micro Focus Fortify Software Security Center User Guide* for a description of the search query syntax.

    c. Specify an **Application name** and **Application version**.

       If you have a successful connection to a Fortify Software Security Center server, you can select an application name and version from the list. Always specify both application name and application version.

       Note: If an application with the specified name and version does not exist on Fortify Software Security Center, Fortify Jenkins Plugin creates it for a successful build.

    d. To specify an amount of time to wait for the upload to Fortify Software Security Center, click **Auto Job Assignment**. The Fortify Jenkins Plugin polls Fortify Software Security Center until the FPR is processed before it runs the NVS calculation.

       The valid values are 0-60.

12. Click **Save**.

Viewing Analysis Results

If you uploaded Micro Focus Fortify Static Code Analyzer results to Micro Focus Fortify Software Security Center, you can view a security vulnerability graph for your project and a summary of the issues from Jenkins.

Security Vulnerability Graph for Your Project

The project page displays a Normalized Vulnerability Score (NVS) graph. NVS is a normalized score that gives you a rough idea of the security vulnerability of your project. The Fortify Jenkins Plugin calculates the NVS with the following formula:

```
NVS = ((CFPO * 10) + (HFPO * 5) + (MFPO * 1) + (LFPO * 0.1)) * 0.5 +
      ((P1 * 2) + (P2 * 4) + (P3 * 16) + (PABOVE *64)) * 0.5
```

where:

- CFPO = Number of critical vulnerabilities (unless audited as Not an Issue)
- HFPO = Number of high vulnerabilities (unless audited as Not an Issue)
- MFPO = Number of medium vulnerabilities (unless audited as Not an Issue)
- LFPO = Number of low vulnerabilities (unless audited as Not an Issue)

and:

- PABOVE = Exploitable
- P3 = Suspicious
- P2 = Bad practice
- P1 = Reliability issue

The total issues count is not very useful. For example, if Application A has 0 critical issues and 10 low issues, the total issue count is 10. If Application B has five critical issues and no low issues, the total issue count is 5. These values might mislead you to think that Application B is better than Application A, when it is not.

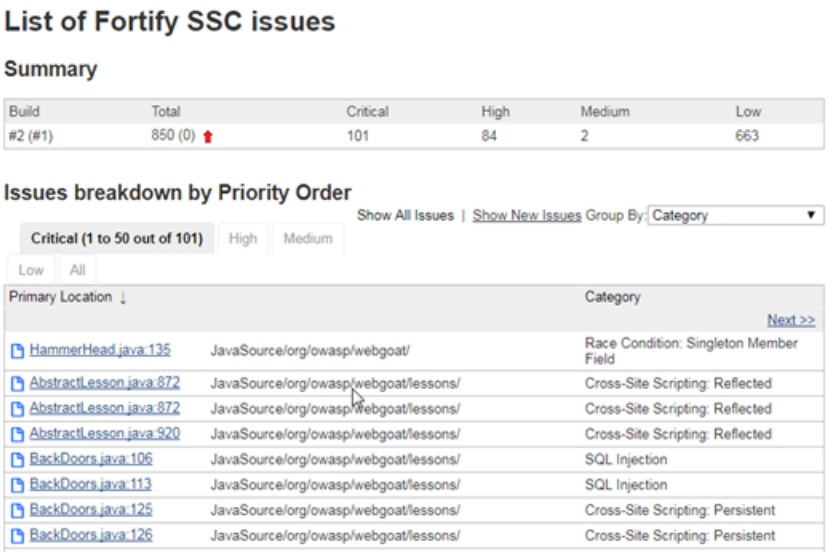
The NVS calculated for the two example applications provides a different picture (simplified equation):

- Application A: NVS = 0*10 + 10*0.1 = 1
- Application B: NVS = 5*10 + 0*0.1 = 50

Viewing Issues

To see the issues for a Fortify Static Code Analyzer analysis that you have uploaded to Micro Focus Fortify Software Security Center, open your project and click **Fortify Assessment** on the left.

The interactive **List of Fortify SSC issues** page displays the **Summary** and **Issue breakdown by Priority Order** tables.



The **Summary** table shows the difference in the number of issues in different categories between the two most recent builds. A blue arrow next to a value indicates that the number in that category has decreased, and a red arrow indicates that the number in that category has increased.

The **Issues breakdown by Priority Order** table shows detailed information about the issues for the specified location and category in each priority folder. Wait for the table to load. If the data load takes too long, you might need to refresh the browser window (F5).

By default, you see the critical issues first. To see all issues, click the **All** tab.

Note: The more issues a page shows, the longer it takes to load. Fortify recommends that you do not use the **All** tab for large projects.

To see only those issues that were introduced in the latest build of your code, click the **Show New Issues** link at the top of the table.

The first and the second columns show the file name and line number of the issue and the full path to this file. The last column displays the category of each vulnerability.

By default, issues are sorted by primary location. To organize them by category, click the **Category** column header.

To see more details about or to audit a specific issue, click the file name in the first column. The link takes you directly to the details for that issue on the Fortify Software Security Center server. If you are not logged in to Fortify Software Security Center, you are prompted to log in.

Configuring the Number of Issues Displayed on a Page

By default, the page displays up to 50 issues. To navigate to all the issues, use **Next>>** and **<<Previous** on the top and bottom of the table. To increase the maximum number of issues displayed to 100 per page, from the **50 | 100 | All** section at the bottom of the page, click **100**.

To control the number of the issues shown on a page from the **Configure System** page:

- In the **Fortify Assessment** section, click **Advanced Settings**, and then change the value in the **Issue breakdown page size** box.

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