



BEA JRockit Mission Control™®

Introduction to BEA JRockit Management Console

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Introduction to the Management Console

The BEA Management Console, part of BEA JRockit BEA Mission Control 2.0, allows you to monitor and control running instances of the BEA JRockit JVM. It provides real-time information about the running Java application's characteristics, such as memory consumption and CPU usage. This information can be used both during development—for example, to find where in an application's life cycle it consumes more memory—and in a deployed environment—for example, to monitor the system health of a running application server.

This section includes the following topics:

- [How Does the Management Console Work?](#)
- [Management Console Components](#)
- [The Role of JMX](#)
- [Console Licensing](#)
- [Console Overhead](#)

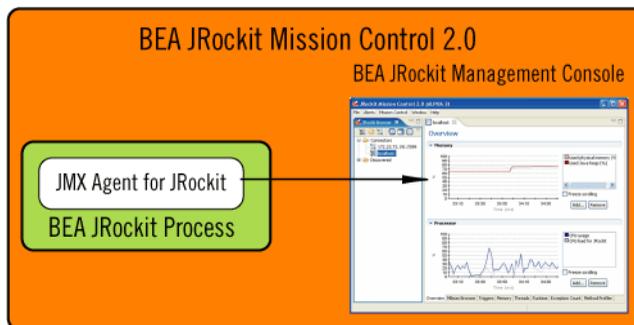
How Does the Management Console Work?

BEA JRockit is highly instrumented for monitoring and management. The platform provides information on performance, resource consumption, and the JVM and logging settings of applications running on the Java platform.

BEA Mission Control uses the Java Management Extensions (JMX) interface for monitoring and managing resources on a network. JMX provides a standard way to connect to the Java runtime

environment and applications; the JMX Remote API allows that environment to be accessed remotely. The environment is accessible through the JMX managed bean (MBean) interfaces, which are registered in the management server. Applications can also create their own MBeans and register them in the management server, which can serve as a single point for remote access. A JMX-compliant client, such as the BEA JRockit Management Console, can connect to the platform management server and manage the application (as well as the Java platform) using JMX technology (see [Figure 1-1](#)).

Figure 1-1 Overview of the Management Console



For More Information

- For information on JMX, see [The Role of JMX](#).
- For information on Management Console components, see [Management Console Components](#)

Management Console Components

The Management Console is a multi-tabbed interface, each tab allowing you to monitor and/or manage an aspect of a running application. Which tabs your version of the Management Console uses depends on which Java plug-ins you have installed with the console. When fully-implemented, the console will include eight tabs ([Figure 1-2](#)) and one menu, which map to seven plug-ins.

Figure 1-2 Fully Implemented Management Console



This topic describes each of these Management Console components. It includes these sections:

- [Overview Tab](#)
- [MBean Browser Tab](#)
- [Triggers Tab](#)
- [Memory Tab](#)
- [Threads Tab](#)
- [Runtime Tab](#)
- [Exception Count Tab](#)
- [Method Profiler Tab](#)

Overview Tab

Plug-in: `com.jrockit.mc.console.ui.overview`

The **Overview** tab allows you to monitor processor behavior and memory statistics during system runtime. The **Overview** tab is helpful in analyzing a system's general health as it can reveal behavior that might indicate bottlenecks or other sources of poor system performance.

MBean Browser Tab

Plug-in: `com.jrockit.mc.console.ui.mbeanbrowser`

The Management Console uses management beans (MBeans) to provide a unified and consistent interface for monitoring and managing application performance. The **MBean Browser** tab is a tool for monitoring the performance of these MBeans.

Triggers Tab

Plug-in: `com.jrockit.mc.console.ui.notification`

The **Triggers** tab lists all trigger rules that you have created for an application and allows you to activate or deactivate any trigger. These rules, when violated, launch a user-defined notification that advises users of the violating condition.

Memory Tab

Plug-in: `com.jrockit.mc.console.ui.overview`

The **Memory** tab allows you to monitor how efficiently your application is using the memory available to it. This tab focuses on heap usage, memory usage, and garbage collection schemes. The information provided on this tab can greatly assist you in determining whether you have configured BEA JRockit to provide optimal application performance.

Threads Tab

Plug-in: `com.jrockit.mc.console.ui.threads`

The **Threads** tab allows you to monitor thread activity for a running application. This tab contains both a graph that plots thread usage by an application over time and a sortable list of all live threads used by the application. It will also display thread stack traces.

Runtime Tab

Plug-in: `com.jrockit.mc.console.ui.system`

The **Runtime** tab allows you to monitor system performance during runtime. This tab provides such information as the average processor load over time and as a percentages of the overall load, the number of Java processes currently running, and the percentage of overall processor load. It also lists all system properties loaded with the application.

Exception Count Tab

Plug-in: `com.jrockit.mc.console.ui.profiler`

The **Exception Count** tab provides a type of profiling that counts the number of exceptions of a certain type, providing information that is helpful when you are troubleshooting your Java application.

Method Profiler Tab

Plug-in: `com.jrockit.mc.console.ui.profiler`

The **Method Profiler** tab allows you to monitor method execution in a non-intrusive way. Method profiling can provide information about the average time spent in selected methods and the number of times methods are invoked. monitor you running application's methods and find out where in the code you might have glitches.

Alerts Menu

Plug-in: `com.jrockit.mc.alert`

The **Alerts** menu is associated with `com.jrockit.mc.console.ui.notification`, which plugs in here. This menu launches the **Application Alerts** dialog box, which displays alerts generated when rules set on the [Triggers Tab](#).

The Role of JMX

Like SNMP and other management standards, the Java Management Extensions (JMX) is a public specification and many vendors of commonly used monitoring products support it. JMX provides a standard way to monitor the Java runtime environment and applications; the JMX Remote API allows that monitoring to be accessed remotely. The instrumentation is accessible through the JMX managed bean (MBean) interfaces, which are registered in the management server. Applications can also create their own MBeans and register them in the management server, which can serve as a single point for remote access. A JMX-compliant client, such as the BEA Mission Control Management Console, can connect to the platform management server and manage the application (as well as the Java platform) using JMX technology.

Compatibility with J2SE 1.4.2

Generally, JMX is a feature available only on applications running on J2SE 1.5.0 (5.0). To accommodate Management Console users running on J2SE 1.4.2, BEA Mission Control provides an adapter layer that allows them access to JMX.

For a complete reference on the JMX standard, please refer to:

<http://java.sun.com/j2se/1.5.0/docs/api/javax/management/package-summary.html>

Console Licensing

The following license types are currently available:

- **Developer License**—The Developer License is free and allows BEA JRockit to run the Management Console for one hour.
- **Enterprise License**—The Enterprise License allows unlimited use of the Management Console. It is bound to an IP address.

To download the necessary license, please visit:

<http://dev2dev.bea.com/jrockit/tools.html>

Console Overhead

The extra cost of running the Management Console against a running BEA JRockit JVM is small and can almost be disregarded. This provides for a low cost monitoring and profiling of your application.

Note: We do not recommend that you run the Management Console on the same machine as the JRockit you are monitoring. If you run the Management Console on the same machine, the Management Console GUI will steal valuable resources from the applications running on the JVM and you risk performance degradation as a result.

Using the Management Console

The Management Console is comprised of many components, some of which can be manipulated while others remain static. For example, graphs plot such information as CPU usage and thread counts, while tables display raw statistical information such as how many CPUs are in use and how long the application has been running. The topics in this section serve as general instructions for using the console components to properly manage your running application. It includes these topics:

- [Starting the Management Console](#)
- [Customizing Settings](#)
- [Parts of the Management Console](#)
- [Maximizing and Minimizing a Tab](#)
- [Changing the Console View](#)
- [Adding and Removing an Attribute](#)
- [Zooming-in to a Graph](#)
- [Changing the Y-Axis on a Graph](#)

Starting the Management Console

To start the Management Console, you attach it to a management server or local host, depending upon how you have deployed your system. Before you can start the Management Console, you must have an application running on an instance of BEA JRockit.

To start the console

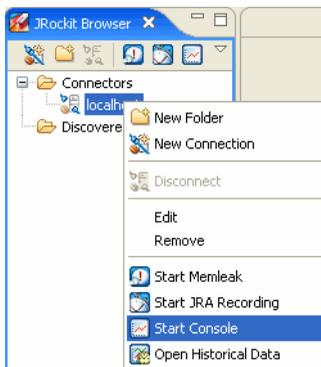
1. With Mission Control, locate the server to which you want to connect in the Mission Control Browser (Figure 2-1).

Figure 2-1 Locating the Server in the Mission Control Browser



2. Right-click the mouse.
A context menu for the connection opens (Figure 2-2).

Figure 2-2 Connection Context Menu



3. Select **Start Console**.
After a few moments, the Management Console appears in the right panel of Mission Control.

Customizing Settings

You can change preferences for updating frequency, persistence directory, maximum log size, etc. for the Management Console.

This section is divided into the following topics:

- [To open the preferences window for the Management Console](#)
- [To change communication settings](#)
- [To change persistence settings](#)

To open the preferences window for the Management Console

- Click **Window > Preferences > JRockit Mission Control > Management Console**.

The **Preferences** window opens.

To change communication settings

1. Click **Window > Preferences > JRockit Mission Control > Management Console > Communication**.
2. Set the communication options for the Management Console.
 - **Default update interval [ms]**—this is the time interval that the Management Console updates displayed information.
 - **Mail server (SMTP)**—this is the mail server that is used when, for example, sending notifications.
 - **E-mail address**—this is the e-mail address that is used as the sender address when the system sends notifications.
 - **Update interval for thread stacks [ms]**—this is the e-mail address that is used when the system sends notifications.
3. Click **OK**.

To change persistence settings

1. Click **Window > Preferences > JRockit Mission Control > Management Console > Persistence**.

The following can be set:

- **Persistence directory**—this is where the Management Console saves the persisted values of attributes (in the attribute subscription log). Values that are saved are, for example, any changes that you make to MBeans, i.e., name changes or such. If there, for some reason, arises problems with the logs, you can clear the logs by deleting them and then have the Management Console create a new one for you.
- **Enable log rotation**—when enabling log rotation, you can set a size on the persisted log. By doing so, you let the Management Console create a new log file as soon as the limit is reached.
- **Limit maximum log size**—when combining the log rotation setting with a setting for the maximum log size, you will enable full log rotation, i.e. the Management Console will delete the oldest log file as soon as the maximum log size limit is reached, and you will always know how much space the log files take on your computer.

2. Click **OK**.

Parts of the Management Console

As described in [Introduction to the Management Console](#), the Management Console is a multi-tab interface, with the tabs linked to specific Java plug-ins that ship with the console (which itself is a plug-in of BEA Mission Control 2.0). Each tab is comprised of different elements that you use to manage and monitor a running application. These elements are listed in this topic.

- [Panels](#)
- [Graphs](#)
- [Tables](#)
- [Lists](#)
- [Data Input Panels](#)

Panels

Each tab is divided into panels ([Figure 2-3](#)), “boxes” of information that separate different groups of tenuously- or specifically-related data into logical collections.

Figure 2-3 Panels Contain Different Types of Information, Such as These Panels on the Trigger Tab

▼ Trigger Condition

Please select what kind of event the rule should trigger on.

Attribute:

Max trigger value:

Sustained [s]:

Limit period [s]:

Trigger on ascending flank

Trigger on descending flank

▼ Trigger Action

Please select what action you like to perform when the rule is triggered.

- Application alert
- Console output
- Send e-mail
- Start JRA Recording
- Thread stack dump

▼ Trigger Constraints

Set the constraints (optional).

Date span

Day of week

Time span

Monday

Tuesday

Wednesday

Thursday

Friday

Saturday

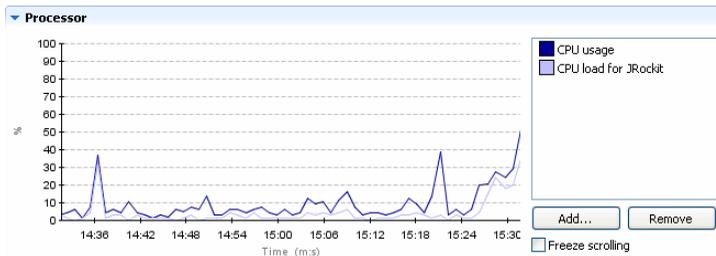
Sunday

Panels contain the other components of the tab; for example, [Graphs](#), [Tables](#), and [Lists](#) and some panels also include input fields (the use of these input fields is described in the topic covering the specific tab). Panels allow data input and viewing. The number of panels is different on each tab and is determined by the number of different data sets shown on the tab. Panels can be hidden, as described in [Changing the Console View](#) and some can be reformatted from vertical to horizontal, as described in [Changing the Console View](#).

Graphs

Graphs ([Figure 2-4](#)) show performance of an attribute over time.

Figure 2-4 Typical Management Console Graph



The values are plotted on the X-axis (vertical axis) and are usually specified in percentages or raw numbers. The time element is plotted on the Y-axis (horizontal axis). Time is displayed in increments of seconds, minutes, or hours. Each graph has a legend that uses a color patch to identify the attribute being plotted. You can add or remove attributes from a graph by following the procedures in [Adding and Removing an Attribute](#).

The following Management Console tabs include graphs as part of their content:

- Overview
- Memory
- Runtime
- Threads

Tables

Tables ([Figure 2-5](#)) show statistics and other quantifiable information about a running application.

Figure 2-5 Typical Management Console Table

Live Threads 2:39:21 PM

Filter column Thread Name * *

Thread Name	Thread State	Unknown name	Is Native
Main Thread	TIMED_WAITING	N/A	Yes
(Signal Handl...	RUNNABLE	N/A	Yes
(Code Gener...	RUNNABLE	N/A	Yes
(Code Optimi...	RUNNABLE	N/A	Yes
(GC Main Thr...	RUNNABLE	N/A	Yes
(VM Periodic ...	RUNNABLE	N/A	Yes
Finalizer	RUNNABLE	N/A	Yes
Reference H...	RUNNABLE	N/A	Yes
Timer-0	TIMED_WAITING	N/A	Yes
RMI TCP Acc...	RUNNABLE	N/A	Yes
RMI TCP Acc...	RUNNABLE	N/A	Yes
RMI TCP Con...	RUNNABLE	N/A	Yes
RMI TCP Con...	RUNNABLE	N/A	Yes
RMI LeaseCh...	TIMED_WAITING	N/A	Yes
JMX server c...	WAITING	N/A	Yes

Tables show data in columnar (or tabular) form and on some tables, data is selectable; that is, you can select a line of data and perform some function on it such as on the **Live Threads** table on the [Threads Tab](#). You can add and remove attributes to a table, as described in [Adding and Removing an Attribute](#). You can change the sort order of information from ascending to descending on a table by clicking its column head.

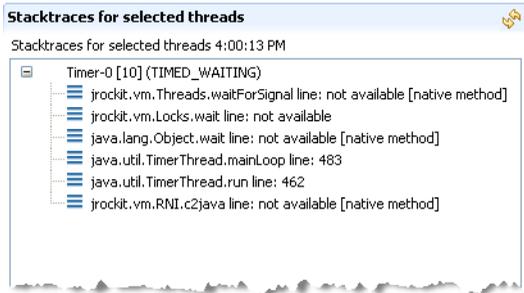
The following Management Console tabs include tables as part of their content:

- MBean Browser
- Memory
- Threads
- Runtime
- Exception Count
- Method Profiler

Lists

Lists ([Figure 2-6](#)) display selectable information that is usually compiled either by system action—such as the stacktrace list on the [Threads Tab](#)—or by the user—such as the trigger rules list on the [Triggers Tab](#).

Figure 2-6 List Show Thread Stacktraces from the Threads Tab



Generally, items on lists are selectable, such as the **Trigger Rules** list on the [Triggers Tab](#) where you can select or deselect a rule; however, some lists are for viewing only, such as the System Properties list on the [Runtime Tab](#).

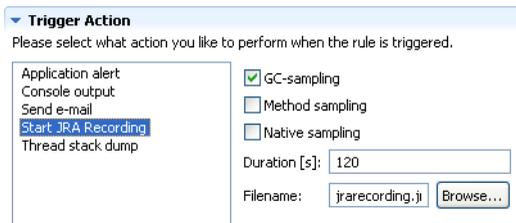
The following Management Console tabs include lists as part of their content:

- Triggers
- Threads
- Runtime
- Exception Count
- Method Profiler

Data Input Panels

Data input panels ([Figure 2-7](#)) contain input fields where you can enter specific data to apply to an attribute.

Figure 2-7 Typical Data Input Panel (*Actual Fields Will Vary*)

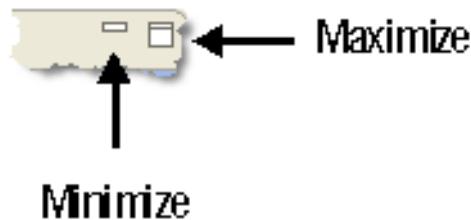


Maximizing and Minimizing a Tab

When you maximize the tab, it will expand over the Mission Control Browser. This is helpful if you need more space to display information on a horizontal graph. Minimizing the tab will close it completely and expand the Mission Control Browser to the full extent of the Mission Control window.

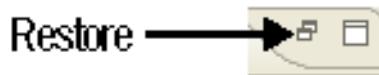
1. To maximize the Runtime tab, click the Maximize control (Figure 2-8).

Figure 2-8 Maximize and Minimize Controls



The tab expands to the full extent of the Mission Control window and the Maximize control changes to the Restore control (Figure 2-9).

Figure 2-9 Restore Control



2. Click the Minimize control (Figure 2-8) to shut the tab.

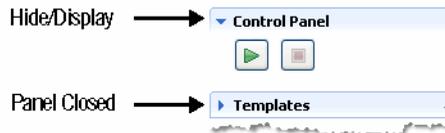
The tab closes and the Mission Control Browser expands to the full extent of the Mission Control window.

3. Click the Restore control to restore the tab to its original state.

Changing the Console View

You can toggle the certain panels open and close by clicking the hide/display arrow at the top of the panel (Figure 2-10).

Figure 2-10 Hide/Display Arrow



Adding and Removing an Attribute

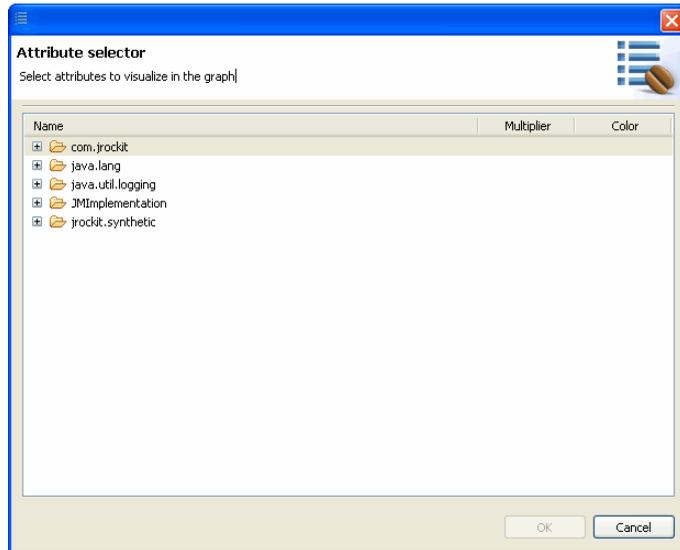
An “attribute” represents a piece of information germane to the MBean’s management purpose; for example, a data item you can plot on the **Processor Usage** graph. This topics shows you how:

- To add an attribute
- To change the color of the attribute
- To change the multiplier of the attribute
- To remove an attribute

To add an attribute

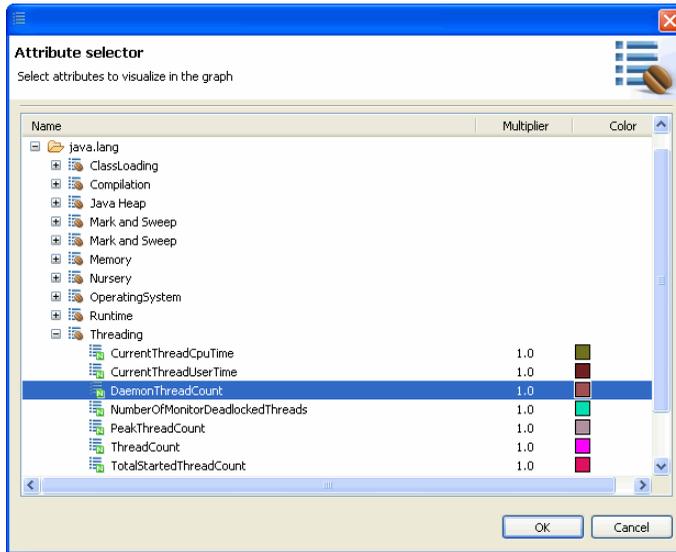
1. Select **Add**.

The Attribute Selector appears ([Figure 2-11](#)).

Figure 2-11 Attribute Selector

2. Identify the Java package that contains the attribute you want to monitor and drill down by clicking on the necessary plus-signs; for example, if you want to plot the thread count, you would drill down as shown in [Figure 2-12](#).

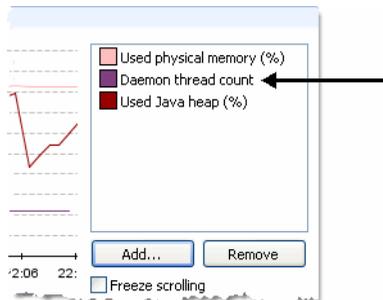
Figure 2-12 Drilling Down to the Preferred Attribute



3. Click **OK**.

The **Attribute Selector** disappears and the selected attribute appears in the graph or table's legend (Figure 2-13) or on the list for which you selected it.

Figure 2-13 Legend with Added Attribute



To change the color of the attribute

1. Select the attribute you want to change. On a graph or table, you would select it from the legend; on a list, you would select it directly from the list (see Figure 2-14).
2. Right-click the legend and select **Edit color**.

3. Pick a new color in the **Color** window or define your own.
4. Click **OK**.

To change the multiplier of the attribute

1. Select the attribute you want to change the multiplier for (see [Figure 2-14](#)).

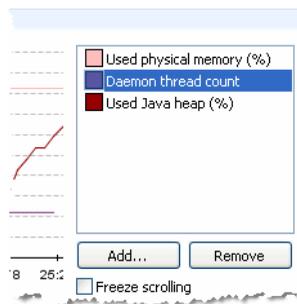
A multiplier is number that the graphs will use to multiply the real value. For example, CPU usage has a multiplier between 0 and 1 that are converted to a percentage in the graph. If the multiplier is 1 it equals 100%.

2. Right-click the legend and select **Edit multiplier**.
3. Enter a new value for the multiplier.
4. Click **OK**.

To remove an attribute

1. Select the attribute you want to delete. On a graph or table, you would select it from the legend; on a list, you would select it directly from the list (see [Figure 2-14](#)).

Figure 2-14 Legend with Attribute Selected



2. Click **Remove**.

The attribute disappears from the tab.

Zooming-in to a Graph

You can zoom-in on either a selected portion of the graph or to different time granularities, as described in [Table 2-1](#).

Table 2-1 Graph Zoom Levels

This zoom level	Shows this information
Selection	A specific, user-defined range on the graph.
Seconds	Second-by-second CPU usage.
Minutes	Minute-by-minute CPU usage.
Hours	Hour-by-hour CPU usage.
Zoom In	Zooms in one incremental step of time; for example, if the graph is incrementing time by the second, selecting this command changes the time increment to minutes. Selecting it a second time changes the time increment to hours.
Zoom Out	Zooms out one incremental step of time; for example, if the graph is incrementing time by the hour, selecting this command changes the time increment to minutes. Selecting it a second time changes the time increment to seconds.

This section explains the following:

- [To zoom-in on a selected range on the graph](#)
- [To zoom-in to a specific time increment](#)

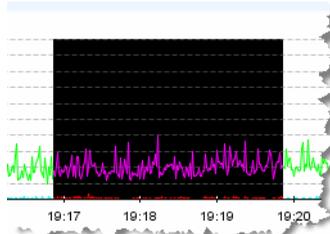
To zoom-in on a selected range on the graph

1. Select the **Freeze scrolling** checkbox.

The graph stops scrolling. This step is important because the data will scroll out of the selected range if you don't freeze it, skewing your results.

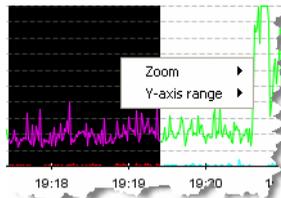
2. Place the pointer at the far left edge of your selected data range and, holding down the left mouse button, drag to the far right edge of the range, as shown in [Figure 2-15](#).

Figure 2-15 Graph with Range Selected



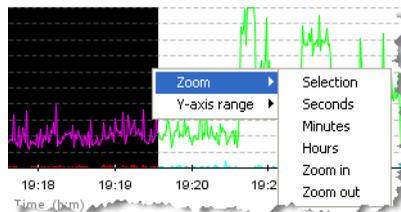
3. Place the pointer over the selection and right-click the mouse.
A context menu for the graph appears (Figure 2-16).

Figure 2-16 Graph Context Menu



4. Select **Zoom...**
A submenu for **Zoom...** appears (Figure 2-17).

Figure 2-17 Graph Context Menu with Zoom Level Submenu Open



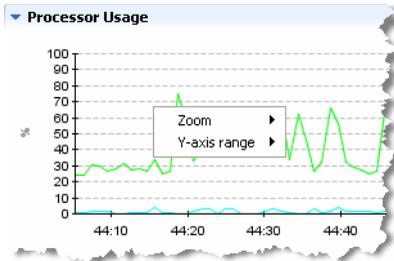
5. Select **Selection**.
The graph refreshes and now shows a detailed view of the selected data range.

To zoom-in to a specific time increment

1. Place the pointer anywhere on the graph and right-click the mouse.

The graph's context menu appears (Figure 2-18).

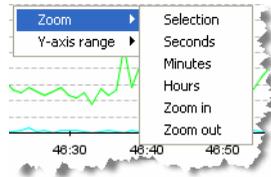
Figure 2-18 Graph Context Menu



2. Select **Zoom...**

The zoom level context menu appears (Figure 2-19).

Figure 2-19 Zoom Level Context Menu



3. Select the time increment at which you want to monitor data.

The graph refreshes to show the data within the selected time increment.

Changing the Y-Axis on a Graph

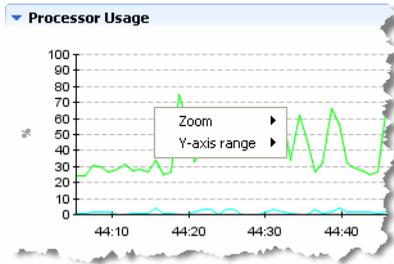
Graph data expressed in percentages shown on the Process Usage graph's Y (vertical) axis. By default, these percentages run from 0 to 100%. Use the following procedure to change the Y-axis range.

To change the Y-axis range

1. Place the pointer anywhere on the graph and right-click the mouse.

The graph's context menu appears (Figure 2-20).

Figure 2-20 Graph Context Menu



2. Select **Y-axis range...**

The Y-axis range context menu appears (Figure 2-21).

Figure 2-21 Y-axis Range Context Menu

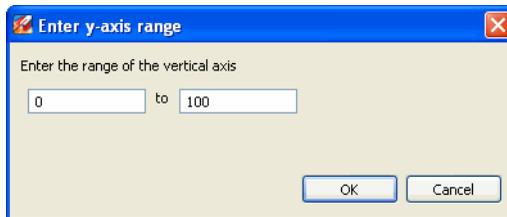


3. Select the range type you want to use.

- **Auto** sets the range to that which will include all attributes selected for the graph.
- **Percent** sets the range at 0 to 100%.
- **Custom** sets any range.

If you select **Custom**, the **Enter y-axis range** dialog box appears (Figure 2-22).

Figure 2-22 Enter y-axis range Dialog Box



4. Enter the range you want to show on the Y-axis and click **OK**.

The Y-axis reformats to show the new range; for example, if you set the range from 20% to 75%, the graph would reformat like the example in [Figure 2-23](#).

Figure 2-23 Reformatted Y-Axis with Custom Range Set

