OpenJDK 11

Getting started with Cryostat 2.0
Abstract

Cryostat is a Red Hat offering on Microsoft Windows and Red Hat Enterprise Linux platforms. The Getting Started with Cryostat 2 guide provides an overview of this product and explains how to install the software and start using it.
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Cryostat is a container-native implementation of JDK Flight Recorder (JFR) that you can use to securely monitor the Java Virtual Machine (JVM) performance in workloads that run on an OpenShift Container Platform cluster. With Cryostat you can start, stop, retrieve, archive, import, and export JFR data for JVMs inside your containerized applications by using a web interface or an HTTP API.

Depending on your use case, you can store and analyze your recordings directly on your OpenShift cluster by using the built-in tools that Cryostat provides, or export recordings to an external monitoring application to perform a more in-depth analysis of your recorded data.

IMPORTANT

The features listed in the this guide are Technology Preview features. Technology Preview features are not supported with Red Hat production service level agreements (SLAs) and might not be functionally complete for production purposes. These features provide early access to upcoming product features, enabling customers to test functionality and provide feedback during the development process.

See Technology Preview Features Support Scope on the Red Hat Customer Portal for information about the support scope for Technology Preview features.
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.
PROVIDING FEEDBACK ON RED HAT DOCUMENTATION

We appreciate your feedback on our documentation. To provide feedback, you can highlight the text in a document and add comments.

This section explains how to submit feedback.

**Prerequisites**

- You are logged in to the Red Hat Customer Portal.
- In the Red Hat Customer Portal, view the document in **Multi-page HTML** format.

**Procedure**

To provide your feedback, perform the following steps:

1. Click the **Feedback** button in the top-right corner of the document to see existing feedback.

   **NOTE**

   The feedback feature is enabled only in the **Multi-page HTML** format.

2. Highlight the section of the document where you want to provide feedback.

3. Click the **Add Feedback** pop-up that appears near the highlighted text.
   A text box appears in the feedback section on the right side of the page.

4. Enter your feedback in the text box and click **Submit**.
   A documentation issue is created.

5. To view the issue, click the issue tracker link in the feedback view.
CHAPTER 1. INSTALLING CRYOSTAT

You can install the Cryostat Operator in a project on OpenShift by using Operator Lifecycle Manager (OLM).

With the Cryostat Operator installed, you can create instances of Cryostat that you can access by using a web interface from the OpenShift web console.

You can also download the latest Cryostat component images from the Red Hat Ecosystem Catalog.

1.1. OVERVIEW OF CRYOSTAT

Cryostat is a container-native Java application based on JDK Flight Recorder (JFR) that you can use to monitor Java Virtual Machine (JVM) performance for containerized workloads that run on an OpenShift cluster.

You can deploy Cryostat in a container in an OpenShift project that hosts your containerized Java applications. You can create JVM targets that correspond to the JVM instances that you use to run your containerized workload. You can connect Cryostat to the JVM targets to record and analyze data about heap and non-heap memory usage, thread count, garbage collection, and other performance metrics for each JVM target.

You can use the tools that are included with Cryostat to monitor the performance of your JVMs in real time, capture JDK Flight Recorder (JFR) recordings and snapshots, generate Automated Analysis Reports, and visualize your recorded performance data by using a Grafana dashboard.

The Cryostat web interface and HTTP API provides a way to analyze your JVM performance data inside the container without having to rely on an external monitoring application. However, you can also export your recordings from Cryostat into an external instance of JDK Mission Control (JMC) when you need to perform a deeper analysis of your data outside of a cluster environment.

Cryostat supports role-based access control (RBAC) as a standard feature of OpenShift Container Platform. You can configure different levels of authorization for each user role to ensure the privacy and integrity of your Flight Recording data.

You can install Cryostat inside an OpenShift project by using Operator Lifecycle Manager (OLM).

You can also download the latest Cryostat component images from the Red Hat Ecosystem Catalog. The following container images exist for Cryostat 2.0 on the Red Hat Ecosystem Catalog:

- Cryostat
- Cryostat Operator
- Cryostat Operator bundle
- Cryostat Grafana dashboard
- JFR data source

Additional resources

- For more information about using OpenJDK for JMC, see the Using Java Flight Recorder with OpenJDK guide.
1.2. INSTALLING CRYOSTAT ON OPENSShift BY USING AN OPERATOR

You can use the Operator Lifecycle Manager (OLM) to install the Cryostat Operator in a project on your OpenShift cluster. You can use the Operator to create Cryostat instances that you can control by using a GUI that is accessible from the OpenShift web console.

Prerequisites

- You have an OpenShift Container Platform 4.6 cluster.
- You have Operator Lifecycle Manager (OLM) installed on your cluster.
- You have one of the following cert-manager versions installed on your cluster:
  - Version 1.1.0 or higher if you are using OpenShift 4.6.
  - Version 1.3.0 or higher if you are using OpenShift 4.9.
- You have an OpenShift user account with permissions to install Operators in a project.
- You are logged in using the OpenShift web console.

Procedure

1. In your browser, navigate to Home > Projects using the web console.
2. Select the name of the project in which you want to install the Cryostat Operator.
3. Install the Cryostat Operator:
   a. Navigate to Operators > OperatorHub in the sidebar of your web console.
   b. Select the Cryostat Operator from the list. You can use the search box in the upper part of the screen to find the Cryostat Operator.
   c. Click Install to install the Cryostat Operator in your project.
4. Deploy an Operator-based instance of Cryostat in your project:
   a. Navigate to Operators > Installed Operators by using the web console and select Cryostat from the list of installed Operators:

   ![Figure 1.1. Viewing the Cryostat operator in the list of installed operators](image)

   b. Navigate to the Details tab.
c. Click **Create instance** under Cryostat in the **Provided APIs** section.

**Figure 1.2. Selecting the Cryostat API provided by the Operator**

![Image of Cryostat API selection](image1)

- d. Select either the **Form view** radio button or the **YAML view** radio button. Choose **YAML view** if you want to enter your information in the YAML configuration file.

- e. Specify a name for the instance of Cryostat that you want to create. You may also specify additional configuration options for your deployment:

  **Figure 1.3. Creating an instance of Cryostat using a form in the web console**

  ![Image of Cryostat form](image2)

  You can use a YAML template to create your instance and specify additional configuration options instead of using the form:
Create an instance of Cryostat using a YAML template in the web console

5. Click Create to start the creation process for your Cryostat instance. You must wait for all resources of your Cryostat instance to be ready before you can access it.

Verification

1. Navigate to Installed Operators in the sidebar of the web console.
2. Select Cryostat from the table of installed Operators.
3. Select the Cryostat tab. Your Cryostat is listed in the table of instances and is in a Ready state.

Next Steps

- Access your Cryostat instance by using the Cryostat web interface. See Accessing Cryostat by using the web interface in the Getting started with Cryostat 2.0 guide.

1.3. ACCESSING CRYOSTAT BY USING THE WEB INTERFACE

You can access and control Cryostat by using a web interface that is accessible from the web console.

Prerequisites

- You are logged in using the OpenShift web console.
- You have a Cryostat instance in your project.

Procedure

1. Get your OpenShift authorization token:
   a. Select Copy login command from the username drop-down menu in the top corner of the web console.
   b. Click Display Token on the next screen.
   c. Copy the API token that is displayed in the upper part of the screen.
2. Navigate to Installed Operators and select Cryostat from the list.

3. Select the Cryostat instance that you want to access from the table under the Cryostat tab.

4. Click the link in the Application URL section to access the login screen.

5. Paste your authorization token into the text box.

6. Click Login to access the web interface of your Cryostat instance.
CHAPTER 2. CREATING AND MANAGING CRYOSTAT RECORDINGS

You can use Cryostat to create and manage JDK Flight Recordings (JFRs) that monitor the performance of Java Virtual Machines (JVMs) that are located in your containerized applications.

With Cryostat 2.0, you can start, stop, retrieve, archive, import, and export JFR data for JVMs.

Prerequisites

- You installed Cryostat 2.0 on OpenShift by using the OperatorHub option.
- You created a Cryostat instance in your OpenShift project.

2.1. CREATING A JDK FLIGHT RECORDER (JFR) RECORDING

You can create a JFR recording that monitors the performance of your JVM located inside your containerized application. After you create a JFR recording, you can either start or stop the JFR to capture real-time data for your JVM, such as heap and non-heap memory usage.

Prerequisites

- You have logged in to your Cryostat web interface.
  - You can retrieve your Cryostat application’s URL by using the OpenShift web console.

Procedure

1. On the Dashboard panel for your Cryostat instance, select a Target JVM from the drop-down menu:

   Figure 2.1. Example of selecting a Target JVM for your Cryostat instance

2. Optional: On the Dashboard panel, you can create a target JVM by selecting the plus icon (➕). After you select the icon a window opens for creating a custom target connection.

   a. In the Connection URL field, enter the URL for your JVM’s Java Management Extension (JMX) endpoint.
   b. Optional: In the Alias field, enter an alias for your JMX Service URL.
3. Click **Recordings** from the menu on the Cryostat web interface. An **Authentication Required** dialog opens on your web interface. Enter your **Username** and **Password** in the **Authentication Required** dialog box. Click **Save** to provide your JMX credentials to the target JVM.

**Figure 2.3. Example of a Cryostat Authentication Required window**

**NOTE**

If the selected target JMX has SSL/TLS certification enabled for JMX connections, you must add its certificate when prompted.

4. On the **Active Recordings** tab, click the **Create** button. A new window opens on the web interface.
5. On the **Custom Flight Recording** tab, enter information in the **Name**, **Duration**, and **Template** fields.

![Figure 2.4. Example of creating an active recording](image)

**WARNING**

If you enter a name in an invalid format, the web interface displays an error message. Additionally, if you enter a name that already exists, Cryostat refuses to create a custom recordings when you click the **Create** button.

The following example shows continuous monitoring enabled for a JVM by check marking the **Continuous** entry box above the **Duration** field. The example also shows selection of the **Profiling** template from the **Template** field. This provides additional JVM information to a JFR recording for troubleshooting purposes. You can display additional options by clicking the **Show advanced options** navigation tree hyperlink.

![Figure 2.5. Example of creating a custom flight recording](image)

6. Click the **Create** button to create your JFR recording. The **Active Recordings** tab opens and it lists your JFR recording.
Your active JFR recording starts collecting data on the target JVM location inside your containerized application. If you specified a fixed duration for your JFR recordings, the target JVM stops the recording when it reaches the fixed duration setting. Otherwise, you must manually stop the recording.

7. Optional: Stop the recording by selecting the check box next to the JFR recording’s name on the Active Recording tab. The Cryostat web interface activates the Stop button in the toolbar in the Active Recordings tab. Click the Stop button. The JFR adopts the STOPPED status, so it stops monitoring the target JVM. The JFR still displays under the Active Recording tab.

**IMPORTANT**

JFR recording data might be lost in the following situations:

- Target JVM fails
- Target JVM restarts

Archive your JFR recordings to ensure you do not lose your JFR recording’s data.

**Additional resources**

- For more information about adding a certificate for a selected target JMX, see [Uploading an SSL certificate](#).
For more information about archiving your JFR recording data, see Archiving JDK Flight Recorder (JFR) recordings.

2.2. UPLOADING AN SSL CERTIFICATE

You must upload an SSL certificate for your JVM if you receive an SSL error message on the Recordings panel of your Cryostat web interface. Otherwise, you cannot access Cryostat tools, such as tools for creating a JFR recording.

Prerequisites

- You have entered your authentication details for your Cryostat instance.
- You have created a target JVM from the Dashboard panel. See Creating a JDK Flight Recorder (JFR) recording.
- You have downloaded the SSL certificate for your target JVM.

Procedure

1. Navigate to the Recordings menu on your Cryostat instance.

2. From the Recordings panel, select your target JVM from the drop-down list. You will receive a prompt if your target JVM does not contain a trusted SSL certificate, as demonstrated in the following example:

Figure 2.8. SSL error message

3. Click the Security button. A window opens on the Cryostat web console that shows the Security dialog box.

Figure 2.9. Security dialog box

4. Click the Upload button. An Upload SSL certificate window opens on your Cryostat web console.
5. Click the **Browse** button and locate the SSL certificate on your local system.

**IMPORTANT**

Your SSL certificate must be DER-encoded in either **binary** or **base64** format. Cryostat supports .der and .cer file extensions.

6. Restart your Cryostat instance.

7. Navigate to the **Recordings** menu on your Cryostat instance.

8. *Optional:* Enter your credentials if an **Authentication Required** dialog opens on your web interface. This dialog opens if the target JVM requires authentication details before you can access its data for recording purposes.

**Next steps**

- Create a JFR recording, see [Creating a JDK Flight Recorder (JFR) recording](#).

**Additional resources**

- For more information about PVCs, see [Persistent storage using local volumes](#) in the OpenShift documentation.

### 2.3. CREATING SNAPSHOTS FROM AN ACTIVE RECORDING

You can take a snapshot of an active JFR recording to capture any collected data, up to a specific point in time, for your target JVM application.

A snapshot gets stored in the memory of a target JVM application. This differs from an archive in that Cryostat stores an archive on a cloud storage disk, which is a more permanent solution for storing a JFR recording’s data.

You can take snapshots of recordings if you want to experiment with different configuration changes among active JFR recordings.

When you create a snapshot for your JFR recording, Cryostat creates a new target JVM named `snapshot-<snapshot_number>`, where `<snapshot_number>` is the number that Cryostat automatically assigns to your snapshot.
A target JVM recognizes a snapshot as an active recording. Cryostat sets any JFR snapshots in the **STOPPED** state, which means that the JFR snapshot cannot record the target JVM. Depending on the JFR configuration, active JFR recordings can continue to monitor the target JVM regardless of the number of snapshots taken.

**NOTE**

For a JFR recording that you set for continuous monitoring of a target JVM application, ensure that you create archived recordings to avoid losing JFR recording data.

If you choose to take regular snapshots to store your JFR recording data, the target JVM application might free some of its data storage space by replacing older recording data with newer recording data.

**Prerequisites**

- You have entered your authentication details for your Cryostat instance.
- You have created a target JVM recording and entered your authenticated details to access the **Recordings** menu. See *Creating a JDK Flight Recorder (JFR) recording*.

**Procedure**

1. On the **Active Recordings** tab, click the **Create** button. A new window opens on the web interface.

   **Figure 2.11. Creating an active recording**

2. Click the **Snapshot Recordings** tab:

   **Figure 2.12. Create snapshot recording**
3. Click the Create button. The Active Recordings tab opens and it lists your JFR snapshot recording. The following example displays a JFR snapshot recording named as snapshot-2:

Figure 2.13. Example of a snapshot recording

NOTE
You can identify snapshots by the snapshot prefix from the list of active recordings.

Next steps
- To archive your JFR snapshot recording, see Archiving JDK Flight Recorder (JFR) recordings.

2.4. ARCHIVING JDK FLIGHT RECORDER (JFR) RECORDINGS

You can archive active JFR recordings to avoid potential data loss from JFR recordings. Data loss might occur when Cryostat replaces legacy JFR recording data with new data to save storage space or when a target JVM abruptly stops or restarts.

When you create an archived recording, Cryostat copies the active JFR recording’s data and stores the data in a persistent storage location on your Cryostat instance. The Cryostat Operator builds this persistent storage location onto the associated persistent volume claim (PVC) on the OpenShift cluster.

You can archive any JFR recording, regardless of its configuration. Additionally, you can archive snapshots from a JFR recording.

Prerequisites
- You have entered your authentication details for your Cryostat instance.
- You have created a target JVM recording and entered your authenticated details to access the Recordings menu. See Creating a JDK Flight Recorder (JFR) recording.

Procedure
1. On the Active Recordings tab, select the checkbox for your JFR recording. The Archive button is activated in the Active Recordings toolbar.
2. Click the Archive button. Cryostat creates an archived recording of your JFR recording and stores it in a persistent storage location on your Cryostat instance.

3. Navigate to the Archived Recordings tab. You can view all your listed archived JFR recordings, including any JFR snapshot recordings that you archived.

4. Optional: To delete an archived recording, select the checkbox for your archived JFR recording entry. When the Delete button displays, click the button.

NOTE
Cryostat assigns names to archived recordings based on the address of the target JVM’s application, the name of the active recording, and the timestamp of the created archived recordings.

Additional resources
- For more information about persistent volume claims (PVCs), see Persistent storage using local volumes in the OpenShift documentation.
2.5. DOWNLOADING AN ACTIVE RECORDING OR AN ARCHIVED RECORDING

You can use Cryostat to download an active recording or an archived recording to your local system.

Prerequisites

- You have entered your authentication details for your Cryostat instance.
- You have created a JFR recording. See Creating a JDK Flight Recorder (JFR) recording.
- Optional: You have archived your JFR recording. See Archiving JDK Flight Recorder (JFR) recordings.

Procedure

1. Navigate to the Recordings menu on your Cryostat instance.
2. Determine the recording you want by clicking either the Active Recordings tab or the Archived Recordings tab.
3. Locate your listed JFR recording and then select its overflow menu:

   **Figure 2.16. Viewing a JFR recording’s overflow menu**

4. From the overflow menu, click Download Recording. Depending on how you configured your operating system, a file-save dialog displays. Save the .jfr binary file to your preferred location.
5. Optional: View the downloaded .jfr binary file online by using the Cryostat View in Grafana feature or offline by using the Java Mission Control desktop application.

Additional resources

- For more information about using JDK Flight Recorder for JMC, see the Using Java Flight Recorder for OpenJDK guide.

2.6. USING CUSTOM EVENT TEMPLATES

You can choose either one of the following default event templates when creating a JDK Flight Recorder (JFR) recording:
Continuous template, which collects basic target Java Virtual Machine (JVM) data for either a fixed duration or until it is explicitly stopped.

Profiling template, which collects in-depth target JVM data for either a fixed duration or until it is explicitly stopped.

By using either of these default event templates, you can quickly create a JFR for monitoring your target JVM’s performance. You can edit either event template at a later stage to suit your needs. For example, the default event templates do not contain application-specific custom events, so you must add these custom events to the custom template.

Cryostat also supports the ALL meta-template, which enables a JFR to monitor all event types for a target JVM. Default values exist for each event type. The ALL meta-template does not contain an XML definition, so you cannot download an XML file for the ALL meta-template.

**Prerequisites**

- You have installed Cryostat 2.0 on OpenShift by using the **Installed Operators** option.
- You have created a Cryostat instance in your OpenShift project.

**Procedure**

1. On the **Dashboard** panel for your Cryostat instance, select a **Target JVM** from the drop-down menu:

   ![Figure 2.17. Example of selecting a Target JVM for your Cryostat instance](image)

2. **Optional:** On the **Dashboard** panel, you can define a target JVM by selecting the plus icon (+). After you select the icon a window opens for defining a custom target connection URL.
   
   a. In the **Connection URL** field, enter the URL for your JVM’s Java Management Extension (JMX) endpoint.
   
   b. **Optional:** In the **Alias** field, enter an alias for your JMX Service URL.

   c. Click the **Create** button.
3. Click **Events** from the menu on the Cryostat web interface. An **Authentication Required** dialog opens on your web interface. Enter your **Username** and **Password** in the **Authentication Required** dialog box. Click **Save** to provide your JMX credentials to the target JVM.

**NOTE**

If the selected target JMX has SSL/TLS certification enabled for JMX connections, you must add its certificate when prompted.

4. Under the **Event Templates** tab, locate your listed event template and then select its overflow menu.

**Figure 2.19. Example of listed event templates**

5. From the overflow menu, click **Download**. Depending on how you configured your operating system, a file-save dialog opens. Save the file to your preferred location.

**Figure 2.20. Example of an event template’s overflow menu**
6. Open the file with your default file editor and edit the file to meet your needs. You must save your file to retain your configuration changes.

NOTE
You can add values to the description and provider attributes that can help with identifying your file at a later stage.

7. From the Events menu, click the plus (+) icon that is under the Event Templates tab. A Create Custom Event Template window opens in your Cryostat web console.

Figure 2.21. Create Custom Event Templates dialog box

8. Click the Browse button and use your default file editor to upload the configured event template to the Cryostat web console.

9. Click the Submit button. The Event Templates tab opens on your Cryostat web console, where you can now view your custom event template.

10. Optional: After you create your event template, you can choose one of the following options for using your template to create a JFR recording:
   - From the Events menu, locate your listed event template and then click Create Recording… from the overflow menu.
   - From the Recordings menu, click the Create button under the Active Recordings tab.

Additional resources
- For more information about adding a certificate for a selected target JMX, see Uploading an SSL certificate.
- For more information about archiving your JFR recording data, see Archiving JDK Flight Recorder (JFR) recordings.
- For more information about creating a JFR recording from the Recordings panel, see Creating a JDK Flight Recorder (JFR) recording.

2.7. UPLOADING A JFR RECORDING TO CRYOSTAT ARCHIVES LOCATION
You can upload a JFR recording from your local system to the archives location of your Cryostat.
To save Cryostat storage space, you might have scaled down or removed your JFR recording. If you downloaded a JFR recording, you can upload it to your Cryostat instance when you scale up or redeploy the instance.

Additionally, you can upload a file from a previous Cryostat instance to a new Cryostat instance. Cryostat analysis tools work on the recording uploaded to the new Cryostat instance.

**Prerequisites**

- You have entered your authentication details for your Cryostat instance.
- You have created a JFR recording. See [Creating a JDK Flight Recorder (JFR) recording](#).
- You have downloaded an active recording or an archived recording. See [Downloading an active recording or an archived recordings](#).

**Procedure**

1. Navigate to the **Recordings** menu on your Cryostat instance.
2. Click the **Archived Recordings** tab:

   ![Figure 2.22. Selecting the archived recording tab](image)

   **Figure 2.22. Selecting the archived recording tab**

3. Click the plus (+) icon. A **Re-Upload Archived Recording** window opens in your Cryostat web interface:

   ![Figure 2.23. Re-uploading archived recording menu](image)

   **Figure 2.23. Re-uploading archived recording menu**
4. Click the **Browse** button located in the **JFR File** field.

5. Locate the JFR recording file, denoted with the **.jfr** format, and then click the **Submit** button.

![Figure 2.24. Re-uploading archived recording file](image)

Your JFR recording file opens under the **Archived Recordings** tab.

### 2.8. VIEWING A JFR RECORDING ON GRAFANA

Cryostat 2.0 integrates with the Grafana application, so you can plot JFR recording data in Grafana. You can view plot data in time interval sections to precisely analyze the performance of your target JVM application.

**Prerequisites**

- You have entered your authentication details for your Cryostat instance.
- You have created a JFR recording. See [Creating a JDK Flight Recorder (JFR) recording](#).

**Procedure**

1. Navigate to the **Recordings** menu on your Cryostat instance.

2. Depending on your needs, click either the **Active Recordings** tab or the **Archived Recordings** tab.

3. Locate your JFR recording and then select the overflow menu:
4. From the overflow menu, click the **View in Grafana...** option. The Grafana application opens in a new web browser window.

5. Click the sign-in icon on the Grafana dashboard:

Figure 2.26. Grafana application sign-in button

6. Determine your credentials by issuing the following commands in your terminal:
<cryostat_name>=$(kubectl get cryostat -o jsonpath='{$.items[0].metadata.name}')

oc get secret $<cryostat_name>-grafana-basic -o jsonpath='{$.data.GF_SECURITY_ADMIN_USER}' | base64 -d

oc get secret $<cryostat_name>-grafana-basic -o jsonpath='{$.data.GF_SECURITY_ADMIN_PASSWORD}' | base64 -d

7. Enter your credentials in the Grafana web console login page.

**Figure 2.27. Example of a Grafana web console login page**

![](image)

8. In Grafana, click the **Dashboards** tab. Then select the the default dashboard, which is named **Dashboard**, under the **General** directory tree entry:

**Figure 2.28. Grafana’s Dashboards interface**

![](image)

A new windows opens your JFR recording’s data in various time-series plots.

9. **Optional:** Interact with any plot by selecting a time-series segment on the plot. Grafana expands the on-screen data to show only the data for that time interval.
2.9. VIEWING AND DOWNLOADING AN AUTOMATED ANALYSIS REPORT

Cryostat 2.0 integrates with a JDK Mission Control (JMC) automated analysis report library, so you can view JMC rules to analyze your JFR recordings data for errors. When JMC finishes analyzing your JFR data, Cryostat produces an automated analysis report that shows any errors associated with the data.

If JMC detects an error in your data, JMC applies a severity score to the error. Severity scores range from 0, which means no error, to 100, which means a potentially severe error. JMC does not add items with a 0 score to the automated generated report, but you can explicitly set JMC to show all scored items.

Prerequisites

- You have entered your authentication details for your Cryostat instance.
- You have created a JFR recording. See Creating a JDK Flight Recorder (JFR) recording.

Procedure

1. Navigate to the Recordings menu on your Cryostat instance.
2. Click the Active Recordings tab:

   Figure 2.30. Selecting the archived recording tab
3. Select the checkbox for your recording and then select the reverse chevron (’) icon to expand your JFR recording’s information. The expanded information shows an Automated Analysis section that contains HTML-formatted information.

**Figure 2.31. Selecting the chevron icon to expand JFR recording information**

![Expanded JFR Recording Information](image1)

4. **Optional:** Click the plus icon (+) beside any Automated Analysis item to view additional information for the error message or to list any available additional items. The example shows an automated analysis report with items listed that contain a description of the error and troubleshooting information:

**Figure 2.32. Plus symbol to view additional automated analysis information**

![Automated Analysis Report](image2)

5. You can select the **Show OK Results** checkbox to display all items, including items marked with a score of 0:
6. Download the automated analysis report by clicking **Download Report** from the overflow menu. Save the report to a location on your local system.

7. Open the downloaded report from the location where you saved the report. You can view the report offline in an application of your choice. On the report, you can view all analysed items, by clicking the **Show OK Results** check box on the report.