



# Migration Toolkit for Runtimes 1.0

## Eclipse and Red Hat CodeReady Studio Guide

Identify and resolve migration issues by analyzing your applications with the MTR plugin for Eclipse or Red Hat CodeReady Studio.



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## Abstract

This guide describes how to use the MTR plugin for Eclipse or Red Hat CodeReady Studio to simplify the migration of Java applications.

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## MAKING OPEN SOURCE MORE INCLUSIVE

Red Hat is committed to replacing problematic language in our code, documentation, and web properties. We are beginning with these four terms: master, slave, blacklist, and whitelist. Because of the enormity of this endeavor, these changes will be implemented gradually over several upcoming releases. For more details, see [our CTO Chris Wright's message](#).

# CHAPTER 1. INTRODUCTION

## 1.1. ABOUT THE MTR PLUGIN FOR ECLIPSE AND RED HAT CODEREADY STUDIO

You can migrate and modernize applications by using the Migration Toolkit for Runtimes (MTR) plugin for Eclipse and Red Hat CodeReady Studio.

The MTR plugin analyzes your projects using customizable rulesets, marks issues in the source code, provides guidance to fix the issues, and offers automatic code replacement, if possible.

## 1.2. ABOUT THE MIGRATION TOOLKIT FOR RUNTIMES

### What is the Migration Toolkit for Runtimes?

The Migration Toolkit for Runtimes (MTR) is an extensible and customizable rule-based tool that simplifies the migration and modernization of Java applications.

MTR examines application artifacts, including project source directories and application archives, and then produces an HTML report highlighting areas needing changes. MTR supports many migration paths including the following examples:

- Upgrading to the latest release of Red Hat JBoss Enterprise Application Platform
- Migrating from Oracle WebLogic or IBM WebSphere Application Server to Red Hat JBoss Enterprise Application Platform
- Containerizing applications and making them cloud-ready
- Migrating from Java Spring Boot to Quarkus
- Updating from Oracle JDK to OpenJDK
- Upgrading from OpenJDK 8 to OpenJDK 11
- Upgrading from OpenJDK11 to OpenJDK 17
- Migrating EAP Java applications to Azure
- Migrating Spring Boot Java applications to Azure

For more information about use cases and migration paths, see the [MTR for developers](#) web page.

### How does the Migration Toolkit for Runtimes simplify migration?

The Migration Toolkit for Runtimes looks for common resources and known trouble spots when migrating applications. It provides a high-level view of the technologies used by the application.

MTR generates a detailed report evaluating a migration or modernization path. This report can help you to estimate the effort required for large-scale projects and to reduce the work involved.

### How do I learn more?

See the [Introduction to the Migration Toolkit for Runtimes](#) to learn more about the features, supported configurations, system requirements, and available tools in the Migration Toolkit for Runtimes.

## CHAPTER 2. INSTALLING THE MTR PLUGIN

You can install the MTR plugin in a connected or a restricted network environment.

### 2.1. INSTALLING IN A CONNECTED ENVIRONMENT

You can install the MTR plugin in a connected environment.

The MTR plugin has been tested with the Eclipse IDE for Java Enterprise Developers 2022-03 and Red Hat CodeReady Studio 12.21.3.GA.

#### Prerequisites

- Java Development Kit (JDK) installed. MTR supports the following JDKs:
  - OpenJDK 11
  - Oracle JDK 11
- 8 GB RAM
- macOS installation: the value of **maxproc** must be **2048** or greater.
- [Red Hat CodeReady Studio](#) or [Eclipse IDE for Java Enterprise Developers 2022-03](#)
- JBoss Tools, installed with the [Eclipse Marketplace Client](#)
- [Mylyn SDK and frameworks](#), installed with Eclipse

#### Procedure

1. Launch Eclipse or CodeReady Studio.
2. From the menu bar, select **Help** → **Install New Software**.
3. Next to the **Work with** field, click **Add**.
4. In the **Name** field, enter **MTR**.
5. In the **Location** field, enter **<http://download.jboss.org/jbosstools/photon/stable/updates/mtr/>** and click **OK**.
6. Select all the **JBoss Tools - MTR** check boxes and click **Next**.
7. Review the installation details and click **Next**.
8. Accept the terms of the license agreement and click **Finish**.
9. Restart Eclipse or CodeReady Studio.

### 2.2. INSTALLING IN A DISCONNECTED ENVIRONMENT

You can install the MTR plugin in a disconnected network environment.

The MTR plugin has been tested with the Eclipse IDE for Java Enterprise Developers 2022-03 and Red Hat CodeReady Studio 12.21.3.GA.

## Prerequisites

- Java Development Kit (JDK) installed. MTR supports the following JDKs:
  - OpenJDK 11
  - Oracle JDK 11
- 8 GB RAM
- macOS installation: the value of **maxproc** must be **2048** or greater.
- [Red Hat CodeReady Studio](#) or [Eclipse IDE for Java Enterprise Developers 2022-03](#)
- JBoss Tools, installed with the [Eclipse Marketplace Client](#)
- [Mylyn SDK and frameworks](#), installed with Eclipse
- Connected workstation for all downloads

## Procedure

1. On a computer with network access, navigate to the Migration Toolkit for Runtimes [download site](#) and download the **migrationtoolkit-mtr-eclipse-plugin-repository** file.
2. Launch Eclipse or CodeReady Studio.
3. From the menu bar, select **Help** → **Install New Software**.
4. Next to the **Work with** field, click **Add**.
5. In the **Name** field, enter **MTR**.
6. Next to the **Location** field, click **Archive**.
7. Select the **migrationtoolkit-mtr-eclipse-plugin-repository** file and click **OK**.
8. Select all the **JBoss Tools - MTR** check boxes and click **Next**.
9. Review the installation details and click **Next**.
10. Accept the terms of the license agreement and click **Finish**.
11. Restart Eclipse or CodeReady Studio.

## 2.3. ACCESSING THE MTR TOOLS

You can access the MTR plugin tools in the **MTR** perspective.

### Prerequisites

- You must restart the Eclipse IDE or Red Hat CodeReady Studio after installing the MTR plugin.

### Procedure

1. Click **Window** → **Perspective** → **Open Perspective** → **Other**.

2. Select **MTR** and click **OK**.

The following components are displayed:

- **Issue Explorer** displays the migration issues identified by the MTR plugin.
- **MTR Server** is a separate process that analyzes projects, flags migration issues, and generates reports.  
You can start, stop, and view the status of the MTR server in the **Issue Explorer**.
- **Issue Details** displays detailed information about a selected issue, including the hint, severity, and any additional resources.
- **MTR Report** is an HTML report generated by the MTR plugin. From the report landing page you can navigate to detailed reports, such as Application Details, Issues, and Dependencies.



#### NOTE

The report is not generated by default. You must select the **Generate Report** option in the run configuration.

## CHAPTER 3. ANALYZING YOUR PROJECTS WITH THE MTR PLUGIN

You can analyze your projects with the MTR plugin by creating a run configuration, running an analysis, and then reviewing and resolving migration issues detected by the MTR plugin.

### 3.1. CREATING A RUN CONFIGURATION

You can create a run configuration in the **Issue Explorer**. A run configuration specifies the project to analyze, migration path, and additional options.

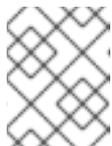
You can create multiple run configurations. Each run configuration must have a unique name.

#### Prerequisite

- You must import your projects into the Eclipse IDE or CodeReady Studio.

#### Procedure

1. In the **Issue Explorer**, click the MTR icon (  ) to create a run configuration.
2. On the **Input** tab, complete the following fields:
  - a. Select a migration path.
  - b. Beside the **Projects** field, click **Add** and select one or more projects.
  - c. Beside the **Packages** field, click **Add** and select one or more the packages.



#### NOTE

Specifying the packages for analysis reduces the run time. If you do not select any packages, all packages in the project are scanned.

3. On the **Options** tab, you can select **Generate Report** to generate an HTML report. The report is displayed in the **Report** tab and saved as a file. Other options are displayed. See [About MTR command-line arguments](#) in the *CLI Guide* for details.
4. On the **Rules** tab, you can select custom rulesets that you have imported or created for the MTR plugin.
5. Click **Run** to start the analysis.

### 3.2. ANALYZING PROJECTS

You can analyze your projects by running the MTR plugin with a saved run configuration.

#### Procedure

1. In the **MTR** perspective, click the **Run** button (  ) and select a run configuration.

The MTR plugin analyzes your projects. The **Issue Explorer** displays migration issues that are detected with the ruleset.

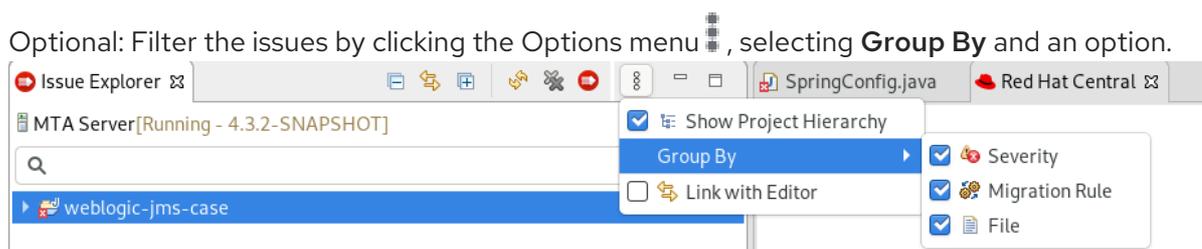
- When you have finished analyzing your projects, stop the MTR server in the **Issue Explorer** to conserve memory.

### 3.3. REVIEWING ISSUES

You can review issues identified by the MTR plugin.

#### Procedure

- Click **Window** → **Show View** → **Issue Explorer**.
- Optional: Filter the issues by clicking the Options menu , selecting **Group By** and an option.



- Right-click and select **Issue Details** to view information about the issue, including its severity and how to address it.

The following icons indicate the severity and state of an issue:

**Table 3.1. Issue icons**

Icon	Description
	The issue must be fixed for a successful migration.
	The issue is optional to fix for migration.
	The issue might need to be addressed during migration.
	The issue was resolved.
	The issue is stale. The code marked as an issue was modified since the last time that MTR identified it as an issue.
	A quick fix is available for this issue, which is mandatory to fix for a successful migration.
	A quick fix is available for this issue, which is optional to fix for migration.

Icon	Description
	A quick fix is available for this issue, which may potentially be an issue during migration.

4. Double-click an issue to open the associated line of code in an editor.

### 3.4. RESOLVING ISSUES

You can resolve issues detected by the MTR plugin by performing one of the following actions:

- You can double-click the issue to open it in an editor and edit the source code.  
The issue displays a Stale icon (  ) until the next time you run the MTR plugin.
- You can right-click the issue and select **Mark as Fixed**.
- If the issue displays a Quick Fix icon (    ), you can right-click the issue and select **Preview Quick Fix** and then **Apply Quick Fix**.

## CHAPTER 4. MANAGING RULES

The MTR plugin comes with a core set of **System** rules for analyzing projects and identifying migration and modernization issues.

You can create and import custom rulesets.

### 4.1. VIEWING RULES

You can view system and custom rules, if any, for the MTR plugin.

#### Prerequisites

- To view system rules, the MTR server must be running.

#### Procedure

1. Click the **Rulesets** tab.
2. Expand **System** to view system rulesets or **Custom** to view custom rulesets.
3. Expand a ruleset.
4. Double-click a rule to open it in a viewer.
5. Click the **Source** tab to view the XML source of the rule.

### 4.2. CREATING A CUSTOM RULESET

You can create a custom ruleset in the **MTR** perspective.

See the [Rules Development Guide](#) to learn more about creating custom XML rules.

#### Procedure

1. Click the **Rulesets** tab.
2. Click the Create Ruleset icon (  ).
3. Select a project and a directory for the ruleset.
4. Enter the file name.



#### NOTE

The file must have the extension **.windup.xml**.

5. Enter a ruleset ID, for example, **my-ruleset-id**.
6. Optional: Select **Generate quickstart template** to add basic rule templates to the file.
7. Click **Finish**.
8. The ruleset file opens in an editor and you can add and edit rules in the file.

9. Click the **Source** tab to edit the XML source of the ruleset file.

You can select the new ruleset when you create a run configuration.

## 4.3. IMPORTING A CUSTOM RULESET

You can import a custom ruleset into the MTR plugin to analyze your projects.

### Prerequisites

- Custom ruleset file with a **.windup.xml** extension.  
See the [Rules Development Guide](#) for information about creating rulesets.

### Procedure

1. Click the **Rulesets** tab.
2. Click the Import Ruleset icon (  ).
3. Browse to and select the XML rule file to import.  
The custom ruleset is displayed when you expand **Custom** on the **Rulesets** tab.

## 4.4. SUBMITTING A CUSTOM RULESET

You can submit your custom ruleset for inclusion in the official MTR rule repository. This allows your custom rules to be reviewed and included in subsequent releases of MTR.

### Procedure

1. Click the **Rulesets** tab.
2. Click the Arrow icon (  ) and select **Submit Ruleset**.
3. Complete the following fields:
  - **Summary:** Describe the purpose of the rule. This becomes the title of the submission.
  - **Code Sample:** Enter an example of the source code that the rule should run against.
  - **Description:** Enter a brief description of the rule.
4. Click **Choose Files** and select the ruleset file.
5. Click **Submit**.