



## Red Hat Fuse 7.13

# Managing Fuse on Springboot Standalone

Manage Fuse applications with the Fuse Console



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## Abstract

When you deploy a Fuse application, you can use the Fuse Console to monitor and interact with Red Hat Fuse integrations.

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## Table of Contents

<b>PREFACE</b> .....	<b>3</b>
<b>MAKING OPEN SOURCE MORE INCLUSIVE</b> .....	<b>4</b>
<b>CHAPTER 1. ABOUT THE FUSE CONSOLE</b> .....	<b>5</b>
<b>CHAPTER 2. ACCESSING THE FUSE CONSOLE FOR SPRING BOOT 2.X</b> .....	<b>6</b>
<b>CHAPTER 3. CUSTOMIZING THE FUSE CONSOLE BRANDING</b> .....	<b>8</b>
<b>CHAPTER 4. SECURING THE FUSE CONSOLE</b> .....	<b>9</b>
<b>CHAPTER 5. ENSURING THAT DATA DISPLAYS CORRECTLY IN THE FUSE CONSOLE</b> .....	<b>11</b>
<b>CHAPTER 6. CONNECTING TO REMOTE FUSE APPLICATIONS</b> .....	<b>12</b>
6.1. CONNECTING TO A REMOTE JOLOKIA AGENT .....	12
6.2. SETTING DATA MOVING PREFERENCES .....	12
6.3. VIEWING JVM RUNTIME INFORMATION .....	13
<b>CHAPTER 7. VIEWING AND MANAGING APACHE CAMEL APPLICATIONS</b> .....	<b>14</b>
7.1. STARTING, SUSPENDING, OR DELETING A CONTEXT .....	14
7.2. VIEWING CAMEL APPLICATION DETAILS .....	14
7.3. VIEWING A LIST OF THE CAMEL ROUTES AND INTERACTING WITH THEM .....	15
7.4. DEBUGGING A ROUTE .....	16
<b>CHAPTER 8. VIEWING AND MANAGING JMX DOMAINS AND MBEANS</b> .....	<b>18</b>
<b>CHAPTER 9. VIEWING AND MANAGING QUARTZ SCHEDULES</b> .....	<b>19</b>
<b>CHAPTER 10. VIEWING DIAGNOSTICS</b> .....	<b>20</b>
<b>CHAPTER 11. VIEWING THREADS</b> .....	<b>21</b>
<b>APPENDIX A. FUSE CONSOLE CONFIGURATION PROPERTIES</b> .....	<b>22</b>



## PREFACE

Red Hat Fuse provides two enterprise monitoring tools for viewing and managing Fuse integrations:

- The Fuse Console is a web-based console that you access from a browser to monitor and manage a running Fuse container. The Fuse Console is based on Hawtio open source software (<https://hawt.io/>). This guide describes how to use the Fuse Console.
- Prometheus stores system and integration-level metrics for Fuse distributions. You can use a graphical analytics interface, such as Grafana, to view and analyze the stored historical data. To learn more about using Prometheus, see [the Prometheus documentation](#).

The audience for this guide is Red Hat Fuse on JBoss EAP administrators. This guide assumes that you are familiar with the Red Hat Fuse platform, Apache Camel, and the processing requirements for your organization.

## 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. ABOUT THE FUSE CONSOLE

The Red Hat Fuse Console is a web console based on HawtIO open source software. For a list of supported browsers, go to [Supported Configurations](#).

The Fuse Console provides a central interface to examine and manage the details of one or more deployed Fuse containers. You can also monitor Red Hat Fuse and system resources, perform updates, and start or stop services.

The Fuse Console is available when you install Red Hat Fuse standalone or use Fuse on OpenShift. The integrations that you can view and manage in the Fuse Console depend on the plugins that are running. Possible plugins include:

- Camel
- JMX
- OSGI
- Runtime
- Logs

## CHAPTER 2. ACCESSING THE FUSE CONSOLE FOR SPRING BOOT 2.X

You can access the Fuse Console for a standalone Fuse Spring Boot 2.x distribution.

### Procedure

1. Add the following dependency to your Fuse application's **pom.xml** file:

```
<dependency>
  <groupId>io.hawt</groupId>
  <artifactId>hawtio-springboot</artifactId>
</dependency>
```

Note that you do not need to specify the exact version because it is provided by the Maven BOM.

2. Edit the **src/main/resources/application.properties** file:
  - a. Set the following properties:
    - **management.endpoints.web.exposure.include=hawtio,jolokia**
    - **hawtio.authenticationEnabled=false**
    - **management.endpoint.hawtio.enabled=true**
    - **management.endpoint.jolokia.enabled=true**

- b. Optionally, set the **management.endpoints.web.base-path** property. By default for Spring Boot 2.x, the Fuse Console's URL includes the context path (**/actuator**) of the management endpoints. For example:

<http://localhost:10001/actuator/hawtio/index.html>

To change this default URL, for example to specify <http://localhost:10001/hawtio>, set the **management.endpoints.web.base-path** property as shown here:

```
management.endpoints.web.base-path=/
```

Your **application.properties** settings should look similar to the following example:

```
# ports
server.port=8080

management.server.port=10001

# enable management endpoints for healthchecks and hawtio
management.endpoints.enabled-by-default = false
management.endpoint.hawtio.enabled = true
management.endpoint.jolokia.enabled = true
```

```

management.endpoints.health.enabled = true

management.health.defaults.enabled=false

camel.health.enabled=false

camel.health.indicator.enabled=true

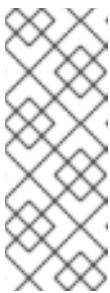
management.endpoints.web.exposure.include=hawtio,jolokia

hawtio.authenticationEnabled=false

# change the URL so that it does not include the actuator folder

management.endpoints.web.base-path=/

```



### NOTE

By default, authentication for the Fuse Console on Spring Boot is disabled. Optionally, you can enable authentication by writing code specific to your Fuse Console distribution. Here is an example that you can use for guidance:

<https://github.com/hawtio/hawtio/tree/master/examples/springboot-authentication>

3. Run the Fuse application:

```
mvn spring-boot:run
```

4. To determine the port number for the Fuse Console URL, obtain the **management.server.port** value by looking at the value set in the **src/main/resources/application.properties** file. For example:

```
management.server.port = 10001
```

5. To open the Fuse Console in a browser, use the following URL syntax where **nnnnn** is the value of the **management.server.port** property:

<http://localhost:nnnnn/actuator/hawtio>

For example, if the **management.server.port** property value is **10001** and you have not set the **management.endpoints.web.base-path** property then the URL is:

<http://localhost:10001/actuator/hawtio/index.html>

## CHAPTER 3. CUSTOMIZING THE FUSE CONSOLE BRANDING

You can customize the Fuse Console branding information, such as title, logo, and login page information, by adding a **hawtconfig.json** file into your Fuse on Spring Boot standalone application.

### Procedure

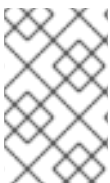
1. Create a JSON file named **hawtconfig.json** in your local Fuse on Spring Boot standalone application's **src/main/webapp** directory.
2. Open the **src/main/webapp/hawtconfig.json** in an editor of your choice, and then add the following content:

```
{
  "branding": {
    "appName": "Red Hat Fuse Console",
    "appLogoUrl": "img/Logo-Red_Hat-Fuse-A-Reverse-RGB.png",
    "companyLogoUrl": "img/Logo-RedHat-A-Reverse-RGB.png"
  },
  "login": {
    "description": "",
    "links": []
  },
  "about": {
    "title": "Red Hat Fuse Console",
    "productInfo": [],
    "additionalInfo": "",
    "copyright": "",
    "imgSrc": "img/Logo-RedHat-A-Reverse-RGB.png"
  },
  "disabledRoutes": [
    "/camel/source",
    "/diagnostics",
    "/jvm/discover",
    "/jvm/local"
  ]
}
```

3. Change the values of the configuration properties listed in [Table A.1, "Fuse Console Configuration Properties"](#).
4. Save your changes.
5. Run Fuse on Spring Boot by using the following command:

```
mvn spring-boot:run
```

6. In a web browser, open the Fuse Console by using this URL:  
<http://localhost:10001/actuator/hawtio/index.html>



### NOTE

If you have already run the Fuse Console in a web browser, the branding is stored in the browser's local storage. To use new branding settings, you must clear the browser's local storage.

## CHAPTER 4. SECURING THE FUSE CONSOLE

To secure the Fuse Console on Spring Boot:

- **Disable the Fuse Console’s proxy servlet when deploying to AWS**

If you want to deploy a standalone Fuse application to Amazon Web Services (AWS), you should disable the Fuse Console’s proxy servlet by setting the **hawtio.disableProxy** system property to **true**.



### NOTE

When you disable the Fuse Console proxy servlet, the Fuse Console’s **Connect** tab is disabled and you cannot connect to other JVMs from the Fuse Console. If you want to deploy more than one Fuse application on AWS, you must deploy the Fuse Console for each application.

- **Set HTTPS as the required protocol**

You can use the **hawtio.http.strictTransportSecurity** property to require web browsers to use the secure HTTPS protocol to access the Fuse Console. This property specifies that web browsers that try to use HTTP to access the Fuse Console must automatically convert the request to use HTTPS.

- **Use public keys to secure responses**

You can use the **hawtio.http.publicKeyPins** property to secure the HTTPS protocol by telling the web browser to associate a specific cryptographic public key with the Fuse Console to decrease the risk of “man-in-the-middle” attacks with forged certificates.

### Procedure

1. Set the **hawtio.http.strictTransportSecurity** and **hawtio.http.publicKeyPins** properties as shown in the following example:

```
public static void main(String[] args) {
    System.setProperty("hawtio.http.strictTransportSecurity", "max-age=31536000;
includeSubDomains; preload");
    System.setProperty("hawtio.http.publicKeyPins", "pin-
sha256=cUPcTAZWKaASuYWhhneDttWpY3oBAkE3h2+soZS7sWs"; max-age=5184000;
includeSubDomains");
    SpringApplication.run(YourSpringBootApplication.class, args);
}
```

2. (For deploying on AWS only) To disable the Fuse Console’s proxy servlet, set the **hawtio.disableProxy** property as shown in the following example:

```
public static void main(String[] args) {
    System.setProperty("hawtio.disableProxy", "true");
}
```

### Additional resources

- For a description of the **hawtio.http.strictTransportSecurity** property’s syntax, see the description page for the [HTTP Strict Transport Security \(HSTS\)](#) response header.

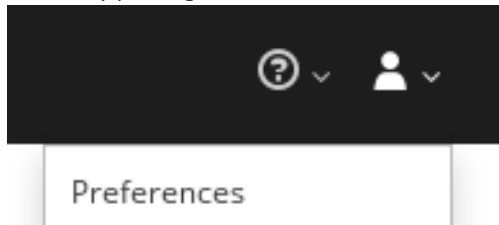
- For a description of the **hawtio.http.publicKeyPins** property's syntax, including instructions on how to extract the Base64 encoded public key, see the description page for the [HTTP Public Key Pinning](#) response header.

## CHAPTER 5. ENSURING THAT DATA DISPLAYS CORRECTLY IN THE FUSE CONSOLE

If the display of the queues and connections in the Fuse Console is missing queues, missing connections, or displaying inconsistent icons, adjust the Jolokia collection size parameter that specifies the maximum number of elements in an array that Jolokia marshals in a response.

### Procedure

1. In the upper right corner of the Fuse Console, click the user icon and then click **Preferences**.



2. Increase the value of the **Maximum collection size** option (the default is 50,000).
3. Click **Close**.

## CHAPTER 6. CONNECTING TO REMOTE FUSE APPLICATIONS

The Fuse Console uses Jolokia, an agent-based approach to Java Management Extensions (JMX) that requires extra software (an agent) installed on the client. By default, Red Hat Fuse includes a jolokia agent.

With standalone Fuse Console distributions, you can connect to remote integrations that already have a jolokia agent (<https://jolokia.org/>) running inside them. If the process that you want to connect to does not have a jolokia agent inside, refer to the jolokia documentation (<http://jolokia.org/agent.html>).

### Procedure

The Fuse Console's proxy servlet uses whitelist host protection, with which by default the Fuse Console can only connect to localhost. If you want to connect the Fuse Console to other remote Fuse instances, you need to configure the `hawtio.proxyWhitelist` system property in the `main()` method of your Spring Boot application:

```
System.setProperty("hawtio.proxyWhitelist", "localhost, 127.0.0.1, myhost1, myhost2, myhost3");
```

## 6.1. CONNECTING TO A REMOTE JOLOKIA AGENT

Before you begin, you need to know the connection details (host name, port, and path) of the remote Jolokia agent.

The default connection URLs for the Jolokia agent on Spring Boot is <http://<host>:8080/jolokia>

As a system administrator, you can change this default.

Typically, the URL to remotely connect to a Jolokia agent is the URL to open the Fuse Console plus `/jolokia`. For example, if the URL to open the Fuse Console is <http://<host>:1234/hawtio>, then the URL to remotely connect to it would probably be <http://<host>:1234/hawtio/jolokia>.

To connect to a remote Jolokia instance so that you can examine its JVM:

1. Click the **Connect** tab.
2. Click the **Remote** tab, and then **Add connection**.
3. Type the **Name**, **Scheme** (HTTP or HTTPS), and the **hostname**.
4. Click **Test Connection**.
5. Click **Add**.



### NOTE

The Fuse Console automatically probes the local network interfaces other than localhost and 127.0.0.1 and adds them to the whitelist. Hence, you do not need to manually register the local machine's addresses to the whitelist.

## 6.2. SETTING DATA MOVING PREFERENCES

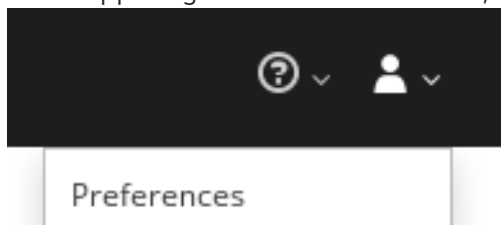
You can change the following Jolokia preferences, for example, if you want to more frequently refresh data that displays in the Fuse Console. Note that increasing the frequency of data updates impacts networking traffic and increases the number of requests made to the server.



- **Update rate** - The period between polls to Jolokia to fetch JMX data (the default is 5 seconds).
- **Maximum depth** - The number of levels that Jolokia will marshal an object to JSON on the server side before returning (the default is 7).
- **Maximum collection size** - The maximum number of elements in an array that Jolokia marshals in a response (the default is 50,000).

To change the values of these settings:

1. In the upper right of the Fuse Console, click the user icon and then click **Preferences**.



2. Edit the options and then click **Close**.

### 6.3. VIEWING JVM RUNTIME INFORMATION

To view JVM runtime information, such as system properties, metrics, and threads, click the **Runtime** tab.

## CHAPTER 7. VIEWING AND MANAGING APACHE CAMEL APPLICATIONS

In the Fuse Console's **Camel** tab, you view and manage Apache Camel contexts, routes, and dependencies.

You can view the following details:

- A list of all running Camel contexts
- Detailed information of each Camel context such as Camel version number and runtime statics
- Lists of all routes in each Camel application and their runtime statistics
- Graphical representation of the running routes along with real time metrics

You can also interact with a Camel application by:

- Starting and suspending contexts
- Managing the lifecycle of all Camel applications and their routes, so you can restart, stop, pause, resume, etc.
- Live tracing and debugging of running routes
- Browsing and sending messages to Camel endpoints

### Prerequisite

The **Camel** tab is only available when you connect to a container that uses one or more Camel routes.

### 7.1. STARTING, SUSPENDING, OR DELETING A CONTEXT

1. In the **Camel** tab's tree view, click **Camel Contexts**.
2. Check the box next to one or more contexts in the list.
3. Click **Start** or **Suspend**.
4. To delete a context:
  - a. Stop the context.
  - b. Click the ellipse icon and then select **Delete** from the dropdown menu.



#### NOTE

When you delete a context, you remove it from the deployed application.

### 7.2. VIEWING CAMEL APPLICATION DETAILS

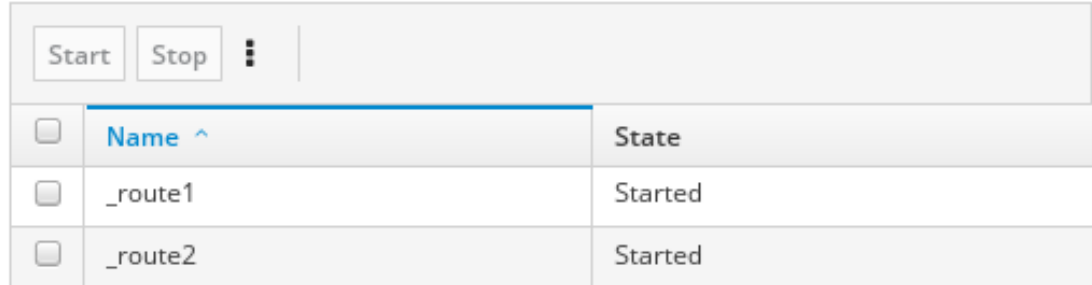
1. In the **Camel** tab's tree view, click a Camel application.
2. To view a list of application attributes and values, click **Attributes**.

3. To view a graphical representation of the application attributes, click **Chart** and then click **Edit** to select the attributes that you want to see in the chart.
4. To view inflight and blocked exchanges, click **Exchanges**.
5. To view application endpoints, click **Endpoints**. You can filter the list by **URL**, **Route ID**, and **direction**.
6. To view, enable, and disable statistics related to the Camel built-in type conversion mechanism that is used to convert message bodies and message headers to different types, click **Type Converters**.
7. To view and execute JMX operations, such as adding or updating routes from XML or finding all Camel components available in the classpath, click **Operations**.

## 7.3. VIEWING A LIST OF THE CAMEL ROUTES AND INTERACTING WITH THEM

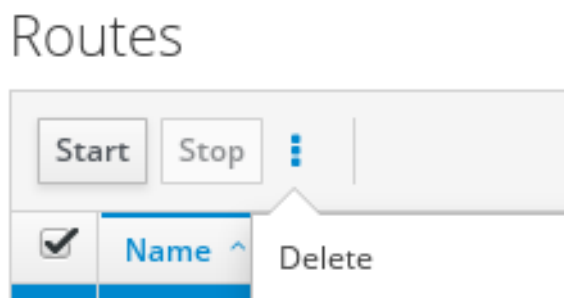
1. To view a list of routes:
  - a. Click the **Camel** tab.
  - b. In the tree view, click the application's routes folder:

Routes



<input type="checkbox"/>	Name ^	State
<input type="checkbox"/>	_route1	Started
<input type="checkbox"/>	_route2	Started

2. To start, stop, or delete one or more routes:
  - a. Check the box next to one or more routes in the list.
  - b. Click **Start** or **Stop**.
  - c. To delete a route, you must first stop it. Then click the ellipse icon and select **Delete** from the dropdown menu.



**NOTE**

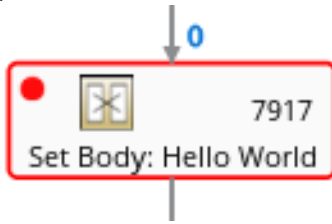
- When you delete a route, you remove it from the deployed application.
- You can also select a specific route in the tree view and then click the upper-right menu to start, stop, or delete it.

3. To view a graphical diagram of the routes, click **Route Diagram**.
4. To view inflight and blocked exchanges, click **Exchanges**.
5. To view endpoints, click **Endpoints**. You can filter the list by URL, Route ID, and direction.
6. Click **Type Converters** to view, enable, and disable statistics related to the Camel built-in type conversion mechanism, which is used to convert message bodies and message headers to different types.
7. To interact with a specific route:
  - a. In the **Camel** tab's tree view, select a route.
  - b. To view a list of route attributes and values, click **Attributes**.
  - c. To view a graphical representation of the route attributes, click **Chart**. You can click **Edit** to select the attributes that you want to see in the chart.
  - d. To view inflight and blocked exchanges, click **Exchanges**.
  - e. Click **Operations** to view and execute JMX operations on the route, such as dumping the route as XML or getting the route's Camel ID value.
8. To trace messages through a route:
  - a. In the **Camel** tab's tree view, select a route.
  - b. Select **Trace**, and then click **Start tracing**.
9. To send messages to a route:
  - a. In the **Camel** tab's tree view, open the context's endpoints folder and then select an endpoint.
  - b. Click the **Send** subtab.
  - c. Configure the message in JSON or XML format.
  - d. Click **Send**.
  - e. Return to the route's **Trace** tab to view the flow of messages through the route.

## 7.4. DEBUGGING A ROUTE

1. In the **Camel** tab's tree view, select a route.
2. Select **Debug**, and then click **Start debugging**

3. To add a breakpoint, select a node in the diagram and then click **Add breakpoint**. A red dot appears in the node:



The node is added to the list of breakpoints:

Breakpoints	
setBody1	×
log1	×

4. Click the down arrow to step to the next node or the **Play** button to resume running the route.
5. Click the **Pause** button to suspend all threads for the route.
6. Click **Stop debugging** when you are done. All breakpoints are cleared.

## CHAPTER 8. VIEWING AND MANAGING JMX DOMAINS AND MBEANS

Java Management Extensions (JMX) is a Java technology that allows you to manage resources (services, devices, and applications) dynamically at runtime. The resources are represented by objects called MBeans (for Managed Bean). You can manage and monitor resources as soon as they are created, implemented, or installed.

With the JMX plugin on the Fuse Console, you can view and manage JMX domains and MBeans. You can view MBean attributes, run commands, and create charts that show statistics for the MBeans.

The **JMX** tab provides a tree view of the active JMX domains and MBeans organized in folders. You can view details and execute commands on the MBeans.

### Procedure

1. To view and edit MBean attributes:
  - a. In the tree view, select an MBean.
  - b. Click the **Attributes** tab.
  - c. Click an attribute to see its details.
2. To perform operations:
  - a. In the tree view, select an MBean.
  - b. Click the **Operations** tab, expand one of the listed operations.
  - c. Click **Execute** to run the operation.
3. To view charts:
  - a. In the tree view, select an item.
  - b. Click the **Chart** tab.

## CHAPTER 9. VIEWING AND MANAGING QUARTZ SCHEDULES

Quartz (<http://www.quartz-scheduler.org/>) is a richly featured, open source job scheduling library that you can integrate within most Java applications. You can use Quartz to create simple or complex schedules for executing jobs. A job is defined as a standard Java component that can execute virtually anything that you program it to do.

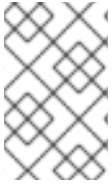
The Fuse Console shows the **Quartz** tab if your Camel route deploys the **camel-quartz2** component. Note that you can alternately access Quartz mbeans through the JMX tree view.

### Procedure

1. In the Fuse Console, click the **Quartz** tab.  
The **Quartz** page includes a treeview of the Quartz Schedulers and **Scheduler**, **Triggers**, and **Jobs** tabs.
2. To pause or start a scheduler, click the buttons on the **Scheduler** tab.
3. Click the **Triggers** tab to view the triggers that determine when jobs will run. For example, a trigger can specify to start a job at a certain time of day (to the millisecond), on specified days, or repeated a specified number of times or at specific times.
  - To filter the list of triggers select **State**, **Group**, **Name**, or **Type** from the drop-down list. You can then further filter the list by selecting or typing in the fill-on field.
  - To pause, resume, update, or manually fire a trigger, click the options in the **Action** column.
4. Click the **Jobs** tab to view the list of running jobs. You can sort the list by the columns in the table: **Group**, **Name**, **Durable**, **Recover**, **Job ClassName**, and **Description**.

## CHAPTER 10. VIEWING DIAGNOSTICS

Use the **Diagnostics** tab to view diagnostic information about the JVM via the JVM DiagnosticCommand and HotspotDiagnostic interfaces.



### NOTE

The functionality is similar to the **Diagnostic Commands** view in Java Mission Control (jmc) or the command line tool jcmd. The plugin will provide corresponding jcmd commands in some scenarios.

### Procedure

1. To retrieve the number of instances of loaded classes and the amount of bytes they take up, click **Class Histogram**. If the operation is repeated, the tab shows the difference since last run.
2. To view the JVM diagnostic flag setting, click the **JVM flags**.
3. For a running JVM, you can also modify the flag settings.

### Additional resources

The supported JVM depends on the platform, for more information go to one of the following sources:

- <http://www.oracle.com/technetwork/java/vmoptions-jsp-140102.html>
- <http://openjdk.java.net/groups/hotspot/docs/RuntimeOverview.html>



## CHAPTER 11. VIEWING THREADS

You can view and monitor the state of threads.

### Procedure

1. Click the **Runtime** tab and then the **Threads** subtab. The **Threads** page lists active threads and stack trace details for each thread. By default, the thread list shows all threads in descending ID order.
2. To sort the list by increasing ID, click the **ID** column label.
3. Optionally, filter the list by thread state (for example, **Blocked**) or by thread name.
4. To drill down to detailed information for a specific thread, such as the lock class name and full stack trace for that thread, in the **Actions** column, click **More**.

## APPENDIX A. FUSE CONSOLE CONFIGURATION PROPERTIES

By default, the Fuse Console configuration is defined in the **hawtconfig.json** file. You can customize the Fuse Console configuration information, such as title, logo, and login page information.

Table A.1, “Fuse Console Configuration Properties” provides a description of the properties and lists whether or not each property requires a value.

**Table A.1. Fuse Console Configuration Properties**

Section	Property Name	Default Value	Description	Required?
About	Title	Red Hat Fuse Management Console	The title that shows on the About page of the Fuse Console.	Required
	productInfo	<i>Empty value</i>	Product information that shows on the About page of the Fuse Console.	Optional
	additionalInfo	<i>Empty value</i>	Any additional information that shows on the About page of the Fuse Console.	Optional
	copyright	<i>Empty value</i>	Copyright information that shows on the About page of the Fuse Console.	Optional
	imgSrc	<b>img/Logo-RedHat-A-Reverse-RGB.png</b>	The image that appears on the About page of the Fuse Console.	Required
branding	appName	Red Hat Fuse Management Console	The name for your application. This name displays in the title bar of the Fuse Console.	Required

Section	Property Name	Default Value	Description	Required?
	appLogoUrl	<b>img/Logo-Red_Hat-Fuse-A-Reverse- RGB.png</b>	The path to your application logo image file that displays in the Fuse Console navigation bar. The value can be a path relative to the Hawtio status URL or an absolute URL.	Required
	Css		The URL of an external CSS stylesheet, that can be used to style the application. It can be a path, relative to the Hawtio status URL, or it can be an absolute URL.	Optional
	companyLogoUrl	<b>img/Logo-RedHat-A-Reverse- RGB.png</b>	The path to your company logo image file.	Required
	Favicon		The URL of the favicon, that usually displays in the Web browser tab. It can be a path, relative to the Hawtio status URL, or it can be an absolute URL.	Optional
login	description	<i>Empty value</i>	Descriptive text that displays on the Fuse Console Login page (for example, <a href="http://localhost:8181/hawtio">http://localhost:8181/hawtio</a> ).	Optional

Section	Property Name	Default Value	Description	Required?
	links	[ ]	Specify an array of <b>"url"</b> and <b>"text"</b> pairs to provide additional links to pages where the user can get more information or help.	Optional
disabledRoutes	<i>none</i>	[ ]	Disables specific paths (i.e., plugins) on the console. Do not change this section. Any change is not supported for distributions other than OpenShift.	Optional