

# HP Business Service Management

for the Windows® operating system

Software Version: 9.00

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## Using Operations Management

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# Welcome to This Guide

This guide describes how to configure, administer, and use Operations Management to do the following:

- ▶ Monitor the events that occur in your organization's IT environment.
- ▶ Correlate the events and events across multiple domains.
- ▶ Compile and display a detailed overview of the health of your systems.

**This chapter includes:**

- ▶ [How This Guide Is Organized](#) on page 16
- ▶ [Who Should Read This Guide](#) on page 16
- ▶ [How Do I Find the Information That I Need?](#) on page 17
- ▶ [Additional Online Resources](#) on page 19
- ▶ [Documentation Updates](#) on page 20

## How This Guide Is Organized

This part of the guide contains the following chapters:

### Part I Working with Operations Management

Explains how to use Operations Management to monitor and manage the events that occur in your IT environment and resolve the underlying problems.

### Part II Configuring Operations Management

Describes the concepts and tasks required to configure and maintain Operations Management. The information provided helps you configure Operations Management for users to monitor and manage the IT environment efficiently.

### Part III Content Packs

Describes the content packs delivered with Operations Management. The information provided helps you configure Operations Management to manage specific areas such as infrastructure elements, databases, and applications.

## Who Should Read This Guide

This guide is intended for the following users of HP Business Service Management:

- ▶ Operations Management software administrators.
- ▶ Domain (subject matter) experts, for example, database experts, and Exchange administrators.
- ▶ Operations Management operators and domain operators.

Users of this guide should be knowledgeable about navigating and using enterprise applications. Users should also be familiar with the concepts underlying enterprise monitoring and management.



## How Do I Find the Information That I Need?

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You can access the Documentation Library by doing the following:



- ▶ In Business Service Management, select **Help > Documentation Library**.
- ▶ From a Business Service Management Gateway Server machine, select **Start > Programs > HP Business Service Management > Documentation**.



### Topic Types

Within this guide, each subject area is organized into topics. A topic contains a distinct module of information for a subject. The topics are generally classified according to the type of information they contain.

This structure is designed to create easier access to specific information by dividing the documentation into the different types of information you may need at different times.

Three main topic types are in use: **Concepts**, **Tasks**, and **Reference**. The topic types are differentiated visually using icons.

Topic Type	Description	Usage
<b>Concepts</b> 	Background, descriptive, or conceptual information.	Learn general information about what a feature does.
<b>Tasks</b> 	<p><b>Instructional Tasks.</b> Step-by-step guidance to help you work with the application and accomplish your goals. Some task steps include examples, using sample data.</p> <p>Task steps can be with or without numbering:</p> <ul style="list-style-type: none"> <li>▶ <b>Numbered steps.</b> Tasks that are performed by following each step in consecutive order.</li> <li>▶ <b>Non-numbered steps.</b> A list of self-contained operations that you can perform in any order.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Learn about the overall workflow of a task.</li> <li>▶ Follow the steps listed in a numbered task to complete a task.</li> <li>▶ Perform independent operations by completing steps in a non-numbered task.</li> </ul>
	<p><b>Use-case Scenario Tasks.</b> Examples of how to perform a task for a specific situation.</p>	Learn how a task could be performed in a realistic scenario.

Topic Type	Description	Usage
 <b>Reference</b>	<b>General Reference.</b> Detailed lists and explanations of reference-oriented material.	Look up a specific piece of reference information relevant to a particular context.
	<b>User Interface Reference.</b> Specialized reference topics that describe a particular user interface in detail. Selecting <b>Help on this page</b> from the Help menu in the product generally open the user interface topics.	Look up specific information about what to enter or how to use one or more specific user interface elements, such as a window, dialog box, or wizard.
 <b>Troubleshooting and Limitations</b>	<b>Troubleshooting and Limitations.</b> Specialized reference topics that describe commonly encountered problems and their solutions, and list limitations of a feature or product area.	Increase your awareness of important issues before working with a feature, or if you encounter usability problems in the software.

## Additional Online Resources

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# Part I

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## Working with Operations Management



# 1

---

## Introduction and Overview

The information in this section helps Operations Management operators to monitor the events that occur in your organization's IT environment, correlate events, and, as a result, compile and display a detailed overview of the health of your CIs.

**This chapter includes:**

- [How This Section Is Organized](#) on page 23
- [Who Should Read This Section](#) on page 25

### How This Section Is Organized

This part of the guide contains the following chapters:

**Chapter 1 Introduction and Overview**

This chapter introduces you to chapters describing the basic use of Operations Management.

**Chapter 2 Event Management**

This chapter introduces the concepts of managing events, and describes how to work with events to help solve the problems that they represent.

**Chapter 3 Health Perspective**

This chapter introduces the Health Perspective used to manage events from the point of view of the health of the CIs associated with event received from your monitored objects.

## **Chapter 4 Performance Graphs**

This chapter describes the main concepts of performance graphing, which enables you to generate and view performance graphs and graphs for the objects and events that you are monitoring.

This chapter introduces the concepts of performance graphing, and describes how to generate and view performance graphs for the objects and that you are monitoring.

## **Chapter 5 Actions Pane**

This chapter introduces the Actions pane used to manage running actions on events or their related CIs and nodes.

## **Chapter 6 User Tools**

This chapter describes how to use tools configured in Operations Management to help manage solving the problems identified by events.

## **Chapter 7 Filtering Events**

This chapter describes the main concepts of event filters and how you can use filters to focus on the information that you want to see and, as a result, locate and fix problems more quickly and easily.

## **Chapter 8 Views for Operations Management**

This chapter describes the main concepts of views and how you can use views to reduce and refine the configuration items you see in the Model Explorer. The contents of the Event Browser are filtered by the selected configuration item.



## Who Should Read This Section

This guide is intended for the following users:

- Operations Management users
- Operations Management subject matter experts (for example, DB, and Exchange)

Users of this section should be familiar with:

- Navigating and using enterprise applications
- Enterprise monitoring and management concepts

For more information about how to configure Operations Management to manage events, see "Introduction and Overview" on page 231.

Welcome to This Guide

# 2

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## Event Management

### **This chapter includes:**

#### Concepts

- [Operations Management Orientation](#) on page 29
- [Event Browser and the Event Perspective](#) on page 32
- [Health Perspective](#) on page 45
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- ▶ [Browser Options Dialog Box on page 99](#)

- ▶ [Closed Events Browser Configuration Dialog](#) on page 100
- ▶ [Relate Events Dialog](#) on page 102
- ▶ [Correlation Rule Generator Dialog](#) on page 104
- ▶ [opr-archive-events Command-Line Interface](#) on page 109
- ▶ [opr-close-events Command-Line Interface](#) on page 111
- ▶ [Troubleshooting and Limitations](#) on page 113

## **Operations Management Orientation**

Managing events with Operations Management helps you to do the following:

- ▶ Restore services
- ▶ Minimize service disruptions

### **Operations Management Application**

You can find the Operations Management Application pages using the following menu option:

**Applications > Operations Management**

The Operations Management Application area includes the following tabs:

- ▶ **Event Perspective**

Display, monitor, and manage the events that occur in your IT environment. For details, see "Event Browser and the Event Perspective" on page 32.

- ▶ **Health Perspective**

Display alternative perspectives of the events you are monitoring. For details, see "Health Perspective" on page 45.

► **Performance Perspective**

Configure, generate, and view graphs and tables that can help you understand and manage the performance of the systems in the environment you are managing with Operations Management. For details, see "Performance Graphs" on page 47.

## **Operations Management Administration**

You can find the Operations Management Administration pages from:

**Admin > Operations Management**

The Operations Management Administration area is organized as follows:

► **Design Operations Content**

Contains following managers that you use to make the essential configurations for event management:

► **Tools**

Display and configure the tools that your users need to help manage the events occurring in your IT environment. For details, see "Tools Management" on page 238.

► **Performance Graphs**

Display and configure the mapping of CI types to available graph families. For details, see "Performance Graphs Manager" on page 263.

► **Indicator Mapping Rules**

Indicator mapping rules use event filters to identify event attributes that are used to set or modify an indicator value. If the mapped indicator sets a health indicator, the corresponding values for the health indicator are also set. For details, see "Indicator Mapping Rules Manager Basics" on page 284.

► **View Mappings**

Map an existing view to one or more configuration item types, and manage the views. Display the list of mapped views in the Selected View list in the Health Top View pane of the Health Perspective tab. For details, see "View Mappings Manager" on page 310.

➤ **Correlation Rules**

Define and deploy the rules and policies that enable you to correlate the events that occur in the different domains in your IT environment. For details, see "Topology-Based Event Correlation" on page 329.

➤ **Tune Operations Management**

Contains the following managers used to customize Operations Management to match your individual needs:

➤ **Connected Servers**

Manage the servers that Operations Management uses to encapsulate snapshots of configuration data about the health of the networks you are monitoring. For details, see "Connecting Servers" on page 361.

➤ **Forwarding Rules**

Display and configure the rules for forwarding events to other servers in a MOM environment. For details, see "Event Forwarding to External Servers" on page 381.

➤ **Notifications**

Display and configure Email, SMS, and Pager notifications for filtered events. For details, see "Notifications" on page 391.

➤ **Downtime Behavior**

Display and configure the handling of events for CIs in Downtime. For details, see "Downtime Configuration" on page 403.

➤ **Custom Actions**

Display and configure scripts to run custom actions on events. For details, see "Custom Actions" on page 413.

➤ **Event Processing Customizations**

Display and configure scripts used to enrich events with additional information during event processing. For details, see "Handling Events Automatically" on page 423.

► **User Group Assignments**

Display and configure mappings to automatically assign incoming events to existing user groups. For details, see "Assign User Groups to Incoming Events" on page 453.

► **Manage Content**

Contains a link to the BSM Contents Pack manager:

► **Content Packs**

Manage the packages that Operations Management uses to encapsulate snapshots of configuration data about the health of the networks you are monitoring.

## **Event Browser and the Event Perspective**

This section describes the features and functionality of the Event Browser and the Event Perspective. The information you find here covers the following main panes:

► **Model Explorer**

Displays the contents of the configuration item database and enables you to configure filters that determine how you view the contents of the database.

► **Event Browser**

Displays a detailed summary of all the events that occur in the operating environment you are monitoring.

► **Event Details**

Contains more detailed information about the selected event. Event details can be displayed as a pane below the Event Browser or as a popup window.

► **Actions Pane**

Display, and execute the tools, HPOM actions and Run Books that can be executed on the selected events in the Event Browser. For details, see "Tools" on page 52, "Operations Manager Actions" on page 54, and "Launching Operations Orchestration Run Books" on page 55.



The size of all Operations Management Application panes can be manually modified. You can also use the Expand and Collapse buttons to alter the display formats to predefined settings. The Restore button revert the associated pane to the default size.

## Model Explorer

The Model Explorer displays the CIs and relationships from the ODB. It enables you to select views that filter the contents of the ODB before presenting it in a CI tree in the Browse Views tab to simplify navigation.

When you select one or more configuration items in the CI Tree, a filter is automatically applied to the Event Browser so that only those events that are related to the selected configuration items are displayed.

The selected view also limits the events displayed to those related to CIs contained by the view. The Model Explorer selections can also be cleared using the **Clear All** button.

---

**Note:** The behavior of the Event Browser depends on the type of the CI selected: CI Group type, Node type, or Other types.

---

## Event Browser

The Event Browser displays a summary of all the events that have occurred in the operating environment you are monitoring. The details include:


- Date and time when the event occurred.
- Host system (node) where the event occurred.
- Application that caused the event.
- Severity of the event.
- The user responsible for solving the problem that caused the event, if assigned.

You can also use the Event Browser to display information about the status of a selected event. The event states are **Open**, **In Progress**, **Resolved** or **Closed**. The information displayed by default is a small selection of the total information available about an event.


---

**Tip:** Tool tips are available and provide a brief explanation of the functionality of the associated button.

---

You can configure the contents of the Event Browser to show the information that is most important to you using the Browser Options  dialog box.

All changes you make to the Event Browser layout are automatically saved to your user account. The next time you logon, the Event Browser displays the latest events in accordance with the way you configured the Event Browser. For example, when you relogin, the last selected view and Event Browser tab are selected and reopened.

Selecting an event in the Event Browser displays the event's properties in the details pane, as long as the details pane is not hidden . The details pane contains tabs that enable you to view and modify some aspects of the selected event (for example, event properties, annotations, custom attributes, and priority).

---

**Note:** It is not possible to edit an event with the state **Closed**, except for adding annotations. To edit a closed event, you must first reopen it.

---

## General Event Details

The General tab in the Event Details pane displays the most commonly required information associated with a selected event. General event information includes the following details:

- **Severity:** Indication of the level of the problem assigned to the selected event. Usually, this is the same as the severity status of the original event received from HP Operations Manager.
- **Lifecycle State:** Point in the event lifecycle that the selected event has reached (Open, In Progress, Resolved or Closed).
- **Priority:** Importance assigned to the selected event (for example, Low, Medium, or High).
- **Location** in the network where the original problem occurred (read-only).
- **User** who is responsible for solving the problem.
- **Message text** in the Title field. This type of text field also supports URLs and hyperlinks.

The available information displayed in the General tab summarizes the most important information contained in the original event. A blank field indicates that no information is available. If you know that a particular type of required information is not automatically available, you can use custom attributes to provide this information.

## Additional Info

The Additional Info tab in the Event Details pane displays more detailed information associated with a selected event. Additional event information includes the following details:

- Application name
- Object
- Key
- Close events with key
- Suppress deduplication flag
- Received during Downtime flag

- ▶ Description of the event
- ▶ Solution information for the event

## Actions

HP Operations Manager actions can be started manually from any events which have actions associated with them. The actions can be used to help solve the problem that caused the event or inform about the existence of a problem, for example, by means of a notification.

The Event Browser displays an icon in the A column to indicate that an automatic action is available for the selected event. An icon in the U column indicates that a user action is available for the selected event. For more information about the icons used in the Event Browser, see "Event Browser Overview" on page 71.

## Annotations

An annotation is a free-text attachment to the description of an event used to provide information that may be useful to solve the cause of this event. You can use the Annotations tab in the Event Details pane to add, view, and manage the annotations associated with an event. The annotations text field also supports URLs and hyperlinks.

The Event Browser displays icons in the annotations column N to indicate that annotations exist for a selected event. For more information about the icons used in the Event Browser, see "Event Browser Overview" on page 71.

## Assignment of Events to Users

The Event Browser shows you to which user and group an event is assigned for investigation and resolution. If the event is not yet assigned, you can assign it from the General tab in the Event Details pane.

You can also configure rules to automatically assign incoming events to available user groups. Automatic assigning of events to user groups responsible for solving these events significantly improves the efficiency of event management. Each event is assigned to an appropriate user group as soon as it is received. All operators in a user group are allowed to work on those events assigned to that user group. For detailed information, see "Event Assignment" on page 453. See also "Event Categories" on page 38.

---

**Note:** To display the contents of the Event Browser according to the user assigned to the event, select the User or Group column header. To define users and user groups, choose the following menu option:

**Admin > Platform > Users and Permissions > User Management**

---

## Closed Events

You can view the history of closed events over a specified time period. This information can help you to derive a better understanding of long-standing problems. From the Closed Events Browser, you can change the lifecycle state of any displayed events, for example, to Open.

The Closed Events Browser shows only a snapshot of closed events available at the time of opening the Closed Events Browser. Reopened events are automatically removed from the Closed Events Browser window. However, events that are closed after the opening of the Closed Events Browser are not automatically added to the current Closed Events Browser window. A refresh is required. The timestamp when the snapshot was taken is displayed in the Closed Events Browser window.

You can create filters to help you identify specific events, for example, to select a particular CI.

For details about using the Closed Events Browser, see "How to View All Closed Events" on page 67.

## Custom Actions

Custom actions are script-based actions that can be executed on the selected event. You configure custom actions from the Custom Actions manager, where you to setup scripts to run custom actions on events. For example, you can add a text string to certain events to make them easier to identify in the Event Browser. Available custom actions for an event are executed from the context menu.

For more information about creating and managing custom actions, see "Custom Actions" on page 413.

## Custom Attributes

Custom attributes are additional information included in the original event forwarded by a monitoring application such as HP Operations Manager. For example, you can define custom attributes to attach the location of the problem element or contact details for the team assigned to troubleshoot the problem.

You can use the Custom Attributes tab in the Event Details pane to view and manage the custom attributes available for an event.

You can also add custom attributes as columns to the Event Browser.

## Event Categories

Event categories are logical groups of events with some similarities (for example, belonging to the same problem area). Event categories help simplify the process of deciding to which user or user group an event type should be assigned for investigation.

The Event Browser displays the category to which a selected event belongs (for example, Storage, Database (DB), System, or WebApp (Web Application)).

---

**Note:** To display the contents of the Event Browser according to event category, include Category as an Event Browser column option and then select the Category column header to sort alphabetically.

---

You can restrict user access to events on the basis of event categories. For example, some users can be restricted to view and work on events belonging to the category Database only. Other users are given access to events that belong to the category System only.

For more information about event assignment, see "Assignment of Events to Users" on page 36.

## Event History

Event history is a log of information about who or which component has changed values of an Operations Management event. This feature enables an operator to see how event attribute values have changed during the life of an event, for example, the sequence of severity changes. Event history information is available in a separate tab in the Event Details pane and can be viewed by any user with access to that event.

### History Tab

The information available in the History tab if event is manually modified in the event console, or automatically by close related events (closing all existing related events to a new incoming event) or duplicate event suppression (retain and update the original event and close newer duplicates) includes the following:

- ▶ The servers timestamp of the modification
- ▶ The old and the new value of the modified attribute(s)
- ▶ Information is also available about the modifier of the event. One of the following types of information is available:
  - ▶ User name, if an Operations Management user has modified the event or if an external user has made the modification.

- ▶ Title line which summarizes an change resulting from automatic closing of related events or an automatic suppression of duplicate events.
- ▶ Integration user name of the HPOM synchronization, if the event is modified by a data synchronization from HPOM.
- ▶ For annotations and custom attributes, the executed action, such as delete, or modify, is displayed in the history line entry.

### **Event History Creation**

An event history entry is created for the following cases:

- ▶ User changes an attribute of an event using the Event Browser.
- ▶ An external user or application changes event attributes using the Northbound Interface.
- ▶ HPOM or another Operations Management instance synchronizes an attribute change to Operations Management.
- ▶ Duplicate suppression changes an existing event.
- ▶ Pair-wise correlation component changes existing events.

An event history entry is not created in the following cases:

- ▶ A pipeline step (for example, CI resolution, or ETI resolution) changes an event which is not marked as received because it is still being processed by the pipeline.
- ▶ Events which are modified by the opr-close-events.bat tool.

### **Event History Characteristics**

The following list summarizes the main technical characteristics of event history information:

- ▶ User cannot modify existing history information.
- ▶ Closing, deleting, and archiving events using the opr-archive-events tool deletes history, but history is included as part of the XML output produced by the opr-archive-events tool.
- ▶ There is no limit to the number of history entries per event.



History is created if one or more of the following properties of an event are modified:

- Cause (cause/symptom relationship)
- Duplicate Count
- Correlation Rule
- Description
- Severity
- HPOM user
- AssignedGroup
- Custom Attributes
- Time Received
- Title
- Lifecycle state
- Priority
- Assigned User

In addition, changes to event annotations are also tracked as changes in the event history.

## Filters

The Event Browser enables you to display events according to filters that you define. For example, you can filter the events displayed according to severity, assigned user, event category, or lifecycle state. For details, see [Filtering Events](#) on page 197.

---

**Tip:** When you select a configuration item in the CI Tree, Operations Management automatically applies a filter to the Event Browser so that only those events are displayed that are related to the selected configuration item.

---

## Instructions

Operators working with the HPOM message browser can see additional instructions, when available, for this message. It is equally helpful for Operations Management operators to be able to access this information when using HPOM servers to forward events to Operations Management. This information is displayed in the Instructions tab of the Event Browser.

HPOM instructions are not contained within the event but are dynamically retrieved from the HP Operations Manager either from the corresponding policy or an external instruction provider when you select the Instructions tab.

---

**Note:** In MOM environments where events can come from multiple servers, you must connect to a server with the policy installed as only these have the instructions available. Originating servers must be configured as a Connected server. For details, see [Connecting Servers](#) on page 361.

---

## Lifecycle Management

The Event Browser enables you to display and track the position of an event in a defined lifecycle. A lifecycle is a complete series of predefined states that summarizes the event's life. The lifecycle states are as follows:

- ▶ **Open:** Event is identified for investigation of the problems that caused the event. It is either not assigned to a user or assigned but not yet being worked on.
- ▶ **In Progress:** Assigned user has started working on the investigation of the event's underlying problems. The name of the assigned user appears in the User column.
- ▶ **Resolved:** Investigation into the selected event's underlying problem has been found and fixed.
- ▶ **Closed:** Event is removed from the list of active events displayed in the Event Browser.



---

**Note:** Lifecycle states are linked to authorizations granted to users. For example, the user to whom an event is assigned can change the assigned event's state from Open to In Progress and Resolved but not to Closed. Only users with higher authority can assign events to other users or change the event lifecycle state from Resolved to Closed.

---

Although the lifecycle states occur in a consecutive manner, you can set an event's lifecycle state at any time. For example, you can assign an event to an alternative user, or reopen an investigation by changing the event state from Closed to In Progress.

---

**Note:** You can change the lifecycle state of an event by selecting the event and selecting the appropriate button (for example, the Open  or Work On  button). For more information about event lifecycle buttons and the actions they perform, see "Event Browser Overview" on page 71.

---

## Notifications

Notifications are Emails, SMSs and Pager messages that can be sent on receipt of preconfigured types of events. You configure notifications from the Notifications manager, where you setup rules to notify people when events with predefined characteristics are received.

For example, if critical events for the most important business-relevant services are received by Operations Management during any weekend period, the engineer responsible for these services is immediately informed by an email, SMS or pager message, or any combination of these. Recipients configured in BSM are available to the Notifications manager. You use templates to define how events are translated into emails, SMS messages, or pager messages.

For more information about creating and managing notifications, see "Notifications" on page 391.

## Related Events

To reduce the problem of duplication and overload when managing information from multiple sources, you can set up topology-based rules. These rules correlate events by distinguishing between symptom and cause events and present a clearer picture of the state of the operational environment that you are monitoring.

Topology-based event correlation uses a combination of specified symptoms and a probable causes to determine the cause of an event, which it then flags in the Event Browser. An icon in the C column of the Event Browser indicates that the selected event has been correlated. For details about correlated events, see "Related Events Tab" on page 92. For more information about event correlation in general, see "Event Correlation" on page 50.

## Severities Assigned to Events

Each event can be assigned a severity to show the importance of the underlying problem. The values are: critical, major, minor, warning, normal, and unknown. The Event Browser indicates an event's severity with an icon.

---

**Note:** The Items bar at the bottom of the Event Browser indicates the number of active events by severity. An active event is one that is open and being worked on.

---

## Source Info

The Source Info tab in the Event Details pane displays information associated relating to the identification of the source CI of the received event.

## Synchronization of Events

Event synchronization enables bidirectional communication between domain managers, for example, Operations Management and HP Operations Manager. Updates and modifications to events can be exchanged. For example, changes of ownership or modifications to the severity status of an event are synchronized between management servers.

---

**Note:** HPOM events are not updated when using the `opr-close-events` tool and the `opr-archive-events` tool to close, delete, and archive events. The events in HPOM remain unaffected.

The opposite is also true when using the `omwmsgutil` (HPOM for Windows) tool and `opcack` and `opchistdown` (HPOM for UNIX) tools to close, delete, and archive events. The events in Operations Management remain unaffected.

All these tool operates directly on their respective databases and the changes do not go through the workflow process, resulting in the loss of synchronization between Operations Management and HPOM.

If you use these tools to close, delete, and archive events from one system (for example, Operations Management), you must make the equivalent changes with the appropriate tools on the other system (for example, HPOM).

---

## Health Perspective

This section describes how to display more information about events by changing the way you view them. It includes the following sections:

- "Health Perspective Basics" on page 45
- "Health Top View" on page 46
- "Health Indicators Pane" on page 46

### Health Perspective Basics

The health perspective page displays topological information and health indicators related to the selected event. This display enables you to simultaneously see events from different perspectives and helps you to better understand complex relationships and dependencies.

For example, you can view the following:

- List of active events.
- Topological view of the CI related to the selected event.
- Health indicators assigned to the objects, their state and value.

## Health Top View

The Health Top View displays the business availability of your system components. The CI bar icons in the Health Top View provide a visual indication of the health of the related CI of the selected event, based on the hierarchy tree structure defined for each view. The connecting lines between the bars define the relationships between the CIs.

For more information about KPIs see, "HI-Based KPI Calculations" on page 120. For more information about Health Top Views, see "Health Top Views" on page 117.

## Health Indicators Pane

The Health Indicators pane of an event shows a list of the health indicators used to calculate the health of the configuration item to which the selected event belongs. The information displayed includes the name and value of the health indicator, its current status, the last time it was updated, and whether the trend is up, down, or stable.

The Health Indicators pane displays a list of all the health indicators assigned to the KPIs that are attached to the selected configuration item. The list is divided according to health indicators contributing to KPIs.

For more information about health indicators see, "Health Indicators" on page 119.

## Performance Graphs

You can generate graphs and tables to illustrate graphically how the monitored objects in the environment are performing. The graphs you generate show an overview of important performance metrics (for example, CPU and swap space utilization over time, memory page use, and availability).

You can choose from a variety of graph types and configure the details that you want to include in the graph, the time period to be used, and the display format (for example, graph, chart, or table). You can also display the same data in different forms using multiple tabs.

For details about the performance graphs, see "Graphing Concepts" on page 134. For more information about how to refine the way in which the data is presented in graphs, see "Types of Graphs" on page 135.

## Filters

You can limit the set of events displayed in the Event Browser using filters that you define to display a subset of the available events. For example, you can filter the events displayed according to severity, the assigned user, the event category, or the lifecycle state. You can also display the filtered events in different pages.

---

**Note:** Filters are visible and available only to the user who created them.

---

For more information about filters in general, see "Event Filters" on page 200.

## Event Priority

Event priorities can be automatically calculated from the Business Model and the Event's severity. Event Priority is assigned one of the following values Lowest, Low, Medium, High, or Highest.

The Event Priority calculation is executed in the event pipeline on new events. It also can be started manually on multiple events from the console context menu.

Input parameters for the calculation are:

- Severity of the event
- Business criticality of the related CI (if available)

---

**Note:** If no CI is related to the selected event, the priority will be None.

---

The business impact is provided by the Business Impact Service (BIS) and the severity is an attribute of the event.

The calculation of priority is based on the relationship in the following table.

	Event Severity					
Impact	Unknown	Normal	Warning	Minor	Major	Critical
NoImpact	Lowest	Lowest	Low	Low	Medium	Medium
Low	Lowest	Lowest	Low	Low	Medium	Medium
MediumLow	Low	Low	Low	Medium	Medium	High
Medium	Medium	Low	Medium	Medium	High	High
MediumHigh	High	Medium	Medium	High	High	Highest
High	Highest	Medium	High	High	Highest	Highest

In event forwarding, the calculated priority is forwarded to the receiving application. If the CI related to the event is configured in the receiving application, the event priority is recalculated by each receiving application. If the CI related to the event is not configured in the receiving application, the event priority contained within the forwarded event is used.



---

**Note:** You can manually change the automatically-assigned priority of an event. You can also select two or more events and recalculate their priorities, for example to reflect a change in Business Criticality.

---

## Event Sources

Events originating from various sources can be processed, for example:

- ▶ HP BSM components:
  - ▶ HP Operations Manager for UNIX (HPOM for UNIX)
  - ▶ HP Operations Manager for Windows (HPOM for Windows)
  - ▶ HP Network Node Manager i (NNMi)
  - ▶ HP End User Management (EUM):
    - ▶ Business Process Monitor (BPM)
    - ▶ Real User Monitor (RUM)
  - ▶ HP SiteScope
  - ▶ HP Systems Insight Manager
- ▶ Third-party management software, normally used to monitor specific environments or special needs not monitored by other solution components:
  - ▶ Microsoft® Systems Center Operations Manager, Active Directory, Exchange
  - ▶ BlackBerry Enterprise Server
  - ▶ SAP

Alerts, for example, from CI Status Alerts, SLA Alerts, and Event Based Alerts, can also generate events in Operations Management. For example, Operations Management operators can collect, view, correlate, and manage events generated from Event Based Alerts from HP End User Management (EUM) components. EUM components include Business Process Monitor (BPM), or Real User Monitor (RUM).

## Relating Events and Automatically Creating Correlation Rules

You can manually relate events, assigning one event as a cause event and the other logically-related events as symptom events. For further information, see [How to Relate Events Manually](#) on page 57.

Manually-related events can also be used as the basis for creating new or enhancing existing correlation rules. For further information, see [How to Create Correlation Rules from Manually-Related Events](#) on page 59.

## Event Correlation

Topology-Based Event Correlation (TBEC) in Operations Management is used to automatically identify and display the real cause of problems. Events that are only symptoms of the cause event can be filtered out using the Top Level Items filter, resulting in a clearer overview of the actual problems that need to be solved. Event correlation relies on defining relationships between correlation rules, ETIs and ETI-values associated to events, and CIs and relations between these CIs.

---


**Note:** To use event correlation, the Event Management Foundation and Correlation licenses are required. For detailed information on licensing, see *the HP Business Service Management Deployment Guide PDF*.

---

The topology-based event correlation process works as follows:

- ▶ Checks whether a relationship exists between the events being correlated.
- ▶ Monitors the CIs and ETI values assigned to events being correlated.
- ▶ Determines relationship between two events by checking if there is a relationship in the topology database between the CIs to which the events are related.

The correlation result is displayed in the Event Browser with an icon in the C column to indicate that it is the result of a correlation process.

 — Event is the *cause* of another event

 — Event is the *cause* of one event and a *symptom* of another event

 — Event is a *symptom* of another event

---

**Note:** You might not be authorized to open the Correlation Rules manager. For more information about user authorization, see "User Management" on page 459.

---

Events related as a result of correlation with the selected Event are displayed in the Related Events tab. The selected event can also be a symptom event and you can also see its cause in the Related Events tab.

For more information about the icons used in the Event Browser, see "Event Browser Overview" on page 71. For details about correlated events, see "Related Events Tab" on page 92. For more information about setting up correlation rules, see "Topology-Based Event Correlation" on page 329.

## Tools

You can specify tools, for example, to ping a system. These tools are launched from events or from the Actions panel and run on the associated CI. Tools are designed to help users solve common problems quickly and efficiently.

All available tools are displayed in the Select Tool window launched in the context of a configuration item. The selection of tools a particular user sees in context menus depends on the tools that are available for the configuration item affected by a particular event.

For information about running configured tools, see "Run Tools Graphical User Interface" on page 195.

## Event Closing and Archiving Database Tools

You can use the following two database maintenance command-line tools to close and archive events:

- **opr-close-events**
- **opr-archive-events**

Both command-line tools are available only on Data Processing servers and are protected from unauthorized execution.

---

**Note:** HPOM events are not updated when using the `opr-close-events` tool and the `opr-archive-events` tool to close, delete, and archive events. The events in HPOM remain unaffected.

The opposite is also true when using the `omwmsgutil` (HPOM for Windows) tool and `opcack` and `opchistdown` (HPOM for UNIX) tools to close, delete, and archive events. The events in Operations Management remain unaffected.

All these tool operates directly on their respective databases and the changes do not go through the workflow process, resulting in the loss of synchronization between Operations Management and HPOM.

If you use these tools to close, delete, and archive events from one system (for example, Operations Management), you must make the equivalent changes with the appropriate tools on the other system (for example, HPOM).

---

### **opr-close-events Command-Line Interface**

It is possible that a certain problem in the IT environment results in the generation of a very large number of similar events (event storm) which are received by Operations Management. Browsing through and filtering the a large number of events can be time-consuming and may lead to time-out errors.

Time-outs may be experienced as a result of delays in processing a large number of events in the web application, for example, when you select all events in the browser and attempt to close them. The user interface server may take a long time to start up or may experience a memory bottleneck.

You can use the **opr-close-events** command-line interface tool to close a large number of events, including related events, as experienced during an event storm, even when the Operations Management user interface is not responding.

For a description of the **opr-close-events** command options, see "opr-close-events Command-Line Interface" on page 111.

## opr-archive-events Command-Line Interface

The database maintenance command-line tool **opr-archive-events** enables you to archive closed events. The specified closed events are exported to an XML-format file. These events are deleted from the database on archiving.

---


**Note:** Importing closed events is not supported.


---

For a description of the **opr-archive-events** command options, see "opr-archive-events Command-Line Interface" on page 109.

## Operations Manager Actions

You can run actions configured in HP Operations Manager from Operations Management. Events from HP Operations Manager received by Operations Management may contain event-related actions. If event-related actions exist, the following icons are displayed in the Event Browser in the A column and the U column:

 — Automatic action is available

 — User action is available

Operator-initiated actions and automatic actions are also displayed in the Actions tab of the Event Details pane.

Further icons indicate the status of the actions, including, starting, running, succeeded, and failed. For a complete overview of the icons and actions available, see "Event Browser Overview" on page 71.

You can execute these actions from either the Actions tab or the context menu of the event. The result of the action execution creates an annotation that is added to the event, if configured in the policy. It is also possible to stop an event-related action before execution completes.

Event-related actions for assigned and unassigned events require authorization to run. If you are not authorized to execute event actions, you still see the configured commands but you are not allowed to execute them.

---

**Note:** Actions that contain the `$OPC_GUI_CLIENT` and `$OPC_GUI_CLIENT_WEB` variables are not supported and are filtered out.

---

For information about running actions, see "How to Run an HPOM Action" on page 65.

## Launching Operations Orchestration Run Books

If you are using HP Operations Orchestration (OO) to automate operator tasks for analyzing or fixing problems, these OO Run Books can be mapped to CI Types within BSM.

Run Books can be started from events (context menu) and from the Actions pane of the Actions Perspective. The CIs related to the event define which of the available flows are suitable. When you launch a Run Book from an event, appropriate flow parameters are automatically acquired from the CI or event itself.

---

**Note:** When integrating Run Books from OO, you must specify for which CI types each Run Book is valid (configured in the Platform) and define which event attributes can be used as Run Book input parameters.

If a Run Book input parameter is mapped to a CI attribute and an event attribute, the event attribute takes precedence (if launched from events).

---






For information about running actions, see "How to Launch an HP Operations Orchestration Run Book" on page 66.

## How to Configure the Event Browser

This task describes how to configure the Event Browser to display only the details that you are interested in. For example, you can add and remove columns, customize additional tabs, and configure filters to change and improve the way in which data displays.

All changes you make to the Event Browser layout are automatically saved to your user account. The next time you log on, the Event Browser displays the latest events in accordance with the way you configured the Event Browser. For example, the last selected view is selected and reopened.

### To configure the Event Browser:

- 1 Open the Event Browser to display the list of known events:  
**Applications > Operations Management > *select a perspective***
- 2 In the Event Browser, click the **Browser Options**  button.
- 3 From the **Columns** tab, select the columns to display in the Event Browser and click the add  button to include them in the Display these fields box.
- 4 Select from the **Display these columns** box any columns that you do not want to display and click the remove  button.
- 5 Select column names and rearrange their display positions by use of the  and  buttons.

The first column item in the list is displayed as the first column in the Event Browser. Subsequent column items are placed progressively to the right in the order of their appear in the Display these columns list.

Alternatively, to select the default columns for display in the Event Browser, click **Reset**.

- 6 Select **OK**.



---

**Note:** You can add custom attributes as columns by defining them under the corresponding infrastructure settings:

**Admin > Platform > Setup and Maintenance > Infrastructure Settings > Operations Management > Custom Attributes Settings**

Custom attributes defined there can then be selected as a column in the Event Browser.

---

## How to Relate Events Manually

This task describes how to manually relate selected events in the Event Browser by assigning one event as a cause event. All other related events become symptom events.

### To manually relate an event:

- 1 Open the Event Browser to display the list of known events:  
**Applications > Operations Management > *select a perspective***
- 2 In the Event Browser, select the events that you want to relate.
- 3 Right-click one of these events and select **Relate Events ...** from the context menu.

The Relate Events dialog box opens.

- 4 Select one of the events as the cause event.

All other events are symptoms of the selected cause event.

- 5 *Optional:* Manually related events can also be used as the basis for automatically generating a correlation rule. If you also want to create a correlation rule based on the current relationship, select the check box **Open correlation rule wizard**. For details about creating a correlation rule using the Correlation Rule Generator, see [How to Create Correlation Rules from Manually-Related Events](#) on page 59.

- 6 Select **OK**.

## **How to Recalculate Event Priorities**

This task describes how to manually recalculate the priorities for selected events in the Event Browser. This might be necessary when Business Criticality values have changed in the underlying business model, and you want to have these changes reflected in your active events.

### **To manually recalculate the priority of an event:**

- 1 Open the Event Browser to display the list of known events:  
**Applications > Operations Management > *select a perspective***
- 2 In the Event Browser, select the events for which you want to recalculate the priority.
- 3 Right-click one of these events and select **Recalculate Priority** from the context menu.

The priority value for the selected events is updated.

## **How to Set Priorities Manually**

This task describes how to manually change the automatically-assigned priority of an event.

### **To manually change the priority of an event:**

- 1 Open the Event Browser to display the list of known events:  
**Applications > Operations Management > *select a perspective***
- 2 In the Event Browser, select the event for which you want to change the priority value.
- 3 Open the Event Details pane.
- 4 Select the required priority from the Priority list.
- 5 Select **Save**.

## How to Create Correlation Rules from Manually-Related Events

This task describes how to create or enhance a correlation rule based on selected events. From the Event Browser, you need to identify related events, select a cause event, relate them manually, and choose to create a correlation rule to reflect this relationship.

The Correlation Rule Generator wizard requires that the events being used to generate a new rule have a Related CI.

---

**Note:** If related ETIs and their values are not available, you can define indicator mapping rules to set indicator values (see [How to Create and Edit Indicator Mapping Rules](#) on page 293), and create a correlation rule for this case. You must also modify and redeploy the event forwarding policy that created the event in HP Operations Manager to provide a suitable ETI and value for this type of event. Next time such an event is received, an ETI is included, and the associated correlation rule is triggered.

---

### To create or edit a correlation rule from manually-related events:

- 1 Open the Event Browser to display the list of known events:  
**Applications > Operations Management > *select a perspective***
- 2 In the Event Browser, select the events that you want to relate.

---

**Note:** [Generation of a correlation rule from selected events is limited to a maximum of 10 events.](#)

---

- 3 Right-click one of these events and select **Relate Events ...** from the context menu.

The Relate Events dialog box opens.


- 4 Select one of the events as the cause event.

All other events are symptoms of the selected cause event.

**5** Select **Open correlation rule wizard**.

**6** Select **OK**.

The Correlation Rule Generator dialog opens.

**7** Select the cause event (**Use as Cause**  button).

All rules with the selected cause are displayed.

**8** From the Select Events for Creating or Enhancing a Correlation Rule section, select additional events that are to be included in the correlation rule.

---

**Note:** The list of possible rules that can be enhanced is dependent on the CI Type of the cause event selected.

---

**9** Select **Create** to create a correlation rule based on the specified cause and symptom events, or select an existing correlation rule and click **Enhance**.

The Rule Properties page opens.

**10** Specify the properties for a new correlation rule or make the appropriate changes to the existing correlation rule.

**11** *Optional:* If you want the correlation rule to be activated immediately, select **Active**.

**12** *Optional:* Select an alternative time window for this correlation rule. This defines time period used to correlate events with an existing event. An event received after the time period is past is not be correlated with the original event. An alternative time window overrides the global default set in the Infrastructure Settings Manager page for Operations Management. For details, see "Topology-Based Event Correlation Settings" on page 530.

**13** Select **Next**.

The Rule Details page opens.

**14** *Optional:* You can select nodes from a graph and can add additional ETIs to the rule.

**15** Select **Finish** to create the new correlation rule or modify the existing one.

For more information about correlation rules, see "Correlation Rules" on page 327.

## **How to Transfer Control to an External Manager**

This task describes how to transfer control of events in the Event Browser to an external manager.

---

**Note:** The external manager server must be specified as a target in the Connected Servers manager.

---

For example, if your organization uses HP Service Manager as a central service desk, you can transfer control of events from the Event Browser to HP Service Manager. This is often case when the Operations Management operator is not able to solve the problem and needs to have the problem assigned to an expert. HP Service Manager creates an incident returns the Incident ID to Operations Management. This is displayed in the External Info tab with additional information about the event available from the external manager.

---

**Note:** If control for an event is transferred, it is not possible to transfer control again and the option is not displayed.

---

**To manually transfer control of an event to an external manager:**

**1** Open the Event Browser to display the list of known events:

**Applications > Operations Management > *select a perspective***

- 2 In the Event Browser, select the events that you want to transfer control to an external manager.
- 3 Right-click one of these events and from the context menu select:  
**Transfer Control to > *select a manager***

---

**Note:** If there is a problem connecting to the system to which you want to transfer control, the event forward request or event update synchronization request is held in a queue. If the request cannot be delivered to the target server within the specified time, it is automatically deleted from this queue.

To set the Event Forwarding Expiration time period, see [Event Forwarding Settings](#) on page 518. The default value is 2 hours and the minimum value is 1 hour.

---

## How to Add Annotations to an Event

This task describes how to add an annotation to an event. Annotations help the user understand the background of an event.

### To add an annotation to an event:

- 1 Open the Event Browser to display the list of known events:  
**Applications > Operations Management > *select a perspective***
- 2 In the Event Browser, select an event.
- 3 From the Event Details pane, select the **Annotations** tab.  
Click the **Add Annotation \*** button from the Annotations toolbar to open the Add Annotation dialog box.
- 4 Enter the information text.
- 5 Select **OK**.

## How to Add Custom Attributes to an Event

This task describes how to add custom attributes to an event. Custom attributes provide extra information that can help the user understand the background to an event and, as a result, speed up the resolution of the event's underlying problem.

---

**Note:** To add or modify custom attributes, you must be logged on as a user with permissions to modify the event.

---

### To add a custom attribute to an event:


- 1 Open the Event Browser to display the list of known events:  
**Applications > Operations Management > *select a perspective***
- 2 In the Event Browser, select an event.
- 3 From the Event Details pane, select the **Custom Attributes** tab.
- 4 Click the **Add Custom Attribute \*** button to open the Add Custom Attribute dialog box.
- 5 Enter the custom attribute name and value.
- 6 Select **OK**.

## How to Assign an Event to a User or User Group

This task describes how to assign an event from the Event Browser to a user or user group.


### To assign an event to a user or user group:

- 1 Open the Event Browser to display the list of known events:  
**Applications > Operations Management > *select a perspective***
- 2 From the Event Browser pane, select the event that you want to assign to a user.

- 3 Open the Event Assignment dialog box in one of the following ways:
  - ▶ In the Event Browser pane, click the **Assign To**  button.
  - ▶ Right-click the event and select **Operations > Assign To** from the context menu.
- 4 In the Assigned Group box, use the menu to select the user group to which you want to assign the selected event (for example, **Database Experts** or **Application Server Operators**).
- 5 In the Assigned User box, use the menu to select the user to whom you want to assign the selected event.

The users displayed in the menu are filtered according to the user group selected in the previous step.

---

**Tip:** Alternatively, in the **General** tab of the Event Details pane, select the user and group from the Assigned Group and the Assigned User boxes and click the **Save**  button.

---

- 6 Select **OK**.


## **How to Run an HPOM Action**

In this task, learn how to run HP Operations Manager actions for an event containing event-related actions.

### **To run an action from an event with related actions:**

- 1 Open the Event Browser to display the list of known events:  
**Applications > Operations Management > *select a perspective***
- 2 Select an event that includes event-related actions.

Actions are identified by the following icons displayed in the Event Browser in the **A** column and the **U** column:

 — Automatic action is available

 — User action is available



Further icons indicate the status of the actions, including, starting, running, succeeded, and failed. For a complete overview of the icons and actions available, see "Run Tools Graphical User Interface" on page 195.

**3** Select the **Actions** tab.

The action specification, target node, and the status of the available actions are displayed. A maximum of one automatic action and one user action is available for an event.

**4** For the action that you want to run, select **Start**.

Alternatively, from the context menu for the event, select the appropriate action:

**Right-click > Actions > Start ...**

The action starts, the status changes to Running and the associated action icon in the Event Browser changes to reflect this status.

After the action execution has completed successfully, the status changes to Succeeded. If the action did not execute successfully, the status is changed to Failed.

**5** Select the **Annotations** tab for a summary of the executed action.

## **How to Launch a Custom Action**

In this task, learn how to Launch a custom action for an event.

**To run a Custom Action from an event:**

**1** Open the Event Browser to display the list of known events:

**Applications > Operations Management > *select a perspective***

**2** Select the Custom Action that you want to run on an event:

**Right-click > Launch > Custom Actions > *select a custom action***

The selected custom action is launched in the context of the selected event.

## **How to Launch an HP Operations Orchestration Run Book**

In this task, learn how to Launch an HP Operations Orchestration Run Book for an event.

**To run a Run Book from an event:**

- 1 Open the Event Browser to display the list of known events:

**Applications > Operations Management > Event Perspective**

- 2 Select the Run Book that you want to run on an event:

**Right-click > Launch > Run Books > *select a Run Book***

The selected Run Book is launched in the context of the event or the CI associated with the selected event.

---

**Note:** The context menu item is only visible if the logged on user has permissions to execute Run Books. Users can be configured under:

**Admin > Platform > User and Permissions**

In the Permissions tab under the Operations Orchestration Integration context.

---

---

**Tip:** Run Books can also be run from the Actions pane.

---

## How to View All Closed Events

In this task, you display a Closed Events Browser window containing all closed events over a selected time period.

The Closed Events Browser shows only a snapshot of closed events available at the time of opening the Closed Events Browser. Events that are reopened are automatically removed from the Closed Events Browser. Events that are closed after the opening of the Closed Events Browser are not automatically added to the current Closed Events Browser window. A refresh is required. The timestamp when the snapshot was taken is displayed in the Closed Events Browser window.

The maximum number of events that can be displayed in the Closed Events Browser can be configured in the Settings Manager. For details, see "Closed Events Browser Settings" on page 510.

### To show closed events history related to a current event:

- 1 Open the Event Browser to display the list of known events:

**Applications > Operations Management > *select a perspective***

- 2 Click the **Show Closed Events**  button.

- 3 In the **Closed Events Browser Configuration** window, specify the time period for which you want to display history.

Select a predefined period, and the number of available related closed events is displayed in the Number of events ... field.

If you select **Select a custom range**, specify a custom time range, and select **Apply**. The number of available related closed events is displayed in the Number of events ... field.

- 4 Select **OK** to display the Closed Events Browser window containing the available events.

Actions can be executed on the selected event using the available buttons and context menus. For details, see "Closed Events Browser Configuration Dialog" on page 100.

## How to View the Closed Event History of a CI

In this task, you display a Closed Events Browser window containing all closed events related to the related CI of a current event over a selected time period.

The Closed Events Browser shows only a snapshot of closed events available at the time of opening the Closed Events Browser. Events that are closed after the opening of the Closed Events Browser are not added to the current Closed Events Browser window. The timestamp when the snapshot was taken is displayed in the Closed Events Browser window.

The maximum number of events that can be displayed in the Closed Events Browser can be configured in the Settings Manager. For details, see "Closed Events Browser Settings" on page 510.

### To show closed events history related to a current event:

- 1 Open the Event Browser to display the list of known events:

**Applications > Operations Management > *select a perspective***

- 2 Right-click the event for which you want to see the event history and select **Show > Closed Events (Related CI)** from the context menu.

- 3 In the **Closed Events Browser Configuration** window, specify the time period for which you want to display history.

Select a predefined period, and the number of available related closed events is displayed in the Number of events ... field.

If you select **Select a custom range**, specify a custom time range, and select **Apply**. The number of available related closed events is displayed in the Number of events ... field.

- 4 Select **OK** to display the Closed Events Browser window containing the available events.

Actions can be executed on the selected event using the available buttons and context menus. For details, see "Closed Events Browser Configuration Dialog" on page 100.

## **Event Perspective Graphical User Interface**

This section aims to help you become familiar with the Event Perspective and understand how you can use it to better manage the events that occur in your IT environment. The Event Perspective page displays event-related information in separate panes, the contents of which are described in greater detail in the following topics:

- "Model Explorer" on page 70
- "Event Browser Overview" on page 71
- "General Tab" on page 82
- "Additional Info Tab" on page 86
- "Source Info Tab" on page 87
- "Actions Tab" on page 89
- "Annotations Tab" on page 89
- "Custom Attributes Tab" on page 90
- "Related Events Tab" on page 92
- "History Tab" on page 94
- "Resolver Hints Tab" on page 95
- "Instructions Tab" on page 97
- "External Info Tab" on page 98
- "Closed Events Browser Configuration Dialog" on page 100
- "Correlation Rule Generator Dialog" on page 104
- "opr-archive-events Command-Line Interface" on page 109
- "opr-close-events Command-Line Interface" on page 111

### **Event Browser Context Menus**

Most actions are also available from context menus, for example, the Event Browser. Context menus provide quick and direct access to information about selected elements and actions that you can perform on them.

You open a context menu by right-clicking a GUI element. The information available and the actions that are possible from a context menu depend on the element and the context in which it exists.

---

**Note:** Some options and tools displayed in context menus require you to be logged on as a user with the authorization to start the selected tool.

---

For more information about the actions that are available in context menus and tool tips displayed in the Event Browser page, see the Event Browser graphical user interface descriptions.

## Model Explorer

The Model Explorer displays configuration items from the Operational Database (ODB). The displayed selection can be filtered by applying a view. Views configure the Model Explorer to display only the configuration items specified in the view.


The contents of the Event Browser pane are filtered according to the selected view or configuration item type. The active filter is indicated in the Filter applied list.

Using the View Manager (**Admin > OBD Administration > Modeling > View Manager**), you can configure new views or modify existing views to change, increase, or decrease the information displayed.

## Event Browser Overview

The Event Browser pane, available in the Action, Event and Health Perspectives, displays an overview of the active events that exist in the IT environment you are monitoring. Events are generated by domain managers and are forwarded to Operations Management and report important events that occur in the managed environment. Events relate to problems and are managed by an administrator or assigned to users for resolution.

---

**Tip:** The contents of the Event Browser pane in the Event Perspective and Health Perspective are filtered according to the selected view or configuration item. The active view or configuration item filter is indicated in the filter list activated using the **(View/CI) filter**  button. The Active Event Filter is displayed in the filter selection field.

---

Filtering the Event Browser content helps you to focus on the most useful information. You can configure new filters or modify existing filters to change, increase, or decrease the information displayed.

## Closed Events Browser

You can view closed events history over a specified time period, either for all closed events or for a selected CI. From the Closed Events Browser, you can change the lifecycle state of any displayed events. For details, see "Closed Events" on page 37. All Event Browser actions relevant to closed events can be accessed from the Closed Events Browser.

---







**Note:** Reopened events are automatically removed from the Closed Events Browser window. However, events that are closed after the opening of the Closed Events Browser are not automatically added to the current Closed Events Browser window. A refresh is required. The timestamp when the snapshot was taken is displayed in the Closed Events Browser window. Only one Closed Events Browser can be opened at a time by each user.

---








The maximum number of events that can be displayed in the Closed Events Browser can be configured in the Settings Manager. For details, see "Closed Events Browser Settings" on page 510.


## Event Browser Icons, Buttons, and Context Menus

The following table lists the buttons that enable you to perform actions in the Event Browser pane. For a short explanation of the action performed by a button in the Event Browser, check the tooltip.











UI Elements	Description
 <b>Reopen</b>	Sets the lifecycle status for the selected events to <b>Open</b> . The events can now be assigned to users for investigation and resolution.
 <b>Work On</b>	Sets the lifecycle status for the selected events to <b>In Progress</b> , indicating that the underlying problems of the events are under investigation.
 <b>Resolve</b>	Sets the lifecycle status for the selected events to <b>Resolved</b> .
 <b>Close</b>	Sets the lifecycle status for the selected events to <b>Closed</b> .
<b>Close and Reset Health Indicator</b>	Sets the lifecycle status for the selected events to <b>Closed</b> and resets the associated HI values to the default values.
 <b>Assign To ...</b>	Opens the Event Assignment dialog box, enabling you to assign the selected events to a specific user or user group.
 <b>Relate Events ...</b>	<p>Opens the Relate Events dialog box, enabling you to manually relate the selected events by assigning one event as a cause event. All other events become symptom events.</p> <p>Manually related events can also be used as the basis for automatically generating a correlation rule. For details, see "Relating Events and Automatically Creating Correlation Rules" on page 50.</p>



UI Elements	Description
	Toggles between View/CI filtering. Visible from the Event Perspective and the Health Perspectives.
 <b>Event Filters</b>	<p>Opens the Select an Event Filter dialog box, enabling you to select the event filter that you want to apply.</p> <p>From the Select an Event Filter dialog box, you can also open the Filter Configuration dialog box to create an event filter, test, edit or delete an existing event filter.</p> <p>For more information about the event filters, see "Event Filters" on page 200.</p>
 <b>Browser Options</b>	Opens the Browser Options dialog box for the current Event Browser tab. You can modify and set display options (for example, to hide or display columns, or change the order in which the data appears).
 <b>Show/Hide Event Details Pane</b>	Toggles between the Event browser view with and without the Event details pane. You can also open the event details for an event in a pop-up window using the <b>Show &gt; Event Details</b> context menu item or double-click the event.
 <b>Refresh</b>	<p>Synchronizes the event data displayed in the user interface with the latest information available in the database on the server and forces a complete refresh.</p> <p>For information on setting the automatic update interval, see "User Interface Settings" on page 532.</p>
 <b>Show/Hide Closed Events</b>	<p>Displays the Closed Events Browser Configuration window used to specify the time period for the closed events to be displayed in the Closed Events Browser. Select <b>OK</b> and the Events Browser displays the closed events related to the related CI of a current event over a selected time period opens.</p> <p>Click the <b>Hide Closed Events</b>  button to return to the Event Browser.</p>
<Search>	Entered text string is used to search the text displayed in the Event Browser and display only the events containing the specified string. Clearing the field displays all events again.








UI Elements	Description
<b>Recalculate Priority</b>	<p>Manually recalculates the priorities for selected events in the Event Browser.</p> <p>If the Business Criticality has been changed for one or more CIs related to events in the Event Browser, a recalculation assigns new priority values for these events.</p>
<b>Show &gt; Event Details</b>	<p>Opens the event details for an event in a pop-up window and displays all available information about the event.</p>
<b>Show &gt; Related Events</b>	<p>Opens the Related Events tab of the Event Details dialog box which indicates the relationship of the selected event to other events. The information displayed is the same as that available in the event details pane.</p>
<b>Show &gt; Filtered Browser (Node)</b>	<p>Displays only events that concern the Node CI to which the selected event is related.</p>
<b>Show &gt; Filtered Browser (Related CI)</b>	<p>Displays events that concern the selected configuration item only.</p>
<b>Show &gt; Closed Events (related CI)</b>	<p>Displays the Closed Events Browser with closed events that are associated with the CI related to the selected event.</p> <p>Click the <b>Hide Closed Events</b>  button to return to the Event Browser.</p>
<b>Show &gt; Performance Graphs (Neighborhood)</b>	<p>Opens a new window and displays the performance graphs that are available for the selected node or event.</p>
<b>Show &gt; Performance Graphs (CI)</b>	<p>Opens a new window and displays the performance graphs that are available for the selected CI.</p>
<b>Show &gt; Business Service Impact for Related CI</b>	<p>Opens a new window and displays the Business Service Impact for CI associated with the selected event.</p>
<b>Launch &gt; Custom Actions</b>	<p>Opens the Custom Actions menu from which you can select a custom action from a list of those configured for the CI type associated with the selected event.</p>






UI Elements	Description
<b>Launch &gt; Run Books</b>	Opens the Run Books menu from which you can select a Run Book from a list of those configured for the CI type associated with the selected event.
<b>Launch &gt; Tool</b>	Opens the Tool menu from which you can select a tool from a list of those configured for the CI type associated with the selected event.
<b>Transfer Control to</b>	Forwards the selected event to a configured external manager application. Used when the operator is not able to solve the problem and needs to escalate the issue, for example, have a Service Manager incident created. The external manager can be configured to return an incident ID to Operations Management as external information.
<b>Configure &gt; Event Type Indicators</b>	Opens the Indicators manager. You need the appropriate authorization to access the Indicators manager and other Administration features.
<b>Configure &gt; View Mappings</b>	Opens the View Mappings manager. You need the appropriate authorization to access Administration features.
<b>Configure &gt; Tools</b>	Opens the Tools manager. You need the appropriate authorization to access the Indicators manager and other Administration features.





UI Elements	Description
<p><b>Configure &gt; Performance Graphs</b></p>	<p>Opens a new window and displays the graph Design Wizard. This wizard enables you to design a graph and specify its attributes and save it as a template for later use.</p>
<p><b>Items</b></p>	<p>Indicates the number of events by severity and assignment to individual users or user groups. The valid severities are critical, major, minor, warning, normal, and unknown.</p> <p>A total is also displayed along with the number of selected events in brackets (for example, 40 (3)).</p> <p>The following icons indicate event severity status:</p> <ul style="list-style-type: none"> <li> — Critical</li> <li> — Major</li> <li> — Minor</li> <li> — Warning</li> <li> — Normal</li> <li> — Unknown</li> </ul> <p>Usually, this is the same as the severity status of the original event received from HP Operations Manager.</p> <p>The following icons indicate the event assignment status:</p> <ul style="list-style-type: none"> <li> — Event assigned to logged-on user</li> <li> — Event assigned to one of the groups that the logged-on user is a member of.</li> <li> — Events assigned to other users</li> <li> — Event assignment not known</li> </ul> <p>Depending on the settings selected in the active filter, some items are displayed with a value of 0, for example, because they have been excluded by a filter.</p>







## Event Browser Labels

The following table lists the elements that are included in the Event Browser pane. For a short explanation of the action performed by a button in the Event Browser, check the tooltip.

UI Elements (A-Z)	Description
<b>A-Automatic Action</b>	<p>Indicates if an automatic action is attached to the event and describes its status using the following icons:</p> <ul style="list-style-type: none"> <li> — Not run automatic action available for event</li> <li> — Automatic action is running</li> <li> — Automatic action executed successfully</li> <li> — Automatic action failed to execute successfully</li> </ul>
<b>C-Correlation</b>	<p>Indicates if the event has any related events that are hidden as a result of a correlation. The following icons indicate the event's position in a chain of events:</p> <ul style="list-style-type: none"> <li> — Event is a <i>cause</i> in a correlation</li> <li> — Event is a <i>cause</i> in one correlation and a <i>symptom</i> in another</li> <li> — Event is a <i>symptom</i> in a correlation</li> </ul> <p>For details about correlated events, see "Related Events Tab" on page 92.</p>
<b>D-Duplicate Count</b>	<p>Indicates how many duplicate events exist (for example, 2 or 3).</p>
<b>I-Instructions</b>	<p>Indicates if the event contains any Instructions. Operators working with the HPOM message browser can see additional instructions, when available, for this message. It is equally helpful for Operations Management operators to be able to access this information when using HPOM servers to forward events to Operations Management. This information is displayed in the Instructions tab of the Event Browser.</p>

UI Elements (A-Z)	Description
<p><b>N-Annotations</b></p>	<p>Indicates if the event contains any annotations. Annotations are comments or observations relating to the associated (or a similar) event. The following icons indicate the presence of annotations:</p> <p> — Event has annotations</p> <p>For more information about annotations, see "Annotations Tab" on page 89</p>
<p><b>T-Control Transferred</b></p>	<p>Indicates if the responsibility for the associated event has been transferred to an external manager.</p>
<p><b>U-User Action</b></p>	<p>Indicates if a user action is attached to the event and describes its status using the following icons:</p> <p> — Not run user action available for event</p> <p> — User action is running</p> <p> — User action executed successfully</p> <p> — User action failed to execute successfully</p>
<p><b>Application</b></p>	<p>Application that caused the event to occur.</p>
<p><b>(Assigned) Group</b></p>	<p>Name of the group to which the selected event has been assigned.</p>
<p><b>(Assigned) User</b></p>	<p>Name of the network user who is responsible for solving the event's underlying problem. For example, if the event is owned by an Operations Management user, the user name is displayed. If the event is owned by an HPOM user, the user name is displayed with the prefix OM:, for example, OM:Database Operator.</p>
<p><b>Category</b></p>	<p>Name of the logical group to which the event belongs (for example, Database, Security, or Network). An event category is similar in concept to a message group in HP Operations Manager.</p>
<p><b>CI Hint</b></p>	<p>Information that helps to resolve the related CI, for example, Service name in HP Operations Manager event.</p>
<p><b>CI Type</b></p>	<p>Configuration item type associated with the event.</p>

UI Elements (A-Z)	Description
<b>Core ID</b>	Host system where the event occurred.
<b>Description</b>	Optional information about the event in addition to the event's original title and the text captured from the event source.
<b>Event Type Indicator (ETI)</b>	<p>Display name of the event type indicator (ETI) reported by the selected event and the current value, (for example, <code>Web application state: Slow</code>).</p> <p><code>WebAppState</code> is the name of the event type indicator. The corresponding label is <code>Web application state</code>, which is shown in the General tab. The level of the current ETI value is <code>Slow</code>.</p> <p>If event type indicators are assigned (see the Source Info tab) but are not being resolved (event type indicator field in General tab is empty), the configuration must be corrected.</p>
<b>External ID</b>	ID of the event assigned by the external manager.
<b>ID</b>	ID of the event. Same as the ID of the message in HPOM if it is forwarded to Operations Management.
<b>(Lifecycle) State</b>	<p>Point in the event lifecycle that the selected event has reached:</p> <ul style="list-style-type: none"> <li> — Open</li> <li> — In Progress</li> <li> — Resolved</li> <li> — Closed</li> </ul> <p>To change an event's lifecycle status, select the event, and select one of the status buttons above the event list or use the context menu options. User authorizations control the permissions to change lifecycle states.</p>
<b>Node Hint</b>	<p>Information used to identify node CI. For example, the hostname in HP Operations Manager used to find host in ODB:</p> <ul style="list-style-type: none"> <li>▶ DNS name of the originating server.</li> <li>▶ Node ID of the originating server.</li> </ul>

UI Elements (A-Z)	Description
<b>Object</b>	Device such as a computer, printer, or modem.
<b>Originating Server</b>	Management server that initially forwarded the original event along the chain of servers configured in a flexible management environment.
<b>Owned in HP OM</b>	Indicates whether the event is owned by a user in HP Operations Manager (Y). If the event is owned by an HPOM user, the user name is displayed with the prefix OM:, for example, OM:Database Operator in the User field (Event Browser and General tab).
<b>Priority</b>	Priority assigned to the selected event (for example, Low, Medium, or High).
<b>Received during Downtime</b>	Event received from a CI during a time period when the CI was in downtime (scheduled to not be available).
<b>Related CI</b>	Name of the impaired configuration item (CI) where the event occurred.
<b>Sending Server</b>	Last server in the HP Operations Manager flexible management chain that forwarded the event to Operations Management.
<b>Severity (Sev)</b>	<p>Severity assigned to the selected event. Usually, this is the same as the severity status of the original event received from HP Operations Manager. The following icons indicate event severity status:</p> <ul style="list-style-type: none"> <li> — Critical</li> <li> — Major</li> <li> — Minor</li> <li> — Warning</li> <li> — Normal</li> <li> — Unknown</li> </ul>
<b>Solution</b>	Text field used to document solutions to help operators solve the problem indicated by the event.
<b>Source CI</b>	Node where the monitoring agent or probe is running that generated the selected event.



UI Elements (A-Z)	Description
<b>Source CI Hint</b>	Information used to identify the source CI.
<b>Subcategory</b>	Name of the logical subgroup (category) to which the event belongs (for example, Oracle (database), Accounts (security), or Routers (network)).
<b>Time Created</b>	Date and time when the event was created.
<b>Time Lifecycle State Changed</b>	Date and time when the last lifecycle state change took place.
<b>Time Received</b>	Date and time when the event was received.
<b>Title</b>	Brief summary of the event.
<b>Type</b>	Type of message in HPOM. String used to organize different types of events within an event category or subcategory.

## General Tab



The General tab in the Event Details pane displays detailed information about the selected event including its origin, the time at which it was created, and who is responsible for resolving the problem to which it relates. The values for Severity, Lifecycle State, Priority, Assigned Group, and Assigned User can be changed using the associated lists.





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**Note:** If a field is empty, no information exists for the selected item.

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The following table lists the elements that are included in the General tab of the Event Browser.

UI Elements (A-Z)	Description
 <b>Save</b>	Saves the changed values.
 <b>Undo changes</b>	Discards the changed values.
<b>Assigned Group</b>	Name of the group to which the selected event's assigned user belongs.
<b>Assigned User</b>	Name of the user who is responsible for solving the event's underlying problem. For example, if the event is owned by an Operations Management user, the user name is displayed. If the event is owned by an HPOM user, the user name is displayed with the prefix OM:, for example, OM:Database Operator.
<b>Category</b>	Name of the logical group to which the event belongs, (for example, Database, Security, or Network). The event category is similar in concept to the HP Operations Manager message group.
<b>Control Transferred</b>	Indicates if the responsibility for the associated event has been escalated to a higher-level manager.
<b>Duplicate Count</b>	Number of duplicate events associated with the selected event.



UI Elements (A-Z)	Description
<b>Event Type Indicator</b>	<p>Display name of the event type indicator (ETI) used to calculate the status reported by the selected event and the current value, (for example, Web application state:Slow).</p> <p>WebAppState is the name of the event type indicator. The corresponding label is Web application state, which is shown in the General tab. The level of the current ETI value is Slow.</p> <p>If event type indicators are assigned (see the Source Info tab) but are not being resolved (event type indicator field in General tab is empty), the configuration must be corrected.</p>
<b>ID</b>	ID of the selected event. The event reports an event that occurred in the operational environment.
<b>Lifecycle State</b>	<p>Point in the event lifecycle that the selected event has reached:</p> <ul style="list-style-type: none"> <li> — Open</li> <li> — In Progress</li> <li> — Resolved</li> <li> — Closed</li> </ul> <p>To change an event's lifecycle status, select a lifecycle state from the list and click <b>Save</b>. User authorizations control the permissions to change lifecycle states.</p> <p>The following list shows correlation between the state used in the incoming message and the state used in Operations Management:</p> <ul style="list-style-type: none"> <li>▶ Message = acknowledged; Lifecycle state = Resolved</li> <li>▶ Message = owned; Lifecycle state = In Progress</li> <li>▶ Message = neither acknowledged nor owned; Lifecycle state = Open</li> </ul>
<b>Node</b>	Host system where the event occurred.

UI Elements (A-Z)	Description
<b>Priority</b>	<p>The priority assigned to the selected event (for example, for example, Low, Medium, or High).</p> <p>To change an event's priority, select a priority from the list and click <b>Save</b>.</p>
<b>Related CI</b>	<p>Name of the impaired configuration item (CI) where the event occurred.</p>
<b>Severity</b>	<p>Severity assigned to the selected event. Usually, this is the same as the severity status of the original event received from Operations Management. The following icons indicate event severity status:</p> <ul style="list-style-type: none"> <li> — Critical</li> <li> — Major</li> <li> — Minor</li> <li> — Warning</li> <li> — Normal</li> <li> — Unknown (Cannot change severity to Unknown).</li> </ul>
<b>Source CI</b>	<p>Host system where the monitoring agent or probe is running that generated the selected event.</p>
<b>Subcategory</b>	<p>Name of the logical subgroup (category) to which the event belongs (for example, Oracle (database), Accounts (security), or Routers (network)).</p>
<b>Time Created</b>	<p>Date and time when the selected event was created.</p>
<b>Time State Changed</b>	<p>Date and time when the last lifecycle state change took place.</p>
<b>Time Received</b>	<p>Date and time when the selected event was received.</p>
<b>Title</b>	<p>Brief description of the nature of the selected event.</p>
<b>Type</b>	<p>String used to organize different types of events within an event category or subcategory (for example, users or applications, accounts, and security).</p>

## Additional Info Tab

The Additional Info tab in the Event Details pane displays more detailed information about the attributes of the selected event.

The following table lists the elements that are included in the Additional Info tab.

UI Elements (A-Z)	Description
 <b>Save</b>	Saves the changed values.
 <b>Undo changes</b>	Discards the changed values.
<b>Application</b>	<p>Application that caused the event to occur.</p> <p>Unlike the Related CI attribute in Operations Management, which is a direct relationship to a CI in the ODB, the application attribute is a simple string-type attributes from HP Operations Manager.</p> <p>Examples of Application attributes are Oracle, and OS.</p>
<b>Close Events with Key</b>	String used to automatically acknowledge duplicate events.
<b>Description</b>	Optional information about the original event in addition to the event's original title and the text captured from the event source.
<b>Key</b>	Key associated with the original HP Operations Manager event. It is an identifier used to identify the message policy. Used for duplicates and for Close Events with Key.

UI Elements (A-Z)	Description
<p><b>Object</b></p>	<p>Device such as a computer, printer, or modem.</p> <p>Unlike the Related CI attribute in Operations Management, which is a direct relationship to a CI in the ODB, the object attribute is a simple string-type attribute from HP Operations Manager.</p> <p>Examples of Object attributes include <code>orainst, C:, /dev/spool</code>.</p>
<p><b>Received during Downtime</b></p>	<p>Indicates whether an event was received from a CI during a time period when the CI was in downtime (scheduled to not be available).</p>
<p><b>Solution</b></p>	<p>Text field used to document solutions to help operators solve the problem indicated by the event.</p>
<p><b>Suppress Deduplication</b></p>	<p>Indicates whether deduplication is inactive. Stops automatic closing of new events that are duplicates of the selected event. Attributes can be set to suppress deduplication of events. For details, see "Duplicate Events Suppression Settings" on page 512.</p>

 **Source Info Tab**

The Source Info tab of the Event Details pane displays an overview of the information available about the source of the selected event.

The following table lists the elements that are included in the Source Info tab.





UI Elements (A-Z)	Description
<b>Match Information</b>	<p>Displays details of the policy that the event matched:</p> <ul style="list-style-type: none"> <li>➤ Policy Name</li> <li>➤ Policy Type</li> <li>➤ Condition</li> </ul>
<b>Original Event</b>	<p>Displays details of the original event:</p> <ul style="list-style-type: none"> <li>➤ <b>Original ID</b> — Unique ID assigned to the original HP Operations Manager message by the message policy that generated the message.</li> <li>➤ <b>Original Data</b> — Original event text as captured from HP Operations Manager agents before being formatted into an HP Operations Manager message.</li> </ul> <p>Contains information about the original input before being normalized by HP Operations Manager agent policies into a message. Typically, the information available includes node name, message group, application, object, severity, and message text.</p>
<b>Originating Server</b>	<p>Management server that forwarded the original HP Operations Manager event along the chain of servers configured in a flexible management environment:</p> <ul style="list-style-type: none"> <li>➤ DNS Name of the forwarding management server</li> <li>➤ IP Address of the forwarding management server</li> </ul>
<b>Sending Server</b>	<p>Last server in the HP Operations Manager flexible management chain that forwarded the event to Operations Management:</p> <ul style="list-style-type: none"> <li>➤ DNS Name of the last HP Operations Manager management server</li> <li>➤ IP Address of the HP Operations Manager management server</li> </ul>

## Actions Tab

Events from HP Operations Manager received by Operations Management may contain event-related actions. The Actions tab in the Event Details pane displays these actions available for an event. There are two types of possible actions: user actions and automatic action.

Click the Start button to run an action. The Stop button stops a running action from completing.

The following table lists the elements that are included in the Annotations tab.




UI Elements (A-Z)	Description
<b>Action</b>	Action specification summary.
<b>Node</b>	Target system where the action can be run.
<b>Start</b>	Starts the action on the CI associated with the selected event.
<b>State</b>	Describes the status of the available action. The following states are used:  — Available  — Running  — Succeeded  — Failed
<b>Stop</b>	Stops the current action.

## Annotations Tab

The Annotations tab in the Event Details pane displays a list of the annotations attached to the selected event. Annotations are comments and observations relating to the event that help the event owner understand what the underlying problems are and how to fix them. Click the Add button to add an annotation to the selected event.



The following table lists the elements that are included in the Annotations tab of the Event details pane.

UI Elements (A-Z)	Description
	Opens the Add Annotation dialog box. You can add annotation text in the Text field. Click <b>OK</b> to save the annotation.
	Opens the Modify Annotation dialog box. You can edit the annotation text in the Text field. Click <b>OK</b> to save the annotation.
	Opens the Delete Annotation dialog box. Click <b>Yes</b> to delete the annotation.
<b>Text</b>	Content text of the annotation.
<b>Time Created</b>	Date and time when the selected annotation was added to the event.
<b>User</b>	Name of the user who added the selected annotation to the event.

## Custom Attributes Tab




The Custom Attribute tab in the Event Details pane displays a list of the attributes that either an administrator or the responsible user have manually configured and added to the selected event. Click the Add button to configure a custom attribute and add it to the selected event.

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**Note:** To add or modify custom attributes, you must be logged on as a user with permissions to add, update, and delete custom attributes.

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The following table lists the elements that are included in the Custom Attributes of the Event Details tab.

UI Elements (A-Z)	Description
	Opens the Add Custom Attribute dialog box. You can add a name and value for the custom attribute. Click <b>OK</b> to save the custom attribute.
	Opens the Modify Custom Attribute dialog box. You can edit the custom attribute. Click <b>OK</b> to save the custom attribute.
	Opens the Delete Custom Attribute dialog box. Click <b>Yes</b> to delete the custom attribute.
<b>Name</b>	Name of the selected custom attribute defined for the selected event.
<b>Value</b>	Value assigned to the selected custom attribute.

## Related Events Tab


The Related Events tab in the Event Details pane displays an overview of all the events that are related to the event selected in the Event Browser. The way the events are displayed indicates if the event is considered as a symptom or a cause in the correlation process. The event displayed in bold type in the Related Events tab is the event that is selected in the Event Browser pane.

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**Note:** A plus sign (+) icon in the event text column indicates the presence of correlated events, which the related events tab does not by default display. Use the plus sign (+) or minus sign (-) icons to display or hide correlated events.

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The following table lists the elements that are included in the Related Events tab of the Event Details pane.


UI Elements (A-Z)	Description
	Removes the relationship between events. Useful if you think that Operations Management correlated the selected event by mistake. The Unrelate action has no effect on the correlation rule that initially established the event relation. If you want to avoid relating the events in future, modify the associated correlation rule.
<b>Assigned User</b>	Name of the user who is responsible for solving the related event's underlying problem.
<b>Correlation Rule</b>	Link to the correlation rule used to create the relationship.
<b>Related CI</b>	Name of the impaired configuration item (CI) where the event occurred.

UI Elements (A-Z)	Description
<Severity>	<p>Severity assigned to the related event. Usually, this is the same as the severity status of the original event received from HP Operations Manager.</p> <p><b>Tip:</b> For a short explanation of the icons used to indicate event severity, check the tooltip.</p>
<b>State</b>	<p>Point in the event lifecycle that the related event has reached (for example, Open, In Progress, or Resolved).</p>
<b>Time Received</b>	<p>Date and time when the original message associated with the related event was received from Operations Management.</p>
<b>Title</b>	<p>Text of the message sent from Operations Management. Click the plus sign (+) or minus sign (-) icons to expand or collapse any correlated messages. Bold text indicates the message that is selected in the Event Browser.</p>

## History Tab

Event history is a log of information about who or which component has changed values of an Operations Management event. This feature enables an operator to see how event attribute values have changed during the life of an event, for example, the sequence of severity changes. Event history information is available in a separate tab in the Event Details pane and can be viewed by any user with access to that event.

The following table lists the elements that are included in the History tab of the Event Details pane.

UI Elements (A-Z)	Description
<b>Actions</b>	Descriptions of the changes made to the event.
<b>Modification Time</b>	Date and time when the associated change was made to the event.
<b>Modified By</b>	User who made the associated change to the event.
<b>&lt;Search field&gt;</b>	Text field used to search for strings within event history. The  button clears the search string and displays all history information.

## Resolver Hints Tab

The Resolver Hints tab displays the information used to identify the node and CI associated with an event.

The following table lists the elements that are included in the Resolver Hints tab of the Event Details pane.

UI Elements (A-Z)	Description
<b>ETI Resolution</b>	<p><b>ETI Resolution Hint:</b> Original string provided by the external manager, for example, in a custom message attribute from HP Operations Manager. Can be used to associate the event with an ETI.</p> <p>You must set an attribute in the event which can be mapped to this indicator. To do this, set a custom message attribute called <code>EventTypeIndicator</code> in the HPOM policy. Specify a namespace for the CMA that matches the Name of the indicator, for example, <code>CPULoad</code>. Specify an instance that matches an indicator value, for example, <code>High</code>. When an event with an <code>EventTypeIndicator</code> CMA value of <code>CPULoad:High</code> is received, and ETI and values exist, the event attribute Event Type Indicator is set.</p>
<b>Node</b>	<p>Information used to identify the host system in the ODB associated with the selected event:</p> <ul style="list-style-type: none"> <li>▶ <b>Node Hint:</b> Hostname used to find a node in ODB</li> <li>▶ <b>DNS Name:</b> DNS name of the originating system</li> <li>▶ <b>IP Address:</b> IP address of the originating system</li> <li>▶ <b>Core ID:</b> ID of the originating system</li> </ul>
<b>Related CI</b>	<p>Name of the impaired configuration item (CI) where the event occurred.</p> <ul style="list-style-type: none"> <li>▶ <b>Related CI Hint:</b> event information used to identify the CI related to the event.</li> <li>▶ <b>HPOM Service ID:</b> Service ID used to identify the service related to the event.</li> </ul>

UI Elements (A-Z)	Description
<b>Related CI Resolution Info</b>	<p>Information associated with the selected event:</p> <ul style="list-style-type: none"> <li>▶ <b>Matched Hints Count:</b> Number of identified hints that matched the selected CI in the ODB database. This value is presented as a proportion of the number of available identifiers extracted from the event. The available identifiers are displayed in the following sections of the Resolver Hints tab: <ul style="list-style-type: none"> <li>▶ <b>Related CI Hint</b> — includes colon-separated list of CI hints and must include the host identifier.</li> <li>▶ <b>HPOM Service ID</b> — Service ID, in conjunction with object and application, used to identify the service related to the event.</li> <li>▶ <b>ETI Hint</b> — Used to identify the ETI for each CI. If ETI Resolution is successful, the ETI is assumed to be assigned to the CI, and this CI is given a higher match rating.</li> </ul> </li> <li>▶ <b>Status:</b> Provides information about the matches used for related CI resolution. <p>Displays information about the match:</p> <ul style="list-style-type: none"> <li>▶ <b>Success</b> — Confirms a successful match and displays the hint used.</li> <li>▶ <b>Unsuccessful CI resolution</b> — Displays the hint that could not be resolved or indicates that no hint was available to assess. confirms that a match was not possible and indicates the action taken, for example, <i>Fallback to host</i>.</li> </ul> </li> </ul>
<b>Source CI</b>	<p>Information used to identify the CI in the ODB that is the source of the event associated with the selected event:</p> <p><b>Source CI Hint:</b> Description of an Operations Management event attribute used to find the CI in the ODB</p>

## Instructions Tab

The Instructions tab in the Event Details pane displays instruction information from HP Operations Manager designed to help operators handle the associated event.

Operators working with the HPOM message browser can see additional instructions for this message. It is equally helpful for Operations Management operators to be able to access this information when using HPOM servers to forward events to Operations Management. This information is displayed in the Instructions tab of the Event Browser.


HPOM instructions are not contained within the event but are dynamically retrieved either from the corresponding policy or an external instruction provider when you select the Instructions tab.

The following table lists the elements that are included in the Instructions Text tab of the Event Details pane.




UI Elements (A-Z)	Description
<b>Instructions</b>	Instruction text available from the original event from HPOM.  Note: The originating server must be specified as a connected server. For details, see "Connecting Servers" on page 361.



## External Info Tab

The External Info tab is available for events for which ownership has been transferred to an external manager, for example, HP Service Manager. The information displayed in this tab is dynamically loaded from the external manager when the tab is opened. To load the latest information available from the external manager, click the  button in the External Info tab.

The following table lists the elements that are included in the External Info tab of the Event Details pane.

UI Elements (A-Z)	Description
	Refreshes the contents of the External Info tab.
	Opens the event in the external application that is responsible for managing the event.
	Deletes the transfer of control request for a pending transfer of control request. If the transfer request is complete, a cancel is no longer possible and the Cancel Transfer of Control is disabled.
<b>Assigned Group</b>	Group assigned to the event by the external manager.
<b>Assigned User</b>	User assigned to the event by the external manager.
<b>External ID</b>	ID assigned to the event by the external manager.
<b>External Server</b>	Node on which the external manager is hosted.
<b>Lifecycle State</b>	Lifecycle state assigned to the event by the external manager.
<b>Priority</b>	Priority assigned to the event by the external manager.
<b>Severity</b>	Severity assigned to the event by the external manager.

## Browser Options Dialog Box





The Browser Options dialog box is used to configure the Event Browser to display only the details that you are interested in. For example, you can add and remove columns, customize additional tabs, and configure filters to change and improve the way in which data displays.

All changes you make to the Event Browser layout are automatically saved to your user account. The next time you log on, the Event Browser displays the latest events in accordance with the way you configured the Event Browser. For example, the last selected view is selected and reopened.

For more information about setting the columns to be displayed, see "How to Configure the Event Browser" on page 56.

The following table lists the elements that are included in the Browser Options dialog box.

Alternatively, to select the default columns for display in the Event Browser, select **Reset**.

UI Elements (A-Z)	Description
	Adds columns to the Display these columns list.
	Removes columns from the Display these columns list.
	Used to move the selected column items down in the list of columns to be displayed. Items at the top of the list appear on the left side of the Event Browser.
	Used to move the selected column items up in the list of columns to be displayed. Items at the bottom of the list appear on the right side of the Event Browser.
<b>Available columns</b>	Information columns available but not selected for display in the Event Browser.
<b>Display these columns</b>	Information columns selected for display in the Event Browser.
<b>Reset</b>	Selects the default columns for display in the Event Browser.

## Closed Events Browser Configuration Dialog

The Closed Events Browser Configuration dialog box contains the time periods that you can apply to view the history of closed events.

The Closed Events Browser uses a subset of the controls available in the Event Browser. For details, see "Event Browser Overview" on page 71. For information on how to use the Closed Events Browser, see "How to View All Closed Events" on page 67.

The Closed Events Browser Configuration dialog box displays the UI elements listed in the following table.




UI Elements	Description
<b>Apply</b>	Applies the custom time range.
<b>Cancel</b>	Closes the Closed Events Browser Configuration dialog box without opening the Closed Events Browser.
<b>&lt;Date Range&gt;</b>	Sets the filter to display events within the selected predefined time period. The available choices are: <ul style="list-style-type: none"> <li>➤ Last hour</li> <li>➤ Last 24 hours</li> <li>➤ Last 3 days</li> <li>➤ Last 7 days</li> <li>➤ Last 14 days</li> </ul>
<b>End Time</b>	Sets a specific date and time to which point closed events should be selected.
<b>Number of events in the selected range</b>	indicates the number of closed events that will be displayed for the specified time range.  If no closed events can be found, it is not possible to display the Closed Events browser. If too many events are available, reduce the time period in an attempt to focus in more closely on the problem area.
<b>OK</b>	Opens the Closed Events Browser using the time range specified in the Closed Events Browser Configuration dialog box.







UI Elements	Description
<b>Select a custom range</b>	Enables the custom time range fields.
<b>Start Time</b>	Sets a specific date and time from which point closed events should be selected.

## Relate Events Dialog

The Relate Events dialog box displays the selected events to be related. If you want to create a correlation rule to relate similar future events, select **Open correlation rule wizard ...** and specify the cause event. For details, see [How to Create Correlation Rules from Manually-Related Events](#) on page 59.

The Relate Events dialog box displays the UI elements listed in the following table.

UI Elements	Description
<b>C-Correlation</b>	<p>Indicates if the event has any related events that are hidden as a result of a correlation rule. The following icons indicate the event's position in a chain of events:</p> <ul style="list-style-type: none"> <li> — Event is a <i>cause</i> in a correlation rule</li> <li> — Event is a <i>cause</i> in one correlation rule and a <i>symptom</i> in another</li> <li> — Event is a <i>symptom</i> in a correlation rule</li> </ul> <p>For details about correlated events, see "Related Events Tab" on page 92.</p>
<b>Event Type Indicator (ETI)</b>	<p>Display name of the event type indicator (ETI) used to calculate the status reported by the selected event and the current value, (for example, <i>Web application state: Slow</i>).</p> <p><i>WebAppState</i> is the name of the event type indicator. The corresponding label is <i>Web application state</i>, which is shown in the General tab. The level of the current ETI value is <i>Slow</i>.</p> <p>If event type indicators are assigned (see the Source Info tab) but are not being resolved (event type indicator field in General tab is empty), the configuration must be corrected.</p>
<b>Related CI</b>	Name of the impaired configuration item (CI) where the event occurred.





UI Elements	Description
<b>Severity</b>	<p>Severity assigned to the selected event. Usually, this is the same as the severity status of the original event received from Operations Management. The following icons indicate event severity status:</p> <ul style="list-style-type: none"> <li> — Critical</li> <li> — Major</li> <li> — Minor</li> <li> — Warning</li> <li> — Normal</li> <li> — Unknown</li> </ul>
<b>Time Received</b>	Date and time when the event was received.
<b>Title</b>	Brief summary of the event.

## Correlation Rule Generator Dialog

The Correlation Rule Generator dialog box contains the Select Events/Select Rules, Rule Properties and the Rule Details pages that you use to create a correlation rule or enhance an existing correlation rule.

### Selected Events / Select Rules Page

The Correlation Rule Generator dialog box displays the UI elements listed in the following table.

UI Elements	Description
 <b>Use as Cause</b>	Selects the event to be used as the cause event.
 <b>Open Event Details</b>	Opens the event details for the selected event in a pop-up window.
 <b>Select All Events</b>	Selects all events in the Select Events... pane.
 <b>Unselect All Event</b>	Deselects all events in the Select Events... pane.
<b>Create</b>	Enables the creation of a new correlation rule based on the selected events.
<b>CI Type</b>	Configuration item type associated with the event.
<b>Description</b>	Brief description of the correlation rule.
<b>Enhance</b>	If valid, enables the selection of an existing correlation rule to be modified.
<b>Event Title</b>	Title of the selected event.

UI Elements	Description
<b>Include</b>	Allows you to select or deselect events from the available list.
<b>Indicator</b>	Indicator associated with the event.
<b>Indicator Value</b>	Value of the indicator associated with the event.
<b>Selected Events for Creating or Enhancing</b>	Events that you have selected to be the symptoms of the cause event on which the correlation rule is based.
<b>Name</b>	Internal name of the selected correlation rule. Automatically generated from the Display Name value. The first character must be a letter (A-Z, a-z) or an underscore (_). All other characters can be a letter (A-Z, a-z), a number (0-9), or an underscore (_). Can be manually overwritten.
<b>Use as Cause</b>	Event that you have selected to be the cause event on which the correlation rule is to be based.

### Rule Properties Page

The Rule Properties page displays the UI elements listed in the following table.



UI Elements	Description
<b>Active</b>	Used to enable or disable the rule during runtime. By default it is disabled.
<b>Description</b>	Brief description of the correlation rule.
<b>Display Name</b>	Display name of the selected correlation rule used in the graphical user interface.












UI Elements	Description
<b>Name</b>	Internal name of the selected correlation rule. Automatically generated from the Display Name value. The first character must be a letter (A-Z, a-z) or an underscore (_). All other characters can be a letter (A-Z, a-z), a number (0-9), or an underscore (_). Can be manually overwritten.
<b>Time Window</b>	Specifies a specific time period for the selected correlation rule. By default it is not enabled and the global value is used. 0 seconds also mean it is not enabled and the global setting is used.  The range is from 0 to 9999 seconds.

## Rule Details Page

The Rule Details page displays the UI elements listed in the following table.

UI Elements	Description
	Binds one or more symptoms to the cause by taking the shortest path. All other bindings are removed.
	Displays details of the selected CI type, including indicators and values.
<b>Rule Topology Pane</b>	
<Dark Blue background>	Symptom CI type.
<Light Blue background>	Not cause or symptom CI type, but CI type is part of rule topology.
<Orange background>	Cause CI type.
<Pink frame>	Selected CI type.
<no background color>	CI type is not part of the rule.

UI Elements	Description
	Indicates that the configuration item type has an indicator value that is configured as a symptom in the selected correlation rule.
	Indicates that the configuration item type has an indicator value that is configured as a cause in the selected correlation rule.
	Adds the highlighted link (constraint) to the correlation rule. Adding a link enables the path between the linked objects in the context of the correlation rule, which is a requirement for topology-based event correlation. It does not change the ODB view model in any way.
	Removes the highlighted link (constraint) from the correlation rule you are editing. The link between the two objects is no longer recognized in the context of the correlation rule, and any rule that relies on this link no longer works. Removing a link from a correlation rule does not change the ODB view model in any way.
<b>Layout</b>	Selects alternative ways of viewing the Rule Topology diagram. There are three options to chose from: Hierarchical, Circular, and Concentric Radial.
<b>Levels</b>	Selects the depth of topology levels displayed in the Rule Topology diagram.
<b>Zoom</b>	Controls the size of the displayed Rule Topology diagram.
<b>Symptoms and Causes Pane</b>	
 <b>Delete Item</b>	Deletes the selected indicator from the list of indicators included in the correlation rule as either a symptom or a cause.
<b>CI Type</b>	Name of the configuration item type to which the listed indicator is assigned.
<b>Indicator</b>	Name of the indicator referenced in the selected correlation rule.

UI Elements	Description
<b>Indicator Value</b>	Name of the indicator value referenced in the selected correlation rule.
<b>Type</b>	Indicates if the indicator is defined as a symptom or a cause in the selected correlation rule.
<b>Indicators Pane</b>	
	Refreshes the contents of the Indicators list. Use if new indicators becomes available while you are working.
 <b>Group Indicator by Type</b>	Toggles between a list containing all indicators and a list divided into health indicators and event type indicators.
 <b>Add as a Cause</b>	Sets the selected indicator value as a cause for the configuration item type selected in the Rule Topology pane.
 <b>Add as a Symptom</b>	Adds the selected indicator value as a symptom for the configuration item type selected in the Rule Topology pane.

## **opr-archive-events Command-Line Interface**

This section describes the options and parameters available in the **opr-archive-events** command-line interface.

---

**Note:** HPOM events are not updated when using the **opr-close-events** tool and the **opr-archive-events** tool to close, delete, and archive events. The events in HPOM remain unaffected.

The opposite is also true when using the **omwmsgutil** (HPOM for Windows) tool and **opcack** and **opchistdown** (HPOM for UNIX) tools to close, delete, and archive events. The events in Operations Management remain unaffected.

All these tool operates directly on their respective databases and the changes do not go through the workflow process, resulting in the loss of synchronization between Operations Management and HPOM.

If you use these tools to close, delete, and archive events from one system (for example, Operations Management), you must make the equivalent changes with the appropriate tools on the other system (for example, HPOM).

---

The **opr-archive-events** command-line interface is located in:

`<HPBSM_install_dir>\bin` (default: C:\HPBSM\bin)

The **opr-archive-events** command accepts the following options:

**opr-archive-events**

**-o** *<output path and file name>* **-u** *<date>* [**-a**][**-force**]  
**-u** *<date>* **-d** [**-force**]  
**-h**

---

**Note:** You can combine the options that are given between square brackets. Otherwise, use the rest of the options separately.

---

For more information about the options recognized by the **opr-archive-events** command, see the following list:

**-a,--archiveOnly** *<archive file>*

Only archives events without deleting them from the database.

**-d,--deleteOnly**

Deletes only the events from the database without archiving.

**-force**

Archive events without asking user for confirmation.

**-h,--help**

Displays a summary of the command options and exits.

**-o,--output** *<archive\_file>*

Path and name of XML file used to store archived events.

**-u,--until** *<date>*

Archives the events that were received before the specified time. The time must be specified in one of the following formats:

yyyy.mm.dd-hh:mm:ss

yyyy.mm.dd-hh:mm

yyyy.mm.dd-hh

yyyy.mm.dd

## **opr-close-events Command-Line Interface**

This section describes the options and parameters available in the **opr-close-events** command-line interface.

---

**Note:** HPOM events are not updated when using the **opr-close-events** tool and the **opr-archive-events** tool to close, delete, and archive events. The events in HPOM remain unaffected.

The opposite is also true when using the **omwmsgutil** (HPOM for Windows) tool and **opcack** and **opchistdown** (HPOM for UNIX) tools to close, delete, and archive events. The events in Operations Management remain unaffected.

All these tool operates directly on their respective databases and the changes do not go through the workflow process, resulting in the loss of synchronization between Operations Management and HPOM.

If you use these tools to close, delete, and archive events from one system (for example, Operations Management), you must make the equivalent changes with the appropriate tools on the other system (for example, HPOM).

---

The **opr-close-events** command-line interface is located in:

`<HPBSM_install_dir>\bin` (default: C:\HPBSM\bin)

The **opr-close-events** command accepts the following options:

```
opr-close-events  
  [-u <date>] [-f <date>] [-s <severity>][[-force] [-r]  
  -all [-force] [-r]  
  -h
```

---

**Note:** You can combine the options that are given between square brackets. Otherwise, use the rest of the options separately.

---

For more information about the options recognized by the **opr-archive-events** command, see the following list:

**-all**

Closes all events.

**-f,--from <date>**

Closes events (including related events) received after the specified time. This option can be combined with severity and until time. The time must be specified in one of the following formats:

yyyy.mm.dd-hh:mm:ss

yyyy.mm.dd-hh:mm

yyyy.mm.dd-hh

yyyy.mm.dd

**-force**

Closes events without asking user for confirmation.

**-h,--help**

Displays a summary of the command options and exits.

**-r,--resetHIs**

Resets health indicators after closing of events.

**-s,--severity <severity>**

Closes events of the specified severity. This option can be combined with from time and until time. The severity can be one of the following: NORMAL, WARNING, MINOR, MAJOR, CRITICAL.

**-u,--until** <date>

Closes events received before the specified time. This option can be combined with severity and from time. The time must be specified in one of the following formats:

yyyy.mm.dd-hh:mm:ss  
yyyy.mm.dd-hh:mm  
yyyy.mm.dd-hh  
yyyy.mm.dd

## Troubleshooting and Limitations

This section provides help in troubleshooting problems relating to event management.

### **HPOM for Windows User Names are Truncated When Messages are Forwarded**

By default HPOM for Windows has the OM for UNIX compatibility mode enabled (true) in the Server-based Flexible Management configuration. This leads to the truncating of the user names.

- ▶ Change the **OM for UNIX compatibility mode** setting to false in the Server-based Flexible Management namespace in the Generic Server Configuration tab.

### **Correlations Might be Skipped in High Load Situations**

If a high number of events with ETIs is forwarded to Operations Management over a long period of time (30 minutes or longer), the correlation engine only considers up to the specified number of most recent events. If this limit is exceeded, the oldest events are removed from the queue and no longer considered for correlation.

This limit is set using the Max Waiting Queue Size attribute and is located in:

**Infrastructure Settings Manager > Operations Management > Topology-Based Event Correlation Settings**



The default value is 5000. The valid range is 100 to 20000.

- ▶ If you are experiencing this problem, lower the incoming event rate or increase the Max Waiting Queue size limit. If the limit is increased, you should also monitor the memory consumption and, if necessary, increase the memory setting (parameter `-Xmx`) for the `opr-backend` process.

### **Data Collection Tool `opr-checker.bat`**

If you are having problems with your Operations Management installation and need to contact HP Software Support, use the `opr-checker.bat` tool to generate a summary of your installation.

- 1** Run the `opr-checker.bat` tool from the following location and specify a target location for the output file:

```
<HPBSM_install_dir>\opr\support\opr-checker.bat -a -xml >  
%TEMP%\opr-checker.xml
```

- 2** Send the resulting XML file to HP Software Support for analysis.



# 3

---

## Health Perspective

### **This chapter includes:**

#### Concepts

- ▶ [Health Status](#) on page 116
- ▶ [Health Top Views](#) on page 117
- ▶ [Event Type Indicators](#) on page 118
- ▶ [Health Indicators](#) on page 119
- ▶ [HI-Based KPI Calculations](#) on page 120

#### Tasks

- ▶ [How to View Event Type Indicators](#) on page 123
- ▶ [How to Reset Health Indicators](#) on page 123
- ▶ [How to View HI-based Key Performance Indicator Details](#) on page 124
- ▶ [How to View HI Details](#) on page 124
- ▶ [How to View KPI Business Rule Settings](#) on page 125

#### Reference

- ▶ [Health Perspective Graphical User Interface](#) on page 126
- ▶ [Health Top View](#) on page 127
- ▶ [Health Indicators Pane](#) on page 129
- ▶ [Troubleshooting and Limitations](#) on page 131

## Health Status

The Health Perspective tab is used to display the health of related CIs in the context of events. The event selected in the Event browser determines what is displayed in the Health Top View and the selected CI in the Health Top View determines what is displayed in the Health Indicators pane.

In the Health Perspective tab, the following panes help you understand the health status of an object, show you which business rules and KPIs are being used, and how the health status of the selected object affects the health of related objects:

► **Model Explorer**

Displays a list of all the objects in your monitored environment. For more information, see "Model Explorer" on page 33.

► **Event Browser**

Displays a list of the active events in your environment. For more information, see "Event Browser" on page 33.

► **Health Top View**

Displays a hierarchical overview of the relationships between the different objects that make up the monitored environment and indicates the current health of the displayed objects. For more information, see "Health Top Views" on page 117.

► **Health Indicators**

Displays a list of the KPIs and health indicators for the selected CI, used to calculate health-related information such as availability and performance of the selected configuration item. For more information, see "Health Indicators" on page 119.

► **Actions Pane**

Display, and execute the tools, HPOM actions and Run Books that can be executed on the selected events in the Event Browser. For details, see "Tools" on page 52, "Operations Manager Actions" on page 54, and "Launching Operations Orchestration Run Books" on page 55.

Health indicators and key performance indicators are used to determine the health of an object. Operations Management calculates how severe the problems directly associated with the selected object are and combines this information with any additional information available about dependent objects. The combined data is passed to calculation rules that evaluate and set the key performance indicators that indicate the overall health of an object.

The color of an object displayed in the Health Top View is used to indicate its health, and the most critical status of any contributing objects. For example, green can be set to represent normal and red to represent critical. The color used depends on the view settings. Whatever you specify in the view settings contributes to the color of the CI.

---

**Tip:** The Health Perspective panes display data related to the configuration item associated with the selected event. The Health Top View is designed to help investigate problems that require root cause analysis.

---

For more information about health indicators and key performance indicators, see "Health Indicators" on page 119 and "HI-Based KPI Calculations" on page 120.

## Health Top Views

The Health Top View in the Health Perspective tab shows the related CI from the event in the CI neighborhood of the configured view. The view shows the relationships between the configuration items that represent the monitored objects and indicates their current health status. The Health Top View is designed to help investigate problems that require root cause analysis.

It shows the related CI from the event in the CI neighborhood of the configured view. So there could be “sibling” CIs, children, and so on.

**Tip:** You can refine the contents of the Health Top View pane by applying an alternative view. If no event is selected in the Event Browser pane, the Health Top View pane remains empty.

---

You can use the View Mappings manager to map views to individual configuration item types. A list of mapped views appears in the Selected Views list in the Health Top View pane. The contents of the Selected Views list are determined by the configuration item type associated with the event selected in the Event Browser. For more information about view mapping, see "View Mapping" on page 224.

The Health Indicators pane shows you the health indicators used to calculate and set the current severity status of the highlighted configuration item in the Health Top View.

For more information about health indicators and key performance indicators, see "Health Indicators" on page 119 and "HI-Based KPI Calculations" on page 120.

## Event Type Indicators

Event type indicators (ETIs) are attributes of Operations Management events used to categorize events according to the type of occurrence in the managed IT environment. An Operations Management event is created as a result of receiving a message from a manager, such as HP Operations Manager or Network Node Manager. In HPOM, you can configure events to include the custom attribute `EventTypeIndicator`, which is used to set event type attributes. If the custom attribute is not configured, event type attributes can be set by the applicable mapping rules. If adequate information is not available, no ETI is set.

Any occurrence on the monitored system of a given type causing an Operations Management event must be assigned the same ETI. After defining appropriate correlation rules, events are correlated based on the ETIs. The correlation rules relate types of events that can occur on the CI.

Event type indicators are characterized by the following:

- Categorize type of event to abstract multiple event sources.
- At least one value is required. This value is used to describe the event occurrence in the environment, for example, an ETI could read: **System restart:Occurred**. Usually, you do not need to set any values for such ETIs because, as a convenience, one value is created that is called **Occurred**.
- Events contain an ETI attribute. ETIs do not exist as instances in their own right.
- ETIs without a corresponding health indicator are not shown within the Health Indicators pane.
- No manual reset necessary. An ETI is just an event attribute.

A configuration item inherits ETI assignments, including health indicators, from its parent configuration item type. For example, ETIs assigned to the configuration item type **Database** also apply to the configuration item type **Oracle** and are applied to any Oracle Database configuration items.

## Health Indicators

Health indicators determine and display the health of specified aspects of a monitored CI. A health indicator is an event-specific monitor that uses one value to represent the normal state of the CI, for example, **System:Running**. One or more additional values are used to represent any abnormal states, such as **System:Stopped**. In this way, health indicators are used to show if a hardware resource is available and responding.

Health indicators can also display the state of a software application. For example, the possible states of a database server could be specified as: **Available**, **Starting** or **Stopping**. Health indicators can also be used to show the usage of a software application, for example, whether the load is **Normal**, **High**, or **Max. Exceeded**.

Only events that provide CI state information can set a health indicator. Health indicators are assigned to a specific configuration item type through the associated ETI.

---

**Tip:** Operations Management sets indicators automatically using event attributes or mapping rules.

---

Mapping rules can be used to match attributes of incoming events to defined health indicator values, such as **Low** or **High**, for a given configuration type. For example, you can define a health indicator to monitor events related to the CPU load on Unix systems (CI type: **Infrastructure Element > Node > Computer > Unix**). When an event reporting **Low** or **High** CPU load is received, the appropriate health indicator value is set.

Health indicators provide the data that a key performance indicator (KPI) needs to calculate the availability and performance of monitored resources. The KPIs use calculation rules to collate the values from multiple health indicators and set a severity level, such as: **Critical**, **Major**, **Minor**, or **Normal**. For example, a KPI for a database can include multiple health indicators concerning the run state (**Up**, **Down**), the cache-hit ratio (**0**, **50**, **00%**), the length of query queues (**Empty**, **Full**), and response times (**#ms**) to determine overall health.

For more information about key performance indicators, see "HI-Based KPI Calculations" on page 120.

## HI-Based KPI Calculations

Key performance indicators (KPI) apply calculation rules to the data provided by health indicators to determine the availability and performance of the objects to which the health indicators are assigned. The value that results from the calculation is used to set a severity level, for example, normal, warning, minor, major, or critical.

KPIs related to the selected event are displayed in the Health Indicators pane of the Health Perspective tab. Their color reflects the assigned severity. In the Health Top View, KPIs appear under the monitored object to which they belong.



The color of each KPI reflects the KPI's current severity status. The severity status is determined by a business rule, which specifies how and when severity status propagates up a relationship chain. One resource with a critical problem does not mean that all dependent resources are, by definition, also critical. KPIs can use data from multiple sources to determine the overall impact up and down dependency chains and determine the severity status accordingly.

---

**Note:** The type of source determines the importance of the information provided. For example, live data from a monitor running directly on a node is considered more important than data resulting from business rules, which base calculations on KPI relationships and dependencies. This means that KPI states propagated by a business rule may be overridden by live data directly from the CI.

---

Key performance indicators exist for Operations Management in two high-level areas covering health-based and event-based data. The following KPIs use health-based data:

► **System and Application Performance KPI**

Performance-related data from health indicators might include values for the hit ratio in the database cache, server connection speeds, queue lengths, or database query processing times. This example describes health indicators that are specific to the database configuration item type. Other configuration item types have different health indicators.

► **System and Application Availability KPI**

Availability-related data might include server run states (up, down, starting, stopping) or process activity (refusing, accepting connections, not responding).

There are two additional KPI types that use event data for Unassigned or Unresolved events and are attached by default to every configuration item. Unassigned KPIs concern events with an underlying problem that has not yet been allocated to any user for investigation. Unresolved KPIs concern events with underlying problems that have not yet been fixed.

---

**Note:** Unassigned, event-based KPIs are, by definition, also unresolved.

---

If an unassigned or unresolved KPI references data from more than one event, the color of the KPI reflects the severity status set by a business rule. The business rule associated by default with unassigned and unresolved KPIs is the Operations Event Lifecycle Group Rule, which sets the status of the KPI to the highest severity of any events associated with the related configuration item. For example, if a KPI for an unassigned event refers to one critical and four normal events, the KPI appears red to reflect the critical event.

---

**Note:** There is no propagation from child CIs.

---

## How to View Event Type Indicators

In this task, you learn how to list and view event type indicators (ETI).

**To view health indicators:**

- 1 Open the Indicators manager:

**Admin > Operations Management > Design Operations Content > Indicators**

or

Select an event in the Event Browser, open the context menu and select:

**Configure > Event Type Indicators**

- 2 In the CI Types pane, select a CI type.
- 3 In the Indicators pane, select an indicator.

Details of the selected indicator are displayed in the Details pane.

## How to Reset Health Indicators

In this task, you learn how to reset a health indicator. Resetting a health indicator is a way of returning an object's severity status to a defined default value such as Normal.

---

**Note:** Resetting a health indicator is not usually necessary and should be performed in exceptional circumstances only, for example, when Operations Management does not reset it automatically.

---

**To reset a health indicator:**

- 1 Open the Event Browser from Operations Management:

**Applications > Operations Management > *select a perspective***

- 2 In the Event Browser pane, right-click the event you want to close and for which you want to reset the health indicator.

- 3 In the context menu that displays, select **Close and Reset Health Indicator**.

## **How to View HI-based Key Performance Indicator Details**

In this task, you learn how to list and view the details of a key performance indicator (KPI). Key performance indicators use the data provided by one or more health indicators to set a severity level (normal, warning, or critical) for the monitored object.


**To view details of key performance indicators:**

- 1 Open the Health Perspective tab from Operations Management:  
**Applications > Operations Management > Health Perspective**
- 2 In the Event Browser pane, select the event for which you want to view KPI details.
- 3 In the Health Indicators pane, point to the status icon of the KPI for which you want to display details. Details of the KPI, such as Status, Business Rule name, Held Status Since date, are displayed in a pop up dialog box.

## **How to View HI Details**

In this task, you learn how to list and view health indicator details.

**To view the health indicator details:**

- 1 Open the Health Perspective tab from Operations Management:  
**Applications > Operations Management > Health Perspective**
- 2 In the Event Browser pane, select the event for which you want to view Health Indicator State details.
- 3 In the Health Indicators pane, point to the state icon, for example , for the health indicator for which you want to display details.

Details of the selected KPI are displayed in a pop-up window. The background color reflects the status of the KPI.

The details include:

- Status of the KPI
- Business Rule applied to the KPI
- Severity of the health indicator
- Message
- Value

## How to View KPI Business Rule Settings

In this task, you learn how to find out which business rule Operations Management applies to set the severity of a key performance indicator. Key performance indicators use the data provided by one or more health indicators to set a specific severity level for a monitored object. A KPI business rule specifies how the status of dependent KPIs is combined and the result used in the calculation of a parent KPI's severity.

**To view the applied KPI business rule:**

- 1** Open the Health Perspective tab from Operations Management:

**Applications > Operations Management > Health Perspective**

- 2** In the Event Browser pane, select an event.

The CI related to the event and its direct neighborhood CIs are displayed in the Health Top View.

- 3** In the Health Top View pane, point to the object for which you want to view the KPI business rule.

In the pop-up window that opens, check the value of the entry Business Rule to see which business rule was used to set the severity status, for example, Worst Child Rule.

## **Health Perspective Graphical User Interface**

This section describes the health related information displayed in the Health Perspective tab. The information in this sections aims to help you understand how you can use health perspectives to better understand the overall health of your IT environment. In this section, you can find information about the following topics:

- ▶ "Health Top View" on page 127
- ▶ "Health Indicators Pane" on page 129

For information about the other panes, see "Model Explorer" on page 70 and "Event Browser Overview" on page 71.

## Health Top View

The Health Top View pane in the Health Perspective tab displays a topological view of the configuration items affected by the event selected in the Event Browser pane. The view shows the relationships between the configuration items that represent the monitored objects and indicates their current health status. You can also use the Health Top View to see what impact the health of individual objects has on the health of other objects. The information displayed in the Health Top View includes the following details:

UI Elements (A-Z)	Description
<b>Last Updated</b>	Date when the Health Top View information was last refreshed.
<Selected View>	<p>List of the views mapped to the configuration item type (and any parents) referenced by the event selected in the Event Browser, which contain the CI, and, if configured, filtered by event category.</p> <p>Select the view you want to apply to the contents of the Health Top View pane. A view enables you to refine the type and amount of configuration items displayed. The selected view can also affect the severity status of configuration items, since views can exclude or include additional (related) items which have an impact on the displayed topology.</p> <p>You can map views to configuration item types. For more information about mapping views, see "View Mapping" on page 224.</p>

When you hover the cursor over any configuration item displayed in the Health Top View pane *except* the root configuration item in the tree or any item that is colored grey, Operations Management displays details of the factors that contribute to the status of a configuration item, as described in the following table.

---

**Note:** If you have set up other monitors, for example, from BPM or SiteScope, you also see other KPIs listed.

---

UI Elements (A-Z)	Description
<b>Business Rule</b>	Business rule used to determine the availability and performance of the selected configuration item.
<b>Class Type</b>	The CI type of the selected CI.
<b>CI Name</b>	Name of the selected configuration item, for example, DB_Server.example.com.
<b>Status</b>	Severity assigned to the selected CI.
<b>Held status since</b>	Date and time since when the current status was applied to the selected configuration item.
<b>Hidden Child CIs</b>	
<b>&lt;KPI Name&gt;</b>	Display name of the key performance indicator to which the displayed health indicator is assigned, for example, System Availability KPI.
<b>Unassigned Events</b>	KPI associated with events that have either not been assigned to any user or remain unresolved. The information includes, in addition to the details shown for performance and availability KPIs, the number of duplicate or related (and unassigned) events associated with the selected object. The background color indicates the highest severity of the KPIs associated with the selected object.
<b>Unresolved Events</b>	

For descriptions of the context menu items available in the Health Top View pane, see [Event Browser Icons, Buttons, and Context Menus](#) on page 72.








## Health Indicators Pane

The Health Indicators pane lists the KPIs and health indicators for the configuration item associated with the event you select in the Event Browser. For details, refer to the *Service Health* online help.

The Health Indicators pane displays the UI elements listed in the following table. In the table, unlabeled UI elements are shown in angle brackets (<>).

UI Elements (A-Z)	Description
<CI Name>	Name of the selected configuration item, for example, DB_Server.example.com.
<CI Type>	Name of the configuration item type to which the configuration item displayed in the Selected CI field belongs.
<b>Health Indicator</b>	Display name of the health indicator used to set the severity of the selected event.
<b>Last Status Change</b>	Time stamp indicating the last time the current status was updated.
<b>KPI</b>	Display name of the key performance indicator to which the displayed health indicator is assigned, for example, Operations Availability KPI.
<b>Health Indicators Contributing to KPIs</b>	Lists any health indicators that are associated with the selected CI and are assigned to a KPI.
<b>Health Indicators Not Contributing to KPIs</b>	Lists any health indicators that are associated with the selected CI but are not assigned to any KPI.
<b>Selected CI</b>	Name of the configuration item to which the displayed health indicator is assigned.

UI Elements (A-Z)	Description
<p><b>State</b></p>	<p>Current value set for the health indicator specified in the Name field, for example, Success or Failed. The value is also associated with a severity.</p> <p>An icon reflecting the severity assigned to the selected health indicator value is displayed, for example:</p> <p> — Critical</p> <p> — Warning</p> <p> — Normal</p>
<p><b>Trend</b></p>	<p>Arrows pointing up, down, or up and down to indicate the overall trend of the selected KPI since the last update:</p> <p> — Positive</p> <p> — Negative</p>
<p><b>Value</b></p>	<p>Value of the health indicator used to set the severity of the selected event.</p>

## Troubleshooting and Limitations

This section provides help in troubleshooting problems relating to health indicators, including listing, viewing, and enabling.

### **Event Browser is Empty**

- No events are available
- Incorrect filter is applied
- No connection is available to the Operations Management application

### **Health Top View is Empty**

- No event is selected in the Event Browser
- No view is mapped to the related CI of the selected event
- No CI is related to the selected event
- Java applet did not start or is not running correctly

### **Health Indicators Display Incorrectly**

Health indicators are used to assign a severity to a state, for example, **Critical** severity to the state **Unavailable**. The state and the assignment are indicated in the Health Indicators pane. However, calculation rules for a KPI might use several health indicators to set a new severity level for the object in the Health Top View.

- No event is selected in the Event Browser
- The configuration item highlighted in the Health Top View pane does not have any assigned health indicators
- You selected an event in the Event Browser pane and a different configuration item in the Health Top View pane



# 4

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## Performance Graphs

### **This chapter includes:**

#### Concepts

- ▶ [Graphing Concepts](#) on page 134
- ▶ [Types of Graphs](#) on page 135
- ▶ [Overview of Graph Templates](#) on page 137
- ▶ [Merge Graphs Overview](#) on page 138

#### Tasks

- ▶ [How to Manage Graphs - Work Flow](#) on page 141
- ▶ [How to Draw Graphs from Operations Management Views](#) on page 141
- ▶ [How to Draw Graphs from the Performance Perspective](#) on page 143
- ▶ [How to Design Graphs](#) on page 145
- ▶ [How to Edit Graphs](#) on page 146
- ▶ [How to Delete Graphs](#) on page 148

#### Reference

- ▶ [Options for Drawn Graphs](#) on page 148
- ▶ [Performance Perspective Page](#) on page 152
- ▶ [Graph Drill-Down Dialog Box](#) on page 155
- ▶ [Graph Export Dialog Box](#) on page 156
- ▶ [Graph Design Wizard - Overview](#) on page 157
- ▶ [Graph Design Wizard - Graph Selection Page](#) on page 158
- ▶ [Graph Design Wizard - Graph Attributes Page](#) on page 158

- ▶ [Graph Design Wizard - Metric Selection Page](#) on page 164
- ▶ [Metric Selection Page - Metric Selection Window](#) on page 166
- ▶ [Metric Selection Page - Metric Properties Window](#) on page 166
- ▶ [Graph Design Wizard - Special Attributes Page](#) on page 171
- ▶ [Graph Design Wizard - Other Attributes Page](#) on page 177
- ▶ [Graph Design Wizard - Save Graphs Page](#) on page 178
- ▶ [Graph Design Wizard - Finish Page](#) on page 179
- ▶ [Color Palette](#) on page 179
- ▶ [Graph Attributes - List and Description](#) on page 180
- ▶ [Troubleshooting and Limitations](#) on page 185

## **Graphing Concepts**

Graphing enables you to draw graphs and design custom graphs for configuration item types that you are monitoring. You can also compare multiple instances of a resource or an application on one or more configuration items (CIs).

Performance Perspective enables you to draw graphs from templates and also helps you draw ad hoc graphs by selecting required metrics from a metric list that is populated based on the CI you selected.

Using preformatted graphs and reports, you can:

- ▶ Evaluate application and system performance
- ▶ Analyze usage trends
- ▶ Correlate usage
- ▶ Compare application and system performance

## Types of Graphs

While designing or editing a graph, you can select the type of graph. The following list contains the available output types:

▶ **Line**

Displays each metric as a line. Only Line Styles and Markers are valid for this graph type.

▶ **Area**

Displays each metric as a line with data below the line filled with the same color. All metrics in this graph must have same unit. This graph is also known as a filled line graph.

▶ **Bar**

Displays vertical bars for each metric.

▶ **Mixed**

Displays metric that can be individually set as a line or area.

▶ **Horiz Bar**

Displays horizontal bars for each metric.

▶ **Pie**

Displays each metric as a portion of a circular pie chart.

▶ **Gauge**

Displays a single automotive-type dial gauge for each metric.

▶ **Table**

Displays the data in a table with columns for each metric, and rows for each record.

▶ **Horiz Table**

Displays a table with columns for each record and rows for each metric.

▶ **Baseline**

Displays the average values for a single metric for a typical week. All available data from the data source is used to generate this baseline. To calculate the baseline for a typical week, you must have more than seven days of data for the selected system. If there is a large volume of historical data, it may take a few minutes to calculate.

A baseline graph is useful in identifying patterns in system and application activities.

When you specify a baseline graph, eight graphs are drawn. The first graph in the series is a Typical Week graph that displays the average values of a metric, organized by days of the week, and by hours of the day. In addition, there are seven graphs, one for each day of the week. Each of these displays the expected daily high and low values for the metric versus the actual metric value. In the daily graphs, the blue line indicates the range of the values that are expected at any particular hour of that day. The expected values are determined by examining all past data for the system and calculating statistics for every hour of every day of the week. The blue lines typically display the range where 80% of the data points are expected to fall. The red line displays the actual data for each hour of the day.

► XML

Returns the data in the XML format.

► Excel

Returns the data as an Excel spreadsheet. The client system must have Microsoft Excel installed to view this graph type.

► TSV

Returns the data as Tab Separated Values (the values are separated by tabs). This format is similar to CSV, but it separates each item with the tab character instead of a comma. This format is generally easier to understand because the tabs align the values in columns.



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**Note:** If you are selecting a Microsoft Excel or a TSV graph, you must configure the browser settings to display Microsoft Excel and TSV files. For more information on browser settings, see "Unable to View Graph in Certain Formats (XLS/TSV)" on page 185.

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► **CSV**

Returns the data as Comma Separated Values (the values are separated by commas). This is a common way of representing data, which can readily be imported into other applications.

## Overview of Graph Templates

For drawing graphs for the most common scenarios, Operations Management provides a set of standard templates.

A graph template contains information such as:

- Source of the data (agent or data collector)
- Metric or a set of metrics
- Type of graph
- Graph attributes

You can also design your own graph templates or customize an existing template by using the Design Wizard. You cannot save changes made to standard templates, but you can save them as user-defined templates using a different name.

Graphing is organized using a graph family tree, which consists of:

► **Family**

Refers to the group that organizes graphs

► **Category**

Refers to the various sub-groups of graphs that are logically grouped within the family

► **Name**

Uniquely identifies a graph definition

## **Default Graphs**

A default graph in a graph family contains the most important metrics to measure the performance of any resource or application. You can map graph families or categories to a CI. When you launch a graph for a CI or an event that has a graph family or category associated with it, the default graph from the graph family or category is drawn. A graph family can have one or more default graphs. If a graph family does not have a default graph, the first graph in the family or category is selected.

You can also configure a graph as a default graph when designing or editing a graph using the Graph Design Wizard. For instructions on designing a graph, see "How to Design Graphs" on page 145.

## **Merge Graphs Overview**

You can map a graph family or category with a CI type. For more information about mapping and management of graphing, see "Performance Graphs" on page 263.

The Performance Graphs Manager enables software administrators and subject matter experts to map configuration item types to available graph families so that Instance-based graphs can be launched at runtime from a configuration item. For instructions to map CI type to graph family, see "How to Map CI Types to Graph Families" on page 268.

When you select a CI for which you want to draw a graph, all the default graphs from the graph families or categories associated with the corresponding CI type are selected. The attributes from all the default graphs in the families and categories associated with the chosen CI are merged. If a graph family does not have a default graph, the first graph in the family or category is selected. One or more graphs are drawn in a new browser window.

You can design a graph for a CI. When you design a graph for a CI, the graph is also mapped to the CI type of the selected CI. Therefore, the graph is automatically associated with all the CIs belonging to the CI type.

### Example

If you design the graph `mail_tracker` for the CI `Ex_sysA`, which belongs to the CI type `Exchange_server`, all CIs belonging to the CI type `Exchange_server` are automatically associated with the graph `mail_tracker`.

The graphs drawn appear in graph windows. This depends on the graph attributes that are part of the template. For more information, see "Graph Attributes - List and Description" on page 180 and keywords (as they appear in the graph template).

### Example

The standard graph family `Systems Infrastructure` contains the default graph `Global History`. If you select a CI associated with the graph family `Systems Infrastructure`, the graph `Global History` is drawn.

### Example

The CI `A` is associated with the graphs `G1` and `G2`.

The following are graph attributes for graph `G1`:

- ▶ Graph type=line
- ▶ Number of metrics=9
- ▶ Date Range=default, 7 days ending now

The following are graph attributes for graph G2:

- G2=line
- Number of metrics=12
- Date Range=All

Graphing merges the two graphs and creates the resulting graph as follows based on the attributes:

- Number of graphs=1
- Metrics per graph=12
- Date Range=All

---

**Note:** The metrics per graph in the resulting graphs also depend on the value configured in the parameter **Metrics Per Graph**. For more information, see "Graphing Settings" on page 522.

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## How to Manage Graphs - Work Flow

Along with standard graph templates, you can also design custom graphs. Using the Design Wizard, you can create your own graph templates to display the required data. You can also edit the existing graph definition of a standard template and save it as a user-defined template. You can also map graph families or categories to configuration item types. For more information, see "Performance Graphs Manager" on page 263.

You can also draw ad hoc graphs from the graphing perspective view. For more information, see "How to Draw Graphs from the Performance Perspective" on page 143.

Only users with the appropriate access permissions can use Operations Management Administration tools. For more information about user management, see "Operations Management Users" on page 460.

## How to Draw Graphs from Operations Management Views

You can draw graphs from a set of predefined templates or your own graph templates. You can launch a graph from the Operations Management context-sensitive menu available in various views. For more information, see:

- "Health Top View" on page 127
- "Model Explorer Pane" on page 227
- "Event Browser Overview" on page 71

For further information on Operations Management , see "Event Perspective Graphical User Interface" on page 69 and "Health Perspective Graphical User Interface" on page 126. For information about views and view mappings, see "Views for Operations Management" on page 223.

### To draw a graph:

You can launch a graph using one of the following ways:

- ▶ From the **Event Perspective** tab, right-click on the event for which you want to draw a graph in the **Event Browser** pane, and then from the menu options, select **Show > Performance Graphs (Neighborhood)** or **Performance Graphs (CI)**. The progress bar is displayed in the Graphs Panel until the graph is launched.
- ▶ If you want to draw a graph from the Model Explorer, right-click on the CI for which you want to draw a graph, and then from the menu options, select **Show > Performance Graphs (Neighborhood)** or **Performance Graphs (CI)**. The progress bar is displayed in the Graphs Panel until the graph is launched.

---


**Note:** If you are drawing a graph for a CI with multiple instances, make sure the value of the parameter **Maximum Instances** is configured accordingly. While drawing a graph, only as many instances as the value specified for this parameter are displayed. If the number of instances is more than the value of this parameter, the extra instances are excluded from the graph. For more information, see "Graphing Settings" on page 522.

---

The default graph of each family/category is drawn in a new browser window. If a graph family/category does not have a default graph, the first graph in the family/category is selected. There are a multiple options that you can use to perform a more detailed analysis on the drawn graph. For more information, see "Options for Drawn Graphs" on page 148. To understand how the various graphs are merged, see "Merge Graphs Overview" on page 138.

The number of graphs drawn depends on various attributes which are a part of the graph template such as the value of **Metrics per graph**, the graph type configured in the graph templates and number of CIs. See "Graph Attributes - List and Description" on page 180 and keywords (as they appear in the graph template).

**To modify your selection of CI or graph:**

- 1 After you draw a graph, click the  button. The Selection Panel opens. A list of CIs and graphs are available in the Selection Panel.
- 2 Select a configuration item for which you want to draw a graph from the CI tree in the Selection Panel. You can also select multiple CIs to draw a graph. You must select at least one CI. If you do not select any CI, Graphing prompts you to select at least one CI.

---

**Note:** You must select at least one Host CI if you have selected a system performance graph.

---

- 3 Select a graph from the graph tree.
- 4 Select **Draw**. The graph window appears in the Graphs Panel. The New graph windows appear every time you make a new selection and select **Draw**.
- 5 If you want to cancel all the previous selections, select **Clear**.

## **How to Draw Graphs from the Performance Perspective**

You can draw graphs from the Performance Perspective page by selecting metrics or from graph templates.

**To draw ad hoc graphs:**

- 1 Select the CI for which you want to draw graphs from the Model Explorer. Based on the CI you select, the Data Sources pane on the Selection Panel lists the available nodes and data sources. The Metrics tab on the Selection Panel displays the following:
  - ▶ Data Sources pane - Contains the list of data sources. The node and data source are always displayed in the format `<node_name>::<data_source_name>`.

- ▶ Metric Classes pane - Displays the list of classes based on the data source that you selected.
  - ▶ Instances pane - The Instances pane appears and lists all the available instances only when you select a multi-instance metric class.
  - ▶ Metrics pane - Metrics pane displays the list of metrics when you select a metric class.
- 2 Select the data source required from the Data Sources pane. The data source can be PA, EPC, or AGENTLESS. The Metric Classes pane populates the list of metric classes based on the data source that you selected.
  - 3 Select the required metric class. The Metrics pane displays the list of only numeric metrics belonging to that class.

---

**Note:** In addition, the Data Sources pane displays the **Instances** pane when you select a multi-instance class of metrics. For example, if you select Application class of metrics, the Instances pane displays all the instances of the application.

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- 4 Drag and drop a metric from the metric list on Selection Panel to the Graphs Panel. The graph is drawn in the Graphs Panel for the selected metrics. You can drag and drop any number of metrics.

**To Draw Graphs from templates:**

- 1 From the Model Explorer pane, select the CI for which you want to draw graphs.
- 2 From Selection Panel, select the Graphs tab. This tab displays a list of predefined graphs based on the CI that you selected. Depending on the CI that you selected, some of the predefined graphs are preselected.
- 3 Select the graph that you want to draw by clicking on the check box against the name of the graph template, and then click Draw. The graph is drawn in the Graphs Panel.



## How to Design Graphs

You can design graphs and save them as templates by using the Graph Design Wizard. You can launch the Graph Design Wizard from various Operations Management views. For more information, see:

- ▶ "Health Top View" on page 127
- ▶ "Model Explorer Pane" on page 227
- ▶ "Event Browser Overview" on page 71

For further information on the Operations Management console, see "Event Perspective Graphical User Interface" on page 69 and "Health Perspective Graphical User Interface" on page 126.

You can also launch the Graph Design Wizard using **Admin > Operations Management > Performance Graphs**. For more information, see "How to Edit Graphs" on page 146.

### To design a graph:

You can design a graph in one of the following ways:

- ▶ From the Event Browser pane, right-click on the event for which you want to design a graph. From the menu options, click **Configure > Performance Graphs**.
- ▶ If you want to design a graph from the Model Explorer, right-click on the CI for which you want to draw a graph. From the menu options, click **Configure > Performance Graphs**.


The Graph Design Wizard takes you through a series of steps required to design a graph. For detailed information about the individual panes, see the appropriate reference pages, such as "Graph Design Wizard - Graph Attributes Page" on page 158.

## How to Edit Graphs


Graphing enables you to edit a graph that you have created. You can also edit out-of-the-box graph templates and save them as user-defined graph templates with different name. You can launch the Graph Design Wizard to edit a graph from various views from the Operations Management console. For more information, see:

- "Health Top View" on page 127
- "Model Explorer Pane" on page 227
- "Event Browser Overview" on page 71

### To edit a graph template:

- 1** Open the Performance Graphs Manager:  
**Admin > Operations Management > Performance Graphs.**
- 2** From the **Available Graph Families** pane, select the graph that you want to edit.
- 3** Click the **Edit**  button or right-click on the graph and select **Edit Graph Template: Launch Designer** from the menu options. The Launch Performance Graph Designer window opens.
- 4** Select a CI Instance from the list and click **Next >**. Launch Parameters displays the list of parameters available for the CI instance you selected.
- 5** Click **Finish**. The **Graph Design Wizard - Graph Attributes Page** appears.
- 6** The Graph Design Wizard takes you through a series of steps required to edit a graph. For detailed information about the individual panes, see the appropriate reference pages, such as "Graph Design Wizard - Graph Attributes Page" on page 158.

**To edit a drawn graph:**

- 1** Select **Edit** from the **Options** menu of the drawn graph window. The **Graph Design Wizard - Metric Selection Page** appears in the Graphs Panel.
- 2** The Graph Design Wizard takes you through a series of steps required to edit a graph. For detailed information about the individual panes, see the appropriate reference pages, such as "Graph Design Wizard - Special Attributes Page" on page 171.
- 3** Click **Preview** to view the modified graph.
- 4** Click the **Show Design Wizard**  button to view the design wizard of the graph. If you have modified the graph by adding or removing metrics, launch design wizard again by selecting **Edit** from the **Options** menu of the graph window.

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**Note:** If you have more than one drawn graph appearing in the Graphs Panel, the **Edit** option of each drawn graph will invoke a Design Wizard for the selected graph. For more information on how a graph is merged, see "Merge Graphs Overview" on page 138.

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**Note:** You can also edit a graph from the CI menu options. For more information, see "How to Edit Graphs" on page 146.

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## How to Delete Graphs

You can delete any graph that you have created. However, the out-of-the-box graphs cannot be deleted.

### To delete a graph:

- 1 Open the Performance Graphs Manager:  
**Admin > Operations Management > Performance Graphs.**
- 2 From the **Available Graph Families** pane, select the graph that you want to delete.
- 3 Click the graph  button. The graph is deleted.

---

**Note:** A graph family which does not contain graphs will be deleted.

---

## Options for Drawn Graphs

The following additional options are available to perform a more detailed analysis after you draw a graph. For instructions to draw a graph, see "How to Draw Graphs from Operations Management Views" on page 141.

The information in this section aims to help you understand how to interpret the contents of graphs and use the available features and functionality to change the contents of graphs.

- ▶ "Drawn Graph Window - Zoom-In and Zoom-Out Options" on page 151
- ▶ "Drawn Graph Page - Options Menu" on page 149
- ▶ "Drawn Graph Window - Options Menu" on page 150
- ▶ "Drawn Graph Window - Button Options" on page 150
- ▶ "Drawn Graph Window - Zoom-In and Zoom-Out Options" on page 151
- ▶ "Drawn Graph Window - Zoom-In and Zoom-Out Options" on page 151

## Drawn Graph Page - CI and Graphs Selection Panel

The Selection panel displays a list of CIs and graphs, graph families, and categories associated with the drawn graph. The default graphs in the graph families or categories and the CIs used are selected by default.

The following elements are included:

UI Elements (A-Z)	Description
<b>Clear</b>	Click Clear to reset all the options which you selected.
<b>Draw</b>	Click <b>Draw</b> after you select CIs and graphs. The graph in the browser window is redrawn with the new options that you selected.
<b>Select CIs pane</b>	Select a CI for which you want to draw a graph from the CI tree. The CI tree displays only those CIs that are associated with the graph(s) that you have already launched.
<b>Select Graph(s) pane</b>	Select a graph from the graph tree. The graph tree displays only those graphs that are mapped to the CI type already launched.

## Drawn Graph Page - Options Menu

The **Options** menu in the Title Bar in the **Drawn Graph** page includes the following elements:

UI Elements (A-Z)	Description
<b>Close All Graphs</b>	Closes all open graphs windows.
<b>Mouse Hover - Turn On/Off</b>	If you select turn on, by hovering the mouse on the graph area of a drawn graph it opens a pop-up window displaying the actual value of the data point and the time interval of the selected data. If you select turn off, no pop-up window is displayed.

## Drawn Graph Window - Options Menu

The Options menu in the Drawn Graph window title bar includes the following options:

UI Elements (A-Z)	Description
<b>Drill Down</b>	Use this option to view the data in a more granular form. You can also use this option to draw a different graph (image or table). For more information, see "Graph Drill-Down Dialog Box" on page 155.
<b>Edit</b>	This option appears on the drawn graph <b>Options</b> menu only if you have the admin privileges.  This option enables you to edit the drawn graph. The Graph Design Wizard - Metric Selection Page appears in the Graphs Panel.
<b>Export</b>	Use this option to export graphs to formats such as TSV, CSV, XLS, and XML. For more information, see "Graph Export Dialog Box" on page 156.

## Drawn Graph Window - Button Options

The **Drawn Graph** page includes the following elements:

UI Elements (A-Z)	Description
<b>Metric Legend</b>	Graphing provides <b>Metric Legend</b> buttons to hide or show the corresponding graphs of the metric. Click Metric Legend to hide or show the metrics in a graph.  To remove a metric from a graph, right-click on the legend of the metric, and then select <b>Remove</b> . The corresponding graph and the legend are removed from the graph window.

UI Elements (A-Z)	Description
<b>Prepend/Append</b>	Graphing provides the <b>Append</b> and <b>Prepend</b> buttons to append or prepend data for adjoining time intervals based on the value specified for points every while drawing a graph. For more information, see "Specifying Points Every Value" on page 161.
<b>Prev/Next</b>	Graphing provides the <b>Prev</b> and <b>Next</b> buttons to navigate to adjacent time intervals based on the value specified for "points every" while drawing a graph. For more information, see "Specifying Points Every Value" on page 161.

### Drawn Graph Window - Zoom-In and Zoom-Out Options

After you draw a graph, you can zoom-in to view a smaller set of data points and zoom-out to reset and view the original graph. Zooming-in or zooming-out enable you to adjust the summarization levels.

- ▶ To zoom-in on data, click and drag the mouse to a rectangular area on the graph from left to right. The selected area is highlighted in blue.
- ▶ To zoom-out, click and drag on the graph from right to left. When you zoom-out a graph, the graph is reset to its previous state.

You can zoom-in on data up to multiple levels. Every zoom-out reverts to the graph's previous state.

**Example:** If you are drawing a graph for 10 days, ending on 21st July, 2008 with points every as "auto" Graphing summarizes data and sets the points every value to fit the data in the graph window. If Graphing summarizes data at points every hour for 10 days, when you zoom in, you can view data at points every 15 minutes for a duration for 3 days.

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**Note:** This option is available only for image graphs. However, this option is not available for pie, gauge, baseline, table, and forecast graphs.

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## Performance Perspective Page

The Operations Management console provides a feature called Performance Perspective that enables you to draw graphs from templates and also ad hoc graphs by selecting required metrics.

### Model Explorer Page

The Model Explorer Page displays the list of CIs in a tree. You can create your own views. For information, see "Model Explorer Pane" on page 227.

### Performance Graphs Page

The Performance Graphs Page enables you to make selections and view graphs. The Performance Graphs page consists of the Selection panel and Graphs panel.

### Selection Panel

The Selection Panel provides the list of metrics and graphs based on the CI that you selected. The selection panel consists of two tabs:

UI Elements (A-Z)	Description
<b>Metrics</b>	This view enables you to select one or more metrics from any data source based on the CI that you selected from Model Explorer and Draw Graphs. The complete name of each metric appears as a tooltip when you hover the mouse on the metric names, which are otherwise not completely visible in the Selection Panel.
<b>Predefined Graphs</b>	This view provides a list of graph templates based on the CI that you select from Model Explorer.





## Graphs Panel

The Graphs Panel displays all the drawn graphs. For instructions to draw graphs and the various options available, see **How to Draw Graphs from the Performance Perspective**.


After you draw a graph on the Graphs panel, the following options are available:

- ▶ Legends for the metrics appear on the graph window that enables you to hide and show the graphs of the metrics.
- ▶ Node name at which the data source is collecting data from the nodes is displayed.
- ▶ You can hover the mouse over the drawn graphs to know the value of the metric, and the timestamp and the time interval.
- ▶ You can close all open graphs windows at once.

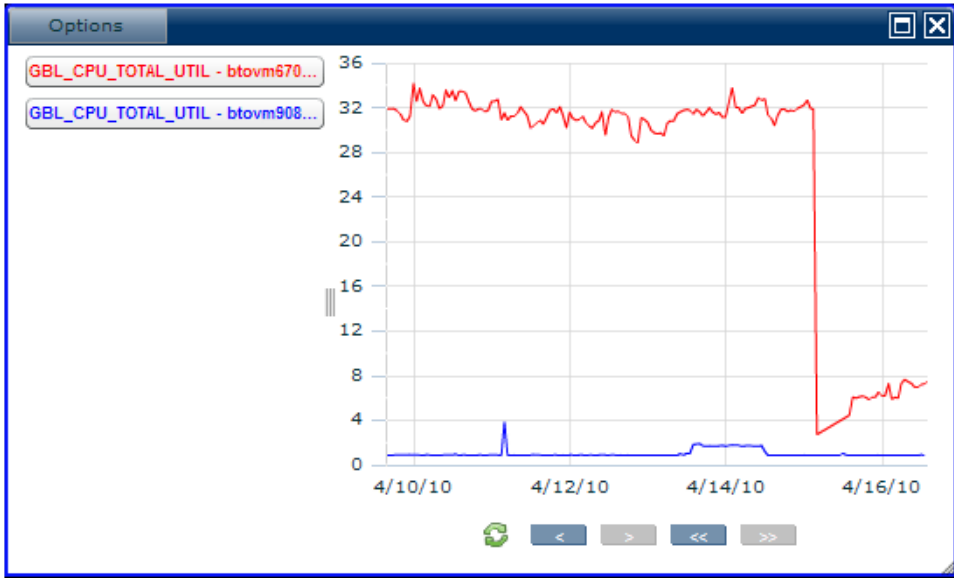
The Graphs Panel displays **Show Design Wizard**  and **Hide Design Wizard**  buttons that enable you to show and hide the **Design Wizard** while editing a selected drawn graph. The edited graph hides when you edit the graph attributes in the **Design Wizard**. Click the Preview button in the **Design Wizard** to view the edited graph.

Listed below are the types of graphs which you can draw for analysis and troubleshooting:

### Compare metrics from different CIs:

- 1** Select a CI. The selected metrics and predefined graphs for the chosen CI appears in the  Selection Panel. Drag and drop a metric from the Selection Panel to the Graphs Panel. The graph is drawn in the Graphs Panel.
- 2** Select the second CI with which you want to compare. Select the same metric from the Selection Panel. Drag and drop the metrics to the previously drawn graph to compare the data across CIs.

For example, select a metric 'BYCPU\_TOTAL\_UTIL' from two CIs. You can now compare the total CPU utilization data from nodes associated with the two CIs.



### Remove metric

Right-click on the metric name from the legend and select remove. The corresponding line representing the metric is removed from the graph and will no longer appear in the legend.

### Add metric

Drag and drop a metric into an existing graph. The new metric is displayed in the graph and will be listed in the legend.

**Hide metric**

Click on the metric name from the legend in the graph window. The legend of the metric is disabled and the graph of the metric does not appear in the graph window.

**Show metric**

Click on the disabled metric from the legend. The legend of the metric is enabled and the graph of the metric reappears on the graph window.

**Copy metrics from one graph to another**

You can drag a metric from one graph and add it to another. The target graph will display the newly added metric.

**Pull out metric from a graph**

You can drag a metric from one graph and drop it into the empty space in graph panel area. A new graph is drawn with the metric which you selected.

## Graph Drill-Down Dialog Box

After you draw a graph, select **Options > Drill down** from the graph window. This section describes in detail the information displayed in the performance graph Drill-down dialog box. The Drill-down dialog box enables you to view the data in a more granular form. You can also use this option to draw a different graph (image or table).

The **Drill-down** dialog box includes the following elements:

UI Elements (A-Z)	Description
<b>Draw</b>	Generates the newly defined table, graph, or process table and displays it on a separate page.
<b>Draw a different graph</b>	Displays the Select a Graph pane that you use to select the type of graph you want to use to format the resulting data.  <b>Note:</b> This option is <i>not</i> available if you select <b>Process Table</b> as the drill-to output format.

UI Elements (A-Z)	Description
<b>Drill to:</b>	You can choose how you want to display the information you drill down to, for example: <ul style="list-style-type: none"> <li>▶ <b>Table:</b> Displays the requested data in lists in a tabular form.</li> <li>▶ <b>Graph:</b> Displays the requested data in the form of a graph.</li> <li>▶ <b>Process Table:</b> Displays the requested data in the form of a process table. This option is available only for host CIs.</li> </ul>
<b>End Date</b>	You can change the date and time when the displayed report period ends by dragging the slider.
<b>Start Date</b>	You can change the date and time when the displayed report period starts by dragging the slider.

## Graph Export Dialog Box

After you draw a graph, select **Options > Export** from the graph window. The Export from a Graph window opens. You can export the graph in the following formats: TSV, CSV, XLS, and XML.

The Graph Export dialog box includes the following elements:

UI Elements (A-Z)	Description
<b>Cancel</b>	Click <b>Cancel</b> to close the dialog box and return to the drawn graph page.
<b>OK</b>	Click <b>OK</b> to export the data in the selected format.
<b>Type</b>	Select the format in which you want to export the graph.

---

**Note:** If you are selecting a Microsoft Excel or a TSV graph, you must configure the browser settings to display Microsoft Excel and TSV files. For more information on browser settings, see "Unable to View Graph in Certain Formats (XLS/TSV)" on page 185.

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## **Graph Design Wizard - Overview**

Graphing enables you to design custom graphs using the Design Wizard feature. You can create your own graph templates to display the required data. You can also edit the existing graph definition of an out-of-the-box template and save it as a user-defined template.

The design wizard consists of the following steps:

- 1 Graph Design Wizard - Graph Selection Page**
- 2 Graph Design Wizard - Graph Attributes Page**
- 3 Graph Design Wizard - Metric Selection Page**
- 4 Graph Design Wizard - Special Attributes Page**
- 5 Graph Design Wizard - Other Attributes Page**
- 6 Graph Design Wizard - Save Graphs Page**
- 7 Graph Design Wizard - Finish Page**

## Graph Design Wizard - Graph Selection Page

The Graph Selection page displays all graphs associated with the CI that you have selected. Select the graph that you want to edit and click Next. However, if you select only one family or category from the "Performance Graph Manager Graphical User Interface" on page 271, then only graphs belonging to that family or category are displayed.

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**Note:** This step of design wizard appears only while editing a graph.

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## Graph Design Wizard - Graph Attributes Page

From the Graph Attributes page, you can specify the graph attributes while designing a graph and save it as a template for later use.

The following elements are included:

UI Elements (A-Z)	Description
<b>Automatically Refresh</b>	When you select the <b>Automatically Refresh</b> check box, the graph is redrawn every five minutes with the latest data available from the data source. The refresh rate is configurable. Contact your software administrator to configure the time interval for refreshing data.
<b>Cancel</b>	Click <b>Cancel</b> to exit the design wizard.

UI Elements (A-Z)	Description
<b>Date Range</b>	<p>The default date range is: 7 days ending 'Now' and Points Every value is auto. You can also modify default settings for date and time.</p> <p>Use Defaults - Clear Use Defaults check box to modify the default values.</p> <p><b>Duration</b> - Specify the time duration for which you want to design the graph. Enter the number and specify the unit of time. You can specify time duration in minutes, hours, days, and weeks. If you select “all”, all the data gathered by the data source and logged in the agent log files is included in the graph.</p> <p><b>Points Every</b> - Use the <b>Points Every</b> (POINTS EVERY) setting to control how much data is to be summarized in each point on the graph and hence determine the granularity (number of data points) of data on the graph. For more information, see <b>Specifying Points Every Value</b>.</p> <p><b>Ending</b> - Specify the end date for the graph. Select from one of the following options:</p> <ul style="list-style-type: none"> <li>▶ <b>Now</b> - the current date and time on the server.</li> <li>▶ <b>Last</b> - the date and time when data was last collected by the data source.</li> <li>▶ <b>Date/Time</b> - When you select this option, the calendar button is enabled. Click the calendar button to select the date. Select the time from the Time drop-down list.</li> </ul>
<b>Default Graph</b>	<p>When you select the <b>Default Graph</b> check box, the graph which you design will be the default graph in the family or category to which it belongs.</p> <p><b>Note:</b> A graph family or category can have one or more default graph(s). Graphing merges and draws all the graphs. For more information on the way Graphing merges the various attributes, see <b>Merge Graphs Overview</b>.</p>

UI Elements (A-Z)	Description
<b>Description</b>	Enter a general description of what the graph represents. <b>Note:</b> A description of each graph appears as a tooltip when you mouse hover on the graph names in the Selection Panel.
<b>Force Points Every</b>	Select this option to force control on the granularity (number of points) on the graph. This value overrides any Points Every value specified while drawing a graph.
<b>Graph Type</b>	Select the type of graph you want to design from the drop-down list. Click here for a list of <b>Types of Graphs</b> with descriptions.
<b>Help</b>	Click <b>Help</b> to view the help content for the current wizard page.
<b>Limit Number of Points</b>	<p>Enter the number of records (table graph) or data points (for image graph) which you want to view on the graph at a time. The default value is 100. If the graph contains more data points, the <b>Prev</b> and <b>Next</b> buttons are enabled, so that you can navigate to view all the data points.</p> <p>The number of points also depends on the graph type which you have selected:</p> <ul style="list-style-type: none"> <li>▶ For a table graph, the default value for number of rows can be configured by the software administrator. However, the value specified while designing a graph template overrides the default value and the value is saved in the graph template.</li> <li>▶ If you are designing a pie graph or a gauge graph, by default, the Limit Number of Points is set to one. You cannot change this value.</li> </ul> <p>The recommended value for maximum number of points is 1000 for a graph. If you select a value greater than this, it will take a long time for the graph to appear.</p>
<b>Next</b>	Click <b>Next</b> to go to the next page.
<b>Preview</b>	Click <b>Preview</b> to preview the graph.



UI Elements (A-Z)	Description
<b>Save/Save As</b>	Click <b>Save</b> or <b>Save As</b> to save your graph, <b>The Graph Design Wizard - Save Graphs</b> page appears.
<b>Sum From Raw</b>	Select this option if you want to specify that Graphing should gather unsummarized data from the data sources and then summarize the retrieved data. Select this option when you do not want the data to be summarized by data source. Using this feature can cause large volumes of data to be transferred from the data source and can slow down the resulting graph or table. When you select this option, you can specify the summarization level for individual metrics.

## Specifying Points Every Value

Use the Points Every (POINTSEVERY) option to control how much data is to be summarized in each point on the graph. You can use the Points Every option to determine the granularity (number of data points) on the graph. The default value is Auto. You can select from the following options:

- Auto
- 5 minutes
- 15 minutes
- 30 minutes
- hour
- 3 hours
- 6 hours
- 12 hours
- Day
- Unsummarized

## Auto

Selecting this option automatically selects the value to display the data points within the configured limit. If you select **Auto**, Graphing automatically summarizes the data based on the date range that you have specified to a level that would make the graph easy to read. If the combination of Date Range and Points Every settings results in too many points, the Points Every value is automatically adjusted to display all of the requested data in one page. In addition, Graphing also provides the **Append** and **Prepend** buttons to increase the data points that you can view on a single page.

- ▶ Click **Append** >> to view data for the next set of data points, in addition to the data you are currently viewing.
- ▶ Click **Prepend** << to view data for the previous set of data points, in addition to the data you are currently viewing.

If you click **Append** or **Prepend**, Graphing adds additional data to the graph which you are currently viewing. The number of points displayed is same as the data points which appear in the initial graph, but the duration is doubled. For example, if you are viewing data for the previous one month, and you click **Prepend**, you can view the data for the previous two months.

All the data points are displayed in the same page. The Points Every setting is reset by Graphing to make the data readable. When all the data available is displayed, the Append and Prepend buttons are disabled.

### Example for Append/Prepend:

When the combination of the date range and Points Every settings is one week of data from 1/1/2009 to 8/1/2009 with points every one hour, if you Click Append/Prepend additional one week of data is displayed in the same page. You can see two weeks of data with points every three hours.

### Example for Auto:

For example, if you have specified the Duration as 12 hours, the graph displays this data for 12 hours and the summarization is automatically set by Graphing to accommodate this data within one page.

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**Note:** In case of Image Graphs, based on the value set for **limit number of points**, summarization interval is decided by Graphing when 'points every' is selected as auto. The behavior of the **Next/Prev** button is different if 'points every' is selected as auto, unlike the behavior when 'points every' is specified as any other value other than auto from the drop down. When auto is selected, you can view data for the duration which you have specified, in the same graph, with summarization interval specified by the Graphing. The **Next/Prev** options displays the graph from the next and previous duration with the same points every (summarization) value.

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### **5 minutes**

Displays one data point for every five minutes of the specified duration.

### **15 minutes**

Displays one data point for every fifteen minutes of the specified duration.

### **30 minutes**

Displays one data point for every thirty minutes of the specified duration.

### **hour**

Displays one data point for every one hour of the specified duration.

### **3 hours**

Displays one data point for every three hours of the specified duration.

### **6 hours**

Displays one data point for every six hours of the specified duration.

### **12 hours**

Displays one data point for every twelve hours of the specified duration.

### **Day**

Displays one data point for every day of the specified duration.

## Unsummarized

Data is not summarized. The raw data collected by the data source for the specified duration is displayed. Any value set in Graphing does not affect the summarization.

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**Note:** If the points every value is anything other than **auto**, and if the data in the chosen time range cannot be fit into a single graph or table, the graph or table appears in more than one page and **Prev** and **Next** buttons are enabled. Click **Prev** to move to the previous page and **Next** to go to the next page to view all the data. The **Append/Prepend** options are disabled when you set **Points Every** is set to anything other than **auto**.

---

## Graph Design Wizard - Metric Selection Page

The Metric Selection page enables you to design a graph and save it as a template for later use.

The following elements are included:

UI Elements (A-Z)	Description
<b>Add Metrics</b>	Opens the Metric Selection window. For details, see "Metric Selection Page - Metric Selection Window" on page 166.
<b>Cancel</b>	Click <b>Cancel</b> to exit the design wizard.
<b>Help</b>	Click <b>Help</b> to view the help content for the current wizard page.
<b>Move Down</b>	From the list of metrics, select the metric which you want to move down by clicking on the row corresponding to the metric. Click <b>Move Down</b> to move the metric to the bottom of the list from its current position.

UI Elements (A-Z)	Description
<b>Move Up</b>	From the list of metrics, select the metric which you want to move up by clicking on the row corresponding to the metric. Click <b>Move Up</b> to move the metric to the top of the list from its current position in the list.
<b>Next</b>	Click <b>Next</b> to go to the next page.
<b>Prev</b>	Click <b>Prev</b> to go to the previous page.
<b>Preview</b>	Click <b>Preview</b> to preview the graph.
<b>Properties</b>	From the list of metrics, select the metric for which you want to specify the properties and click <b>Properties</b> to open the <b>Metric Selection Page - Metric Properties Window</b> .
<b>Remove</b>	From the list of metrics, select the metric which you want to remove by clicking on the row corresponding to the metric. Click <b>Remove</b> to remove a metric from the list.
<b>Remove all</b>	Click <b>Remove All</b> to remove all the metrics from the list.
<b>Save/Save As</b>	Click <b>Save</b> or <b>Save As</b> to save your graph, The Graph Design Wizard - Save Graphs page appears.

## Metric Selection Page - Metric Selection Window

The Metric Selection window opens when you click on the Add Metrics tab on the Metric Selection page. It includes the following elements (unlabeled UI elements are shown in angle brackets>):

UI Elements (A-Z)	Description
<b>Add</b>	Select one or more metrics for which you want to draw graph and click <b>Add</b> .
<b>Close</b>	Click <b>Close</b> after you complete the selection. The list of metrics which you selected now appears in a tabular form on the metric selection page of the design wizard.
<b>Data Sources</b>	Select a data source from the list to view the available metrics.
<b>Metric classes tree</b>	The metric classes tree displays a list of classes and metrics belonging to each class that are available on the data source. The list of metrics appears when you expand the metric class name.

## Metric Selection Page - Metric Properties Window

You can configure the way a particular metric appears on the graph. To change the properties of a metric, perform the following tasks:

- 1** Click on the row corresponding to the metric, whose properties you want to change.
- 2** Click on the Properties tab on the Metric Selection page, the Metric Properties window opens.

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**Note:** You cannot specify a color for the metric.

---

The following elements are included:

UI Elements (A-Z)	Description
<b>Cancel</b>	Click <b>Cancel</b> to exit without saving the changes you made.
<b>Filter</b>	<p>You can specify a condition to filter metrics:</p> <ul style="list-style-type: none"> <li>▶ <b>Metric name</b> - Select the metric for which you want to apply the filter</li> <li>▶ A comparison symbol - Select a comparison symbol. See list of <b>Comparison Symbols</b>.</li> <li>▶ A value to compare - Enter a value to compare</li> <li>▶ <b>Add</b> - Click <b>Add</b> to apply the metric filter</li> <li>▶ <b>AND/OR</b> - Use the logical operators AND or OR, to specify multiple filters.</li> <li>▶ <b>Update</b> - To modify the condition you specified, select the filter condition, modify the conditions and click Update.</li> <li>▶ <b>Remove</b> - To remove a filter condition, select the filter condition and click Remove.</li> <li>▶ <b>Remove All</b> - Click Remove All to delete all the filters.</li> </ul>
<b>Help</b>	Click <b>Help</b> to view the help content for the current wizard page.

UI Elements (A-Z)	Description
<p><b>Label</b></p>	<p>Enter a label for the metric. The label identifies this metric on the graph or table. The label can be modified for one metric at a time. The label can be a literal string, or it can contain references to special substitution variables.</p> <ul style="list-style-type: none"> <li>▶ <b>@@[LABEL]</b> - The metric label specified by the data source. For example, (CPU %). If a label is not specified by the data source then the metric name is used.</li> <li>▶ <b>@@[METRIC]</b> - The metric name. For example: (GBL_CPU_TOTAL_UTIL)</li> <li>▶ <b>@@[CLASS]</b> - The metric class. For example: (GLOBAL)</li> <li>▶ <b>@@[SYSTEM]</b> - The node name supplying the metric. For example: (mysys.net.com)</li> <li>▶ <b>@@[DATASOURCE]</b> - The data source for this metric. For example: (PA, EPC)</li> <li>▶ <b>@@metric</b> - The value of the metric from the same data source and class. For example:            @@BYDSK_DEVNAME will label the metric with the value of the BYDSK_DEVNAME metric. If the BYDSK_DEVNAME metric value were "0", Disk @@BYDSK_DEVNAME would produce a label of Disk 0.            Example:            @@[SYSTEM]:@@[CLASS]:@@[METRIC] might produce a label like            "mysys.net.com:GLOBAL:GBL_CPU_TOTAL_UTIL"</li> </ul> <p><b>Note:</b> Graphs that contain only one metric will automatically display the system name for the metric label, when multiple nodes are selected. If you do not specify a label, the Graphing uses the default metric label specification; that is, any label supplied by the data source for the metric, or the metric name.</p>
<p><b>OK</b></p>	<p>Click <b>OK</b> to save all the changes and exit from this window. The Graph Design Wizard - Metric Selection page appears.</p>



UI Elements (A-Z)	Description
<b>Summarization</b>	<p>If you have selected the <b>Sum from Raw</b> check box on the Graph Attributes page, the Summarization drop down box appears. The default value is Average. Summarization of data is done when multiple records from a data source are combined to view the required amount of time per data point. Click here to view the various types of summarization options.</p> <ul style="list-style-type: none"><li>▶ Auto - When you design graph with auto summarized data, the Graphing summarizes data based on the summation type provided by the data sources, if the Sum from Raw check box on the Graph Attributes screen is not selected. If the summarization type is not provided by the agents or if the Sum from Raw check box on the Graph Attributes screen is selected and if you specify the summarization type as 'auto', Graphing uses the 'average' value to summarize data. Currently, data sources such as Performance Agent and EPC provide summarization types for the respective metrics.</li><li>▶ Average - If the summarization type is not provided by the data sources and if the Sum from Raw check box is selected, by default Graphing uses the option 'average'. Average refers to the mean value obtained by dividing the sum of values by the number of samples.</li><li>▶ Sum - On selecting this option, Graphing adds metric values to arrive at a sum.</li><li>▶ Minimum - On selecting this option, Graphing uses the lowest numeric value.</li><li>▶ Maximum - On selecting this option, Graphing uses the highest numeric value.</li><li>▶ Last - On selecting this option, Graphing uses the last value read from the data source.</li><li>▶ Count - On selecting this option, Graphing uses the number of records from the data source that are combined into each point.</li></ul>

UI Elements (A-Z)	Description
<b>Type</b>	Displays the type of graph that you selected while specifying graph attributes. If you have selected mixed graph, you can specify the graph type for the metric which you selected. The options available are Line or Area.
<b>YAxis</b>	Specify whether you want the Y-Axis of the graph to appear on the left hand side or right hand side from the drop-down list.  Note: This option is available only for graph types Line, Area and Mixed. For all other graph types, the option Right does not appear in the drop-down list.

### Comparison Symbols

The following elements are included (unlabeled UI elements are shown in angle brackets>):

Symbol	Description
=	Equal to
<	Less than
>	Greater than
~	Like (textual comparison with leading or trailing “.” expressions)
!=	Not Equal
!~	Not Like (textual comparison with leading or trailing “.” expressions)
<=	Less than or Equal to
>=	Greater than or Equal to

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**Note:** While specifying strings or expressions for filters, use regular expressions. (Example: `.*C.*` instead of `*C*`).

The like comparisons such as “~” and “!~” are textual comparisons that allow wild cards. When you select these symbols, specify a valid regular expression value; for example, specify `APP_NAME~.*xyz.*` to select data where the application name contains the text “xyz”.

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## Graph Design Wizard - Special Attributes Page

The Special Attributes page enables you to specify the special attributes while designing a graph. Click the options below based on the graph type you selected:

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**Note:** This option is not available for XML, CSV, Baseline and TSV graph types. If you are editing a graph, all the attributes saved in the graph template appear preselected.

---

## Special Attributes for Image Graphs

If you have selected the graph type as Line, Area or Bar graph, the following elements are included (unlabeled UI elements are shown in angle brackets>):

UI Elements (A-Z)	Description
<b>Cancel</b>	Click <b>Cancel</b> to exit the design wizard.
<b>Effects</b>	<p><b>Stacked:</b> If you are designing an area or bar graph, select the Stacked option to stack one metric on top of the other metrics in the graph. The “Stacked” effect makes it easier to view the overlapping data.</p> <p>Note: The Effects option is available only for the bar and area graphs.</p>
<b>Help</b>	Click <b>Help</b> to view the help content for the current wizard page.
<b>Left Y Axis</b>	<ul style="list-style-type: none"> <li>▶ <b>Label</b> - Specify a label for Y-Axis appearing on the left side.</li> <li>▶ <b>Minimum</b> - Specify minimum value for points on the left side Y-Axis. If left blank, the initial scale of the axis will automatically be adjusted to accommodate the values in the graph.</li> <li>▶ <b>Maximum</b> - Specify maximum value for points on the left side Y-Axis. If left blank, the initial scale of the axis will automatically be adjusted to accommodate the values in the graph.</li> </ul>

UI Elements (A-Z)	Description
<b>Metric Display order</b>	<p>Specify the order in which you want the metrics to be displayed. The default value is 'User defined'. You can select from the following options:</p> <ul style="list-style-type: none"> <li>▶ <b>User defined</b> (See <b>Metric Selection Page - Metric Selection Window</b>) - Select this option if you want the metrics to appear in the order of the sequence on the Metric Selection screen.</li> <li>▶ <b>Average Value</b> - Select this option if you want the metrics to appear in the ascending order of the average value. When you select this option and draw a graph, the higher values appear at the top. You can use this feature in conjunction with the value specified in the Metrics per Graph field.</li> <li>▶ <b>Reverse Average Value</b> - Select this option if you want the metrics to appear in the descending order of the average value. When you select this option and draw a graph, the lowest values appear at the top.</li> </ul>
<b>Metrics per graph</b>	<p>Specify the number of metrics you want to see in a graph. The default value is eight.</p> <ul style="list-style-type: none"> <li>▶ <b>Single graph</b> - Click Single Graph, to limit the number of graphs to one graph when number of metrics or instances exceed the value specified for “Metrics per Graph”.</li> <li>▶ <b>Multiple graphs</b> - Click Multiple Graphs, to display multiple graphs when number of metrics or instances exceed the value specified for “Metrics per Graph”. The number of metrics or instances in each graph is less than or equal to the value specified for “Metrics per Graph”.</li> </ul>
<b>Next</b>	Click <b>Next</b> to go to the next page.
<b>Prev</b>	Click <b>Prev</b> to go to the previous page.
<b>Preview</b>	Click <b>Preview</b> to preview the graph.

UI Elements (A-Z)	Description
<b>Right Y Axis</b>	<p><b>Label</b> - Specify a label for Y-Axis appearing on the right side. This enables you to specify a label for the right side of the graph to identify the right hand Y-Axis. This field does not appear unless at least one metric has the “Right Y-Axis” selected from the Metric Properties Window.</p> <p><b>Minimum</b> - Specify minimum value for points on the right side Y-Axis. If left blank, the initial scale of the axis is automatically be adjusted to accommodate the values in the graph.</p> <p><b>Maximum</b> - Specify maximum value for points on the right side Y-Axis. If left blank, the initial scale of the axis is automatically adjusted to accommodate the values in the graph.</p>
<b>Save/Save As</b>	Click <b>Save</b> or <b>Save As</b> to save your graph, The Graph Design Wizard - Save Graphs page appears.

### Special Attributes for Tables

You can highlight a cell in a table based on its content so that the records can be accessed easily. You can also set conditions to filter the contents from a table based on the metric value. The following elements are included:

UI Elements (A-Z)	Description
<b>Add</b>	Click <b>Add</b> to include the table highlight condition that you have specified in the list.
<b>AND/OR</b>	<p>Select either AND or OR to apply multiple conditions:</p> <ul style="list-style-type: none"> <li>▶ <b>AND</b> - filters the rows that satisfy the first condition you set and the row that satisfies the following condition as well.</li> <li>▶ <b>OR</b> - filters the rows that satisfy either the preceding or the following condition.</li> </ul>
<b>Cancel</b>	Click <b>Cancel</b> to exit the design wizard.

UI Elements (A-Z)	Description
<b>Color</b>	Select a highlight condition from the list and click <b>Color</b> , to add a color to the cell. <b>The Color Palette</b> appears. Select a color, for example, blue from the color palette and click <b>OK</b> .
<b>Help</b>	Click <b>Help</b> to view the help content for the current wizard page.
<b>Next</b>	Click <b>Next</b> to go to the next page.
<b>Prev</b>	Click <b>Prev</b> to go to the previous page.
<b>Preview</b>	Click <b>Preview</b> to preview the graph.
<b>Remove</b>	Select a table highlight condition that you want to remove and click <b>Remove</b> . The table highlight condition is deleted and will no longer appear when you preview or draw the graph.
<b>Remove</b>	Select a filter condition that you want to remove and click <b>Remove</b> . The filter condition is deleted and will no longer appear when you preview or draw the graph.
<b>Remove All</b>	Click <b>Remove All</b> to delete all the filter conditions that you have specified.
<b>Save/Save As</b>	Click <b>Save</b> or <b>Save As</b> to save your graph, The Graph Design Wizard - Save Graphs page appears.
<b>Table Filters</b>	Select the metric for which you want to set a filtering condition. Select a <b>Comparison Symbols</b> and enter value to compare against the metric. For example, 50. <b>Note:</b> The metrics added in the <b>The Graph Design Wizard - Metric Selection page</b> are listed for filtering. If you want to add or remove a metric, click <b>Previous</b> to go back to the Metric Selection screen and add or remove a metric.

UI Elements (A-Z)	Description
<b>Table Highlights</b>	Select the metric for which you want to highlight from the drop-down list. Select a <b>Comparison Symbols</b> and enter value to compare against the metric.  <b>Note:</b> The metrics added in the <b>The Graph Design Wizard - Metric Selection page</b> are listed for filtering. If you want to add or remove a metric, click <b>Previous</b> to go back to the Metric Selection screen and add or remove a metric.
<b>Update</b>	Select the filter condition that you want to edit. Update the filter condition as required. Click <b>Update</b> . The changes are effective next time you preview or draw the graph.

Example for Table Highlight:

If you select the metric GBL\_CPU\_TOTAL\_UTIL and > (greater than) as the comparison symbol, and 4 as a value to compare against the metric and color as red from the color palette, when you preview or draw the graph, you can see the cells with records satisfying the condition you set; that is GBL\_CPU\_TOTAL\_UTIL>4 highlighted in red.

## Comparison Symbols

Listed below are the comparison symbols which you can use while specifying a condition to highlight or filter a table:

Comparison Symbols	Description
=	Equal to
>	Greater than
<	Less than
>=	Greater than or Equal to
<=	Less than or Equal to
!=	Not Equal to
!~	Not like



---

**Note:** When specifying interest reason for table filters and table highlights, do not use the wildcard expressions such as \*C\*. Use a regular expression, for example, .\*C\*.

---

## Graph Design Wizard - Other Attributes Page

The following elements are included (unlabeled UI elements are shown in angle brackets>):

UI Elements (A-Z)	Description
<b>Cancel</b>	Click <b>Cancel</b> to exit the design wizard.
<b>Graph Header</b>	Specify a description for the graph. The description appears at the top of the page. The description appears only in the print view.
<b>Graph Trailer</b>	Specify a description for the graph. This description appears at the bottom of the page. The description appears only in the print view.
<b>Next</b>	Click <b>Next</b> to go to the next page.
<b>Prev</b>	Click <b>Prev</b> to go to the previous page.
<b>Preview</b>	Click <b>Preview</b> to preview the graph.
<b>Save/Save As</b>	Click <b>Save</b> or <b>Save As</b> to save your graph. The Graph Design Wizard - Save Graphs page appears.

## Graph Design Wizard - Save Graphs Page

The following elements are included:

UI Elements (A-Z)	Description
<b>Category</b>	Enter the name of the graph category. (This is optional, graphs can be grouped directly under a family).
<b>Help</b>	Click <b>Help</b> to view the help content for the current wizard page.
<b>Family</b>	Enter the name of the graph family.
<b>Name</b>	Enter a name for the graph.
<b>OK</b>	Click <b>OK</b> and modify the graph name.
<b>Save</b>	Click <b>Save</b> to save the graph.
<b>Save As</b>	Click <b>Save As</b> to save the graph with a different name.

---

**Tip:** The name can be a combination of alphabets, numbers and the special characters and space. In case you use special characters other than #, -, \_ a error message stating that the “The name can only contain a combination of alphabets, numbers and the special characters: #, -, \_ and space” appears. If the family name and category already exists, the Graphing automatically populates the Family, Category and Name fields text boxes with the names when you type the first few alphabet.

---

## Graph Design Wizard - Finish Page

The following elements are included (unlabeled UI elements are shown in angle brackets>):

UI Elements (A-Z)	Description
<b>Design Another Graph</b>	Click <b>Design Another Graph</b> if you want to design another graph. <b>Graph Design Wizard - Graph Attributes Page</b> appears. For instructions, see "How to Design Graphs" on page 145. <b>Note:</b> This option appears in the design wizard if you are designing a new graph.
<b>Help</b>	Click <b>Help</b> to view the help content for the current wizard page.
<b>Text Message</b>	After you save the graph, the design wizard displays the following message: You have successfully designed a graph with the Design Wizard!

## Color Palette

The following elements are included:

UI Elements (A-Z)	Description
<b>Cancel</b>	To cancel the changes and go back to design wizard.
<b>Left Pane</b>	The left pane displays the available hues or shades of a particular color. Do one of the following: <ul style="list-style-type: none"> <li>▶ Click a required hue to select the same.</li> <li>▶ Enter the values for Red, Green, and, Blue to select a particular color.</li> </ul>
<b>OK</b>	To apply the changes and go back to design wizard.

UI Elements (A-Z)	Description
<b>Selected Color Box</b>	The selected color is displayed on the Selected Color box.
<b>Vertical bar</b>	Click the vertical bar from the color palette, to select the color you want.

## Graph Attributes - List and Description

The following table lists all graph attributes, keywords (as they appear in the graph template) and their descriptions. The table also details the way Graphing handles conflicting parameters defined in the different default graph templates.

**Note:** A software administrator can configure parameters specific to Graphing. For more information, see "Graphing Settings" on page 522:

The following elements are included (unlabeled UI elements are shown in angle brackets>):

UI Elements (A-Z)	Description
<b>Auto-Refresh</b>	The interval at which the Graphing can refresh the drawn graphs automatically so that the graph is updated with the latest data. Graphing enables this option if any of the selected graph templates has the option enabled.
<b>Date range</b>	<p>Range of date and time to include in the graph. If you do not specify any values for <b>DATERANGE</b>: the default date value (that is, duration of 7 Days, ending Now) is used. If you specify "all" for date range, all the data collected in the data source will be used in graphing.</p> <p>Graphing chooses the value of date range as "ALL" if any of the selected graph templates contain the value "All". However, if none of the default graphs templates contain the value <b>ALL</b>, the Graphing chooses the maximum value from all the graph templates.</p>

UI Elements (A-Z)	Description
<b>Graph type</b>	<p>For a list of graph types supported by the Graphing, see “Supported Graph Types” on page 6.</p> <p>The Graphing merges similar graph types. However, if the graph type is specified as table or Gauge in any of the graph templates then a separate graph is drawn for each of these graph types.</p> <p><b>Example</b></p> <p>If there are 3 graphs associated with the CI, and if 2 of the graphs have the graph type as line and one has graph type table, then the line graphs are merged and a separate table graph is drawn.</p>
<b>Left-axis and right-axis max</b>	<p>The maximum value on the right (optional) Y-Axis.</p> <p>The maximum value on the left (default) Y-Axis. For the Gauge graph type, the parameter will be the maximum value on the gauge scale.</p> <p>Graphing takes the maximum from all the values in the default graph template.</p>
<b>Left-axis and right-axis min</b>	<p>The minimum value on the left (default) Y-Axis. For the Gauge graph type, this parameter is the minimum value on the gauge scale.</p> <p>The minimum value on the right (optional) Y-Axis.</p> <p>Graphing takes the minimum values from all the values in the default graph template.</p>
<b>Left-axis title and right-axis title</b>	<p>Specifies the label for the left Y-Axis.</p> <p>Specifies the label for the right Y-Axis.</p> <p>Graphing combines all available values from the selected graph templates.</p>
<b>LineStyle</b>	<p>This specification is valid only when the GRAPHTYPE is solid line. You can select from the following values:</p> <p>Graphing takes the value from the last metric.</p>

UI Elements (A-Z)	Description
<b>LineWidth</b>	<p>The number of pixels wide to draw the line for this metric. This specification is valid only when the GRAPHTYPE is line and the LINESTYLE is solid. The default value is 2.</p> <p>Graphing takes the value from the last metric.</p>
<b>Metrics filter</b>	<p>A data filter that is applied to the data. Data records that do not meet the filter specifications will not be used in the final calculation. Graphing combines all available values based on classes from the selected graph templates.</p>
<b>Metrics per graph</b>	<p>The maximum number of metrics on a single graph. The default is eight.</p> <p>Graphing chooses the maximum value specified from all the selected graph templates.</p> <p><b>Example</b></p> <p>If there are two graphs associated with the chosen CI, out of which one has metrics per graph as eight and other has twelve, the Graphing chooses the value as twelve.</p> <p><b>Note:</b> The metrics per graph in the resulting graph(s) also depends on the value configured by a software administrator for the parameter <b>Metrics Per Graph</b>. For more information, see "Graphing Settings" on page 522.</p>
<b>Number of points</b>	<p>The number of data points to be displayed on a graph. This value is used to summarize the data for each data point and to fit the graph in a single window, when POINTSEVERY value is set to auto. For other POINTSEVERY values, Graphing determines the number of (data points and time intervals) for each graph and provides options to view the next or previous set of data points or intervals. For line, area, and table graphs, the default value is 100. You need not specify a number for Pie and Gauge graph types.</p> <p>It is recommended that you do not to set the value to more than 1000 as this might impact the performance of the application. Graphing chooses the maximum value available from all the selected graph templates.</p>

UI Elements (A-Z)	Description
<b>Points every</b>	Determines the granularity (number of data points) on the graph. This value is used in conjunction with the NUMBEROFPOINTS value to determine the level of summarization to use. Graphing chooses the value <b>Auto</b> if any of the selected graph templates contain the value for points every as <b>Auto</b> . However, if none of the graph templates has the value <b>Auto</b> , the Graphing chooses the minimum value from all graph templates. For more information, see <b>Specifying Points Every Value</b> .

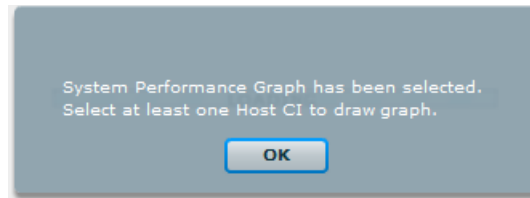
UI Elements (A-Z)	Description
<p><b>Sum from Raw</b></p>	<p>If this parameter is available in the graph template, the unsummarized data from the Performance Agent data source is fetched from the system and then summarized by Graphing. You must enable this only when you do not want the summarization of the data from the data source. Using this feature can cause large volumes of data to be transferred from the system and can slow down the performance. This parameter can be specified only while fetching data from Performance Agent data source.</p> <p>Graphing enables this option if any of the selected graph templates has the “Sumfromraw” option enabled.</p>
<p><b>Sumtype</b></p>	<p>Summarization of data is required when multiple records from a data source have to be combined to view the desired amount of time per data point. This option is applicable only when “SUMFROMRAW” is enabled in the graph template.</p> <p>Graphing summarizes data based on the way value you have specified. The available options are:</p> <ul style="list-style-type: none"> <li>▶ <b>Auto</b> - When this parameter is specified, Graphing uses the summation type provided by the data source (Performance Agent and EPC). If the data sources do not provide the summation type, Graphing uses the “Average” sum type to summarize data.</li> <li>▶ <b>Average</b> - Combines the numeric values by adding and then dividing by the number of values (mean). Non-numeric data will use the last value.</li> <li>▶ <b>Sum</b> - Combines numeric values by adding values.</li> <li>▶ <b>Minimum</b> - Combines numeric values by taking the smallest value.</li> <li>▶ <b>Maximum</b> - Combines numeric values by taking the largest value.</li> <li>▶ <b>Last</b> - Combines numeric or non-numeric values by taking the last value received.</li> <li>▶ <b>Count</b> - Counts the number of records from the data source that were combined into each data point.</li> </ul> <p>Graphing takes the value from the last metric in the default graph templates.</p>



## Troubleshooting and Limitations

### Unable to Draw a System Performance Graph

After launching a graph for a CI or a list of CIs, the following message appears:



You cannot draw a system performance graph without selecting a host CI. When you try to draw a system performance graph make sure you select at least one host CI.

### Unable to Edit or Delete a Graph

You need to be software administrator to edit or delete a graph. For information regarding the user roles, see "Operations Management Users" on page 460.

### Graph Saved from Design Wizard but Not Mapped to any CI Type

When you edit a graph from the design wizard or when you design a graph from the admin UI, you need to map the graph to a CI type. For instructions, see "How to Map CI Types to Graph Families" on page 268.

### Unable to View Graph in Certain Formats (XLS/TSV)

You must check if the option to download files in the Microsoft Excel and TSV format is enabled in the browser security settings. To check the browser settings, perform the following tasks:

- 1 Click **Internet Options** on the **Tools** menu of Internet Explorer. The **Internet Options** window appears.

- 2** Click the **Security** tab. Check if the security level in your browser settings is set to high. Make sure the Internet icon is selected and click Custom Level. The **Security Settings** window appears.
- 3** Scroll down to the Downloads section and select the **Enable** option under **File Download**.
- 4** Click **OK** and close the Internet Options window.
- 5** Open the **Control Panel** and double-click **Folder Options**.
- 6** Click the File Types tab to display the registered file types.
- 7** Select the **XLS** file format and TSV file format from the Registered file types list, and then click the Advanced button. The **Edit File Type** window appears.
- 8** Click to clear the **Confirm Open After Download** check box.
- 9** Click **OK**.

### **Unable to Draw a Graph from a CI**

This can happen when CI is not mapped to a graph family or category. When you edit a graph from the design wizard or when you design a graph from the admin UI, you need to map the graph to a CI type. For instructions, see "How to Map CI Types to Graph Families" on page 268.

### **Some instances of the CI Not Appearing in the Drawn Graph**

If you are drawing a graph for a CI with multiple instances, make sure the value of the parameter "Maximum Instances" is configured accordingly. While drawing a graph, graphing displays only as many instances as the value specified for this parameter. If the number of instances is more than the value of this parameter, graphing will not display those in the drawn graph. For more information, see "Graphing Settings" on page 522.

# 5

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## Actions Pane

### **This chapter includes:**

#### Concepts

- ▶ [Actions and the Actions Pane](#) on page 187

#### Tasks

- ▶ [How to Run an Action](#) on page 188

#### Reference

- ▶ [Actions Pane Graphical User Interface](#) on page 190

### **Actions and the Actions Pane**

The Actions pane used to display the actions that are available for the selected event, its related CI, or the node that hosts the CI. Actions include Tools, Run Books, Custom Actions, and Performance Graphs. The Actions pane is used in the Event Perspective and the Health Perspective and can be added to custom perspectives.

## How to Run an Action

In this task, you learn how to run an action available for a selected event.

### To run an action from an event with related actions:

- 1 Open a perspective containing the Actions pane to display the list of known events and their associated actions:

**Applications > Operations Management > *Select a Perspective***

- 2 Select an event.

The Actions pane displays the actions available for the selected event.

Action types are identified by the following icons:



— Performance Graphs



— Tools



— Run Books



— Custom Actions

- 3 Select an action from the Actions pane.

If the action does not require any further data, it is run immediately. If further data is required, for example for a Tool or a Run Book, the associated UI is launched and a wizard guides you through the action launch.

*Optional:* Enter the Action name or part of the Action name in the **Search** field to reduce the list of displayed Actions. Similarly, select **CI** or **Node** to limit the list of displayed Actions to those that are applicable to either the related CI or the host Node.

For further information on Performance Graphs, see [Performance Graphs](#) on page 133.

For further information on how to run Tools, see [How to Launch a Tool](#) on page 193.

For further information on how to run HPOM actions, see [How to Run an HPOM Action](#) on page 65.

For further information on how to run Run Books, see [How to Launch a Custom Action](#) on page 66.

For further information on how to run Run Books, see [How to Launch an HP Operations Orchestration Run Book](#) on page 66.

## Actions Pane Graphical User Interface

This section describes the information displayed in the Actions pane. The information in this section aims to help you to use actions.

The Actions pane displays a list of the Actions (Tools, Run Books, Custom Actions, and Performance Graphs) applicable to the selected event, its related CI, or the node that hosts the CI.

The Actions pane displays the UI elements listed in the following table:

UI Elements (A-Z)	Description
<b>CI</b>	CI related to the selected event.
<b>Clear</b>	Removes the currently applied search string and displays all applicable actions for the selected CI.
<b>Event</b>	Title of the event that provides a brief summary of the event.
<b>Filter</b>	Used to reduce the number of actions displayed in the Actions pane by showing only those applicable to CIs or Nodes. <b>All</b> — Shows all applicable actions for the selected event. <b>CI</b> — Shows actions that can be run on the CI related to the selected event. <b>Node</b> — Shows actions that can be run on the Node related to the selected event.
<b>Node</b>	Host name to which the event is related.
<b>Search</b>	Used to reduce the number of actions displayed in the Actions pane by showing only those that match the entered search string.

# 6

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## User Tools

### **This chapter includes:**

#### Concepts

- ▶ [User Tools Basics](#) on page 191

#### Tasks

- ▶ [How to Launch a Tool](#) on page 193

#### Reference

- ▶ [Run Tools Graphical User Interface](#) on page 195
- ▶ [Troubleshooting and Limitations](#) on page 196

### **User Tools Basics**

You can specify tools in Operations Management, for example, to ping a system. These tools are run from events on the associated CI. Tools are designed to help you solve common problems quickly and efficiently.

In the context of a event, available tools are displayed in the **Launch > Tools** context menu.

In the context of a configuration item, available tools are displayed in the **Launch Tools ...** context menu and are also displayed in the Actions pane of a perspective.

The selection of tools a particular user sees in context menus depends on the tools that are available for the configuration item affected by a particular event.

For more information about using the Tools manager to configure custom tools, see "Tool Creation" on page 239.

---

**Note:** Access to Administration features may be restricted. You must have corresponding permissions to launch the Tools manager.

---



## How to Launch a Tool

In this task, you learn how to launch a tool that is configured for a particular configuration item type. Tools are displayed in the context menus.

---

**Note:** Tools, custom action, performance graphs, and run books available for a selected event are also displayed in the Actions pane of a perspective.

---

### To launch a custom tool:

- 1 Open the Event Browser to display the list of known events:  
**Applications > Operations Management > *select a perspective***
- 2 In the Model Explorer pane, select a view containing the configuration item type with the tool you want to start.

---

**Tip:** Use the search feature if you are not sure of the name or location of the configuration item.

---

Alternatively, in the Event Browser, select an event that concerns the configuration item of the type that includes the tool you want to run.

- 3 To open the Run Tool dialog box, make one of the following selections:
  - ▶ Right-click an event in the Event Browser and select:  
**Launch > Tool > *select a tool***
  - ▶ Right-click a configuration item in the Model Explorer and select  
**Launch Tool ... > *select a tool***

The Run Tool dialog box opens for the selected tool configured for the configuration item type associated with the event.

- 4 If the tool requires any additional information to resolve parameters, type the required information in the pages presented by the Run Tool wizard.

- 5 To run the selected tool, select **Run Tool**.

For scripts and executable commands, the Execution Result window opens and displays the output of the tool execution.

Use the **Word wrap for output** option to make sure that all output text is displayed within the output pane.

Use the **Refresh** button to update the displayed output or select a refresh interval to regularly update the displayed output while the tool is executing.

For URL launches, the target is opened in a browser.

- 6 For scripts and executable commands, after the tool has been run, select **Close**.

## Run Tools Graphical User Interface

The Run Tool dialog box enables you to view the tool you want to run before running it. You can also browse any other tools that are displayed in the same tools context menu.

The Run Tools page displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Back</b>	Opens the previous page in the Run Tool Wizard, if available. The Back button is inactive (grey) if no previous page is exists.
<b>Cancel</b>	Closes the Run Tool Wizard without running a tool.
<b>Close</b>	Closes the Run Tool Wizard after a tool has been run.
<b>Next</b>	Opens the next page in the Run Tool Wizard, if available. The Next button is inactive (grey) if no other page exists.
<b>Refresh</b>	Updates the displayed output of the active tool.
<b>Refresh every ...</b>	Automatically updates the displayed output of the active tool using the refresh interval selected from the list.
<b>Run Tool</b>	Starts the tool that is selected in the Run Tool Wizard. If the tool requires additional information to resolve parameters, a wizard enables you to supply the required information before the tool starts.
<b>Word wrap for output</b>	Wraps tool output text so that it is displayed within the width of the output pane.

## **Troubleshooting and Limitations**

This section provides help for those people who are troubleshooting problems concerning the launch and use of Operations Management tools. For more information about troubleshooting tool configuration and availability, see "Tools Management" on page 238.

### **No Tools Display**

- ▶ No tools are available for the selected type of configuration item or the configuration item associated with the selected event.
- ▶ The selected event does not contain Related CI or Node information.

### **Tool Does Not Run**

- ▶ The tool is incorrectly configured.

Tools are not launched in the context of an event. They can be run on configuration items only. However, all tools contain event parameters.

- ▶ The tool depends on external resources such as network or internet connectivity that are not currently available.

# 7

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## Filtering Events

### **This chapter includes:**

#### Concepts

- ▶ [Filtering Methods](#) on page 198
- ▶ [Event Filters](#) on page 200

#### Tasks

- ▶ [How to Filter Events by Views](#) on page 203
- ▶ [How to Filter Events by Configuration Items](#) on page 204
- ▶ [How to View and Apply Event Filters](#) on page 205
- ▶ [How to Define Basic Event Filters](#) on page 206
- ▶ [How to Define Advanced Event Filters](#) on page 208

#### Reference

- ▶ [Filter Manager Pages](#) on page 213
- ▶ [Basic Filter Configuration Dialog](#) on page 214
- ▶ [Advanced Filter Configuration Dialog](#) on page 218
- ▶ [Troubleshooting and Limitations](#) on page 222

## Filtering Methods

Large IT environments naturally create a large number of events. All active events are displayed in the Event Browser and maintaining a clear overview of the events that require attention becomes increasingly difficult as the number of received events increases.

You can filter the contents of the Event Browser, for example, in the Event and Health Perspectives (or perspective containing an Event Browser and the Model Explorer), according to a combination, where available, of the following selections:

► **Views**

Views are used to group configuration items into logical sets. Selecting a view, the Event Browser only displays events that are related to the CIs specified in the selected view.

► **Configuration Items**

Selecting one or more CI from the CI tree only displays events in the Event Browser that are related to the selected CIs.

► **Configuration Item Collection**

Selecting a CI Collection from the CI tree only displays events in the Event Browser that are related to the CIs that are contained within the selected collection.

► **Event Filters**

Applying an event filter enables you to limit the type of events displayed in the Event Browser by defining rules that filter events according to event criteria such as severity, lifecycle state, assignment (ownership), category, dates and times, custom attributes, resolution information and application name.

---

**Note:** An Event Browser page without a Model Explorer pane can only be filtered using event filters.

---

By applying a combination of the available filtering methods, you can display just the most important events that you are responsible for. It is possible to create a view to display a CI tree list tailored to the responsibilities of an operator. Operators can then select a CI from the CI tree and be shown all related events. Alternatively, operators can define filters to, for example, show only events labelled as Critical and Major. Combining the selection of a CI and applying the same filter displays all events labelled as Critical and Major for the select CI.

## Filter Selection


The contents of the Event Browser pane in the Event Perspective and Health Perspective can be filtered by the selected view or configuration item and by the selected event filter.

The active view or configuration item used to filter the Event Browser content is indicated in the Event Browser title. For example, if a view with the name **Host Resources** is selected, The Event Browser title displays:

### Event Browser for Host Resources

When you open the Event Browser for the first time, no filters are applied and **Select an event filter** is displayed in the Event Browser Filter applied list. After you have selected a filter, the name of the active event filter is displayed in the filter selection field. If you want to clear the selected filter, select **No Filter**. The effect of the filter on the Event browser is cleared, but can be reapplied as required.

---

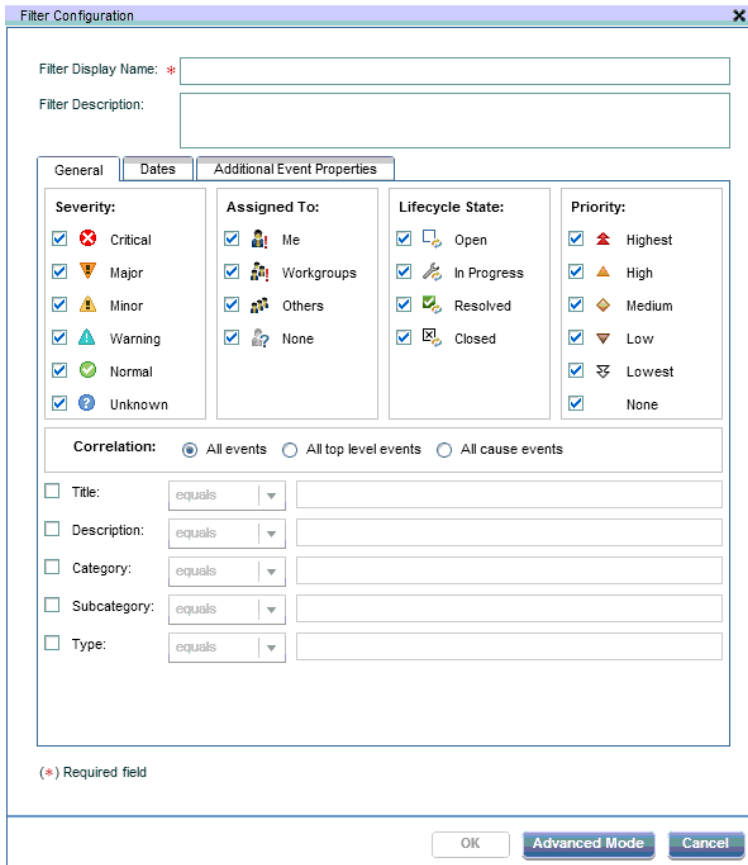
**Note:** By default, the contents of the Event Browser pane are filtered according to the selected configuration item or view. To disable filtering by configuration item or view use the **Enable/Disable View Filtering**  toggle button.

---

## Event Filters

Event filters enable you to limit the type of events displayed in the Event Browser by defining rules that filter events according to criteria such as severity, origin, type, and ownership. The filters you define are available from the Select an Event Filter dialog box or the filter selection drop-down box of the Event Browser. The active filter remains on display in the filter selection drop-down box.

You define and edit filters using the Filter Configuration dialog available from the Event Browser. Basic filtering information is grouped under the General, Dates, and Additional Event Properties tabs. A basic filter definition is the combination of all information specified in the three tabs.









Filter Configuration

Filter Display Name: \*





Filter Description:

General | Dates | **Additional Event Properties**





**Severity:**

-  Critical
-  Major
-  Minor
-  Warning
-  Normal
-  Unknown







**Assigned To:**

-  Me
-  Workgroups
-  Others
-  None

**Lifecycle State:**

-  Open
-  In Progress
-  Resolved
-  Closed

**Priority:**

-  Highest
-  High
-  Medium
-  Low
-  Lowest
-  None

**Correlation:**  All events  All top level events  All cause events

Title: equals

Description: equals

Category: equals

Subcategory: equals

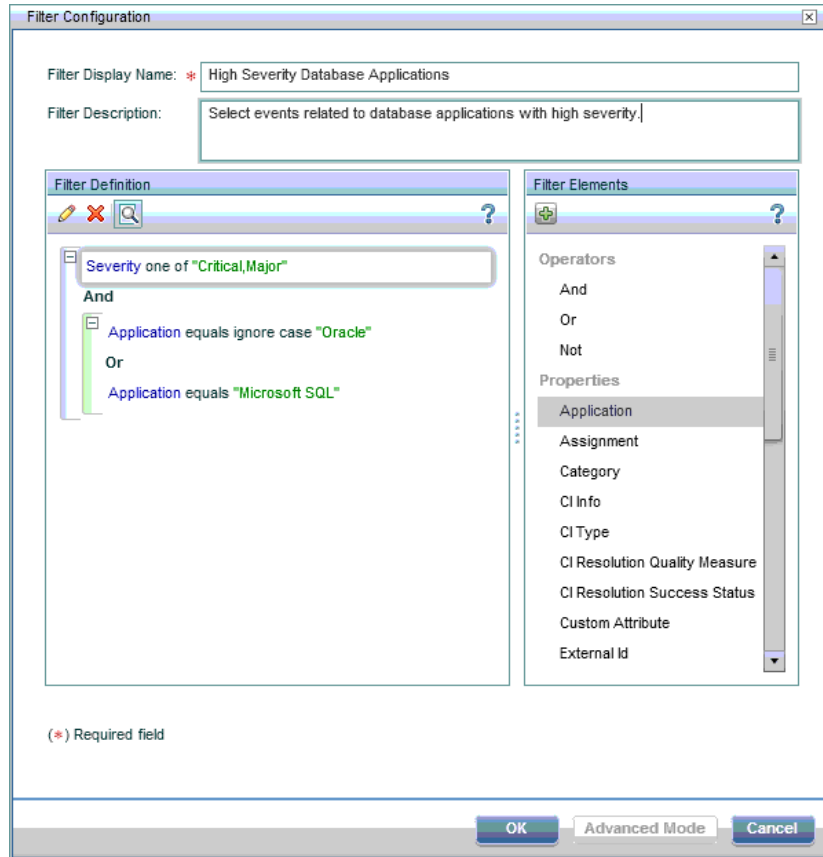
Type: equals

(\*) Required field

OK Advanced Mode Cancel



You can also use the Advanced Mode for defining more complex filters. An advanced filter definition is specified in the Filter Definition pane using combinations of properties and operators.




---

**Note:** When investigating closed events using the Closed Events Browser, you must first specify the time period of interest. Filters can then be applied to the available events.

---

Filters are specified by individual users for use locally in their own Event Browser. A user-configured filter is available only to the user under which it was configured.

### **Filter Application**

You can create filters for use in the Event Browser, the Closed Events Browser, and many Operations Management administration areas. Most filters are dedicated to the browser or manager for which they are configured. You can apply a different filter for each instance of a perspective. Filters defined for the Event Browser are also available in the Closed Events Browser and vice versa.

## How to Filter Events by Views

In this task, you learn how to filter the events displayed in the Event Browser according to an ODB view. Only events related to configuration items included in the selected view appear in the Event Browser.

### To filter events by ODB Views:

- 1 Start the Event Perspective or Health Perspective:

**Applications > Operations Management > *select a perspective***

- 2 In the Browse Views tab of the Model Explorer, use the view list to select a view to apply.

The events displayed in the Event Browser are limited to events associated with the selected view.

---

**Note:** The View filter is combined with the currently applied event filter.

---

---

**Tip:** To disable filtering by views, click the Enable/Disable View Filtering  toggle button.

---

## How to Filter Events by Configuration Items

In this task, you learn how to filter the events displayed in the Event Browser by configuration item. Only events related to the selected configuration item appear in the Event Browser.

**To filter events by configuration item:**

- 1 Start a perspective containing an Event Browser and a Model Explorer, for example, the Event Perspective or the Health Perspective:

**Applications > Operations Management > *select a perspective***

- 2 In the Browse Views tab of the Model Explorer, use the view list to select a view to apply.
- 3 Select one or more configuration items, CI collections, or a combination of both from the Model Explorer pane to use as an event filter.


The events displayed in the Event Browser are limited to events associated with the selected configuration item.

---

**Note:** The CI filter is combined with the currently applied event filter.

---

---

**Tip:** To disable filtering by views, click the Enable/Disable View Filtering  toggle button.

---


## How to View and Apply Event Filters

In this task, you learn how to display a list of configured event filters and apply one to the Event Browser.

### To view a list of configured event filters:

- 1 Start a perspective containing an Event Browser and a Model Explorer, for example, the Event Perspective or the Health Perspective:

**Applications > Operations Management > *select a perspective***


- 2 Select a filter from the Filter list.
- 3 Alternatively, in the Event Browser, click the **Event Filter**  button.

The Select an Event Filter dialog box opens containing a list of available event filters.

---

**Note:** The contents of the list of event filters displayed in the Select an Event Filter are user specific. The list contains only event filters that the active user has configured.

---

- 4 Select the event filter you want to apply.
- 5 *Optional:* Open the Filter Configuration dialog box using the **Edit Item**  button and modify the selected filter and click **OK**.
- 6 Click **OK** to enable the selected event filter.

Enabling a filter updates the contents of the browser immediately.

- 7 If the selected filter does not display the results you require, redefine the selected event filter or select an alternative event filter.

**Note:** If you want to clear the selected filter, select **No Filter** from the filter selection box.


Deleting the filter selected in the Event Browser from the list of filters automatically applies no filter to the Event Browser.

---

## How to Define Basic Event Filters

In this task, you learn how to set up a basic filter for the Event Browser or the Closed Event Browser using the Filter Configuration dialog.

**To define an event filter:**

- 1 From the Event Browser or the Closed Event Browser, open the Select an Event Filter dialog box using the **Event Filter**  button.

---

**Note:** The Select an Event Filter dialog box is also available using the **Manage Event Filters (...)** button in the New and Edit dialog boxes of the Administration managers.

---

- 2 From the Select an Event Filter dialog box, open the Filter Configuration dialog box using the **New Item**  button.

The Filter Configuration dialog box opens.

- 3 Enter a name and description for the new filter.
- 4 Use the displayed tabs to configure the new filter (General, Dates, and Additional Event Properties).

In the Filter Configuration dialog, if any one of the selected criteria within a frame is true, for example, Severity of the event is Critical, the event is selected by the filter.

All selections in the frames themselves and the other filter criteria, for example, Severity is Critical and Assigned to is Me, must be matched by the event for it to be selected by the filter.

For example, if the severities Critical and Major are selected within the same pane, events exhibiting either severity are displayed. If the assignment Not assigned is also selected from another pane, only events not assigned to a user and exhibiting one of the selected severities are displayed.

Filter Configuration

Filter Display Name: \* New Basic Filter

Filter Description: This is a basic filter

General | Dates | **Additional Event Properties**

**Severity:**

- Critical
- Major
- Minor
- Warning
- Normal
- Unknown

**Assigned To:**

- Me
- Workgroups
- Others
- None

**Lifecycle State:**

- Open
- In Progress
- Resolved
- Closed

**Priority:**

- Highest
- High
- Medium
- Low
- Lowest
- None

**Correlation:**  All events  All top level events

Title: equals [ ]

Description: equals [ ]

Category: equals [ ]

Subcategory: equals [ ]

Type: equals [ ]

(\*) Required field

OK Advanced Mode Cancel

- 5** *Optional:* Use the Advanced Mode to further tailor your filter. For details, see "How to Define Advanced Event Filters" on page 208.


---

**Note:** [Advanced filters cannot be displayed in the basic filter view.](#)

---

- 6** Select **OK** to save the changes.

The Filter Configuration dialog box closes and the new event filter is added to the list of filters in the Select an Event Filter dialog box.


- 7** *Optional:* Select the newly created event filter and click the **Find Matching Events**  button. This opens a new Event Browser window, displaying the results of applying the newly defined filter. If the filter does not display the results you require, redefine the filter.

For details of the Filter Configuration dialog, see "Basic Filter Configuration Dialog" on page 214.

## **How to Define Advanced Event Filters**

In this task, you learn how to set up an advanced event filter for the Event Browser or the Closed Event Browser using the Filter Configuration dialog.

### **To define an advanced event filter:**

- 1** From the Event Browser or the Closed Event Browser, open the Select an Event Filter dialog box using the **Event Filter**  button.

---

**Note:** [The Select an Event Filter dialog box is also available using the Manage Event Filters \(...\) button in the New and Edit dialog boxes of the Administration managers.](#)

---

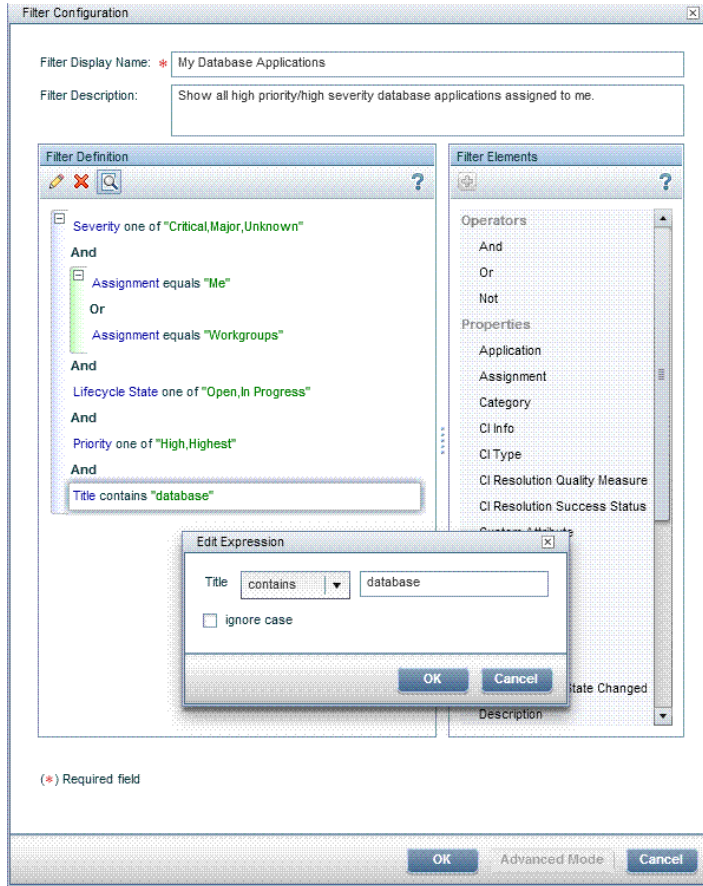


- 2 From the Select an Event Filter dialog box, open the Filter Configuration dialog box using the **New Item** \* button.

The Filter Configuration dialog box opens.

- 3 Enter a name and description for the new filter.
- 4 *Optional:* Use the displayed tabs to make any suitable basic configurations for the new filter (General, Dates, and Additional Event Properties). These configurations become the starting point for the advanced filter configuration. For details, see "How to Define Basic Event Filters" on page 206.
- 5 Select **Advanced Mode** to switch to the advanced filter definition mode.


The Advanced Mode enables you to very precisely specify filters using a combination of operators, properties, and expressions.



---

**Note:** Advanced filters cannot be displayed in the basic filter view and it is not possible to switch to the basic filter view from the advanced filter view.

---

- 6 Start assembling a filter by dragging properties and operators to the Filter Definition pane, for example, Description. Alternatively, select elements or operators and add them to the active filter specification using the **Add**  button.

The Edit Expressions dialog box opens containing an editor specific to the selected property type.

- 7 There are two basic types of Edit Expressions dialog boxes: string filters and pre-specified filters

► **Defining a string filter:**

Select a matching criteria for the selected property, for example, **contains** and specify a text string to search for.

The matching criteria **matches** and **not matches** are used for specifying regular expressions providing you with a very powerful filtering tool.

---

**Note:** Processing filters containing regular expressions requires higher resources than for filters without them and it is recommended that regular expressions are used only when a simpler alternative is not possible.

---

*Optional:* Select **ignore case** to make the expression case-insensitive.

► **Defining a pre-specified filter:**

Pre-specified filters are used to select attributes which have a known range of values, for example, severities, priorities, lifecycle states, and dates.


Select a matching criteria for the selected property, for example, **equals**, **before**, **one of**, **is true**, and, where appropriate, select one or more of the available options, for example, severity values, priority values, or lifecycle states.

- 8 Select OK to close the Edit Expression dialog box.
- 9 Repeat steps 6 to 8 to specify additional filtering components to the filter specification.

If you want to change an entry, double-click it. The Edit Expression window opens from which you can change the specification of the expression.

- 10 Select **OK** to save the changes.

The Filter Configuration dialog box closes and the new event filter is added to the list of filters in the Select an Event Filter dialog box.







- 11** *Optional:* Select the newly created event filter and click the **Find Matching Events**  button. This opens a new Event Browser window, displaying the results of applying the newly defined filter. If the filter does not display the results you require, redefine the filter.

For details of the Filter Configuration dialog, see "Basic Filter Configuration Dialog" on page 214.

## Filter Manager Pages

The Select an Event Filter dialog box displays a list of the filters that are configured by the active user for the current browser or manager. You can select a filter from the list of configured event filters and apply it, edit or delete an existing filter, or create and test a new filter.

The Select an Event Filters dialog box displays the UI elements listed in the following table.

UI Elements	Description
	Synchronizes the filter data displayed in the list of available filters with the latest information available in the database.
	Opens the Filter Configuration dialog box from which you can create and define a new event filter. Click <b>OK</b> to save the new filter.
	Creates a copy of the selected filter and opens the Filter Configuration dialog box.
	Opens the Filter Configuration dialog box for the selected event filter from which you can modify the selected event filter. Click <b>OK</b> to save the modifications to the selected event filter.
	Opens the Delete Event Filter dialog box for the selected event filter. Click <b>Yes</b> to delete the selected filter annotation.
	Displays events that match the selected filter in an Event Browser pop-up window. Useful for testing an event filter before applying it to the Event Browser.

## Basic Filter Configuration Dialog

The Basic Filter Configuration dialog box displays the attributes that you can use either individually or in combination to filter events before displaying them. For more information about the information displayed in the Filter Configuration tabs, see the following sections.

### Common Buttons and Icons

The Filter Configuration window includes the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Advanced Mode</b>	Opens the Advanced Mode used to define more comprehensive filters. For details, see "How to Define Advanced Event Filters" on page 208. <b>Note:</b> Advanced filters cannot be displayed in the basic filter view.

### General Tab

The General tab in the Filter Configuration dialog box displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Assigned To</b>	User or user group to whom the events you want to find are assigned. Multiple assignments can be selected. For example, you can select Assigned To Me and Not Assigned.
<b>Category</b>	Category of event that you want to use as a filter option, for example: DB, Storage, System, or WebApp.

UI Elements (A-Z)	Description
<b>Correlation</b>	<p>Select the desired option to search for all events, only top level events, or only cause events:</p> <p><b>All events:</b> includes events correlated as symptoms of other events.</p> <p><b>All top level events:</b> includes all events that do not have a cause assigned.</p> <p><b>All cause events:</b> includes all events that are root cause events. They cannot be symptoms of another cause event.</p>
<b>Description</b>	Description of an event as displayed in the contents of the original event's description field.
<b>Lifecycle State</b>	Stage in the problem lifecycle that the events you are looking for have reached, for example: Open, In Progress, Resolved or Closed. Multiple lifecycle states can be selected.
<b>Priority</b>	Searches for events that match the specified priorities, for example: None, Low, or Medium. Multiple priorities can be selected.
<b>Subcategory</b>	Name of the event subcategory to which the events you are looking for belong.
<b>Severity</b>	Selects an event severity to use as a filter option. Multiple severities can be selected.
<b>Title</b>	Title of the events you are looking for.
<b>Type</b>	Type of event you want to display with the filter.

## Dates Tab

The Dates tab in the Filter Configuration dialog box displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Time Created</b>	Specifies the dates and times between which the events you are searching for occurred.
<b>Time Received</b>	Specifies the dates and times between which Operations Management first received notification of the events you are searching for.
<b>Time Lifecycle State Changed</b>	Date and time when the last lifecycle state change took place.

## Additional Event Properties Tab

The Additional Event Properties tab in the Filter Configuration dialog box displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Application</b>	Selects events linked to the named application.
<b>CI Type</b>	<p>Selects the option to search for events that are related to the specified CI type or are a child of the specified CI type.</p> <ul style="list-style-type: none"> <li>▶ <b>equals:</b> Related CI matches a specified CI type</li> <li>▶ <b>is derived from:</b> Related CI is derived from the specified CI type</li> </ul>







UI Elements (A-Z)	Description
<b>Custom Attribute</b>	<p>Selects the Custom Attributes editor where you can specify a custom attribute, an operator, and a value for use in filtering.</p> <p>You define a custom attribute filter by specifying the name of the custom attribute in the field on the left, selecting a filter matching criteria from the list, and specifying the value of the custom attribute in the field on the right.</p> <p><b>Note:</b> In the Advanced mode, You can add further custom attribute specifications. These can be related using any of the available operators.</p>
<b>Key</b>	Selects events that contain a reference to the named key.
<b>Object</b>	Selects events that are related to a named object, as specified in the original HP Operations Manager message.
<b>Original Data</b>	<p>Original event text as captured from HP Operations Manager agents before being formatted into an HP Operations Manager message.</p> <p>Contains information about the original input before being normalized by HP Operations Manager agent policies into a message. Typically, the information available includes node name, message group, application, object, severity, and message text.</p>
<b>Solution</b>	<p>A text field used to describe the solution steps taken to solve the problem identified by the event.</p> <p>Solution texts can be synchronized with external managers such as Service Manager.</p>

## Advanced Filter Configuration Dialog

The Advanced Filter Configuration dialog box displays the attributes that you can use either individually or in combination to filter events before displaying them. For more information about the information displayed in the Filter Configuration tabs, see the following sections.

### Advanced Filter Configuration

The filter matching criteria lists display the UI elements listed in the following table.

UI Elements (A-Z)	Description
	Opens the Edit Expression dialog box for the selected event filter element from which you can modify the selected event filter element.  Click <b>OK</b> to save the modifications to the selected event filter element.
	Deletes the selected event filter element from the selected event filter specification.
	Toggles between full view and compact view of the filter specification.
	Adds the selected element to the active filter component in the Filter Definition pane or opens the Edit Expression dialog box for the selected filter element.
<b>Cancel</b>	Closes the Select an Event Filter dialog box without changing the selected event filter.
<b>Expression</b>	Component of a filter definition that describes the way in which a property in an event is to be included.
<b>Filter Definition</b>	Contains the components chosen to define the filter. Properties are associated with a value and are connected using operators.

UI Elements (A-Z)	Description
<b>Filter Elements</b>	Contains the available operators and properties used to specify an advanced filter. Drag each required property or operator to the filter definition pane and drop it in its logical location in the filter. To edit and delete entries from the filter definition, use the buttons or double-click the expression that you want to change.
<b>Ignore case</b>	Selects ignoring of case-sensitivity for the value of the expression.

## Filter Matching Criteria

The filter matching criteria lists display the UI elements listed in the following table.

UI Elements (A-Z)	Description
=	Displays any event that has a value of the selected attribute that is identical to the specified value.
<	Displays any event that has a value of the selected attribute that is less than the specified value.
<=	Displays any event that has a value of the selected attribute that is lower than or identical to the specified value. For example, selecting the value 33, for CI Resolution Quality Measure displays all events with CI Resolution Quality Measure below 33%
>	Displays any event that has a value of the selected attribute that is greater than the specified value.
>=	Displays any event that has a value of the selected attribute that is higher than or identical to the specified value. For example, selecting the value 50, for CI Resolution Quality Measure displays all events with CI Resolution Quality Measure values above 50%.
<b>After</b>	When specifying times, selects events that have a timestamp more recent than the specified time.

UI Elements (A-Z)	Description
<b>Before</b>	When specifying times, selects events that have a timestamp older than the specified time.
<b>contains</b>	<p>Displays any event that contains a reference to the specified string in the selected attribute. For example, searching for any string that contains <b>database</b> returns:</p> <ul style="list-style-type: none"> <li>➤ database</li> <li>➤ database status</li> <li>➤ Oracle Database status</li> </ul>
<b>equals</b>	<p>Displays any event that has an attribute or attribute value that is identical to the specified string. For example, searching for events of a category type that equals <b>database</b> returns events of the following category:</p> <ul style="list-style-type: none"> <li>➤ database</li> </ul>
<b>False</b>	Used to set an attribute not to be matched.
<b>matches</b>	<p>Displays any event that matches the specified regular expression.</p> <p>Processing filters containing regular expressions requires higher resources than for filters without them and it is recommended that regular expressions are used only when a simpler alternative is not possible.</p>
<b>not contains</b>	<p>Displays any event that does not contain a reference to the specified string in the selected attribute. Searching for a string that does not contain <b>database</b> returns all strings except those containing <b>database</b>, for example:</p> <ul style="list-style-type: none"> <li>➤ Blue moon</li> <li>➤ Almost everything else</li> </ul>
<b>not equals</b>	<p>Displays any event that has an attribute that is not identical to the specified string. For example, searching for events of a category that does not equal <b>database</b> returns events with categories that are not identical to <b>database</b>, returns event attributes such as:</p> <ul style="list-style-type: none"> <li>➤ Storage</li> <li>➤ DB</li> <li>➤ Network</li> </ul>

UI Elements (A-Z)	Description
<b>not matches</b>	Displays any event that does not match the specified regular expression.  Processing filters containing regular expressions requires higher resources than for filters without them and it is recommended that regular expressions are used only when a simpler alternative is not possible.
<b>one of</b>	Used to specify that any one of the selected attribute values can be used to match the filter.
<b>True</b>	Used to set an attribute to be matched.

## **Troubleshooting and Limitations**

This section provides help for those people who are troubleshooting problems relating to Operations Management event filters, including creating, modifying, and enabling filters.

### **Filters Not Available in Event Filter List**

- Filter does not belong to active user.
- Filters are only available for the area for which they are created. For example, an Event Browser filter is not available in the Closed Events Browser.

### **Events Not Visible**

- Make sure that the correct filter is enabled.
- Make sure that the currently enabled filter is correctly configured.
- Make sure that the currently applied CI or View does not filter out events that you want to see.

# 8

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## Views for Operations Management

### **This chapter includes:**

#### Concepts

- ▶ Views on page 223
- ▶ View Mapping on page 224

#### Tasks

- ▶ How to Select a View on page 226

#### Reference

- ▶ Model Explorer Pane on page 227

### **Views**

This chapter describes the main concepts of views. The ConfigurationItem model in the configuration management database can be very large, holding thousands of configuration items (CIs). A view enables you to build a subset of the overall ConfigurationItem model, containing only those CIs relating to a specific area of interest. You can define your own views to display only the information that is relevant to your organization's business needs.

Views for Operations Management help you to limit the configuration items displayed in the Model Explorer. Operations Management filters the contents of the Event Browser in the Event Perspective and the Health Perspective according to the selected configuration items.

To configure and modify views, use the View Manager:

**Admin > ODB Administration > Modeling > Modeling Studio**

Operations Management Content Packs provide views that group configuration items into sets that help you to perform your tasks more efficiently. You can modify existing (or configure new) views to change, increase, or decrease the amount and type of information displayed. You can exchange the views between instances of Operations Management using the Import and Export features of the Content Packs manager.

---

**Tip:** You can use views to limit the contents of the CI Tree. Selecting a configuration item from the CI Tree restricts the contents of the Event Browser to events related to that configuration item only.

---

To learn how to display a complete list of the Operations Management views, see "How to Select a View" on page 226. For more information about the CI Tree, see "Model Explorer Pane" on page 227.

## View Mapping

A view displays a subset of the overall ConfigurationItem model, for example, only those CIs that relate to a specific area of interest. Selecting a view enables you to refine both the type and the amount of information displayed, for example, in the CI Tree or the Health Top View pane.

You can map views to configuration item types. The mapped views appear in the Selected Views list displayed in the Health Top View pane of the Health Perspective tab. For more information about the contents of the Health Top View pane and the Selected Views list, see "Health Top View" on page 127.

You can exchange the view mappings that you configure between instances of Operations Management using the Import and Export features of the Content Packs manager.



**Note:** Only users with the appropriate access permissions can use the Administration features.

---

To learn how to display a complete list of the Operations Management views, see "How to Select a View" on page 226. For more information about the CI Tree, see "Model Explorer Pane" on page 227.

## How to Select a View

You can use views to configure the Model Explorer to display any combination of the available configuration items. The following steps explain how to select a view from the drop-down list of views available.

---

**Tip:** For information on button actions, see "Model Explorer Pane" on page 227.

---

### To display a list of views:

- 1 Open the Event Perspective or the Health perspective to display the list of known events:

**Applications > Operations Management > *select a perspective***

- 2 In the Model Explorer pane, select the **Browse Views** tab.
- 3 Use the **View** list to display the available views and select the required view.

Entering a character in the View field highlights the first matching view name.

 **Model Explorer Pane**

The Model Explorer displays an overview of the configuration items (CIs) stored in the ODB. Displaying the CIs in a tree enables you to browse and locate them more easily.

You can use views to configure the Model Explorer to display any combination of the available configuration items. You can also highlight configuration items that match a specific pattern or search through the database to locate individual or groups of configuration items.

The Model Explorer contains tabs that enable you to browse and search through views of the ODB.



# Part II

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## Configuring Operations Management



# 9

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## Introduction and Overview

The information in this section describes how to configure Operations Management.

**This chapter includes:**

- ▶ [How This Section Is Organized](#) on page 231
- ▶ [Who Should Read This Section](#) on page 235

### How This Section Is Organized

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**Note: Licences**

To be able to use Operations Management functionality, the appropriate combination of three licences are required. If no licenses are installed, Operations Management remains unavailable and appears dimmed.

The Operations Management licenses:

- ▶ **Event Management Foundation license only**
- ▶ **Event Management Foundation and Topology-Based Event Correlation License**
- ▶ **Target Connector License**

For detailed information on licensing, see *the HP Business Service Management Deployment Guide* PDF.

---

This part of the guide contains the following chapters:

## **Chapter 9 Introduction and Overview**

The information in this chapter introduces you to the topics covered in Part 2 of this guide, which describes more advanced use of Operations Management, including software configuration and administration.

## **Chapter 10 Tools**

This chapter provides information that helps you understand how to configure and manage the User Tools.

## **Chapter 11 Performance Graphs**

This chapter describes the Performance Graphs Manager used to configure the mapping of CI types to available graph families.

## **Chapter 12 Indicator Mapping Rules**

This chapter introduces the Indicators manager. You learn how to configure event type indicators, health indicators and key performance indicators to provide information for Views, which Operations Management operators can use to pinpoint problems in the monitored IT environment.

## **Chapter 13 View Mappings**

This chapter describes the View Mappings manager used to map existing Views to one or more configuration item types and manage the mapped Views. The information provided aims to help you understand how to use the View Mappings manager to configure and manage Operations Management Views, and exchange them between management servers.

## **Chapter 14 Correlation Rules**

This chapter introduces the Correlation Rules manager, used for configuring topology-based event correlation. You learn how to configure correlation rules and apply them to health indicators to help you better understand, monitor, and manage the problems that have an impact on the objects in your IT environment.



## **Chapter 15 Connecting Servers**

This chapter describes how to specify HP Operations Manager servers, external event processing servers, and other Operations Management (BSM) servers as event forwarding targets.

Connected servers are used in conjunction with event forwarding rules to redirect selected events to specific event managers.

## **Chapter 16 Event Forwarding to External Servers**

This chapter describes how to setup rules to select and forward events to external event managers such as another BSM server, HP Operations Manager and or a help desk application.

## **Chapter 17 Notifications**

This chapter describes how to setup rules to notify people who are located remotely when events with predefined characteristics are received. Notifications can take the form of Emails, SMSs and Pager messages

## **Chapter 18 Downtime Configuration**

This chapter describes how to configure Operations Management to manage the events received from CIs which were in downtime (configuration of CIs specifying periods of unavailability due to predetermined maintenance times).

## **Chapter 19 Custom Actions**

This chapter describes how to setup scripts to run custom actions on events. For example, you can add a text string to certain events to make them easier to identify in the Event Browser.

## **Chapter 20 Handling Events Automatically**

This chapter describes how to automate handling and processing of incoming events.

## **Chapter 21 Event Assignment**

This chapter describes how to automatically assign incoming events to available user groups. Automatic assigning of events to user groups responsible for solving these event significantly improves the efficiency of event management. Each events is assigned to an appropriate user group as soon as it is received. All operators in a user group are allowed to work on those events assigned to that user group.

## **Chapter 22 User Management**

This chapter introduces the concept of users, user roles, and user views and provides information that helps you understand how to create and manage users and groups.

## **Chapter 23 Auditing in Operations Management**

This chapter describes how to audit the configurations of Operations Management and monitor changes to those configurations.

## **Chapter 24 Tracing and Logging Operations Management UIs**

This chapter describes how to configure and run logging and tracing of the Operations Management UIs.

## **Chapter 25 Topology Synchronization**

This chapter describes how to configure and run topology synchronization from HP Operations Manager servers to Operations Management.

## **Chapter 26 Infrastructure Settings for Operations Management**

This chapter provides an details of the settings required for Operations Management including information that helps you understand how to set and configure Operations Management within the BSM platform.

## Chapter 27 Content Packs

This chapter introduces Content Packs in Operations Management. Details of available content packs are documented at the end of this document.

### Who Should Read This Section

This guide is intended for the following users of Operations Management:

- ▶ Operations Management software administrators
- ▶ Operations Management subject matter experts (for example, DB and Exchange)

Users of this section should know about both Operations Management and Business Service Management. Users should also have a good understanding of the various technical areas they are responsible for (for example, databases, or Microsoft Exchange) and know about enterprise monitoring and management concepts.

Welcome to This Guide

# 10

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## Tools

### **This chapter includes:**

#### Concepts

- ▶ [Tools Management](#) on page 238
- ▶ [Tool Creation](#) on page 239
- ▶ [Tool Inheritance](#) on page 240

#### Tasks

- ▶ [How to View Tools](#) on page 241
- ▶ [How to Search and Filter CI Types](#) on page 241
- ▶ [How to Create Tools](#) on page 243
- ▶ [How to Edit Tools](#) on page 245
- ▶ [How to Define Tool Categories](#) on page 246

#### Reference

- ▶ [Tools Manager Graphical User Interface](#) on page 248
- ▶ [CI Types Pane](#) on page 248
- ▶ [Tools Pane](#) on page 251
- ▶ [Tool Details Pane](#) on page 252
- ▶ [Create New Tool and Edit Tool Dialogs](#) on page 253
- ▶ [Attribute Selection Dialogs](#) on page 259
- ▶ [Troubleshooting and Limitations](#) on page 262

## Tools Management

You can add your own tools to help users and administrators to perform the basic tasks they need to carry out their designated roles. The tools you configure with the Tools manager are assigned to a particular configuration item type, for example, Node, Router, or Database. You can launch tools available for an event from the context menus and the Actions pane of a perspective.

Tool categories are used to grant controlled execution access to tools for operators. Each tool is assigned a category, and for operators to be able to use the tools with a certain category, they must be granted execution permissions for this Tool Category.

If you want to grant a user access to a specific tool category, you grant execution permissions explicitly for that Operations Management tool category. If you want to grant access to all tool categories for a user, you grant execution permissions for all Operations Management tool categories (Tool Categories top-level entry). For more information about user authorizations, see "User Management" on page 459.

---

**Note:** Only users with the appropriate access permissions can use Operations Management Administration. For more information about user management, see "User Management" on page 459.

---

## Tool Creation

Operations Management enables you to create tools to help users to perform common tasks on configuration items. When you create a tool, it is associated with a configuration item type.

---

**Note:** Tools created for a CI type are inherited by all child CI types of that CI type.

---

The following are some examples of typical tools:

- ▶ Command tool to check the status of an Oracle Database instance. The tool is assigned to the configuration item type **Oracle Database**.

If you are managing multiple versions of Oracle Databases, where the tool requires different parameters and options to check the status of the Oracle Database processes, you can create copies of the most appropriate tool and customize them for the various Oracle versions using the duplicate feature. Each tool is then dedicated to a specific version of Oracle.

- ▶ Command tool to check for firmware updates. The tool is assigned to the configuration item type **Net Device**.
- ▶ URL tool to search for problems with the operating system running on the host system. The tool is assigned to the configuration item type **Windows (ConfigurationItem > InfrastructureElement > Node > Computer > Windows)** Using known attributes for the configuration item type **Node**, such as `ci.host_os` and `ci.host_osversion`, the tool automatically recognizes the type and version of the operating system. You need to only add keywords to refine the search. The tool runs the command shown in the following example:

```
http://search.technet.microsoft.com/  
Default.aspx?Brand=technet&Query=${ci.host_os} ${ci.host_osversion} ${Additional  
Keywords}
```

## Tool Inheritance

When you create tools, you associate them with a particular configuration item type, for example, **Node** or **Net Device**. When you run a tool, you run it from an event that must be associated with the CI type for which the tool is specified.

If you configure a tool for a configuration item type, for example, **Node**, all configuration item types below **Node** in the hierarchy inherit the tool and it is also available for the configuration item types, **Computer**, **Mainframe**, **VAX**.

The Tools manager indicates the configuration item type with which a tool is associated. The name of the configuration item type is displayed in parentheses alongside the tool in the Tools pane, for example: **Ping (Node)**.

For more information about UI elements in the Tools manager, see "Tools Manager Graphical User Interface" on page 248.



## How to View Tools

In this task, you learn how to display a list of the tools configured and available for use in your environment.

**To view a list of tools:**

**1** Open the Tools manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > Tools**

**2** In the CI Types pane, select the configuration item type for which you want to view tools.

The Tools pane displays a list of the tools configured for the selected configuration item type.

## How to Search and Filter CI Types

In this task, you learn how to search for specific CI types and view CI types that match specified filter criteria. There are two filters:

- ▶ Show only CI types with assigned tools
- ▶ View (Show CI types contained within a specified view)

---

**Tip:** For information on button actions, see "Tools Manager Graphical User Interface" on page 248.

---

### Searching for a CI Type


You can use the Search field to locate the first instance of the CI type name or part of a name that you specify.

**To search for a specified CI type:**

**1** Open the Tools manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > Tools**


- 2 In the Search field, enter a string.

---

**Note:** The search string must be at least three characters long. Searching is automatically started as soon as the third character is entered and the first match is highlighted. This prerequisite avoids searches being started too often and resources being blocked. Names with less than three characters can be found by clicking on the  button.

---

The first CI type in the CI Types tree to match the specified string is highlighted. If that CI is not initially visible, the CI tree is expanded to display the CI Type.

- 3 Click the  button to find the next occurrence of the CI Type for which you are searching.

## Finding CI Types with Assigned Tools

You can use the filter to display all CI types that have content assigned to them.

### To filter the CI tree to show only CI types with assigned tools:

- 1 Open the Tools manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > Tools**
- 2 In the Filter pane, select **Show only CI types with assigned tools**.  
The CI Types pane displays only those CI types that have tools assigned.

---

**Note:** You can use the Show only CI types with assigned tools filter and the filtering by a selected view together. The result displays only CI types contained within the specified view and with assigned tools.

---





## Filtering the CI Types Tree with a View

You can use the filter to display all CI types that are contained within a certain view.

### To filter the CI Types tree with a view:

- 1** Open the Tools manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > Tools**
- 2** In the Search pane, select **View**.  
The View field becomes active.
- 3** Select a view from the list or use the Browse Views (...) button to open the Views selection dialog box, select the view that you want to use, and select **OK**.

The CI Types tree is updated to display only the CI types that match the view selected.

You can use the Expand () and Collapse () buttons to expand or collapse the CI tree. The **Expand** () button expands all CI types which are under the selected CI type. The **Collapse** () button collapses all open nodes except for the selected node.

If no item matches the filter, the No CI type found message is displayed.

---

**Note:** You can use the Show only CI types with assigned tools filter and the filtering by a selected view together. The result displays only CI types contained within the specified view and with assigned tools.

---

## How to Create Tools

In this task, you learn how to create a tool and make it available for use in your environment.

### To create a tool:

- 1** Open the Tools manager from Operations Management Administration:

**Admin > Operations Management > Design Operations Content > Tools**

- 2** In the CI Types pane, browse to and select the configuration item type for which you want to create a tool.
- 3** In the Tools pane, click the **\*** button to open the Create New Tool wizard.
- 4** Enter a unique tool name, display name, and (optional) a description of the function of the tool.
- 5** *Optional:* Select a category for the tool.
- 6** Select a category from the list or use the Browse Views (...) button to open the Select a Category dialog box, select the category that you want to use, and select **OK**.

Tool categories are used to group tools that are to be accessible for a specific group of users. The Default category is the default selection. If a suitable category is not available, you can define a new category using the **\*** button in the Select a Category window. For details, see ["How to Define Tool Categories" on page 246](#).

- 7** Select **Next**.
- 8** Select the type of Tool to be created (Executable, Script, or URL), and select **Next**.
- 9** Complete the subsequent panes, for example:
  - Script:** Script and target panes, and select **Finish**.
  - Executable:** Command and target panes, and select **Finish**.
  - URL:** URL pane, and select **Finish**.

For more information about the buttons, icons, labels, and options in the Create New Tool wizard, see ["Create New Tool and Edit Tool Dialogs" on page 253](#).

---

**Note:** For URLs, you can test your configuration before saving the settings.


---

**10** Select **Finish** to save your new tool configuration.

## How to Edit Tools


In this task, you learn how to modify an existing tool and make it available for use in your environment.

---

**Note:** To simplify creating a tool that is similar to an existing tool, you can create duplicates of any existing tool using the  button.

---

### To edit a tool:

- 1** Open the Tools manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > Tools**
- 2** In the CI Types pane, browse to and select the configuration item type for which you want to modify an existing tool.
- 3** In the Tools pane, click the  button to open the Edit Tool dialog box.  
The Edit Tool opens and displays the General Tool Information tab.
- 4** Modify the entries in any of the available tabs as required, for example:  
**Script:** Script and target panes.  
**Executable:** Command and target panes.  
**URL:** URL pane.

for more information about the buttons, icons, labels, and options in the Create New Tool wizard, see "[Create New Tool and Edit Tool Dialogs](#)" on [page 253](#).



---

**Note:** For URLs, you can test your configuration before saving the settings.

---

- 5 Select **OK** to save your new tool configuration.



## How to Define Tool Categories

In this task, you learn how to define a new tool category and make it available for assigning to tools. If you need a new tool category, click the Manage Tool Categories  button, or select an existing tool and open the edit tool dialog box or use the  button in the Select a Category window.

### To define a new tool category:

- 1 Open the Tools manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > Tools**


- 2 In the CI Types pane, click the Manage Tool Categories  button.

Alternatively, browse to and select the configuration item type for which you want to create a tool or edit an existing tool and the appropriate button:  or .

Click the **Other category** radio button.

Click the Browse (...) button.

The Select a Category window opens.

- 3 Click the  button in the Select a Category window.

The Create New Tool Category dialog box opens.

- 4 Enter a unique tool category name, display name, and a description of the requirement for the tool category.

- 5 Select **OK** to save your new tool category.

- 6 This category can now be assigned to the selected tool from the Browse Tool Categories window.

---

**Note:** It is not possible to delete an assigned tool category. Before deleting an assigned tool category, complete the following steps:

- ▶ Assign the tool using the unwanted tool category to the default category and save the tool.
  - ▶ From the Select a Category Tool dialog box, delete the unwanted tool category.
-

## **Tools Manager Graphical User Interface**

This section describes the describes the buttons, icons, labels, and menu options in the Tools manager that you use to create the tools. In this section, you can find information about the following topics:

► **CI Types Pane**

Displays a list of all available CI Types to which you can assign a tool. For more information, see "Model Explorer" on page 70.

► **Tools Pane**

Displays a list of all available tools for the selected CI. The list includes both the tools that you have defined and saved for the selected CI and all tools inherited from parent CI Types. For more information, see "Tools Pane" on page 251.

► **Tool Details Pane**

Displays an overview of the tool that is selected in the **Tools** pane. For more information, see "Tool Details Pane" on page 252.

► **Create New Tool**

A wizard used to create tools. For more information, see "How to Create Tools" on page 243.

► **Edit Tool**

A wizard used to edit tools. For more information, see "How to Edit Tools" on page 245.

## **CI Types Pane**







The CI Types pane in the Tools manager displays an overview of the configuration item types that represent the objects in your IT environment. The list includes all default items, any items you have modified, and any items you have added, for example, with additional content packs.



**Tip:** If you want to modify or manage configuration item types, use the CI Types Manager:

**Admin > ODB Administration > Modeling > CI Type Manager**

The information displayed in the CI Types pane of the Tools manager includes the following details:







UI Elements (A-Z)	Description
	Refreshes the contents of the configuration item tree. Use if new content becomes available while you are working or you have uploaded new contents (for example, from another user or the command-line interface).
 <b>Expand Selection</b>	Expands the list to display items belonging to the selected group.
 <b>Collapse Others</b>	Collapses all open branches except for the selected branch.
	<p>Entering a string with more than 2 characters in the search field locates the first instance of the string in the CI Tree.</p> <p>Clicking the search button finds the next occurrence of the string for which you are searching. For more information about searching, see "How to Search and Filter CI Types" on page 241.</p>
	Collapses the Filter pane.
	Expands the Filter pane for use.

UI Elements (A-Z)	Description
<b>CI Types</b>	<p>Hierarchical list representing the configuration item types that you want to monitor in your IT environment. To display the required CI Type, browse to and select the item of interest. The details associated with the CI Type are displayed.</p> <p>If the CI Types list is filtered, (filtered) is displayed next to the CI Types title.</p> <p>When CI types and their children have no objects assigned, their entries appear dimmed.</p> <p>When objects are directly assigned to a CI type, their entries appear bolded.</p>
<b>Filter</b>	<p>Used to search for specific CI types and view CI types that match specified filter criteria. There are two filters:</p> <ul style="list-style-type: none"> <li>▶ Show only CI types with assignments</li> <li>▶ View (Shows CI types contained within a specified view)</li> <li>▶ ... Opens the Views dialog box from which you can select a view with which to filter CI types.</li> </ul> <p><b>Note:</b> If you apply a view to the filter CI Types tree which removes all CI types with assignments, the ConfigurationItem entry remains in normal text, indicating that assignments exist. Remove the view, or select a more appropriate view to display the CI types with assignments that you require.</p> <p>For more information about searching and filtering, see "How to Search and Filter CI Types" on page 241.</p>
<b>Show only CI types with ...</b>	Displays in the CI Tree only CI Types with assignments.
<b>View</b>	Displays in the CI Tree only CI Types contained within the selected view.

## Tools Pane

The Tools pane displays in a list all the tools you have configured for your users.

The Tools pane displays the UI elements listed in the following table.

UI Elements	Description
	Refreshes the contents of the tools list. Use if new content becomes available while you are working or you have uploaded new contents (for example, from another user or the command-line interface).
 <b>New Item</b>	Opens the Create New Tool wizard, which enables you to define a new tool. For more information about the Create New Tool wizard, see <a href="#">"Create New Tool and Edit Tool Dialogs" on page 253</a> .
 <b>Duplicate Item</b>	Creates a duplicate of the selected tool in the Edit Tool dialog box. For more information about the Edit Tool dialog box, see <a href="#">"Create New Tool and Edit Tool Dialogs" on page 253</a> .
 <b>Edit Item</b>	Opens the Edit Tool dialog box, which enables you to modify the tool selected in the <b>Tools</b> pane. For more information about the Edit Tool dialog box, see <a href="#">"Create New Tool and Edit Tool Dialogs" on page 253</a> .
 <b>Delete Item</b>	Deletes the selected tool from the database.
 <b>Manage Tool Categories</b>	Opens the Manage Tool Categories dialog box.

## Tool Details Pane

The Tool Details pane displays an overview of the tool that is selected in the list of tools in the Tools pane. There are three types of tools: Executables, Scripts, and URLs. The details displayed for each type of tool changes, depending on the type of tool selected.

The Tool Details pane displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>General</b>	
<b>Category</b>	Used to grant controlled access to tools. Tools are assigned a category and users are given execute permissions to tool categories appropriate to their roles. For further details, see "Tools Management" on page 238.
<b>Description</b>	Brief description of the tool that is selected for viewing or modification. If the tool is one instance of the same tool, the description might include information about the operating system (or application) version it is intended for.
<b>Display Name</b>	External name for the tool. The external name is the name that you want to expose to users.
<b>Name</b>	Name you want to assign to the tool for internal use only. The name must be unique and is verified when saving.
<b>Type</b>	Type of tool configured, for example, URL.
<b>Command Details</b>	
<b>Command</b>	Command statement
<b>Run as</b>	Account under which the command must be run.
<b>Run on</b>	Target on which the tool (executable or script) can be run.
<b>Script Details</b>	
<b>Language</b>	Language in which the script is written.

UI Elements (A-Z)	Description
<b>Run as</b>	Account under which the script must be run.
<b>Run on</b>	Target on which the tool (executable or script) can be run.
<b>Script</b>	Text of the script to be run.
<b>URL Details</b>	
<b>URL</b>	URL to be run.

## Create New Tool and Edit Tool Dialogs

The Create New Tool wizard enables you to create new tools. The Edit Tool dialog box enables you to modify the selected tool. Both dialog boxes are similar and divided into the following two, distinct sections:

- General
- Tool specific information such as Script, Command, URL, and Target.

### General

The General pane of the Edit Tool dialog box or the Create New Tool wizard displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Category</b>	Used to grant controlled access to tools. Tools are assigned a category and users are given execute permissions to tool categories appropriate to their roles. For further details, see "Tools Management" on page 238.
<b>Default category</b>	Tool category applied to all tools when an alternative category is not selected.

UI Elements (A-Z)	Description
<b>Description</b>	Brief description of the tool you are modifying. The description typically includes information about the operating system (or application) version it is intended for.
<b>Display Name</b>	External name for the tool. The display name is the name you want to display to users. The display name can be changed for localization purposes.
<b>ID</b>	Unique identification number for internal purposes only (Edit dialog only).
<b>Name</b>	Short name for the tool for internal use only. The name must be unique. You cannot save a new tool if the name you choose is already in use.
<b>Other category</b>	Selected custom tool category.
<b>Type</b>	Type of tool configured, for example, URL (Edit dialog only).

## Command

The Command pane of the Edit Tool dialog box or the Create New Tool wizard displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Command</b>	Command specification that is executed on tool launch.
<b>Insert runtime parameters at cursor</b>	<p>If required, insert parameters into the command field. These parameters are replaced with values on tool launch. Possible parameters are:</p> <ul style="list-style-type: none"> <li>▶ CI attributes</li> <li>▶ Event attributes</li> <li>▶ Infrastructure settings</li> <li>▶ Monitoring host name (on the host that the monitoring HPOM Agent is running)</li> <li>▶ Management server name</li> <li>▶ Hosted on host name (the host on which the CI is hosted)</li> </ul>

## Script

The Script pane of the Edit Tool dialog box or the Create New Tool wizard displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Language</b>	Language in which the script is written. Supported scripts are Perl, Visual Basic, Batch files, and Microsoft Windows Script Host.

UI Elements (A-Z)	Description
<b>Script</b>	Text of the script to be run.
<b>Insert runtime parameters at cursor</b>	<p>If required, insert parameters into the command field. These parameters are replaced with values on tool launch. Possible parameters are:</p> <ul style="list-style-type: none"> <li>➤ CI attributes</li> <li>➤ Event attributes</li> <li>➤ Infrastructure settings</li> <li>➤ Monitoring host name (on the host that the monitoring HPOM Agent is running)</li> <li>➤ Management server name</li> <li>➤ Hosted on host name (the host on which the CI is hosted)</li> </ul> <p><b>Note:</b> You can also specify custom parameters using the @@&lt;parameter&gt;@@ syntax.</p>



## URL

The URL pane of the Edit Tool dialog box or the Create New Tool wizard displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>URL</b>	URL specification that is executed on tool launch.
<b>Insert runtime parameters at cursor</b>	<p>If required, inserts parameters into the command field. These parameters are replaced with values on tool launch. Possible parameters are:</p> <ul style="list-style-type: none"> <li>▶ CI attributes</li> <li>▶ Event attributes</li> <li>▶ Infrastructure settings</li> <li>▶ Monitoring host name (on the host that the monitoring HPOM Agent is running)</li> <li>▶ Management server name</li> <li>▶ Hosted on host name (the host on which the CI is hosted)</li> </ul> <p><b>Note:</b> You can also specify custom parameters using the <code>\${&lt;parameter&gt;}</code> syntax.</p>
<b>Test</b>	Tests the URL before saving. When parameters are inserted into the URL, you are prompted for values before the test launch.

## Target

The Target pane of the Edit Tool dialog box or the Create New Tool wizard displays the UI elements listed in the following table (not required for URL tools).

UI Elements (A-Z)	Description
<p><b>Run as</b></p>	<p>Account under which the command or script must be run. The possible options are:</p> <ul style="list-style-type: none"> <li>➤ Monitoring Agent User: agent account credentials are used to execute the command or script.</li> <li>➤ Operator Specified User: on tool launch, the operator is prompted for user credentials.</li> </ul>
<p><b>Run on</b></p>	<p>Target on which the tool (executable or script) can be run.</p> <p>Possible targets are:</p> <ul style="list-style-type: none"> <li>➤ Monitoring Host (for example a system being monitored by an HPOM agent)</li> <li>➤ Management Server (for example, the HPOM management server)</li> <li>➤ Other Host</li> </ul> <p>The Other Host text field is free form with the possibility to insert parameters. These parameters are replaced with values on tool launch. Possible parameters are:</p> <ul style="list-style-type: none"> <li>➤ CI Attributes</li> <li>➤ Event Attributes</li> <li>➤ Infrastructure Settings</li> </ul>

## Attribute Selection Dialogs

### Available Attributes Dialog

The Available Attributes dialog box enables you to browse a list of attributes that are available for the configuration item type associated with the tool you are creating or modifying. You can add these attributes as part of your command, script, or URL.

The Available Attributes dialog box displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>CI Type</b>	Configuration item type associated with the tool you are creating or modifying, for example: ConfigurationItem, Node, or Computer.
<b>Description</b>	Brief description of the attribute listed for the associated configuration item type.
<b>Display Name</b>	Name of the attribute listed for the available configuration item type, for example: (System) Language, or Codepage.
<b>Type</b>	Type of attribute available, for example: BOOLEAN, STRING, STRING_LIST, or LONG.

### Available Infrastructure Settings Dialog

The Available Infrastructure Settings dialog box enables you to browse a list of settings that are available in BSM and added them to the tool you are creating or modifying. You can add these settings as part of your command, script, or URL.

The Available Infrastructure settings dialog box displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Application / Foundation / All</b>	Name of the context selected in the Infrastructure Settings Manager.
<b>Display Name</b>	External name for the infrastructure setting as specified in the Infrastructure Settings Manager.
<b>Value</b>	Actual value assigned to the infrastructure setting. Values include boolean (true or false), numeric values, system names, application names, and symbols.

## Available Event Attributes Dialog


The Available Event Attributes dialog box enables you to browse a list of available event attributes that are available for the configuration item type associated with the tool you are creating or modifying. You can add these attributes, one at a time, as part of your command, script, or URL. You can also specify custom attributes by entering the name of the custom attribute in the custom attribute field.

The Available Event Attributes dialog box displays the UI elements listed in the following table. In the table, unlabeled UI elements are shown in angle brackets (<>).




UI Elements (A-Z)	Description
<b>Attribute</b>	Selects the event attribute list from which you can select available event attributes.
<b>Custom Attribute</b>	Selects the custom attribute field in which you can specify a custom attribute. The custom attribute that you specify is entered using the syntax: <code>#{event.custom&lt;custom attribute name&gt;}</code>

UI Elements (A-Z)	Description
<b>Display Name</b>	Name of the event attribute listed for the available configuration item type, for example: Originating Server, HI Value, or Custom Attribute.
<b>Key Value</b>	Event attribute key used to identify the event attribute.

## Manage Tool Categories

The Select a Category dialog box enables you to browse a list of available Tool Categories. Click the Manage Tool Categories  button, or, if you need to create a Tool Category or edit an existing one, use the appropriate button to open the Create or Edit dialog boxes.

The Select a category dialog box displays the UI elements listed in the following table. In the table, unlabeled UI elements are shown in angle brackets (<>).

UI Elements (A-Z)	Description
 <b>New Item</b>	Opens the Create New Tool Category dialog box, which enables you to define a new tool category. For more information about the Create New Tool Category dialog box, see " <a href="#">How to Define Tool Categories</a> " on page 246.
 <b>Edit Item</b>	Opens the Edit Tool Category dialog box, which enables you to modify the tool category selected in the <b>Select a Category</b> dialog box. For more information about the Edit Tool dialog box, see " <a href="#">How to Define Tool Categories</a> " on page 246.
 <b>Delete Item</b>	Deletes the selected tool category from the database.
<b>Description</b>	Brief description of the selected tool category.
<b>Display Name</b>	Name displayed in the UI for the selected tool category.
<b>Name</b>	Internal name of the selected tool category.

## **Troubleshooting and Limitations**

This section provides help for those people who are troubleshooting problems with the tools you use for Operations Management administration, including creating, modifying, and enabling tools.

### **Tools Display Incorrectly**

- Make sure a tool or a tool instance is configured for the related CI of the selected event.

### **Tools Not Shown For Configuration Item Type**

- Make sure a tool or a tool instance is configured for the selected configuration item type
- Contains event parameters

### **Tools Execution Fails on HPOM Clusters**

- If the HPOM server is running on a cluster, it is possible that events contain the physical address of one of the cluster nodes as the originating node and not the virtual cluster node itself. If a tool is executed after the original node is no longer active, tool execution fails.

To avoid this issue, define the physical nodes of the cluster and the virtual node as connected servers, and define the virtual node as the execution host for the physical nodes.

In this way, when a tool is executed, the physical host is found by the originating node of the event, the execution is then forwarded to the virtual node, and then finally redirected to the active node.

# 11

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## Performance Graphs

### **This chapter includes:**

#### Concepts

- ▶ [Performance Graphs Manager](#) on page 263

#### Tasks

- ▶ [How to Search and Filter CI Types](#) on page 265
- ▶ [How to Map CI Types to Graph Families](#) on page 268
- ▶ [How to Launch the Performance Graph Designer](#) on page 269

#### Reference

- ▶ [Performance Graph Manager Graphical User Interface](#) on page 271
- ▶ [CI Types Pane](#) on page 271
- ▶ [Performance Graphs Pane](#) on page 274
- ▶ [Assign Performance Graphs Dialog](#) on page 278
- ▶ [Launch Performance Graph Designer Dialog](#) on page 280
- ▶ [Troubleshooting and Limitations](#) on page 281

### **Performance Graphs Manager**

This chapter describes the Performance Graphs manager used to map and manage performance graphs. Configuration item types must be mapped to available graph families so that instance-based graphs can be launched at runtime from a configuration item.

An instance identifier is required to launch instance-based graphs at runtime from a configuration item. To be able to display graphs for a CI type, available graph families must be mapped to the CI type.

The Performance Graphs manager enables users to perform the following management-related tasks:

- ▶ Map graph families to configuration item types.
- ▶ Launch the Design dialog to create a new graph template or edit an existing graph template.
- ▶ Delete graph template.
- ▶ Configure calculation of instance identifiers based on CI attributes.

---

**Note:** Only users with the appropriate access permissions can use Operations Management Administration. For more information about user management, see "User Management" on page 459.

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## How to Search and Filter CI Types

In this task, you learn how to search for specific CI types and view CI types that match specified filter criteria. There are two filters:

- Show only CI types with assigned performance graphs
- View (Show CI types contained within a specified view)

---

**Tip:** For information on button actions, see "Performance Graph Manager Graphical User Interface" on page 271.

---

### Searching for a CI Type

You can use the Search field to locate the first instance of the CI type name or part of a name that you specify.

**To search for a specified CI type:**


- 1** Open the Performance Graphs manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > Performance Graphs**
- 2** In the Search field, enter a string.

---

**Note:** The search string must contain at least three characters. Searching is started when the third character is entered and the first match is highlighted. Names with less than three characters cannot be found.

---

The first CI type in the CI Types tree to match the specified string is highlighted. If that CI is not initially visible, the CI tree is expanded to display the CI Type.

- 3** Click the  button to find the next occurrence of the CI Type for which you are searching.

## Finding CI Types with Assigned Performance Graphs

You can use the filter to display all CI types that have content assigned to them.

### To filter the CI tree to show only CI types with assigned performance graphs:

- 1 Open the Performance Graphs manager from Operations Management Administration:

**Admin > Operations Management > Design Operations Content > Performance Graphs**

- 2 In the Filter pane, select **Show only CI types with assigned performance graphs**.

The CI Types pane displays only those CI types that have performance graphs assigned.

---

**Note:** You can use the Show only CI types with assigned performance graphs filter and the filtering by a selected view together. The result displays only CI types contained within the specified view and with assigned performance graphs.

---

## Filtering the CI Types Tree with a View

You can use the filter to display all CI types that are contained within a certain view.

### To filter the CI Types tree with a view:

- 1 Open the Performance Graphs manager from Operations Management Administration:

**Admin > Operations Management > Design Operations Content > Performance Graphs**





- 2 In the Search pane, select **View**.

The View field becomes active.

- 3 Click the Browse Views (...) button to open the Views selection dialog box.

- 4 Select the view that you want to use, and select **OK**.

The CI Types tree is updated to display only the CI types that match the view selected.

You can use the Expand () and Collapse () buttons to expand or collapse the CI tree. The **Expand** () button expands all CI types which are under the selected CI type. The **Collapse** () button collapses all open nodes except for the selected node.

If no item matches the filter, the No CI type found message is displayed.

---

**Note:** You can use the Show only CI types with assigned performance graphs filter and the filtering by a selected view together. The result displays only CI types contained within the specified view and with assigned performance graphs.

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## How to Map CI Types to Graph Families



This task shows you how to map a configuration item type to a graph family.

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**Tip:** For information on button actions, see "Performance Graph Manager Graphical User Interface" on page 271.

---

### To map a CI type to a graph family:

- 1 Open the Performance Graphs manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > Performance Graphs**
- 2 In the CI Types pane, select the configuration item that you want to map to a graph family.
- 3 In the Performance Graphs pane, click the  button to open the Assign Performance Graphs dialog box.
- 4 In the Graph Instance ID Configuration pane, enter the value for Instance ID Definition. You can access the available attributes using the **Insert CI Attributes** button.
- 5 *Optional:* Enter the values for **Search Pattern** and **Replace Occurrences by**. These values are used to look for the specified pattern in the attribute value and replace it with the value of the replacement. The attribute is resolved using the new value.  
  
For example, if you want to search for oracle and replace it with ORA, specify oracle as the pattern value and ORA as the replacement value.
- 6 In the Available Graph Families dialog box, select the graph families that you want to map to the selected configuration item type.  
  
Either drag the graph families to the **Assigned Graph Families** pane or use the context sensitive menu item **Add to Assigned Graph Families** or use the  button.

Adding families to the Assigned Graph Families pane implicitly adds all graph categories and templates that belong to the selected family. These families are displayed in bold text and the implicitly added categories are displayed in italics. Individual categories added to the Assigned Graph Families pane are displayed in bold text and are arranged under the family to which they belong, displayed in italics.

- 7 Select **OK** to apply your mapping and close the Graph Instance ID Configuration dialog box.

## How to Launch the Performance Graph Designer

This task shows you how to launch the New Graph Template Launch Designer in the context of a selected CI instance to help you to design a new graph template. Launch parameters are required to identify the CI instance.

For more information about creating a graph template, see "[How to Design Graphs](#)" on page 145.

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**Tip:** For information on button actions, see "Performance Graph Manager Graphical User Interface" on page 271.

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### To launch the Performance Graph Designer for a selected CI:

- 1 Open the Performance Graphs manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > Performance Graphs**
- 2 In the CI Types pane, select the configuration item type from which you want to launch the Performance Graph Designer.
- 3 Click the \* button in the Available Graph Families pane. The Launch Performance Graph Designer dialog box opens.
- 4 In the CI Instances pane of the Launch Performance Graph Designer dialog box, select the CI instance to use as a sample for the creation of a graph template for this CI type, and select **Next**.

The calculated launch parameters for the selected CI are displayed in the Launch Parameters pane.

**5** Select **Finish**.

The Performance Graph Designer wizard opens. For information about creating a graph template, see ["How to Design Graphs" on page 145](#).

## Performance Graph Manager Graphical User Interface

This section lists and describes the layout of the Performance Graphs manager.

### ► CI Types

Displays a list of all available configuration item types to which you can map to available graph families. For more information, see "CI Types Pane" on page 271.

### ► Performance Graphs

Displays a summary of the performance graphs configuration for the selected configuration item type. For more information, see "Performance Graphs Pane" on page 274.

## CI Types Pane

The CI Types pane enables you to choose the configuration item types that you want to map to available graph families.

The CI Types pane displays the UI elements listed in the following table.







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**Tip:** If you want to modify or manage configuration item types, use the CI Types Manager:

**Admin > OBD Administration > Modeling > CI Type Manager.**

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The information displayed in the CI Types pane of the Performance Graphs manager includes the following details:

UI Elements (A-Z)	Description
	Refreshes the contents of the CI Types pane.
 <b>Expand Selection</b>	Expands the list to display items belonging to the selected group.
 <b>Collapse Others</b>	Collapses all open branches except for the selected branch.
	Finds the next occurrence of the CI Type for which you are searching. For more information about searching, see "How to Search and Filter CI Types" on page 265.
	Collapses the Filter pane.
	Expands the Filter pane for use.







UI Elements (A-Z)	Description
<b>CI Types</b>	<p>Hierarchical list representing the configuration item types that you want to monitor in your IT environment. To display the event type indicators, KPIs, and mapping rules associated with a configuration item, browse to and select the item of interest. The various tabs display the details.</p> <p>If the CI Types list is filtered, (filtered) is displayed next to the CI Types title.</p> <p>When CI types and their children have no objects assigned, their entries appear dimmed.</p> <p>When objects are directly assigned to a CI type, their entries appear bolded.</p>
<b>Filter</b>	<p>Used to search for specific CI types and view CI types that match specified filter criteria. There are two filters:</p> <ul style="list-style-type: none"> <li>➤ Show only CI types with assigned performance graphs</li> <li>➤ View (Show CI types contained within a specified view)</li> <li>➤ ... Opens the Views dialog box from which you can select a view with which to filter CI types.</li> </ul> <p><b>Note:</b> If you apply a view to the filter CI Types tree which removes all CI types with assignments, the ConfigurationItem entry remains in normal text, indicating that assignments exist. Remove the view, or select a more appropriate view to display the CI types with assignments that you require.</p> <p>For more information about searching and filtering, see "How to Search and Filter CI Types" on page 265.</p>

## Performance Graphs Pane

The Performance Graphs manager enables you to choose the graph families you want to map to the selected configuration item.

The Performance Graphs pane displays the UI elements listed in the following table.

UI Elements	Description
	Reloads the performance graphs configuration for the selected CI Type. Use if new content becomes available while you are working or you have uploaded new contents (for example, from another user or the command-line interface).
	Opens the Assign Performance Graphs dialog box to create a new performance graphs configuration for the selected CI type.
	Opens the Assign Performance Graphs dialog box, which enables you to modify the mapping for the CI selected in the CI Types pane. For more information about the Assign Performance Graphs dialog box, see <a href="#">"Assign Performance Graphs Dialog"</a> on page 278.
	Removes the performance graphs configuration from the selected CI type.

## Graph Instance ID Pane

The Graph Instance ID pane displays the attributes and modifiers used to identify configuration items for which you want to display graphs.



The Graph Instance ID Configuration pane displays the UI elements listed in the following table.





UI Elements (A-Z)	Description
<b>Instance ID Definition</b>	String consisting of configuration item attributes and free form text. The configuration item attributes are specified as variables that refer to attributes of the CI Type. The value is resolved at runtime against a configuration item instance.

## Available Graph Families

The Available Graph Families pane displays the graphs, graph categories and templates available on the system. For more information about creating and editing graph templates, see "How to Design Graphs" on page 145 and "How to Edit Graphs" on page 146.

The Available Graph Families pane displays the UI elements listed in the following table.

UI Elements	Description
	Reloads the available graph families for the selected CI Type. Use if new content becomes available while you are working or you have uploaded new contents (for example, from another user or the command-line interface).
	Launches the Launch Performance Graph Designer dialog box to help you to launch a new graph template. For more information about creating a graph template, see " <a href="#">How to Design Graphs</a> " on page 145.

UI Elements	Description
	Launches the Launch Performance Graph Designer for editing the selected graph template launch details. For more information about editing a graph template, see <a href="#">"How to Edit Graphs" on page 146</a> .
	Removes the selected custom graph template from the system.
	Expands the list to display items belonging to the selected group.
	Collapses all open branches except for the selected branch.

## Assigned Graph Families

The Assigned Graph Families pane displays the graph and graph categories assigned to the selected CI Type.

The Assigned Graph Families pane displays the UI elements listed in the following table. In the table, unlabeled UI elements are shown in angle brackets (<>).






UI Elements (A-Z)	Description
<b>Categories</b>	Sub-groups of graphs that are logically grouped within the family.
<b>Families</b>	Top-level group that is used to organize graphs.

UI Elements (A-Z)	Description
<bold>	Adding families to the Assigned Graph Families pane implicitly adds all graph categories that belong to the selected family. These families are displayed in bold text. Individual categories added to the Assigned Graph Families pane are displayed in bold text and are arranged under the family to which they belong, displayed in italics.
<italics>	Categories added implicitly to the Assigned Graph Families pane as a result of adding the families to which these categories belong are displayed in italics. Families are displayed in italics if they are added to show to which family an individually selected category belongs.

## Assign Performance Graphs Dialog

The Assign Performance Graphs dialog box displays the graph and graph categories assigned to the selected CI Type.

The Assign Performance Graphs dialog box displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
 <b>Add to Assigned Graph Families</b>	Adds the graph family (and all associated categories) or category selected in the Available Graph Families pane to the list of Assigned Graph Families to be included in performance graphs configuration.
 <b>Unassign</b>	Removes the graph family and all associated categories from the Assigned Graph Families pane, which excludes it from the performance graphs configuration.
 <b>Unassign All</b>	Removes all items from the list of items selected for inclusion in the performance graphs configuration.
 <b>Expand Selection</b>	Expands the list to display items belonging to the selected group.
 <b>Collapse Others</b>	Collapses all open branches except for the selected branch.

UI Elements (A-Z)	Description
<b>Assigned Graph Families</b>	<p>Lists the graph families and categories that you have selected to map to the selected configuration item type.</p> <p>Adding families to the Assigned Graph Families pane implicitly adds all graph categories that belong to the selected family. These families are displayed in bold text and the implicitly added categories are displayed in italics. Individual categories added to the Assigned Graph Families pane are displayed in bold text and are arranged under the family to which they belong, displayed in italics.</p>
<b>Available Graph Families</b>	<p>Lists the available graph families and categories that you can map to the selected configuration item type.</p> <p>Either drag the graph families and categories to the Assigned Graph Families pane or use the context sensitive menu item Add to Assigned Graph Families.</p>
<b>Insert CI Attribute</b>	Access the available CI attributes.
<b>Instance ID Definition</b>	String consisting of configuration item attributes and free form text. The configuration item attributes are specified as variables that refer to attributes of the CI Type. The value is resolved at runtime against a configuration item instance.
<b>Replace Occurrences by</b>	<i>(Optional)</i> : String used as the replacement for pattern matches within the string resolved by Attribute.
<b>Search Pattern</b>	<p><i>(Optional)</i>: Regular expression pattern that is matched within the string resolved from the Attribute. Any portion of the string that matches the pattern is replaced by the Replace Occurrences by string.</p> <p>For example, if you want to search for oracle and replace it with ORA, specify oracle as the pattern value and ORA as the replacement value.</p>

## Launch Performance Graph Designer Dialog

The Launch Performance Graph Designer dialog box specifies the CI instance and the launch parameters for which you want to create a graph template.

The Launch Performance Graph Designer dialog box displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>CI Instances</b>	CI for which the graph designer is to be launched.
<b>CI Type</b>	Name of the configuration item type to which the selected configuration item belongs.
<b>Name</b>	Name of the configuration item to which the CI Instance is related, for example, DB_Server.example.com.
<b>Type</b>	Type of the configuration item to which the CI Instance is related, for example, Related Host or Instance ID.



## Troubleshooting and Limitations

This section provides help on troubleshooting problems with the Performance Graphs manager.

### **No Response from the PMI Server**

- ▶ If an error message is displayed informing that the PMI server is not answering, reload the configured graph families.



# 12

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## Indicator Mapping Rules

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**Note:** To be able to use the health-related functionality of Operations Management, the Event Management Foundation and Health licenses are required. For detailed information on licensing, see the *HP Business Service Management Deployment Guide* PDF.

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### **This chapter includes:**

#### Concepts

- ▶ [Indicator Mapping Rules Manager Basics](#) on page 284
- ▶ [Mapping Events to Indicators](#) on page 286

#### Tasks

- ▶ [How to Search and Filter CI Types](#) on page 290
- ▶ [How to Create and Edit Indicator Mapping Rules](#) on page 293
- ▶ [How to Order Indicator Mapping Rules](#) on page 296

#### Reference

- ▶ [Indicator Mapping Rules Graphical User Interface](#) on page 297
- ▶ [CI Types Pane](#) on page 297
- ▶ [ETI Mapping Rules Pane](#) on page 300
- ▶ [Mapping Overview Pane](#) on page 303
- ▶ [Create New and Edit Mapping Rule Dialog](#) on page 304
- ▶ [Select Indicator Dialog](#) on page 306

- ▶ [Select an Event Filter Dialog](#) on page 307

## Indicator Mapping Rules Manager Basics

This chapter introduces the features of the Indicator Mapping Rules manager, used to help you manage indicator mapping rules.

Indicators are used to represent the various types of events that can occur in the monitored environment, for example, System restart, Host state, Memory usage, or Print-queue length. Indicators can simply report that an event has occurred, for example, System restart:*Occurred*. They can also be used to represent the likely states for the defined events, for example, host state:*down*, memory usage:*high*, or print-queue length:*full*. Changes of state often indicate the existence of a problem.

Appropriate indicators must be created for each configuration item type, and the ODB model definition for configuration item types includes information about the specific indicator assignments. Assigning event type indicators to a specific configuration item type ensures that the all instances of that configuration item type can be similarly monitored.

Operations Management uses two types of indicators:

### ▶ Event Type Indicators (ETI)

Event type indicators indicate that a problem has occurred. They use the severity attribute from the event. This severity can be used to set an ETI value using the based on severity option. One indicator value is required. By default, the value Normal is created when creating an event type indicator.

An ETI could read: System Restart: *occurred*.

ETIs are necessary for topology-based event correlation.

### ► Health Indicators (HI)

Health indicators are used to indicate the detailed health of CIs by setting a severity status. When a health indicator is defined, an associated event type indicator is automatically created. Health indicators are independent of the event lifecycle. You can close events, but the health of the associated CI is still available.

For example, you can use the attributes of a critical event reporting a lack of storage space on a logical volume to set an health indicator value **Down** with the severity **Critical** assigned to the configuration item type **Logical Disk**.

Health indicators when assigned to KPIs are intended for use in the calculation of the severity status of health-based KPIs. However, health indicators provide more fine grained information using the **Status Snapshot**.

When health indicators are configured to work in conjunction with KPIs, they show the impact of a problem on the CI's neighborhood in a clear and easy to understand way, by propagating the impact of a problem with a low-level CI to higher-level CIs using the **Health Top View**.

An event being sent from a manager such as HP Operations Manager to Operations Management signifies an occurrence in the managed environment. This event includes information about the source of the problem and could include health-related attributes. When this event is received by Operations Management, indicators are set based on this attribute. If the event attribute is not, or cannot be included, indicator mapping rules can be used to set indicators.

Operations Management uses health indicators to determine and display the health of different aspects of a monitored object. A health indicator is an event-specific monitor that uses one or more values to represent the individual states of a monitored object, such as **Running** or **Stopped**. Health indicators can be used to show if a hardware resource is available and responding or, if the performance of a software application changes according to whether the load is normal, high, or exceeding specification.

Operations Management creates a health indicator in conjunction with an event type indicator. When creating a health indicator, the associated event type indicator is automatically created.

Health indicators monitor and show specific aspects of the health of the configuration item type to which they are assigned. A configuration item inherits health indicator assignments from its parent configuration item type. For example, health indicators assigned to the configuration item type `Database` also apply to the configuration item type `Oracle` or `DB2` and are applied to any `Oracle` and `DB2` database configuration items.

Health indicators provide the data that key performance indicators (KPI) need to calculate the health-based severity status for the availability and performance of monitored resources. You assign health indicators to KPI calculation rules, to collate health-related data, determine a configuration item's availability and performance, and indicate its overall health, for example, with a severity status and color.

## Mapping Events to Indicators

An event can contain the `EventTypeIndicator` custom message attribute from HPOM specifying a severity. If this is available, the Operations Management custom attribute `ETI Resolution Hint` is set and this is used to set indicator values automatically.

For events that do not include this custom attribute, you can define indicator mapping rules to set indicator values.

Indicator mapping rules are intended to help in the following situations:

- ▶ Monitoring events that are not integrated in either Operations Management or forwarded from HP Operations Manager.
- ▶ Integrating events from a custom application or a Smart Plug-in that is not Operations Management-ready.

The mapping of event attributes to indicator values occurs either through the installation and setup of an Operations Management content pack or as a result of a manually created indicator mapping rule.

You can set indicators in one of the following ways:

- ▶ at a specific event using indicator mapping rules
- ▶ by setting the indicator with an HP Operations Manager message policy

---

**Tip:** One event can set only one indicator value. However, you can configure multiple message policies to report on different aspects of the same event and use the event generated by each policy to set dedicated indicators.

---

Indicator mapping rules exist in the context of a specific type of configuration item, for example, **Computer**, **Host**, or **Router**. The indicator mapping rules defined for a specific configuration item type can use only the indicators assigned to the specified configuration item type.

### Filters for Indicator Mapping Rules

You can define indicator mapping rules that search filtered events for strings and values which are then used to set an indicator value. If the mapped indicator sets a health indicator, the corresponding values for the health indicator are also set. For more detailed information about defining filters, see "Filtering Events" on page 197.

Using the Manage Event Filters dialog, you can define filters that target the events to be considered in an indicator mapping rule. The filter can use any of the available event attributes. For example, you can define an indicator mapping rule that considers only those events that have a critical or major severity status and are assigned to a particular user or user group.

---

**Tip:** You can test new filters while defining or editing an indicator mapping rule.

---

An indicator mapping rule filter can only be used with indicator mapping rules. They are not interchangeable with event filters.

If the `EventTypeIndicator` custom message attribute is not available from HPOM or overriding of automatic settings is enabled, but the event matches an indicator mapping rule filter, the rule maps the event to the specified indicator. The value of the indicator is set by one of the following methods:

► **Specific Indicator Value**

The event is mapped to an indicator which is set to the value specified in the mapping rule.

For example, you are monitoring databases and Operations Management receives an event that matches the mapping rule filter of the **Database Status** indicator. The event sets the indicator value that has been specified in the mapping rule, for example, **Down**.

► **Based On Severity**

Events matching the mapping rule filter are assigned the severity associated with the indicator value that matches the severity of the event.

For example, you are monitoring the CPU load and Operations Management receives an event that matches the mapping rule filter of the **CPU Load** indicator and has a severity of **major**. The event automatically sets the indicator value that has been specified to corresponds to this severity, for example, **Overloaded**.

## **Mapping Rule or CMA**

If an event generated by an HP Operations Manager Smart Plug-in uses custom attributes to set an indicator value automatically, you can configure Operations Management to override this automatic setting and set the indicator value in accordance with an indicator mapping rule. For further information, see "Event Type Indicator Settings" on page 521.

## **Order of Indicator Mapping Rules**

You can create many indicator mapping rules for a CI type. Where more than one indicator mapping rule is available for a configuration item type, the number in the **Order** column indicates the order in which the indicator mapping rules are applied during the mapping process. As soon as one indicator mapping rule matches, the mapping process stops and ignores all subsequent rules further down the specified order.



The indicator mapping rules configured for a CI type and inherited from higher-level CI types are listed in the Mapping Overview pane. The indicator mapping rules configured for each CI type are listed in the Mapping Rules list for their respective CI type names. You can change the order of the indicator mapping rules only for the selected CI type.

## **Inheritance of Indicator Mapping Rules**

A CI type inherits indicator mapping rules from CI types higher in the hierarchy. An indicator mapping rule defined for the Host configuration item type is inherited by all configuration items types lower in the hierarchy, such as Unix, and Windows.

You can control which configuration items inherit defined indicator mapping rules by choosing the level in the configuration item hierarchy at which to define them. The higher in the CI type hierarchy the mapping rule is specified, the greater the number of CI types that inherit it.

The Mapping Overview pane shows the inheritance of indicator mapping rules in the reverse order of the CI types in the CI Types tree.

## How to Search and Filter CI Types

In this task, you learn how to search for specific CI types and view CI types that match specified filter criteria. There are two filters:

- ▶ Show only CI types with assigned indicator mapping rules
- ▶ View (Show CI types contained within a specified view)

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**Tip:** For information on button actions, see "Indicator Mapping Rules Graphical User Interface" on page 297.

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### Searching for a CI Type

You can use the Search field to locate the first instance of the CI type name or part of a name that you specify.


**To search for a specified CI type:**

- 1** Open the Indicator Mapping Rules manager from Operations Management Administration:

**Admin > Operations Management > Design Operations Content > Indicator Mapping Rules**


- 2** In the Search field, enter a string.

---

**Note:** The search string must be at least three characters long. Searching is started as soon as the third character is entered and the first match is highlighted. Names with less than three characters can be found by clicking on the  button.

---

The first CI type in the CI Types tree to match the specified string is highlighted. If that CI is not initially visible, the CI tree is expanded to display the CI type.

- 3 Click the  button to find the next occurrence of the CI type for which you are searching.

## Finding CI Types with Assigned Indicators

You can use the filter to display all CI types that have indicators assigned to them.

**To filter the CI tree to show only CI types with assigned indicator mapping rules:**

- 1 Open the Indicators Mapping Rules manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > Indicator Mapping Rules**
- 2 In the Filter pane, select **Show only CI types with assigned indicator mapping rules**.

The CI Types pane displays only those CI types that have indicators assigned along with the parents of these CI types. If a parent CI type has no assigned indicators, they are grayed out in the display.

---

**Note:** You can use the Show only CI types with assigned indicator mapping rules filter and the filtering by a selected view together. The result displays only CI types contained within the specified view and with assigned indicators.

---

## Filtering the CI Types Tree with a View

You can use the filter to display all CI types that are contained within a certain view.

**To filter the CI Types tree with a view:**

- 1 Open the Indicator Mapping Rules manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > Indicator Mapping Rules**

- 2 Expand the Filters pane, select **View**.

The View field becomes active.

- 3 Select a view from the Views list or click the Browse Views (...) button to open the Views selection dialog box, select the view that you want to use, and select **OK**.

The CI Types tree is updated to display only the CI types that match the view selected.

If no item matches the filter, the No CI type found message is displayed.

---

**Note:** You can use the Show only CI types with assigned indicator mapping rules filter and the filtering by a selected view together. The result displays only CI types contained within the specified view and with assigned indicators.

---

## How to Create and Edit Indicator Mapping Rules



In this task, you learn how to set up an indicator mapping rule that searches filtered events for attribute values that are then used to set an indicator value. If the mapped indicator sets a health indicator, the corresponding values for the health indicator are also set.

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**Tip:** For information on button actions, see "ETI Mapping Rules Pane" on page 300. For more information about the window you use to set up and test filters, see "Filtering Events" on page 197.


---

### To define an indicator mapping rule:

- 1** Open the Indicator Mapping Rules manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > Indicator Mapping Rules**
- 2** Select the CI type for which you want to define an Indicator Mapping Rule.
- 3** To create or edit indicator mapping rules, in the ETI Mapping Rules pane, use the  button to open the Create New Mapping Rule, or use the  button to open the Edit Mapping Rule dialog box for an existing indicator mapping rule.

The Create New Mapping Rule or Edit Mapping Rule dialog box opens.

---

**Tip:** Use the Duplicate item  button to create a mapping rule that is similar to an existing mapping rule.

---

- 4** Enter a Display Name, Name, and a short description for the new mapping rule.

- 5** *Optional:* Select **Active** to include the current mapping rule in the matching process.


Clearing **Active**, disables an indicator mapping rule. This can be useful if you want to exclude an indicator mapping rule from a list of rules for testing purposes.

- 6** Select an event filter for the mapping rule from the **Events Filter** list. The filter determines which events to consider in the mapping operation.

If no appropriate filter is already configured, click the Browse (...) button, which opens the Select an Event Filter dialog box. Create a filter or edit an existing one. For information about filters, see "How to Define Basic Event Filters" on page 206.

- 7** Select an Event Type Indicator.

---

**Note:** The indicator that you want to select must already be available. If a suitable indicator is not available, first create it and then create the ETI Mapping Rule. The  button opens the Indicators manager.

---

- 8** Select a Map to Indicator Value mode.

An event attribute value must be mapped to an indicator value, using one of the following methods:

- Based on Severity (information from the event)
- Specific Indicator Value (can be selected in the mapping rule)

**Note:** If no obvious indicator value is available for **Based on Severity** mapping, Operations Management uses the nearest available value. For example, if a **Critical** event is mapped to an event type indicator that only has values of **Major** and **Normal** severities, Operations Management maps critical events to the event type indicator value with severity **Major**.

If you define multiple values with the same severity, mapping is undefined.

---

- 9 Select **OK** to save the changes you have made.

The new indicator mapping rule is added to the end of the list of indicator mapping rules displayed in the **ETI Mapping Rules** pane.

## How to Order Indicator Mapping Rules



In this task, you learn how to change the order of indicator mapping rules.

---

**Tip:** For information on button actions, see "ETI Mapping Rules Pane" on page 300. For more information about the window you use to set up and test filters, see "Basic Filter Configuration Dialog" on page 214.

---

### To change the order of execution of an indicator mapping rule:

- 1 Open the Indicator Mapping Rules manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > Indicator Mapping Rules**
- 2 Select the CI type for which you want to change the order of the indicator mapping rules, for example:  
**ConfigurationItem > InfrastructureElement > Node > Computer > Windows**
- 3 Select the mapping rule for which you want to change the order.
- 4 Using the **Move Up**  and **Move Down**  buttons, rearrange the order of the selected mapping rule and repeat for any other indicator mapping rules that you want to move.

The order of the indicator mapping rules, including inherited rules, can also be seen in the Mapping Overview pane.

---

**Note:** Reordering rules has an impact on lower CI type levels. For example, if you reorder rules for Computer, this change is made on both the Windows and Computer level.

---



## Indicator Mapping Rules Graphical User Interface

This section describes the information displayed in the Indicator Mapping Rules manager. The information in this section describes the buttons, icons, labels, and menu options that you use to create, configure, and manage the indicator mapping rules that to set indicator values.

In this section, you can find information about the following topics:

### ► CI Types

Displays an overview of the configuration item types that are available and representing the objects in your IT environment. For more information, see "CI Types Pane" on page 297.

### ► ETI Mapping Rules

Displays a list of event type indicator mapping rules and their details associated with the configuration item type selected in the CI Types pane. For more information, see "ETI Mapping Rules Pane" on page 300.





### ► Mapping Overview

Displays an overview of the indicator mapping rules that are associated with the selected CI Type and the inherited indicator mapping rules of parent CI types. For more information, see "ETI Mapping Rules Pane" on page 300.

## CI Types Pane

The CI Types pane in the Indicator Mapping Rules manager displays the configuration item types that represent the objects in your IT environment. You use the Indicator Mapping Rules manager to perform the following tasks:







- View the indicator mapping rules that are assigned to a selected configuration item type
- Configure new indicator mapping rules and assign them to individual configuration items types

You can use the Expand () and Collapse () buttons to expand or collapse the CI tree. The **Expand** () button expands all CI types which are under the selected CI type. The **Collapse** () button collapses all open nodes except for the selected node.

**Tip:** If you want to modify or manage configuration item types, use the CI Types Manager:

**Admin > ODB Administration > Modeling > CI Type Manager**

The information displayed in the CI Types pane of the Indicator Mapping Rules manager includes the following details.






UI Elements (A-Z)	Description
	Refreshes the contents of the configuration item tree. Use if new content becomes available while you are working or you have uploaded new contents (for example, from another user or the command-line interface).
 <b>Expand Selection</b>	<b>Expand Selection:</b> Expands the list to display items belonging to the selected group.
 <b>Collapse Others</b>	<b>Collapse Others:</b> Collapses all open branches except for the selected branch.
	Finds the next occurrence of the CI Type for which you are searching. For more information about searching, see "How to Search and Filter CI Types" on page 290.
	Collapses the Filter pane.
	Expands the Filter pane for use.

UI Elements (A-Z)	Description
<b>CI Types</b>	<p>Hierarchical list representing the configuration item types that you want to monitor in your IT environment.</p> <p>If the CI Types list is filtered, (filtered) is displayed next to the CI Types title.</p> <p>The font weight is used to show the assignment of indicators to CI types:</p> <ul style="list-style-type: none"> <li>▶ Normal font weight: No assignment but a child has assigned indicators.</li> <li>▶ Gray font weight: No indicator mapping rule assigned for this CI type and its children.</li> <li>▶ Bold font weight: Indicator mapping rules assigned directly to this CI Type.</li> </ul>
<b>Filter</b>	<p>Used to search for specific CI types and view CI types that match specified filter criteria. There are two filters:</p> <ul style="list-style-type: none"> <li>▶ Show only CI types with assigned indicator mapping rules</li> <li>▶ View (shows CI types contained within a specified view)</li> <li>▶ ... Opens the Views dialog box from which you can select a view with which to filter CI types.</li> </ul> <p><b>Note:</b> If you apply a view to the filter CI Types tree which removes all CI types with assignments, the ConfigurationItem entry remains in normal text, indicating that assignments exist. Remove the view, or select a more appropriate view to display the CI types with assignments that you require.</p> <p>For more information about searching and filtering, see "How to Search and Filter CI Types" on page 290.</p>
<b>Show only CI Types with assigned mapping rules</b>	<p>Filters the CI Types tree to display all CI types that have indicator mapping rules assigned to them.</p>
<b>View</b>	<p>Enables selection of the view that you want to use.</p> <p>The CI Types tree is updated to display only the CI types that match the view selected.</p>

## ETI Mapping Rules Pane

The ETI Mapping Rules pane displays a list of the rules that Operations Management uses to map the attributes of events to indicator values in Operations Management. You can edit and delete existing indicator mapping rules, and configure and test filters for them. You can also change the order of execution the indicator mapping rules. For more information, see "How to Create and Edit Indicator Mapping Rules" on page 293.

The ETI Mapping Rules pane displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
	Refreshes the contents of the ETI Mapping Rules pane. Use if new indicator mapping rules become available while you are working.
 <b>New Item</b>	Opens the Create New Mapping Rule dialog box, which enables you to define a new indicator mapping rule and add it to the list already assigned to the selected configuration item type.
 <b>Duplicate Item</b>	Opens the Edit Mapping Rule dialog box and creates a duplicate of the selected indicator mapping rule. The name of an indicator mapping rule is for internal use only and must be unique.
 <b>Edit Item</b>	Opens the Edit Mapping Rule dialog box, which you can use to modify and save indicator mapping rules.
 <b>Delete Item</b>	Removes the selected mapping rule.

UI Elements (A-Z)	Description
 <b>Find Matching Events</b>	<p>Finds events that match the selected filter specified in the selected indicator mapping rule.</p> <p>Find Matching Events selects all events containing the indicator set by the selected indicator mapping rule. These events must match the filter configured for the selected mapping rule and must be related to the selected CI type.</p>
 <b>Go to Indicators</b>	<p>Opens the Indicators Repository.</p>
 <b>Manage Event Filters</b>	<p>Opens the Manage Event Filters dialog box, enabling you to select the event filter that you want to apply.</p> <p>From the Select an Event Filter dialog box, you can also open the Filter Configuration dialog box to create an event filter, edit or delete an existing event filter.</p> <p>For more information about the event filters, see "Event Filters" on page 200.</p>
 <b>Move Down</b>	<p>Moves the selected mapping rule down to a lower priority position.</p>
 <b>Move Up</b>	<p>Moves the selected mapping rule up to a higher priority position.</p>
<b>Active</b>	<p>Indicates if the mapping rule is active or not. Only active rules are applied during the mapping process.</p>
<b>Display Name</b>	<p>Display name of the mapping rule available.</p>
<b>Event Filter</b>	<p>Name of the event filter that is active in the mapping rule. Filters determine which events the mapping rule should consider.</p>
<b>Indicator</b>	<p>Name of the selected indicator.</p>

UI Elements (A-Z)	Description
<b>Map to Indicator Value</b>	Indicator value set using one of the following methods: <ul style="list-style-type: none"><li>▶ <b>Based on severity:</b> Indicator value used is governed by the severity information from the event.</li><li>▶ <b>Specific Indicator value:</b> Specifies an indicator value independent of any severity information from the event.</li></ul>
<b>Order</b>	Where more than one mapping rule is available for a configuration item type, the number in the Order column indicates the order in which the rules are applied during the mapping process. Using the <b>Move Up</b> and <b>Move Down</b> buttons, you can change the position of rules in the list. <b>Note:</b> If a rule matches, no further rules are applied.

## Mapping Overview Pane



The Mapping Overview pane displays a summary of the rules that Operations Management uses to map the attributes of events to indicator values in Operations Management for the selected CI type. Inherited rules are also displayed and labeled with the CI type for which they are defined.

The Mapping Overview pane displays the UI elements listed in the following table.


UI Elements (A-Z)	Description
<b>Display Name</b>	Display name of the mapping rule available.
<b>Event Filter</b>	Name of the event filter that is active in the mapping rule. Filters determine which events the mapping rule should consider.
<b>Indicator</b>	Name of the selected indicator.
<b>Map to Indicator Value</b>	Indicator value set using one of the following methods: <ul style="list-style-type: none"> <li>▶ <b>Based on severity:</b> Indicator value used is governed by the severity information from the event.</li> <li>▶ <b>Specific Indicator value:</b> Specifies an indicator value independent of any severity information from the event.</li> </ul>

## Create New and Edit Mapping Rule Dialog

The Create New Mapping Rule and Edit Mapping Rule dialog boxes are used to create and edit indicator mapping rules. Indicator mapping rules use event filters to identify event attributes that are used to set or modify an indicator value.

To create indicator mapping rules, in the ETI Mapping Rules pane, click the  button to open the Create New Mapping Rule dialog box or the  button to open the Edit Mapping Rule dialog box.

---

**Tip:** Use the Duplicate Item  button to create a mapping rule that is similar to an existing mapping rule.

---

The ETI Mapping Rules pane is found under:

**Admin > Operations Management > Design Operations Content > Indicator Mapping Rules**

The Create New Mapping Rule dialog box and the Edit Mapping Rules dialog box display the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Active</b>	Indicates if the mapping rule is active or not. Only active rules are applied during the mapping process.
<b>Description</b>	Brief summary of the rule's action.
<b>Display Name</b>	External name for the mapping rule. The external name (label) is the name that is visible to users.





UI Elements (A-Z)	Description
<b>Event Filter</b>	<p>Name of the event filter that is active in the mapping rule. Filters determine which events the mapping rule should consider.</p> <p>Use the list to select the filter to apply in the rule. The filter determines which events to consider in the mapping operation. For details about creating filters, see <a href="#">Filtering Events</a> on page 197.</p> <p><b>Note:</b> The filter dialog displayed for Indicator Mapping Rules is customized for this task. For example, the Assigned To: pane is not displayed as it is not relevant.</p>
<b>Indicator</b>	<p>Selects the indicator you want to set with the event attribute.</p>
<b>Map to Indicator Value</b>	<p>Selects how the indicator value is mapped to the event. You can select one of the following:</p> <ul style="list-style-type: none"> <li>▶ <b>Based on Severity:</b> Indicator value used is governed by the severity information from the event.</li> <li>▶ <b>Specific Indicator Value:</b> Specifies an indicator value independent of any severity information from the event.</li> </ul>
<b>Name</b>	<p>Internal name of the indicator mapping rule. This is the name used in the event received from HPOM to match the indicator in Operations Management.</p> <p>Automatically generated from the Display Name value. The first character must be a letter (A-Z, a-z) or an underscore (_). All other characters can be a letter (A-Z, a-z), a number (0-9), or an underscore (_). Can be manually overwritten.</p>

## Select Indicator Dialog

The Select Indicator dialog box is used to select an indicator to be mapped to to events matching the mapping rule.

Select an indicator from the list, or open the Select Indicator dialog box by clicking the Indicator browse button (...). from the Create New Mapping Rule or the Edit Mapping Rule dialog boxes.





The Select Indicator dialog box display the UI elements listed in the following table.



UI Elements (A-Z)	Description
	Refreshes the contents of the Select Indicators list. Use if new indicators becomes available while you are working.
 <b>Toggle Grouping by Type</b>	Toggles between a flat list of all indicators, identified with indicator type icons and a list where health indicators and event type indicators are grouped in separate lists.

## Select an Event Filter Dialog

The Select an Event Filter dialog box displays a list of the event filters used by indicator mapping rules. From this dialog box, you can select an event filter to apply, create, edit, rename, test and delete event filters. For more information about filters, see "Filtering Events" on page 197.

The Select an Event Filter dialog box displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
	Refreshes the contents of the Select an Event Filter list. Use if new filters becomes available while you are working.
 <b>New Item</b>	Opens the Filter Configuration dialog box, which enables you to define a new event filter for indicator mapping rules.  The following characters are not supported in filter names: &, <, and >.  For more information about filters, see <a href="#">"Filtering Events" on page 197</a> .
 <b>Duplicate Item</b>	Creates a duplicate of the selected filter.
 <b>Edit Item</b>	Opens the Filter Configuration window, which you can use to modify and save an event filter.

UI Elements (A-Z)	Description
 <b>Delete Item</b>	Removes the selected event filter.
 <b>Find Matching Events</b>	Finds events that match the selected filter.

# 13

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## View Mappings

### **This chapter includes:**

#### Concepts

- ▶ [View Mappings Manager](#) on page 310
- ▶ [Health Top View Management](#) on page 310
- ▶ [Mapping Health Top Views](#) on page 311

#### Tasks

- ▶ [How to Search and Filter CI Types](#) on page 313
- ▶ [How to Map a View to a Configuration Item Type](#) on page 316
- ▶ [How to Test a View Mapping](#) on page 318

#### Reference

- ▶ [View Mappings Manager Graphical User Interface](#) on page 319
- ▶ [CI Types Pane](#) on page 320
- ▶ [View Mappings Pane](#) on page 322
- ▶ [New and Edit View Mapping Dialogs](#) on page 323
- ▶ [Select a View Dialog Box](#) on page 323
- ▶ [Troubleshooting and Limitations](#) on page 325

## View Mappings Manager

This chapter describes the View Mappings manager used to map existing ODB Views to one or more configuration item types for the Health Top View in the Health Perspective and manage the list of mapped views.

The View Mappings manager enables users to perform the following management-related tasks:

- ▶ Map an existing ODB View to one or more configuration item types
- ▶ Manage the list of mapped ODB Views
- ▶ Display the list of mapped ODB Views in the Selected View list located in the Health Top View pane of the Health Perspective tab

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**Note:** Only users with the appropriate access permissions can use Operations Management Administration. For more information about user management, see "User Management" on page 459.

---

## Health Top View Management

Health Top Views are the ODB views that Operations Management uses to display configuration items in the Health Top View pane of the Health Perspective tab. A view displays a defined subset of the ODB ConfigurationItem model, for example, only configuration items that relate to a specific area of interest such as Storage or Databases.

---

**Note:** Health Top Views and topology views are not the same. Health Top Views have one parent and the same element can appear more than once if required by the relationships being displayed. Topology views are a flat representation of the database elements where elements appear only once.

---

Generally, views enable you to limit both the type and the amount of information displayed. For example, selecting a view in the Event Browser CI Tree refines the number and type of configuration item types loaded from the ODB and displayed in the list of available configuration item types.

Similarly, you can restrict the amount and type of information presented in the Health Top View pane by selecting a view from the Selected View list. The contents of the Select View list depend on the configuration items in the Health Top View, which are themselves related to the event selected in the Event Browser, and the views mapped to them in View Mappings.

You can use the Content Packs manager to import and export the list of mapped views displayed in the Selected View list. The Import and Export features of the Content Packs manager provide a convenient way for software administrators to exchange lists of mapped views between instances of Operations Management.

## Mapping Health Top Views

You can map ODB Views to configuration item types. The mapped ODB Views appear in the Selected Views list displayed in the Health Top View pane of the Health Perspective tab.

Views enable users to refine both the type and the amount of information displayed. For example, selecting a view in the Event Perspective CI Tree refines the number and type of configuration item types loaded from the ODB and displayed in the list of available configuration item types. Similarly, users can restrict the amount and type of information presented in the Health Top View pane by selecting a view from Selected View list. The views displayed in the Selected View list is determined by the view mappings defined in the View Mappings manager.

You can also use the View Mappings manager to filter the views that the user sees in the Selected View list according to the category of an event, such as DB or Storage. In this way, you refine the available views to those that make most sense for a given usage model. For example, if you map the DB2 view to the configuration item type DB Tablespace, you can also specify in the mapping rule that only views containing configuration item types concerning events belonging to event categories DB or Storage (or both) are visible.

For more information about the contents of the Health Top View pane and, in particular, the contents of the Selected Views list, see "Health Top View" on page 127.



## How to Search and Filter CI Types

In this task, you learn how to search for specific CI types and view CI types that match specified filter criteria. There are two filters:

- Show only CI types with assigned view mappings
- View (Show CI types contained within a specified view)

---

**Tip:** For information on button actions, see "View Mappings Manager Graphical User Interface" on page 319.

---

### Searching for a CI Type

You can use the Search field to locate the first instance of the CI type name or part of a name that you specify.


**To search for a specified CI type:**

- 1** Open the View Mappings manager from Operations Management Administration:

**Admin > Operations Management > Design Operations Content > View Mappings**


- 2** In the Search field, enter a string.

---

**Note:** The search string must be at least three characters long. Searching is started automatically as soon as the third character is entered and the first match is highlighted. This prerequisite avoids searches being started too often and resources being blocked. Names with less than three characters can be found by clicking on the  button.

---

The first CI type in the CI Types tree to match the specified string is highlighted. If that CI is not initially visible, the CI tree is expanded to display the CI Type.

- 3 Click the  button to find the next occurrence of the CI Type for which you are searching.

## Finding CI Types with Assigned View Mappings

You can use the filter to display all CI types that have content assigned to them.

**To filter the CI tree to show only CI types with assigned view mappings:**

- 1 Open the View Mappings manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > View Mappings**
- 2 In the Filter pane, select **Show only CI types with assigned view maps**.  
The CI Types pane displays only those CI types that have view mappings assigned.

---

**Note:** You can use the Show only CI types with assigned view maps filter and the filtering by a selected view together. The result displays only CI types contained within the specified view and with assigned view mappings.

---

## Filtering the CI Types Tree with a View



You can use the filter to display all CI types that are contained within a certain view.

**To filter the CI tree with a view:**

- 1 Open the View Mappings manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > View Mappings**
- 2 In the Search pane, select **View**.  
The View field becomes active.

- 3 Select a view from the list or use the Browse Views (...) button to open the Views selection dialog box, select the view that you want to use, and select **OK**.

The CI Types tree is updated to display only the CI types that match the view selected.

You can use the Expand () and Collapse () buttons to fully expand or collapse the CI tree. If a filter is set, only those items selected by the filter are expanded.

If no item matches the filter, the No CI type found message is displayed.

---

**Note:** You can use the Show only CI types with assigned view maps and the filtering by a selected view together. The result displays only CI types contained within the specified view and with assigned view mappings.

---

## How to Map a View to a Configuration Item Type

This task shows you how to map a view to a configuration item type and add the newly created view mapping to the complete list of the Operations Management views that are mapped to configuration item types.

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**Tip:** For information on button actions, see "View Mappings Manager Graphical User Interface" on page 319.

---

### To map an view to a CI type:

- 1 Open the View Mappings manager from Operations Management Administration:  
**Admin > Operations Management > Design Operations Content > View Mappings**
- 2 In the Model Explorer pane, select the configuration item that you want to map to a view.
- 3 In the View Mappings manager, click the \* button to open the Create New View Mapping dialog box.
- 4 In the Create New View Mapping dialog box, select a view that contain a reference to the selected configuration item from the list or use the Browse Views (...) button to open the Views selection dialog box, select the view that you want to use, and select **OK**.

Make sure that the view you selected in the previous step is now displayed in the View field.

- 5 **Optional:** If you want to further restrict the views displayed according to event category, select the new view mapping definition and type all or part of the name of an event category into the Event Category Pattern box using standard regular expression, if desired. If you want to specify multiple event categories, use the pipe symbol (|), for example:

DB | Storage

- 6 Enter a precedence value for the view mapping.

The view with the highest precedence is shown in the Health Top View as default. The precedence of inherited view mappings is also taken into account. The valid Precedence range is 0 to 1000.

- 7 Select **OK** to close the Create New View Mapping dialog box.

## **How to Test a View Mapping**

This task shows you how to check a view mapping.

### **To test a view mapping:**

- 1** Open the Health Perspective tab:

**Applications > Operations Management > Health Perspective**

- 2** In the Event Browser pane, select an event related to the view specified in the view mapping and, if you set an additional event category filter, one that belongs to one of the event categories specified in the filter.
- 3** In the Health Top View pane, make sure that the new view mapping definition is displayed in the Selected Views list.

## **View Mappings Manager Graphical User Interface**

This section lists and describes the layout of the View Mappings manager.

### ► **CI Types**

Displays a list of all available configuration item types to which you can map a Health Top View. For more information, see "CI Types Pane" on page 320.

### ► **View Mappings**

Displays a list of the mapped views. For more information, see "View Mappings Pane" on page 322.






## CI Types Pane

The CI Types pane in the View Mappings Manager enables you to choose the configuration item types that you want to map to a view.

The CI Types pane displays the UI elements listed in the following table.

**Tip:** If you want to modify or manage configuration item types, use the CI Types Manager:

**Admin > ODB Administration > Modeling > CI Type Manager**

UI Elements (A-Z)	Description
	Refreshes the contents of the configuration item tree. Use if new content becomes available while you are working or you have uploaded new contents (for example, from another user or the command-line interface).
 <b>Expand Selection</b>	Expands the list to display items belonging to the selected group.
 <b>Collapse Others</b>	Collapses all open branches except for the selected branch.
	Entering a string with more than 2 characters in the search field locates the first instance of the string in the CI Tree.  Clicking the search button finds the next occurrence of the string for which you are searching. For more information about searching, see "How to Search and Filter CI Types" on page 313.
	Expands and collapses the Filter pane.







UI Elements (A-Z)	Description
<b>CI Types</b>	<p>Hierarchical list representing the configuration item types that you want to monitor in your IT environment. To display the required CI Type, browse to and select the item of interest. The details associated with the CI Type are displayed.</p> <p>If the CI Types list is filtered, (filtered) is displayed next to the CI Types title.</p> <p>When CI types and their children have no objects assigned, their entries appear dimmed.</p> <p>When objects are directly assigned to a CI type, their entries appear bolded.</p>
<b>Filter</b>	<p>Used to search for specific CI types and view CI types that match specified filter criteria. There are two filters:</p> <ul style="list-style-type: none"> <li>➤ Show only CI types with assignments</li> <li>➤ View (Shows CI types contained within a specified view)</li> <li>➤ ... Opens the Views dialog box from which you can select a view with which to filter CI types.</li> </ul> <p><b>Note:</b> If you apply a view to the filter CI Types tree which removes all CI types with assignments, the ConfigurationItem entry remains in normal text, indicating that assignments exist. Remove the view, or select a more appropriate view to display the CI types with assignments that you require.</p> <p>For more information about searching and filtering, see "How to Search and Filter CI Types" on page 313.</p>
<b>Show only CI types with ...</b>	Displays in the CI Tree only CI Types with assignments.
<b>View</b>	Displays in the CI Tree only CI Types contained within the selected view.

## View Mappings Pane

The View Mappings manager enables you to choose the view you want to map to the selected configuration item.

The View Mappings pane displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
	Refreshes the list of view mappings.
 <b>New Item</b>	Opens the Create New View Mapping dialog box, to create a view mapping definition. Enter a description and select a view.
 <b>Edit Item</b>	Displays the Edit View Mapping dialog box, which enables you to modify the selected View Mapping.
 <b>Delete Item</b>	Removes the selected view mapping definition from the list of view mappings displayed.
<b>Event Category Pattern</b>	You can restrict the views displayed in the Selected View list of the Health Top View pane in the Health Perspective tab based on the event category, for example, DB or Storage. Enter a regular expression that matches all or part of the event category name that you want to use to filter the displayed views.
<b>Mapping Description</b>	Short description of the mapping listed in the View column.
<b>Precedence</b>	The view with the highest precedence is shown in the Health Top View as default. The precedence of inherited view mappings is also taken into account. The valid Precedence range is 0 to 1000.
<b>View</b>	Name of the view mapped to the selected configuration item type.

## New and Edit View Mapping Dialogs

The Create New View Mapping dialog box enables you to map a view to the selected configuration item. From the and Edit View Mapping dialog box, you can edit existing view mappings.



The Create New View Mapping and Edit View Mapping dialog boxes display the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Event Category Pattern</b>	Regular expression that matches all or part of the event category name that you want to use to filter the displayed views, for example: DBStorage, or Tablespace.
<b>ID</b>	Unique identification number for internal purposes only (Edit dialog only).
<b>Mapping Description</b>	A short explanation of the application of the mapping.
<b>Precedence</b>	The view with the highest precedence is shown in the Health Top View as default. The precedence of inherited view mappings is also taken into account. The valid Precedence range is to 1000.
<b>View</b>	Name of the view that you want to map to the CI type selected in the CI Types pane, for example: ConfigurationItem  <b>Note:</b> Created view is read-only in Edit dialog and cannot be changed. Create a new view and delete the old one)

## Select a View Dialog Box

The View Mapping Select View dialog box enables you to choose the view you want to map to the selected configuration item.

The View Mapping Select View dialog box displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
 <b>Collapse Others</b>	Collapses all open branches except for the selected branch.
 <b>Expand Selection</b>	Expands the list to display items belonging to the selected group.

## Troubleshooting and Limitations

This section provides help on troubleshooting problems with the View Mappings manager.

### **No Content in the View Mappings Pane**

- No configuration item type is selected. Select a configuration item type in the CI Types pane of the View Mappings manager.

### **Select a View Dialog Box Does not Contain Desired View**

- The desired view does not contain a reference to the configuration item type to which you want to map a view. Either add the configuration item type to the view using ODB tools, or map a view to another configuration item type.
- No, or incorrectly defined, event category is specified in the Event Category Pattern box. If necessary, modify the string (or regular expression) specified in the Event Category Pattern box when configuring the view mapping definition. Remember to explicitly save the modified definition.



# 14

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## Correlation Rules

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**Note:** To be able to use the event correlation functionality of Operations Management, the Event Management Foundation and Correlation licenses are required. For detailed information on licensing, see the *the HP Business Service Management Deployment Guide* PDF.

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### **This chapter includes:**

#### Concepts

- ▶ [Correlation Rules Manager Basics](#) on page 328
- ▶ [Topology-Based Event Correlation](#) on page 329
- ▶ [Correlation Rules](#) on page 330
- ▶ [Cross-Domain Event Correlation](#) on page 331
- ▶ [Event Correlation Rule Topology](#) on page 332
- ▶ [Correlation Rule Symptoms and Causes](#) on page 334

#### Tasks

- ▶ [How to Configure Topology-based Event Correlation Rules](#) on page 336
- ▶ [How to Create Event Correlation Rules](#) on page 338
- ▶ [How to Select Topology Views](#) on page 340
- ▶ [How to Define the Rule Topology](#) on page 341
- ▶ [How to Specify Correlation Rule Symptoms](#) on page 343
- ▶ [How to Specify Correlation Rule Causes](#) on page 344

- ▶ [How to Set the Correlation Time Limit](#) on page 345
- ▶ [How to Set the Correlation Auto-Extend Time](#) on page 346

### Reference

- ▶ [Correlation Rules Manager Graphical User Interface](#) on page 347
- ▶ [Correlation Rules Pane](#) on page 348
- ▶ [View Correlation Rule Pane](#) on page 350
- ▶ [Rule Topology Pane](#) on page 351
- ▶ [Correlation Rule Indicators Pane](#) on page 354
- ▶ [Correlation Rule Symptoms and Causes Pane](#) on page 355
- ▶ [Create New Correlation Rule Dialog](#) on page 356
- ▶ [Edit Properties for Correlation Rule Dialog](#) on page 357
- ▶ [Matching CIs for Correlation Rule Dialog](#) on page 358
- ▶ [Troubleshooting and Limitations](#) on page 360

## **Correlation Rules Manager Basics**

This chapter introduces the concept of topology-based event correlation. The information in this chapter explains how to configure correlation rules and apply them to the indicators that are assigned to the configuration item types you are monitoring with Operations Management. You can use topology-based event correlation to help you better understand, monitor, and manage the problems that might have an impact on the objects in your IT environment.

The Correlation Rules manager enables you to define and deploy rules that use indicators to correlate the events occurring in the different domains throughout the managed IT environment. You can use the Correlation Rules manager to perform the following tasks:

- ▶ Define and manage correlation rules
- ▶ Visualize the topology of correlation rules



- ▶ View cause and symptoms events
- ▶ Manage indicators and their values
- ▶ Browse the hierarchy of cross-domain correlation rules

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**Note:** You can use user roles to restrict access to the Correlation Rules manager. For more information about user authorization, see "User Management" on page 459.

---

To access the Correlation Rules manager, select the following menu option:

**Admin > Operations Management > Design Operations Content > Correlation Rules**

## **Topology-Based Event Correlation**

You can define rules that use indicators to correlate or link related events occurring in the different domains of the managed IT environment. Correlating events that are either generated by or related to the same object greatly reduces the number of events displayed in the Event Browser. The reduced number of events in the Event Browser helps operators to locate the cause of the problems more quickly and efficiently.

The correlation process determines the cause of an event. An overview of all events affected by the correlation process is available separately in the Related Events tab of the Details pane. The overview enables you to drill down the correlation history and browse through all correlated events.

The event correlation process uses the topology-based views stored in the ODB to specify which configuration item types can be considered for inclusion in a correlation rule. The topology-based views improve the correlation process by adding path-related constraints to the correlation rule. Topology-based event correlation requires that a relationship exist between the configuration items specified in the correlation rule.

**Note:** The view used to define the configuration item types in a correlation rule must also demonstrate that a relationship exists between the configuration item types specified in the rule.

---

A time limit exists for the processing of the correlation rules you define with the Correlation Rules manager. All the events specified in the correlation rule must occur within a defined period of time. By default, the time limit is set to 5 minutes. If individual symptom or cause events occur outside of the defined time limit, they appear in the Event Browser as normal, uncorrelated events. For more information about the time setting, see "How to Set the Correlation Time Limit" on page 345.

## Correlation Rules

Use the Correlation Rules manager to view, define, and apply correlation rules. Correlation rules associate selected configuration item types with defined indicator values to trigger a correlation process. The correlation process results in the highlighting of one or more configuration items as causes.

Correlation rules require a combination of symptoms and causes. Both symptoms and causes are defined by selecting configuration item types. Each configuration item type (such as a DB2 database) that you specify as a potential symptom requires one or more indicators (for example, *Run State*, or *Availability*) to be defined for it. Each indicator must have a value (for example, *up*, *down*, or *offline*). Configuration item types you choose as causes also require an indicator and a value.

For example, the information in the following table defines a simple correlation rule for a database instance. Operations Management displays cause events in the Event Browser and the symptom events in the Related Events tab of the Message Details pane.

Rule Type	CI Type	Event Type Indicator	Event Type Indicator Value
Symptom	DB2	Network Availability	Offline
Symptom	DB2	Buffer Hit Ratio	Low
Symptom	Process	Run state	Down
<b>Cause</b>	<b>DB Table Space</b>	<b>Buffer Performance</b>	<b>Slow</b>

## Cross-Domain Event Correlation

The Correlation Rules manager enables you to set up rules that correlate indicators for configuration item types in multiple and different domains, for example, database, storage, and web application. Cross-domain correlation connects a chain of rules that are defined in different domains. The correlation process can use the *symptom* of one rule as the *cause* of the next rule in the chain, or vice versa.

The link between correlation rules in different domains is the *same* indicator value assigned to the *same* configuration item type. In one rule, you can define an indicator value as a symptom for a specific configuration item type. In another rule for a different domain, you can define the *same* indicator value as a cause for the *same* configuration item type. If all the events occur in the different domains as expected and trigger the various rules, the correlation process displays in the Event Browser only the cause event from the last rule in the event correlation chain.

---

**Note:** Cross-domain correlation rules must share at least one identical combination of configuration item type and indicator value.

---

For example, if all the necessary correlation rules are defined for the database, storage, and web application domains, and the necessary indicator states are being monitored for a shared configuration item, the Correlation Rules manager can determine that a problem with physical disk utilization in the storage domain is the cause of the problem concerning the availability of the web server.

The Correlation Rules pane in the Correlation Rules manager incorporates a list of correlation rules containing symptoms or values that also feature in rules defined for a different domain. In cross-domain rules, indicator values configured as a symptom in one rule are also defined as a cause in a rule defined in another domain. You can choose whether to view rules that determine the symptom or the cause of an event and expand the item to see if the rule is part of a chain.

## Event Correlation Rule Topology

It is easier to understand the context in which a correlation rule exists and how the rule works if you can see the topology of the configuration item types that are included in the rule. Operations Management uses the Rule Topology pane in the Correlation Rules manager to graphically represent the correlation rule you are designing or modifying. The configuration item types that you include in the correlation rule are highlighted in the topology of the view to which they belong.

Labels indicate the type of objects in the correlation rule and the relationship between the various objects. For example, correlation rules can include relationships such as Contains, Depends on, or Member.

---

**Note:** You cannot change or modify the type of relationship displayed in the Rule Topology pane. The relationship is defined in the ODB view. Use the ODB View Manager to set up new views and new relationships.

---

You use the Rule Topology pane to specify which parts of the view topology to consider for the correlation rule you are configuring. In the Rule Topology pane, you select the configuration item types and select the relationship between them. These relationships are defined in the ODB. The Correlation Rules manager checks that the rule you define indicates both the configuration item types to consider in the event correlation process and their relationship. If the rule does not indicate the relationship between configuration item types, the Correlation Rules manager does not allow you to save it.

The rule topology shows the relationships between all the configuration item types in the chosen view. If only one topological path exists between the configuration item types in your correlation rule, Operations Management automatically highlights the path for you. If more than one path exists, you must manually highlight the path between the configuration item types specified as symptoms and cause in the correlation rule.

If you have configured multiple correlation rules in a chain, where a cause in one rule is a symptom in another, Operations Management displays useful information about the indicator values used in the correlation rule and enables you to navigate between the rules following the correlation chain.

For more information about the contents of the Rule Topology pane, see "Rule Topology Pane" on page 351. For more information about configuring rule topology, see "How to Define the Rule Topology" on page 341.

## Correlation Rule Symptoms and Causes

In Operations Management, a correlation rule defines events as either causes or symptoms. If one or more of the events specified as symptoms occurs within a defined period of time, the triggered rule highlights the cause event in the Event Browser and creates a subgroup containing the symptom events.

---

**Tip:** The Event Browser uses icons to distinguish between events that are configured as the cause in a correlation rule and events that are configured as symptoms. For more information about icons in the Event Browser, see "Event Browser Icons, Buttons, and Context Menus" on page 72.

---

Every rule that Operations Management uses to correlate events must have at least one symptom and one cause. Multiple cause indicators can be specified as long as they are specified for the same CI type. In the context of Operations Management correlation rules, symptoms and causes are defined as follows:

### ► Symptom

Symptoms in a correlation rule are events that occur as a result of another event. Symptom events are mapped to individual indicator values used to monitor the objects in your IT environment, for example, `Database:Unavailable` or `Application response:Slow`.

You can map a symptom event to more than one indicator value, for example, `Database:Down` or `unavailable`. In this way, the event can contribute to more than one rule.

### ► Cause

Causes in a correlation rule are the events that are reporting problems and are the underlying reasons that other symptom events occur. In a correlation rule, cause events are mapped to an indicator value used to monitor the objects in your IT environment, for example: `Network:Unreachable`.

---

**Note:** If multiple rules correlate the same symptoms at the same time but specify a different event as the cause, the event specified as the cause in the first rule triggered takes precedence and subsequent rules are ignored.

---

You can configure a chain of rules that correlate events across multiple domains. In cross-domain event correlation, an event can be configured as a symptom in one rule and as a cause in another rule. Similarly, an event configured as a cause in one correlation rule can be configured as a symptom in another rule. Rules that correlate events occurring in different domains require at least one common configuration item type and one indicator value. The common configuration item type and indicator value is the link between the rules defined for the different domains.

The contents of the various panes are linked both conceptually and graphically. If you select a configuration item type in the Rule Topology pane, the Indicators Pane displays all indicators that could be assigned as cause or symptom for the current configuration item.

## **How to Configure Topology-based Event Correlation Rules**

This task describes how to configure a topology-based event correlation rule. A correlation rule uses multiple indicator values to determine which events are symptoms of a problem and which events are the causes.

This task includes the following steps:

- "Prerequisites" on page 336
- "Create the Event Correlation Rule" on page 336
- "Select a Topology View" on page 337
- "Define the Rule Topology" on page 337
- "Specify Event Correlation Rule Symptoms" on page 337
- "Specify Correlation Rule Cause" on page 337

### **1 Prerequisites**

To create correlation rules and policies, you need the following:

- Access to Operations Management Administration
- Good understanding of the principles of event correlation
- Detailed knowledge of the objects and events that you want to create rules to correlate
- Working knowledge of configuration item types, indicators, and indicator values
- Understanding of how events relate to each other in terms of cause and effect. For example, the availability of an email server depends on reliable hardware, responsive software, and a functioning network.

### **2 Create the Event Correlation Rule**

In this step, you create a correlation rule to help you solve problems more quickly by distinguishing between events that are the symptoms of a problem and events that are the cause. For more information, see "How to Create Event Correlation Rules" on page 338.



### **3 Select a Topology View**

In this step, you select a view that specifies the configuration item types you want to use in a correlation rule. Topology views reduce and refine the number of configuration item types that you can use in the correlation rule to a more manageable level. For more information, see "How to Select Topology Views" on page 340.

### **4 Define the Rule Topology**

In this step, you define the topology of the correlation rule. Topology is the relationships and dependencies between the various configuration item types in the correlation rule. For more information, see "How to Define the Rule Topology" on page 341.

### **5 Specify Event Correlation Rule Symptoms**

In this step, you specify one or more events as symptoms in a correlation rule. You define the symptoms of a correlation rule by specifying one or more indicator values used to monitor particular events in your IT environment, for example: `Database:Unavailable` or `Service:Slow`. For more information, see "How to Specify Correlation Rule Symptoms" on page 343.

### **6 Specify Correlation Rule Cause**

In this step, you specify the event that you want to define as the cause in a correlation rule. You define the cause of a correlation rule by specifying an indicator value used to monitor a particular event in your IT environment, for example, `Network:Unreachable`. For more information, see "How to Specify Correlation Rule Causes" on page 344.

## How to Create Event Correlation Rules

In this task, you learn how to create a correlation rule. Correlation rules enable you to understand more quickly how to solve problems by distinguishing between events that are the symptoms of a problem and events that are causes.


---

**Note:** You can also manually relate events, assigning one event as a cause event and the other logically-related events as symptom events. For further information, see [How to Relate Events Manually](#) on page 57.

Manually-related events can also be used as the basis for creating new or enhancing existing correlation rules. For further information, see [How to Create Correlation Rules from Manually-Related Events](#) on page 59.

---

### To create a correlation rule:

- 1 Open the Correlation Rules manager:  
**Admin > Operations Management > Design Operations Content > Correlation Rules**
- 2 In the Correlation Rules pane, click the  button. The Create New Correlation Rule dialog box opens.

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**Tip:** For information on button actions, see "Correlation Rules Manager Graphical User Interface" on page 347.

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- 3 Type a name, display name, and description for the new correlation rule.
- 4 Select a topology view to determine which configuration item types are available for inclusion in the new correlation rule. For more information about selecting topology views in correlation rules, see "How to Select Topology Views" on page 340.
- 5 Select **Active** to enable the rule during runtime. By default it is disabled.


Inactive rules are identified with diagonal black line through their icons in the Correlation Rules pane.

- 6** *Optional:* Specify a configuration time window. Select the check box and set the time period for the correlation rule you are creating. The range is from 0 to 9999 seconds. By default it is not enabled and the global value is used. 0 seconds also mean it is not enabled and the global setting is used.

Correlation Time Window sets the period of time in seconds that correlation rules wait for all required events to occur before reporting the cause event and emptying the correlation rule cache.

Cause and symptom events must arrive within that time frame in the correlation engine to be considered for correlation. A time window starts when a first cause or symptom event arrives that cannot be correlated with any other event.

Default value is 960 seconds (6 minutes). You can change this global value. For details, see "Topology-Based Event Correlation Settings" on page 530.

- 7** Select **OK** to start creating the correlation rule.
- 8** In the Finish Creating Correlation Rule pane, specify a valid the Rule Topology with cause and symptoms. For more information about selecting topology views in correlation rules, see "How to Define the Rule Topology" on page 341.
- 9** Click the  button to save the correlation rule.

## How to Select Topology Views

In this task, you learn how to use a topology view to specify which configuration item types you want to use in a correlation rule. Topology views reduce and refine the number configuration item types that you can use in the correlation rule to a more manageable level.

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**Tip:** For information on button actions, see "Correlation Rules Manager Graphical User Interface" on page 347.

---

### To select a topology view for a correlation rule:

**1** Open the Correlation Rules manager:

**Admin > Operations Management > Design Operations Content > Correlation Rules**

**2** In the Rule Topology pane, use the **View** list to choose a topology view. The view you choose specifies the configuration item types that you want to use in the new correlation rule as well as the topological relationships between the configuration item types.

---

**Note:** When you create a rule, the View list displays all known views. After you select a view, the View list displays only those views that refer to any of the configuration item types present in the selected view.

---

**3** If the rule you want to use is not present in the View list, use the View Manager to configure the view.

For more information about topology views in correlation rules, see "Event Correlation Rule Topology" on page 332 and "Rule Topology Pane" on page 351.

## How to Define the Rule Topology

In this task, you use the Rule Topology pane to specify the configuration item types that you want to include in a correlation rule and what relationships and dependencies exist between the various configuration item types. A relationship must exist between the configuration item types in a rule. The Correlation Rules manager does not allow you to save an invalid rule.

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**Tip:** For information on button actions, see "Correlation Rules Manager Graphical User Interface" on page 347.

---

### To define the topology of a correlation rule:

- 1 Open the Correlation Rules manager:  
**Admin > Operations Management > Design Operations Content > Correlation Rules**
- 2 In the Rule Topology pane, use the **View** list to choose a topology view. The view you choose must contain the configuration item types that you want to use in the new correlation rule.
- 3 Specify the topology of the correlation rule by highlighting the path between the configuration item types that you want to associate in the correlation rule. The rule topology shows the relationships between all the configuration item types in the chosen view. If there is more than one path between the configuration item types specified as symptoms and cause in the correlation rule, the shortest path is taken. If you want to use an alternative one, you must make the selection manually.

When creating or modifying rules, it may not always be obvious when a rule is correctly specified. To guide you through correlation rule creation, short explanations are provided at the top of the pane.

Information presented in red indicates that there is an error or omission in the correlation rule. Follow the guidance to correct the error. If it proves difficult to create an error-free rule, use the Rebind button to create a binding between the cause and the symptoms. The rebind automatically removes all bindings and adds the shortest path between the cause and the symptoms.

Information presented in blue indicates that the rule is correctly specified and serves as a reminder to save the modified rule.

---

**Tip:** You highlight a path by clicking the links and objects in the chosen path. Active links are colored blue, inactive links are colored grey.

---

For more information about rule-topology views in correlation rules, see "Event Correlation Rule Topology" on page 332 and "Rule Topology Pane" on page 351.

## How to Specify Correlation Rule Symptoms

In this task, you learn how to specify one or more events as symptoms in a correlation rule. You define the symptoms of a correlation rule by specifying one or more indicator values used to monitor particular events in your IT environment, for example, `Database:Unavailable` or `Service:Slow`.

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**Tip:** For information on button actions, see "Correlation Rules Manager Graphical User Interface" on page 347.

---

### To specify symptoms for a correlation rule:

- 1 Open the Correlation Rules manager:  
**Admin > Operations Management > Design Operations Content > Correlation Rules**
- 2 Create a (or open an existing) correlation rule. For more information about creating correlation rules, see "How to Create Event Correlation Rules" on page 338.
- 3 In the Rule Topology pane, select the configuration item type, the indicator value of which you want to use as a symptom in the selected correlation rule.
- 4 In the Indicators pane, expand the indicator containing the indicator value you want to specify as a symptom in the selected correlation rule.
- 5 Right-click the indicator value you want to use as a symptom in the correlation rule, and select **Add as a Symptom** from the context menu.  
The selected indicator value should appear in the list of symptoms and causes in the Symptoms and Causes pane.

## How to Specify Correlation Rule Causes

In this task, you learn how to specify the event that you want to define as the *cause* in a correlation rule. You define the cause of a correlation rule by specifying an indicator value used to monitor a particular event in your IT environment, for example: Network:*Unreachable*.

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**Tip:** For information on button actions, see "Correlation Rules Manager Graphical User Interface" on page 347.

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### To specify causes in a correlation rule:

- 1 Open the Correlation Rules manager:  
**Admin > Operations Management > Design Operations Content > Correlation Rules**
- 2 Create a (or open an existing) correlation rule. For more information about creating correlation rules, see "How to Create Event Correlation Rules" on page 338.
- 3 In the Rule Topology pane, select the configuration item type for which you want to select the cause.
- 4 In the Indicators pane, right-click the indicator value you want to use as a cause in the correlation rule, and select **Add as a Cause** from the context menu.

The selected indicator value should appear in the list of symptoms and causes in the Symptoms and Causes pane.



## How to Set the Correlation Time Limit


In this task, you learn how to set the period of time that correlation rules wait for all required events to occur before reporting the cause event and emptying the correlation rule cache.

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**Tip:** For information on button actions, see "Correlation Rules Manager Graphical User Interface" on page 347.

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### To set the time limit for correlation rules:

- 1 Open the Infrastructure Settings manager:  
**Admin > Platform > Setup and Maintenance > Infrastructure Settings**
- 2 In the **Applications** list, set the context to **Operations Management**.
- 3 In the Topology-Based Event Correlation Settings section, click the  button for the entry: Correlation Time Window.
- 4 In the Edit Setting dialog box, enter the time limit (in seconds) you want to set in the Value box. The default is 240 seconds.
- 5 Select **Save** to apply the new time setting immediately.

## How to Set the Correlation Auto-Extend Time


In this task, you learn how to set event correlation to automatically extend the correlation time window whenever an additional symptom is correlated to the same cause. Each time that an event is correlated with a problem, the time period set in the correlation time window is restarted to help enable the correlation of a greater proportion of symptoms associated with the original event.

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**Tip:** For information on button actions, see "Correlation Rules Manager Graphical User Interface" on page 347.

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### To set Auto-Extend for correlation rules:

- 1 Open the Infrastructure Settings manager:  
**Admin > Platform > Setup and Maintenance > Infrastructure Settings**
- 2 In the **Applications** list, set the context to **Operations Management**.
- 3 In the Topology-Based Event Correlation Settings section, click the  button for the entry: Auto-Extend Time Window Mode.
- 4 In the Edit Setting dialog box, set the Value to **true**.
- 5 Select **Save** to apply the new time setting immediately.

## Correlation Rules Manager Graphical User Interface

This section describes in detail the information displayed in the Correlation Rules manager. The information in this section describes the buttons, icons, labels, and menu options that you use to create the correlation rules that help users manage the events that occur in your IT environment. In this section, you can find information about the following topics:

### ► Correlation Rules Pane

Displays a list of all available correlation rules. The list includes both the rules from the standard content packs and any rules that you have defined and saved. For more information, see "Correlation Rules Pane" on page 348.

Each correlation rule can also incorporate lists of rules that are related to the cause and symptom of the selected rule.

### ► Rule Topology Pane

Displays a graphical version of the selected correlation rule, including the CI types and all relationships defined in the rule. For more information, see "Rule Topology Pane" on page 351.

### ► Indicators Pane

Displays the indicators for the selected configuration item type in the rule. For more information, see "Correlation Rule Indicators Pane" on page 354.

### ► Symptoms and Causes Pane

Displays a list of the indicators that the selected correlation rule references either as a symptom or as a cause. For more information, see "Correlation Rule Symptoms and Causes Pane" on page 355.

The options available in the UIs and the context menus of the Correlation Rules manager are available in the following topics:






- "Correlation Rules Pane" on page 348
- "Rule Topology Pane" on page 351
- "Correlation Rule Indicators Pane" on page 354
- "Correlation Rule Symptoms and Causes Pane" on page 355








## Correlation Rules Pane

The Correlation Rules pane in the Correlation Rules manager displays a list of all available correlation rules. The list includes rules from the out-of-the-box content packs and any rules that you have defined and saved.

In addition, the Correlation Rules pane includes information about correlation rules, the symptoms and causes of which overlap to form parent-child relationships. Parent-child relationships contain symptoms or causes that feature in a chain of rules defined for multiple domains.

The Correlation Rules pane displays the UI elements listed in the following table.

UI Elements	Description
	Refreshes the contents of the Correlation Rules list. Use if new rules becomes available while you are working.
 <b>New Item</b>	Opens the Create New Correlation Rule dialog box, which you use to define the details of a new (or modify an existing) correlation rule. For more information, see "How to Create Event Correlation Rules" on page 338.
 <b>Duplicate Item</b>	Creates a duplicate of the selected correlation rule. The name of a correlation rule is for internal use only and must be unique.
 <b>Delete Item</b>	Deletes the selected correlation rule from the database.
 <b>Toggle Display of Cross Rule Relations</b>	Toggles between a flat list of correlation rules and a tree that shows how each rule is linked to other rules.

UI Elements	Description
 <p><b>Toggle Sorting by Cause CI Type</b></p>	Toggles between a correlation rule list sorted alphabetically and a list sorted by the cause CI type name.
 <p><b>Expand</b></p>	Expands the list to display items belonging to the selected group.
 <p><b>Collapse</b></p>	Collapses all open branches except for the selected branch.
 <p><b>Find Matching CIs</b></p>	Show all CIs that match the topology specified in the rule and allows to send test events to test the correlation rule.
 <p><b>Edit Properties</b></p>	Opens the basic properties of the selected correlation rule in the Edit Properties for Correlation Rule dialog box. For more information, see "Edit Properties for Correlation Rule Dialog" on page 357.
 <p><b>Save Item</b></p>	<p>Completes the new correlation rule creation or saves the modifications you have made to an existing correlation rule.</p> <p><b>Note:</b> A correlation rule must be made active before it can be used.</p>
 <p><b>Cancel Edit or Create</b></p>	Discards all modifications made while creating or editing the rule topology of the selected correlation rule. When editing, the saved version of the selected correlation rule is reloaded from the database.



## View Correlation Rule Pane

The View Correlation Rule pane in the Correlation Rules manager is also used during the creation of new Correlation Rules when it is labelled Finish Creating Correlation Rule.

The View Correlation Rule pane in the Correlation Rules manager contains the following panes:

- ▶ "Rule Topology Pane" on page 351
- ▶ "Correlation Rule Indicators Pane" on page 354
- ▶ "Correlation Rule Symptoms and Causes Pane" on page 355

The View Correlation Rules pane displays the UI elements listed in the following table.

UI Elements	Description
	Binds one or more symptoms to the cause by taking the shortest path. All other bindings are removed.
	<p><b>Toggle Display of Node Details:</b> Opens the Details window for the selected Rule Topology. The Details window displays:</p> <ul style="list-style-type: none"> <li>▶ <b>Symptoms and Causes</b> Symptoms or causes mapped to the selected CI type.</li> <li>▶ <b>Cross Rule Navigation</b> Shows rules where the selected symptom is a cause or the selected cause is a symptom.</li> </ul>

When creating or modifying rules, it may not always be obvious when a rule is correctly specified. To guide you through correlation rule creation, short explanations are provided at the top of the pane.

Information presented in red indicates that there is an error or omission in the correlation rule. Follow the guidance to correct the error. If it proves difficult to create an error-free rule, delete bindings and use the Rebind button to create a binding between the cause and the symptom. The rebind automatically uses the shortest path between the cause and the symptom.

Information presented in blue indicates that the rule is correctly specified and serves as a reminder to save the modified rule.

## Rule Topology Pane

The Rule Topology pane in the Correlation Rules manager displays a graphical representation of the selected correlation rule, including all the configuration item types configured in the rule as well as any relationships between the included configuration item types and other correlation rules that use the same indicator values. The Correlation Rules manager uses color to indicate the role of a configuration item type in a correlation rule, for example, to show if a configuration item is configured as a symptom (blue) or a cause (orange).








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**Tip:** Configuration item types are only displayed in the Rule Topology pane if you select a rule or apply a view from the View list.

---

The Rule Topology pane displays the UI elements listed in the following table. In the table, unlabeled UI elements are shown in angle brackets (<>).

UI Elements (A-Z)	Description
<Dark blue background>	Symptom CI type.
<Light blue background>	Not cause or symptom CI type, but CI type is part of rule topology.
<Orange background>	Cause CI type.
<Pink frame>	Selected CI type.
<No background color>	CI type is not part of the rule.

UI Elements (A-Z)	Description
	<p>Indicates that the configuration item type has an indicator value that is configured as a symptom in the selected correlation rule.</p> <p><b>Tip:</b> To see which indicator values are configured in the correlation rule. Select Toggle Display of Node Details  button which opens the Details window for the selected Rule Topology.</p>
	<p>Indicates that the configuration item type has an indicator value that is configured as a cause in the selected correlation rule.</p>
	<p>Indicates that the configuration item type has an indicator value that is configured not only as a <i>cause</i> in the selected correlation rule, but also as a symptom in another rule. The name of the other correlation rule is displayed as a hyperlink above the configuration item symbol.</p>
	<p>Indicates that the configuration item type has an indicator value that is configured not only as a symptom in the selected correlation rule, but also as a cause in another rule. The name of the other correlation rule is displayed as a hyperlink below the configuration item symbol.</p>
	<p>Adds the highlighted link (constraint) to the correlation rule. Adding a link enables the path between the linked objects in the context of the correlation rule, which is a requirement for topology-based event correlation. It does not change the ODB view model in any way.</p>
	<p>Removes the highlighted link (constraint) from the correlation rule you are editing. The link between the two objects is no longer recognized in the context of the correlation rule, and any rule that relies on this link no longer works. Removing a link from a correlation rule does not change the ODB view model in any way.</p>
<p><b>Layout</b></p>	<p>Selects alternative ways of viewing the Rule Topology diagram. There are three options to chose from: Hierarchical, Circular, and Concentric Radial.</p>



UI Elements (A-Z)	Description
<b>Levels</b>	Selects the depth of topology levels displayed in the Rule Topology diagram.
<b>View</b>	Displays the ODB views you can use to define which configuration item types are available for inclusion in the selected correlation rule. All views are available in the list before you select a view. After you select a view, the views displayed in the list are restricted to those which contain any of the configuration item types in the selected correlation rule. If the Rules Topology pane is empty, see "Rules Topology Pane is Empty" on page 360.
<b>Visible CI Types</b>	States the number of CI types displayed and the total number of CI types included in the correlation rule. Format: number of CI types displayed/total number of CI types in correlation rule, for example, 3/4.
<b>Zoom</b>	Controls the size of the displayed Rule Topology diagram.

## Correlation Rule Indicators Pane






The Indicators pane in the Correlation Rules manager displays a list of the indicators assigned to the configuration item type selected in the Rule Topology pane. You can select values from any of the listed indicators for use in the correlation rule you are designing.

---

**Note:** If you need to add or modify indicators, you must do this in the Indicators manager.

---

The Correlation Rule Indicators pane displays the UI elements listed in the following table.

UI Elements	Description
	Refreshes the contents of the Indicators list. Use if new indicators becomes available while you are working.
 <b>Go to the Indicator Manager</b>	Opens the Indicators manager.
 <b>Group Indicator by Type</b>	Toggles between a list containing all indicators and a list divided into health indicators and event type indicators.
 <b>Add as a Symptom</b>	Adds the selected indicator value as a symptom for the configuration item type selected in the Rule Topology pane.
 <b>Add as a Cause</b>	Sets the selected indicator value as a cause for the configuration item type selected in the Rule Topology pane.

## Correlation Rule Symptoms and Causes Pane

The Symptoms and Causes pane in the Correlation Rules manager displays a list of the indicators and values configured for the configuration types of the correlation rule. These configuration types are displayed in the Rules Topology pane and indicates if the value is a cause or a symptom in the selected rule. Selecting a symptom or the cause in Rule Topology pane highlights the indicator value in the Indicators pane.


You can also add new event indicator values to the displayed list.

---


**Tip:** To add an indicator value to a correlation rule as a symptom or a cause, either right-click the value and use the options displayed in the popup menu.

---

The Correlation Rule Symptoms and Causes pane displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
 <b>Delete Item</b>	Deletes the selected indicator from the list of indicators included in the correlation rule as either a symptom or a cause.
<b>CI Type</b>	Name of the configuration item type to which the listed indicator is assigned.
<b>Indicator</b>	Name of the indicator referenced in the selected correlation rule.
<b>Indicator Value</b>	Name of the indicator value referenced in the selected correlation rule.
<b>Type</b>	Indicates if the indicator is defined as a symptom or a cause in the selected correlation rule.


## Create New Correlation Rule Dialog

You use the New Correlation Rule dialog box to define the properties of a new correlation rule, for example, name, and description. Click the  button to open the New Correlation Rule dialog box.

The Create New Correlation Rule dialog box displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Active</b>	Used to enable or disable the rule during runtime. By default it is disabled.
<b>Base on ODB View</b>	Selects the ODB view that you want to use as the basis for the correlation rule topology. By selecting a view, the Rule Topology pane displays only those configuration item types that are included in the view.
<b>Display Name</b>	Display name of the selected correlation rule used in the graphical user interface.
<b>Description</b>	Brief description of the correlation rule.
<b>Name</b>	Internal name of the selected correlation rule. Automatically generated from the Display Name value. The first character must be a letter (A-Z, a-z) or an underscore (_). All other characters can be a letter (A-Z, a-z), a number (0-9), or an underscore (_). Can be manually overwritten.
<b>Time Window</b>	Specifies a specific time period for the selected correlation rule. By default it is not enabled and the global value is used. 0 seconds also mean it is not enabled and the global setting is used.  The range is from 0 to 9999 seconds.  For information about setting the default, see <a href="#">"Operations Management Infrastructure Settings Manager" on page 506.</a>

## Edit Properties for Correlation Rule Dialog

You use the Edit Properties for Correlation Rule dialog box to modify the properties of an existing correlation rule, for example, name and description. Click the  button to open the Edit Properties for Correlation Rule dialog box.

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**Note:** The View Correlation Rule pane in the Correlation Rules manager is also used during the creation of new Correlation Rules when it is labelled Finish creating Correlation Rule.

---


The Edit Properties for Correlation Rule dialog box displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Active</b>	Used to enable or disable the rule during runtime. By default it is disabled.
<b>Description</b>	Brief description of the correlation rule.
<b>Display Name</b>	Display name of the selected correlation rule used in the graphical user interface.
<b>ID</b>	Internal location of Correlation Rule (internal, read-only).

UI Elements (A-Z)	Description
<b>Name</b>	Internal name of the selected correlation rule. Automatically generated from the Display Name value. The first character must be a letter (A-Z, a-z) or an underscore (_). All other characters can be a letter (A-Z, a-z), a number (0-9), or an underscore (_). Can be manually overwritten.
<b>Time Window</b>	Specifies a specific time period for the selected correlation rule. By default it is not enabled and the global value is used. 0 seconds also mean it is not enabled and the global setting is used.  The range is from 0 to 9999 seconds.

## Matching CIs for Correlation Rule Dialog

You use the Matching CIs for Correlation Rule dialog box to view all configuration items that match the selected correlation rule in the Correlation Rules pane.

To display the Matching CIs for Correlation Rule dialog box for a specific correlation rule, correlation rule and click the  button in the Correlation Rules pane of the Correlation Rules manager.

The Matching CIs for Correlation Rule dialog box displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Cause CI</b>	Display name of the configuration item, the indicator values of which are configured as a cause in the selected correlation rule
<b>CI Type</b>	Name of the configuration item type to which the indicator referenced in the selected correlation rule is assigned
<b>Configuration Item</b>	Name of the configuration item

UI Elements (A-Z)	Description
<b>Constraint Type</b>	Role that the selected indicator value plays in the correlation rule (symptom or cause)
<b>Indicator</b>	Display name of the indicator, the value of which is referenced in the correlation rule
<b>Indicator Value</b>	Display name of the indicator value used in the correlation process
<b>Send Test Event</b>	Sends a sample event to Operations Management to test the correlation rule

## Troubleshooting and Limitations

This section provides help for those people who are troubleshooting problems relating to event correlation, including creating, modifying, and enabling events.

### **Rules Topology Pane is Empty**

- No rule is selected in the Correlation Rules pane
- No view is active in the Rules Topology pane

### **Indicators List is Empty**

- No configuration item type is selected in the Rules Topology pane
- No indicator is defined for the selected CI type

### **Cannot Save Correlation Rule**

- The rule is invalid or incomplete, for example:
  - The rule does not have at least one *symptom* event
  - The rule does not have a *cause* event
  - The topology path is invalid
  - The rule refers to a configuration item that is not resolvable



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## Connecting Servers

### **This chapter includes:**

#### Concepts

- ▶ Introduction to Connecting Servers on page 362

#### Tasks

- ▶ How to Create a Connection to another OMi Instance on page 363
- ▶ How to Create a Connection to an HPOM Server on page 364
- ▶ How to Create a Connection to an External Event Processing Server on page 366
- ▶ How to Edit a Server Connection on page 368
- ▶ How to Delete a Server Connection on page 369
- ▶ How to Establish a Trust Relationship for a Server Connection on page 370
- ▶ How to Verify the Trusted Relationship on page 372

#### Reference

- ▶ Connected Servers Graphical User Interface on page 373
- ▶ General Tab on page 374
- ▶ Server Types on page 375
- ▶ Server Properties on page 376
- ▶ Integration Type on page 377
- ▶ Outgoing Connection on page 378
- ▶ Event Drilldown on page 379

- ▶ [Incoming Connection](#) on page 380

## Introduction to Connecting Servers

The Connected Servers manager enables you to specify HP Operations Manager servers, external event processing servers, and other Operations Management (BSM) servers as event forwarding targets.

The Connected Servers manager also enables you to specify the web service credentials of the HPOM servers that are used for Tool and Action execution or to retrieve Instructions.

Connected servers are used in conjunction with event forwarding rules to redirect selected events to specific servers. For event forwarding to be possible, the following prerequisites must be met:

- ▶ The two servers need to trust each other. To setup a valid certificated trust, follow the steps on [How to Establish a Trust Relationship for a Server Connection](#) on page 370.
- ▶ All target servers must be configured as Connected Servers. To configure servers connected to Operations Management, see [How to Create a Connection to another OMi Instance](#) on page 363, [How to Create a Connection to an HPOM Server](#) on page 364, and [How to Create a Connection to an External Event Processing Server](#) on page 366.

## How to Create a Connection to another OMi Instance

This task shows you how to create a server connection used to forward events to another Operations Manager *i* instance.

**To create a server connection to another Operations Manager *i* instance:**

**1** Open the Connected Servers manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Connected Servers**

**2** In the Connected Servers pane, click the \* button to open the Create New Server Connection dialog box.

**3** Enter a unique name, display name, and (optional) a description of the connection being specified.

**4** Select **Active**, if you want to make the server connection active immediately.

**5** Click **Next** to open the Server Type page.

**6** Select the **Operations Manager *i*** server type.

**7** Click **Next** to open the Server Properties page.

**8** Enter the fully qualified DNS name of the host system of the Operations Manager *i* instance.

If there are multiple servers, or if HP Business Service Management is deployed in a distributed architecture, specify the load balancer or the BSM Gateway Server hosting the Operations Management application, as required.

**9** Specify if you want to forward topology information from the Operations Manager *i* instance to which you are logged on, to the Operations Manager *i* instance that you are currently configuring.


**10** Click **Test Connection** to check that the specified connection attributes are correct. If an error link is displayed, check the error message, correct the connection information, and re-test the connection.

**11** Select **Finish**.

## How to Create a Connection to an HPOM Server

This task shows you how to create a server connection to an HP Operations Manager server. Operations Management can forward events, run actions and tools on, and retrieve instructions from an HPOM server. Credentials for the HPOM web service are required for this processing.

### To create a server connection to an HP Operations Manager server:

- 1** Open the Connected Servers manager from Operations Management Administration:  
**Admin > Operations Management > Tune Operations Management > Connected Servers**
- 2** In the Connected Servers pane, click the  button to open the Create New Server Connection dialog box.
- 3** Enter a unique name, display name, and (optional) a description of the connection being specified.
- 4** Select **Active**, if you want to make the server connection active immediately.
- 5** Click **Next** to open the Server Type page.
- 6** Select the **HP Operations Manager** server type.
- 7** Click **Next** to open the Server Properties page.
- 8** Enter the fully qualified DNS name of the host system of the HP Operations Manager server.
- 9** Specify if you want to forward topology information from the Operations Manager *i* instance to which you are logged on, to the HP Operations Manager instance that you are currently configuring.
- 10** Select the HP Operations Manager product type. The options include:
  - HP Operations Manager for UNIX
  - HP Operations Manager for Windows
- 11** Click **Test Connection** to check that the specified connection attributes are correct. If an error link is displayed, check the error message, correct the connection information, and re-test the connection.

- 12 Click **Next** to open the Outgoing Connection page.

The outgoing connection is used to receive instructions, and execute tools and actions on external nodes.

- 13 Enter the user credentials (User name and Password) and port required to access the server for receiving instructions, and executing tools and actions. The default port value is automatically inserted and can be restored using **Set default port**.

If you want actions to be run from an alternative server, select **Use Other Server** and select an HP Operations Manager server from the list of configured servers.

- 14 Click **Test Connection** to check that the specified connection attributes are correct. If an error link is displayed, check the error message, correct the connection information, and re-test the connection.

- 15 Select **Finish**.

## How to Create a Connection to an External Event Processing Server


This task shows you how to create a server connection to an external event processing server.

---

**Note:** HP Service Manager 9.20 does not support Notify and Notify and Update as forwarding types.

---

### To create a server connection to an external event processing server:

- 1 Open the Connected Servers manager from Operations Management Administration:  
**Admin > Operations Management > Tune Operations Management > Connected Servers**
- 2 In the Connected Servers pane, click the  button to open the Create New Server Connection dialog box.
- 3 Enter a unique name, display name, and (optional) a description of the connection being specified.
- 4 Select **Active**, if you want to make the server connection active immediately.
- 5 Click **Next** to open the Server Type page.
- 6 Select the **External Event Processing** server type.
- 7 Click **Next** to open the Server Properties page.
- 8 Enter the fully qualified DNS name of the host system of the external event processing server.
- 9 Select Supports Synchronize and Transfer Control if the external server supports transfer control and back synchronization of changes to events.
- 10 Click **Next** to open the Integration Type page.
- 11 Select an Integration Type used to establish the connection with the external server type and provide the requested information.

The options include:

### Call Groovy Script Adapter

Integrating an external server using Groovy scripts requires some steps that are described in the *Operations Manager i Extensibility Guide* PDF.

- a** Select an external event processing type.
- b** Select the Groovy script required by the selected external event processing type.
- c** *Optional:* Specify Groovy script classpaths.
- d** Specify a time limit for the execution of the script.

### Call External Event Web Service

Enter the root URL Path for the external event web service.

- 12** Click **Next** to open the Outgoing Connection page.
- 13** For event forwarding, enter the user credentials (User name and Password) and the port number required to access the external server.
- 14** For secure communication, select the **Use Secure HTTP** option.
- 15** To be able to transfer responsibility to the external event processing server, select the **Supports Synchronize and Transfer Control** option.
- 16** Click **Test Connection** to check that the specified connection attributes are correct. If an error link is displayed, check the error message, correct the connection information, and re-test the connection.
- 17** Click **Next** to open the Event Drilldown page.
- 18** Enter the fully qualified DNS name of the host system of the external event processing server and the port number used for drilldown.
- 19** For secure communication, select the **Use Secure HTTP** option.
- 20** Click **Next** to open the Incoming Connection page.
- 21** Specify the credentials for the Operations Management user used to access and update events.
- 22** Select **Finish**.


## **How to Edit a Server Connection**

This task shows you how to edit an existing connection.

**To edit an existing server connection:**

- 1** Open the Connected Servers manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Connected Servers**

- 2** Select the server that you want to edit.
- 3** In the Connected Servers pane, click the  button to open the Edit Server Connection dialog box.
- 4** Make the required changes to the selected server.  
Navigate between the pages using the tabs.
- 5** Select **Finish**.




## How to Delete a Server Connection

This task shows you how to delete an existing connection.

**To delete an existing server connection:**

- 1** Open the Connected Servers manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Connected Servers**

- 2** Select the server connection settings that you want to delete.
- 3** In the Connected Servers pane, click the  button.

The selected server connection is deleted from the list of connected servers.

## How to Establish a Trust Relationship for a Server Connection

For connection and communication between BSM and external servers such as HPOM hosts, other BSM hosts where Operations Management is running, Load Balancers, or a BSM 9.00 Server with an event channel license, you must establish a trust relationship between the various machines.

If you have a one-machine deployment, then the separate configuration for gateway server is not necessary. In this case, skip to the section “To establish a trust relationship between the Data Processing Server and external servers.”

### To set up certificates on a separate Gateway Server do the following:

- 1 On the BSM Gateway Server, execute the following commands:

```
ovconfchg -ns sec.cm.client -set CERTIFICATE_SERVER  
<processing_server>
```

and:

```
ovcert -certreq
```

- 2 On the BSM Processing Server, execute the following commands:

```
ovcm -listpending -l
```

and:

```
ovcm -grant <reqid>
```

- 3 On the BSM Gateway Server, execute the following commands:

```
ovcert -list
```

and:

```
bbcutil -ping <processing_server>
```

### To establish a trust relationship between the Data Processing Server and external servers, do the following:

- 1 On the BSM Data Processing Server, execute the following command:

```
ovcert -exporttrusted -file omi.cert
```

- 2 On the external machine, execute the following command:

**ovcert -exporttrusted -file other.cert**

- 3** Copy **other.cert** from the external machine to the BSM Data Processing Server.
- 4** Copy **omi.cert** from the BSM Data Processing Server to the external server.
- 5** On the BSM Data Processing Server, execute the following commands:  
**ovcert -importtrusted -file other.cert**  
and:  
**ovcert -importtrusted -file other.cert -ovrg server**
- 6** On the external server, execute the following commands:  
**ovcert -importtrusted -file omi.cert**  
and:  
**ovcert -importtrusted -file omi.cert -ovrg server**
- 7** On all Gateway Servers, execute the following commands:  
**ovcert -updatetrusted**

---

**Note:** If BSM is required to issue certificates, for example, for an Integration Adapter, then the Gateway Servers must be configured to forward all incoming requests to the Data Processing Server. The Data Processing Server must be configured in the Operations Management Infrastructure Settings:

**Applications > Operations Management > Certificate Server Settings > Certificate Server Host**

---

## How to Verify the Trusted Relationship

After establishing a trust relationship between the BSM Data Processing Server and external machines, check the connection between the two systems.

**To check the connection between the BSM Data Processing Server and an external machine, do the following:**

- 1 From the external host, verify that communication to the BSM installation is possible (the return value should be eServiceOk) by executing the following command on the Gateway Server for single Gateway Server deployments or the Load Balancer for multiple Gateway Server deployments:

**`bbcutil -ping https://<HP BSM load_balancer or single_gateway_server>`**

Example of the command result:

```
https://<HP BSM servername>: status=eServiceOk  
coreID=7c66bf42-d06b-752e-0e93-e82d1644cef8 bbcV=06.10.105  
appN=ovbbccb appV=06.10.105 conn=1 time=1094 ms
```

- 2 From the HP BSM Data Processing Server host, verify that communication with the external server host is possible (the return value should be eServiceOk) by executing the following command:

**`bbcutil -ping https://<external_server_hostname>`**







Example of the command result:

```
https://<HP BSM servername>: status=eServiceOk  
coreID=0c43c032-5c94-7535-064a-f7654a86f2d3 bbcV=06.10.070  
appN=ovbbccb appV=06.10.070 conn=7 time=140 ms
```

## Connected Servers Graphical User Interface

The Connected Servers manager enables you to create and manage connections to Operations Management, HP Operations Manager and external event processing servers.

The Connected Servers pane displays the UI elements listed in the following table.

UI Elements	Description
	Reloads the connected servers list.
 <b>New Item</b>	Opens the Create New Server Connection dialog box to create a server connection. For more information about creating server connections, see <a href="#">"How to Create a Connection to an HPOM Server" on page 364</a> .
 <b>Edit Item</b>	Opens the Edit Server Connection dialog box to edit an existing server connection. For more information about editing server connections, see <a href="#">"How to Edit a Server Connection" on page 368</a> .
 <b>Delete Item</b>	Deletes the currently selected server connection. For more information about deleting server connections, see <a href="#">"How to Delete a Server Connection" on page 369</a> .
 <b>Expand All</b>	Expands the list to display details for all the specified servers.
 <b>Collapse All</b>	Collapses all open server details panes.
<b>Active</b>	Indicates whether the associated server connection is currently active.
<b>Description</b>	Brief description of the server connection.

UI Elements	Description
<b>External Event Processing Type</b>	Integration type of external applications.
<b>Forward Dynamic Topology</b>	For HP Operations Manager and Operations Manager <i>i</i> applications, specifies if the associated server is a target for topology synchronization.
<b>Fully Qualified DNS Name</b>	The fully qualified Domain Name System name of the system hosting the selected server. For example: myhost.example.com.  For Operations Manager <i>i</i> installations, if there are multiple servers, or if HP Business Service Management is deployed in a distributed architecture, specify the load balancer or Gateway Server, as required.
<b>Name</b>	Display name of the selected server connection.
<b>Port</b>	The port used to communicate with the selected server. <b>Note:</b> For information about checking and changing ports, refer to the documentation of your web server product.
<b>(Server) Type</b>	Server type of the connected server. The options include: <ul style="list-style-type: none"> <li>➤ Operations Manager <i>i</i></li> <li>➤ HP Operations Manager for UNIX</li> <li>➤ HP Operations Manager for Windows</li> <li>➤ External Event Processing</li> </ul>

## General Tab

The General tab displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Active</b>	Indicates whether the associated server connection is currently active.
<b>Description</b>	Brief description of the server connection.

UI Elements (A-Z)	Description
<b>Display Name</b>	Display name of the selected server connection.
<b>Name</b>	Internal name of the selected server connection. Automatically generated from the Display Name value. The first character must be a letter (A-Z, a-z) or an underscore (_). All other characters can be a letter (A-Z, a-z), a number (0-9), or an underscore (_). Can be manually overwritten.
<b>Type (Edit only)</b>	<b>External Event Processing</b> — Integrations to external applications. <b>Operations Manager</b> — HP Operations Manager for Windows or UNIX applications. <b>Operations Manager i</b> — Integrations into other Operations Manager <i>i</i> applications.

## Server Types

The Server Type tab displays the UI elements for the available applications listed in the following table.

UI Elements (A-Z)	Description
<b>External Event Processing</b>	Select for integrations to external applications.
<b>Operations Manager</b>	Select for HP Operations Manager for Windows or UNIX applications.
<b>Operations Manager <i>i</i></b>	Select for integrations into other Operations Manager <i>i</i> applications.

## Server Properties

The Server Properties tab displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Forward Dynamic Topology</b>	Select if you want to forward topology information from the HP Operations Manager instance that you are currently configuring to this instance of Operations Manager <i>i</i> .
<b>Fully Qualified DNS Name</b>	The fully qualified Domain Name System name of the system hosting the selected server. For example: myhost.example.com.
<b>Integration User</b>	The HPOM user used to update event in HPOM with information from Operations Manager <i>i</i> . <b>NOTE:</b> it is recommended to use a dedicated user so that it is clear which events are owned by and being worked on in Operations Manager <i>i</i> .
<b>Operations Manager Type (HPOM only)</b>	Server type of the connected HP Operations Manager server. The options include:. <ul style="list-style-type: none"> <li>➤ HP Operations Manager for UNIX</li> <li>➤ HP Operations Manager for Windows</li> </ul>



## Integration Type

The Integration Type tab displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Call External Event Web Service</b>	Integration Type used to establish the connection with the external server type and provide the requested information.
<b>Call Groovy Script Adapter</b>	Integration Type used to establish the connection with the external server type and provide the requested information.  Integrating an external server using Groovy scripts requires some steps that are described in the the <i>Operations Manager i Extensibility Guide</i> PDF.
<b>External Event Processing Type</b>	Selects an available external event processing type from the list.
<b>Groovy Script Classpath</b>	<i>Optional:</i> Specifies Groovy script classpaths.
<b>Groovy Script File Name</b>	Selects the Groovy script required by the selected external event processing type from the list.
<b>Maximum Transaction Time</b>	Specifies a time limit for the execution of the script.
<b>Root URL Path</b>	Specifies the root URL Path for the external event web service.

## Outgoing Connection

The Outgoing Connection tab displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Event Forwarding</b>	Credentials and port used for event forwarding to an External Event Processing server.
<b>Integration User</b>	The HPOM user used to update event in HPOM with information from Operations Manager <i>i</i> . This user is also used to run actions and tool on HPOM nodes and retrieve instruction text from HPOM. <b>NOTE:</b> it is recommended to use a dedicated user so that it is clear which events are owned by and being worked on in Operations Manager <i>i</i> .
<b>Password</b>	Password for the user account on the external server. For an HPOM server, used for receiving instructions, and executing tools and actions. For an External Event Processing server, used for event forwarding.
<b>Port</b>	Communication port on the external server. For an HPOM server, used for receiving instructions, and executing tools and actions. For an External Event Processing server, used for event forwarding. <b>Set default port</b> specifies the default port used by HPOM. <b>Note:</b> For information about checking and changing ports, refer to the documentation of your web server product.
<b>Server ID</b>	Enables the selection of an alternative, configured HPOM server for receiving instructions, and executing tools and actions.
<b>Supports Synchronize and Transfer Control</b>	Selects the Supports Synchronize and Transfer Control option to enables the transfer responsibility to the external event processing server.

UI Elements (A-Z)	Description
<b>Use Other Server</b>	Specifies that an alternative, configured HPOM server is to be used for receiving instructions, and executing tools and actions.
<b>Use this Server</b>	Use the currently active server HPOM for receiving instructions, and executing tools and actions.
<b>User Name</b>	Name of the user account on the external server. For an HPOM server, used for receiving instructions, and executing tools and actions. For an External Event Processing server, used for event forwarding.
<b>Use Secure HTTP</b>	Selects the Use Secure HTTP option for secure communication.

## Event Drilldown

The Event Drilldown tab displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Fully Qualified DNS Name</b>	The fully qualified Domain Name System name of the system hosting the External Event Processing server. For example: myhost.example.com.
<b>Port</b>	Communication port on the External Event Processing server, used for event drilldown.
<b>Use Secure HTTP</b>	Selects the Use Secure HTTP option for secure communication.

 **Incoming Connection**

The Incoming Connection tab displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Event Backsync</b>	Credentials of the Operations Management user used by the External Event Processing server to update events on the BSM server from which the event was forwarded.
<b>Password</b>	Password for the automatically-generated user account used to receive updates from the external server.
<b>User Name</b>	Automatically-generated user account used by the External Event Processing server to update events on the server from which the event was forwarded.

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## Event Forwarding to External Servers

### **This chapter includes:**

#### Concepts

- ▶ Introduction to Event Forwarding Rules on page 381

#### Tasks

- ▶ How to Create an Event Forwarding Rule on page 383
- ▶ How to Edit an Event Forwarding Rule on page 385
- ▶ How to Duplicate an Event Forwarding Rule on page 386
- ▶ How to Delete an Event Forwarding Rule on page 387

#### Reference

- ▶ Event Forwarding Graphical User Interface on page 388
- ▶ Troubleshooting and Limitations on page 390

### **Introduction to Event Forwarding Rules**

The Event Forwarding manager enables you to setup rules to select and forward events to external event managers such as another Operations Manager *i* instance, HP Operations Manager and or a Help desk application. These external managers are also referred to as event forwarding targets.

Event forwarding rules are used in conjunction with server connections to redirect selected events to specific event managers. Events can be forwarded for information or as a result of an escalation where the ownership of the problem is transferred to a more specialized group of experts.

Events to be forwarded are held in a queue. A server is selected and an attempt is made to send the first request to this server. If the server is available, all other pending requests for this server are also sent in series. This procedure is repeated for all other forwarding requests and servers. If a server is not available, the next server is selected and the events destined for this server are sent. After all possible events have been sent, servers that could not be reached are retried until forwarding of events in the queue is complete or queued events are older than time period set in the Event Forwarding Expiration setting, at which time they are deleted from the queue. For details about this setting, see [Event Forwarding Settings](#) on page 518.



## How to Create an Event Forwarding Rule

This task shows you how to create an event forwarding rule.

### To create an event forwarding rule:

- 1 Open the Event Forwarding manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Forwarding Rules**

- 2 In the Event Forwarding Rules pane, click the  button to open the Create New Event Forwarding Rules dialog box.
- 3 Enter a display name, and (optional) a description of the event forwarding rule being specified.
- 4 Select **Active**, if you want to make the event forwarding rule active immediately.
- 5 Select an event filter for the event forwarding rule from the **Events Filter** list. The filter determines which events to consider for forwarding.  
If no appropriate filter is already configured, click the Browse (...) button, which opens the Select an Event Filter dialog box. Create a filter or edit an existing one. For information about filters, see "How to Define Basic Event Filters" on page 206.
- 6 Select one or more target server to which the events selected by this rule should be forwarded. For each target server, add it to the rule using the  button.

If no target servers are configured, configure the required target servers first. For details, see "[How to Create a Connection to an HPOM Server](#)" on page 364.

- 7 For each target server that you have added to the event forwarding rule, specify a forwarding type. The options include:
  - Notify
  - Notify and Update
  - Synchronize

- ▶ Synchronize and Transfer Control (External Event Processing Server only)

---

**Note:** An Automatic forwarding rule that is configured to transfer control of an event to a Connected Server may fail if the event has already been transferred to another server. In this case the following is done:

- ▶ The event is forwarded to the specified connected server as Notify and Update and not as Synchronize and Transfer Control.
- ▶ A log file entry is made to the log/opr-backend/opr-backend.log file.
- ▶ An annotation is made to the event with the log message. The author of the annotation is System:Forwarding.


- 
- 8 Select **OK**.



## How to Edit an Event Forwarding Rule

This task shows you how to edit an existing event forwarding rule.

### To edit an existing event forwarding rule:

- 1 Open the Event Forwarding manager from Operations Management Administration:  
**Admin > Operations Management > Tune Operations Management > Forwarding Rules**
- 2 Select the event forwarding rule that you want to edit.
- 3 In the Event Forwarding Rules pane, click the  button to open the Edit Event Forwarding Rule dialog box.
- 4 Make the required changes to the selected event forwarding rule.
- 5 Select **OK**.

## How to Duplicate an Event Forwarding Rule


This task shows you how to duplicate an existing event forwarding rule to use as the basis for a new event forwarding rule.

### To duplicate an existing event forwarding rule:

- 1 Open the Event Forwarding manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Forwarding Rules**

- 2 Select the event forwarding rule that you want to duplicate.

- 3 In the event forwarding rules pane, click the  button.

The Create New Event Forwarding Rule dialog box opens with a duplicate of the selected rule.

- 4 Edit the duplicate event forwarding rule to suit the new event forwarding rule.

For details about editing, see ["How to Edit an Event Forwarding Rule" on page 385](#).


## How to Delete an Event Forwarding Rule

This task shows you how to delete an existing event forwarding rule.

### To delete an existing event forwarding rule:

- 1 Open the Event Forwarding manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Forwarding Rules**







- 2 Select the event forwarding rule that you want to delete.
- 3 In the Event Forwarding Rules pane, click the  button.


The selected event forwarding rule is deleted from the list of event forwarding rules.

## Event Forwarding Graphical User Interface

The Event Forwarding manager enables you to create and manage rules to forward events to Operations Management, HP Operations Manager and external event processing servers.

The Event Forwarding pane displays the UI elements listed in the following table.

UI Elements	Description
	Reloads the event forwarding rules list.
 <b>New Item</b>	Opens the Create New Event Forwarding Rule dialog box to create an event forwarding rule. For more information about creating event forwarding rules, see <a href="#">"How to Create an Event Forwarding Rule" on page 383</a> .
 <b>Duplicate Item</b>	Creates a copy of the selected event forwarding rule. For more information about duplicating event forwarding rules, see <a href="#">"How to Duplicate an Event Forwarding Rule" on page 386</a> .
 <b>Edit Item</b>	Opens the Edit Event Forwarding Rule dialog box to edit an existing event forwarding rule. For more information about editing event forwarding rules, see <a href="#">"How to Edit an Event Forwarding Rule" on page 385</a> .
 <b>Delete Item</b>	Deletes the selected event forwarding rule. For more information about deleting event forwarding rules, see <a href="#">"How to Delete an Event Forwarding Rule" on page 387</a> .
	Opens the Connected Servers manager.

UI Elements	Description
	<p>Opens the Manage Event Filters dialog box, enabling you to select the event filter that you want to apply.</p> <p>From the Select an Event Filter dialog box, you can also open the Filter Configuration dialog box to create an event filter, edit or delete an existing event filter.</p> <p>For more information about the event filters, see "Event Filters" on page 200.</p>
<b>Active</b>	Indicates whether the associated event forwarding rule is active.
<b>Description</b>	Brief description of the event forwarding rule.
<b>Display Name</b>	Display name of the selected event forwarding rule.
<b>Event Filter</b>	Filter used to select events to forward.
<b>Forwarding Type</b>	<p>Specifies how an event forwarded to a certain server is handled. The options include:</p> <ul style="list-style-type: none"> <li>▶ <b>Notify</b> — Target server receives original events but no further updates</li> <li>▶ <b>Notify and Update</b> — Target server receives original events and all further updates</li> <li>▶ <b>Synchronize</b> — Target server receives original events and all further updates and sends back all updates</li> <li>▶ <b>Synchronize and Transfer Control</b> — Target server receives original events and updates and sends back all updates. Ownership of the event is transferred to the other server.</li> </ul>
<b>Target Servers</b>	Servers selected as event forwarding targets for the selected event forwarding rule.

## Troubleshooting and Limitations

This section provides help in troubleshooting problems relating to forwarding events.

### **Events are Being Forwarded to a Disabled Target System**

A target server is disabled by deselecting the **Active** flag in the associated connected server list entry event forwarding continues.

- ▶ Instead of deactivating the server, deactivate the forwarding rule for this server as follows:

From the Forwarding Rules manager, select all rules using this connected server and deactivate these rule. Deactivating a rule also disables forwarding to other targets using this rule.

### **Event Forward Request to a Connected Server Fails**

If the request to forward an event to a particular connected server fails, the request is deleted from the forwarding queue and the event makes an internal note that the delivery to the target server has failed. The event maintains information about the failed request to the specified connected server. Any further forwarding rule matches on this event for this connected server is ignored. If the forwarding type was set to Synchronize and Transfer Control, a standard event annotation is also added to the event, otherwise no event annotation is made.

- ▶ Failure to deliver can occur for retry timeouts, or a catastrophic delivery error. A catastrophic delivery error is a situation where it does not make sense to retry the request, for example, a mis-configuration (authentication fails), or a programming error is encountered in an External Process groovy adapter (NullPointerException). These cases require manual intervention before retrying.

To manually retry failed requests to a particular connected server, from the Event Browser, manually transfer control of an event that has previously failed delivery to a particular server.

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## Notifications

### **This chapter includes:**

#### Concepts

- ▶ [Introduction to Notifications](#) on page 391

#### Tasks

- ▶ [How to Create a Notification Rule](#) on page 392
- ▶ [How to Create and Edit Notification Templates](#) on page 394
- ▶ [How to Edit a Notification Rule](#) on page 395
- ▶ [How to Duplicate a Notification Rule](#) on page 396
- ▶ [How to Delete a Notification Rule](#) on page 397

#### Reference

- ▶ [Notifications Graphical User Interface](#) on page 398
- ▶ [Manage Templates Graphical User Interface](#) on page 400
- ▶ [Available Event Attributes Dialog](#) on page 401

### **Introduction to Notifications**


You use the Notifications manager to setup rules to notify remotely-located people when events with predefined characteristics are received. Notifications can take the form of Emails, SMSs and Pager messages. Notifications must be sent to recipients set up in the Recipients manager.

**Admin > Platform > Recipients > Recipients Management**


## How to Create a Notification Rule

This task shows you how to create a notification.

### To create a notification:

- 1 Open the Notification manager from Operations Management Administration:  
**Admin > Operations Management > Tune Operations Management > Notifications**
- 2 In the Notification Rules pane, click the  button to open the Create New Notification Rule dialog box.
- 3 In the General page, enter a display name, and (optional) a description of the notification being specified.
- 4 Select **Active**, if you want to make the notification active immediately.
- 5 Select an event filter for the notifications from the **Events Filter** list. The filter determines which events to consider for forwarding.

If no appropriate filter is already configured, click the Browse (...) button, which opens the Select an Event Filter dialog box. Create a filter or edit an existing one. For information about filters, see "How to Define Basic Event Filters" on page 206.

- 6 Select **Next**. The Recipients page opens.
- 7 In the Recipients page, select the people to whom you want to have notifications sent. One recipient must be selected.  
If no recipients are already configured, first click the  button to open the Recipients manager and specify the data for the required people before creating the Notification Rule.
- 8 Select **Next**. The Templates page opens.
- 9 In the Templates page, specify an email, SMS and a pager message templates that you want to use as the notification information. Alternatively, select default to apply the default template for the associated message type.



If no appropriate templates are available, select **Manage Templates** and modify an existing one or create new ones. Specify a template for all types of notifications.

For information about creating notification templates, see "[How to Create and Edit Notification Templates](#)" on page 394.

**10** Select **Finish**.


## How to Create and Edit Notification Templates

This task shows you how to create a notification template.

### To create or edit a notification template:



- 1 Open the Notification manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Notifications**

- 2 In the Notifications pane, click the  button to open the Manage Templates dialog box.

Alternatively, if you are creating or editing a notification rule, in the Templates page or tab, select **Manage Templates**.

The Notification Template Manger opens.

- 3 Click the  button to open the Create New Notification Template dialog box or select an existing notification template and click the  button to open the Edit Notification Template dialog box.
- 4 For new templates, enter a Display Name.
- 5 Select the type of message template that you want to configure; **Email**, **SMS**, or **Pager**.
- 6 For an email message, enter a title for the email.
- 7 Construct or modify the message content for the selected Template.

You can specify event attributes in your message text to help make the notification more informative. For example, you can create a message that informs the recipient which system has a problem and what the severity is with the following string:

```
<<event.node.id>> is showing severity <<event.severity>>.
```


To specify event attributes:

- a Click **Insert** to open the Available Event Attributes dialog box.
  - b Select an event attribute to be used in your message and click **Insert**.
  - c Repeat for further event attributes as required.
- 8 Select **OK**.

## How to Edit a Notification Rule

This task shows you how to edit an existing notification.

### To edit an existing notification:

- 1 Open the Notification manager from Operations Management Administration:  
**Admin > Operations Management > Tune Operations Management > Notifications**
- 2 Select the notification that you want to edit.
- 3 In the Notifications pane, click the  button to open the Edit Notifications dialog box.
- 4 Make the required changes to the selected notification.
- 5 Select **OK**.

## **How to Duplicate a Notification Rule**


This task shows you how to duplicate an existing notification to use as the basis for a new notification.

### **To duplicate an existing notification:**

- 1** Open the Notification manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Notifications**

- 2** Select the notification that you want to duplicate.

- 3** In the Notifications pane, click the  button.

The selected notification is duplicated and added to the list of notifications.


- 4** Edit the duplicate notification to suit the new notification.

For details about editing, see ["How to Edit a Notification Rule" on page 395](#).

## How to Delete a Notification Rule

This task shows you how to delete an existing notification rule.

### To delete an existing notification:








- 1** Open the Notification manager from Operations Management Administration:  
**Admin > Operations Management > Tune Operations Management > Notifications**
- 2** Select the notification that you want to delete.
- 3** In the notifications pane, click the  button.


The selected notification is deleted from the list of notifications.

## Notifications Graphical User Interface

The Notifications manager enables you to create and manage forwarding notifications to individuals using email, SMS, and pager messaging.

The Notifications page displays the UI elements listed in the following table.






UI Elements	Description
	Reloads the Notification Rules list.
 <b>New Item</b>	Opens the Create New Notifications dialog box to create a notification. For more information about creating notifications, see <a href="#">"How to Create a Notification Rule" on page 392.</a>
 <b>Duplicate Item</b>	Creates a copy of the selected notification. For more information about duplicating notifications, see <a href="#">"How to Duplicate a Notification Rule" on page 396.</a>
 <b>Edit Item</b>	Opens the Edit Notifications dialog box to edit an existing notification. For more information about editing notifications, see <a href="#">"How to Edit a Notification Rule" on page 395.</a>
 <b>Delete Item</b>	Deletes the selected notification. For more information about deleting notifications, see <a href="#">"How to Delete a Notification Rule" on page 397.</a>
	Opens the Recipients manager from where you can specify an individual's contact data used to forward notifications.
 <b>Manage Templates</b>	Opens the Manage Templates dialog box, enabling you to create, edit and delete templates.

UI Elements	Description
	<p>Opens the Manage Event Filters dialog box, enabling you to select the event filter that you want to apply.</p> <p>From the Select an Event Filter dialog box, you can also open the Filter Configuration dialog box to create an event filter, edit or delete an existing event filter.</p> <p>For more information about the event filters, see "Event Filters" on page 200.</p>
<b>Active</b>	Indicates whether the associated notification is active.
<b>Description</b>	Brief description of the notification.
<b>Display Name</b>	Display name of the selected notification.
<b>Event Filter</b>	Filter used to select events to forward.
<b>Recipients</b>	<p>Specifies how an event forwarded to a certain server is handled. The options include:</p> <ul style="list-style-type: none"> <li>▶ <b>Name</b> — Name of the target recipient for the notification</li> <li>▶ <b>Email</b> — Email address of the target recipient</li> <li>▶ <b>SMS</b> — Mobile phone number of the target recipient</li> <li>▶ <b>Pager</b> — Pager number of the target recipient</li> </ul>
<b>Templates</b>	<p>Text entry pages to specify the content and structure of the notification. The notification types are:</p> <ul style="list-style-type: none"> <li>▶ <b>Email</b></li> <li>▶ <b>SMS</b></li> <li>▶ <b>Pager</b></li> </ul>

## Manage Templates Graphical User Interface

The Manage Templates manager enables you to create and manage email, SMS, and pager message templates for use with notifications.

The Manage Templates page displays the UI elements listed in the following table.

UI Elements	Description
	Reloads the templates list.
 <b>New Item</b>	Opens the Create New Notification Template dialog box to create a notification template. For more information about creating notifications, see " <a href="#">How to Create and Edit Notification Templates</a> " on page 394.
 <b>Duplicate Item</b>	Creates a copy of the selected notification template.
 <b>Edit Item</b>	Opens the Edit Notification Template dialog box to edit an existing notification template.
 <b>Delete Item</b>	Deletes the selected notification template.
<b>Body</b>	Text entry page to specify the content and structure of the notification template.
<b>Display Name</b>	Display name of the selected notification template.
<b>Insert</b>	Opens the Available Event Attributes dialog box, from which you can select event attributes to include in your message text.



UI Elements	Description
<b>Subject</b>	Text entry field to specify the title of the email notification template.
<b>Type</b>	Notification template types: <ul style="list-style-type: none"> <li>➤ Email</li> <li>➤ SMS</li> <li>➤ Pager</li> </ul>

## Available Event Attributes Dialog

The Available Event Attributes dialog box enables you to browse a list of available event attributes that are available for the configuration item type associated with the notification template you are creating or modifying. You can add these attributes, one at a time, as part of your message.

The Available Event Attributes dialog box displays the UI elements listed in the following table. In the table, unlabeled UI elements are shown in angle brackets (<>).

UI Elements (A-Z)	Description
<b>Attribute</b>	Selects the event attribute list from which you can select available event attributes.
<b>Custom Attribute</b>	Selects the custom attribute field in which you can specify a custom attribute. The custom attribute that you specify is entered using the syntax: <code>#{event.custom&lt;custom attribute name&gt;}</code>
<b>Display Name</b>	Name of the event attribute listed for the available configuration item type, for example: Originating Server, HI Value, or Custom Attribute.
<b>Key Value</b>	Event attribute key used to identify the event attribute.



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## Downtime Configuration

### **This chapter includes:**

#### Concepts

- ▶ [Introduction to Downtime Configuration](#) on page 403

#### Tasks

- ▶ [How to Create a Downtime Category Mapping](#) on page 406
- ▶ [How to Edit a Downtime Category Mapping](#) on page 407
- ▶ [How to Delete a Downtime Category Mapping](#) on page 408

#### Reference

- ▶ [Downtime Category Mappings Graphical User Interface](#) on page 409
- ▶ [Downtime Category Mappings Details Graphical User Interface](#) on page 410

### **Introduction to Downtime Configuration**

You can define and manage the downtime of CIs (configuration of CIs specifying periods of unavailability due to predetermined maintenance times) using the Downtime Management manager of the BSM platform.

You can access the Downtime Management manager as follows:

**Admin > Platform > Downtime Management**

A downtime configuration for a CI or a group of CIs primarily specifies the downtime period and the platform behavior (Action) for these CIs during this downtime period. If Take no action is selected, events received by Operations Management are handled normally. The events being generated during a downtime period are ignored. If any other action is selected, for example Suppress events, the downtime behavior configured in Operations Management is applied.

For details about configuring downtime, see "Downtime Management" in *Platform Administration*.

For a CI with configured downtime periods, you must consider how to manage events that are related to this CI while it is unavailable. A category is assigned to the downtime configuration for a CI. In Operations Management, downtime strategies for event management are configured using Downtime Category Mappings which define how events related to a CI are handle when received while that CI was in downtime. By default, events for which the related CI is in downtime are closed automatically.

For example, a category may specify that:

- ▶ Lifecycle of the event is set to resolved
- ▶ Steps in the event pipeline are activated or deactivated

In this example, for all CIs that are associated with this category, events received during downtime are set to **Resolved** and are visible in the Event Browser. All events that are related to these events are automatically set to closed and can be viewed from within the History Browser.

The platform provides a predefined list of categories and you can create additional categories using the Infrastructure Settings. Categories are selected and modified using the Categories list in the Downtime Management manager.

Downtime configurations that do not have a corresponding configuration in the Operations Management Downtime Manager use the category **Default**.

The following Operations Management Infrastructure Settings relate to downtime behavior:

- ▶ **Downtime History Range** — Time period within which past downtime configurations are considered. All downtime periods which have an end time that is before the beginning of the configured downtime history range period are ignored. Events created during such downtimes are treated as events not created during a downtime.
- ▶ **Future Downtime Range** — Time period within which future downtime configurations are considered. All downtime periods which have a start time that is after the end of the configured future downtime range period are ignored. Events created during such downtimes are treated as events not created during a downtime.
- ▶ **Refresh Time Interval** — Maximum time after changes in the maintenance windows configuration are taking effect.


## How to Create a Downtime Category Mapping

This task shows you how to create a downtime category mapping.

**To create a downtime category mapping:**

- 1 Open the Downtime Behavior manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Downtime Behavior**

- 2 In the Downtime Category Mappings pane, click the  button to open the Create New Downtime Category Mapping dialog box.
- 3 Select a category from the Category Name list.


A category is associated with each downtime configuration. When an event is received from a CI while in downtime, depending on the category of the CI downtime configuration, the appropriate downtime category mapping is applied. If no suitable downtime category mapping is available, the Default downtime category mapping is applied.

- 4 In the Set Lifecycle State section, select an action from the following choices:
  - ▶ **No change** — retains the original state of the event
  - ▶ **Closed** — changes the state to Closed for events that are related to CIs which are in downtime of the specified category (default)
  - ▶ **Resolved** — changes the state to Resolved for events that are related to CIs which are in downtime of the specified category
- 5 In the Active Pipeline Steps section, select the pipeline step that you want to have active for this downtime category.
- 6 Select **Show Confirmation Dialog**, if you want a confirmation dialog to be displayed before launching tools and actions.
- 7 Select **OK**.

## How to Edit a Downtime Category Mapping

This task shows you how to edit an existing downtime category mapping.

### To edit an existing downtime category mapping:

- 1 Open the Downtime Behavior manager from Operations Management Administration:  
**Admin > Operations Management > Tune Operations Management > Downtime Behavior**
- 2 Select the downtime category mapping that you want to edit.
- 3 In the Downtime Category Mappings pane, click the  button to open the Edit Downtime Categories dialog box.
- 4 Make the required changes to the selected downtime category mapping.
- 5 Select **OK**.


## How to Delete a Downtime Category Mapping

This task shows you how to delete an existing downtime category mapping.

**To delete an existing downtime category mapping:**

- 1** Open the Downtime Behavior manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Downtime Behavior**

- 2** Select the downtime category mapping that you want to delete.
- 3** In the Downtime Category Mappings pane, click the  button.
- 4** Confirm the deletion by clicking **Yes**.

The selected downtime category mapping is deleted from the list of downtime category mappings.

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**Note:** The Default category can not be deleted.





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## Downtime Category Mappings Graphical User Interface

The Downtime Behavior manager enables you to configure how Operations Management reacts on events that are related to CIs in downtime.

The Category Mappings pane displays the UI elements listed in the following table.

UI Elements	Description
 <b>Refresh</b>	Reloads the Categories list.
 <b>New Item</b>	Opens the Create New Downtime Category Mapping dialog box to create a downtime category mapping. For more information about creating downtime category mappings, see " <a href="#">How to Create a Downtime Category Mapping</a> " on page 406.
 <b>Edit Item</b>	Opens the Edit Downtime Category Mapping dialog box to edit an existing downtime category mapping. For more information about editing downtime category mappings, see " <a href="#">How to Edit a Downtime Category Mapping</a> " on page 407.
 <b>Delete Item</b>	Deletes the selected downtime category mapping. For more information about deleting downtime category mappings, see " <a href="#">How to Delete a Downtime Category Mapping</a> " on page 408.

## Downtime Category Mappings Details Graphical User Interface

The Downtime Details pane displays the configuration details of the downtime configuration selected in the Categories pane.

The Details page displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Active</b>	Indicates whether the associated event pipeline step active. Inactive is displayed for step that are not active.
<b>Active Pipeline Steps</b>	<p>Lists the possible event pipeline processing steps. All steps that are set to active are executed on the events when received.</p> <p>The processing steps that can be activated are:</p> <ul style="list-style-type: none"> <li>▶ <b>Close Related Events</b> — Close all events related to the event received during downtime of CI.</li> <li>▶ <b>EPI at Pipeline Exit</b> — Apply event processing at the end of the event processing stage.</li> <li>▶ <b>EPI after CI/ETI Resolution</b> — Apply event processing after the CI and ETI resolution steps.</li> <li>▶ <b>Duplicate Event Suppression</b> — Apply the Duplicate Event Suppression settings to events received during downtime of CI.</li> <li>▶ <b>Topology-Based Event Correlation</b> — Apply Topology Based Correlation Rules to o events received during downtime of the CI.o events received during downtime of the CI</li> <li>▶ <b>Automatic User Group Assignment of Events</b> — Apply the automatic assignment of user or group to events received during downtime of the CI.</li> </ul>

UI Elements (A-Z)	Description
<b>Set Lifecycle State</b>	Sets the lifecycle state for events received during a downtime period. The possible options are: <ul style="list-style-type: none"><li>▶ <b>No change</b> — retains the original state of the event</li><li>▶ <b>Closed</b> — changes the state to Closed for all events received during a downtime period.</li><li>▶ <b>Resolved</b> — changes the state to Resolved for all events received during a downtime period</li></ul>
<b>Show Confirmation Dialog</b>	Select to display a confirmation dialog before launching tools and actions.



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## Custom Actions

### **This chapter includes:**

#### Concepts

- ▶ Introduction to Custom Actions on page 413

#### Tasks

- ▶ How to Create a Custom Action Script on page 415
- ▶ How to Edit a Custom Action Script on page 417
- ▶ How to Duplicate a Custom Action Script on page 418
- ▶ How to Delete a Custom Action Script on page 419

#### Reference

- ▶ Custom Actions Scripts Graphical User Interface on page 420
- ▶ Custom Actions Details Graphical User Interface on page 421
- ▶ Custom Actions Details Graphical User Interface on page 421
- ▶ Custom Actions Details Graphical User Interface on page 421

### **Introduction to Custom Actions**

The Custom Actions manager enables you to setup scripts to run custom actions on events. For example, you can add a text string to certain events to make them easier to identify in the Event Browser.

Custom actions must be specified in Groovy scripts. For information about writing custom actions, see the *Operations Manager i Extensibility Guide*.

After a custom action is configured in Operations Management, it can be triggered from an event from the context menu:

**Right-click event > Launch > Custom Actions > custom action list**

Custom actions are listed in alphabetical order. The selected custom action is launched in the context of the CI associated with the selected event. If a custom action is run from a non-assigned event, that event is automatically assigned to the user that executed the custom action, and a corresponding entry is made in the Event History.

Permissions to launch custom actions can be set for each user, for information on configuring access to custom actions, see [How to Set Operations Management User or Group Permissions](#) on page 467.

Custom actions can be defined in content packs, which are then used to distribute the custom actions to additional Operations Management installations.


## How to Create a Custom Action Script

This task shows you how to create a custom action.

### To create a custom action:

- 1 Open the Custom Actions manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Custom Actions**

- 2 In the Scripts pane, click the  button to open the Add New Script dialog box.
- 3 In the General tab, enter a display name, and (optional) a description of the script being specified.
- 4 In the Script field, add the script text.
- 5 Select **Active**, if you want to make the custom action active immediately.
- 6 Select the Advanced tab.
- 7 In the Classpath pane, add and order any jar files required by the script.

The ordering of the jar files is used by the classpath during execution. For example:

Jar file A contains a class x.y.z.

Jar file B contains a class x.y.z.

The ordering of the jar files A and B dictates which class of which jar file is loaded.

- 8 Specify a timeout value for the script. If the script execution has not completed within the specified time, the result of the script is ignored.
- 9 Select Read-Only for scripts that must not alter the event.

---

**Note:** If a script that is labelled as read-only attempts to alter the event, the script is not executed and an error message is written to the ctxm logfile.

---

**10** Select **OK**.



## How to Edit a Custom Action Script

This task shows you how to edit an existing custom action.

### To edit an existing custom action:

- 1 Open the Custom Actions manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Custom Actions**

- 2 In the Scripts pane, select the custom action that you want to edit and click the  button.

The Edit Script dialog box opens.

- 3 Make the required changes to the selected custom action.
- 4 Select **OK**.


## **How to Duplicate a Custom Action Script**

This task shows you how to duplicate an existing custom action to use as the basis for a new custom action.

### **To duplicate an existing custom action:**

- 1** Open the Custom Action manager from Operations Management Administration:  
**Admin > Operations Management > Tune Operations Management > Custom Actions**

- 2** Select the custom action that you want to duplicate.

- 3** In the Scripts pane, click the  button.

The selected custom action is duplicated and added to the list of custom action.

- 4** Edit the duplicate custom action to suit the new custom action.

For details about editing, see ["How to Edit a Custom Action Script" on page 417](#).


## How to Delete a Custom Action Script

This task shows you how to delete an existing custom action rule.

### To delete an existing custom action:

- 1 Open the Custom Action manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Custom Actions**







- 2 Select the custom action that you want to delete.
- 3 In the Scripts pane, click the  button.

The selected custom action is deleted from the list of custom actions.

## Custom Actions Scripts Graphical User Interface

The Custom Action manager enables you to create and manage custom actions to modify events.

The Scripts pane displays the UI elements listed in the following table.

UI Elements	Description
 <b>Refresh</b>	Reloads the scripts list.
 <b>New Item</b>	Opens the Add New Script dialog box to create a custom action. For more information about creating custom actions, see <a href="#">"How to Create a Custom Action Script" on page 415</a> .
 <b>Duplicate Item</b>	Creates a copy of the selected custom action. For more information about duplicating custom action, see <a href="#">"How to Duplicate a Custom Action Script" on page 418</a> .
 <b>Edit Item</b>	Opens the Edit Script dialog box to edit an existing custom action. For more information about editing custom action, see <a href="#">"How to Edit a Custom Action Script" on page 417</a> .
 <b>Delete Item</b>	Deletes the selected custom action. For more information about deleting custom action, see <a href="#">"How to Delete a Custom Action Script" on page 419</a> .
 <b>Enable/Disable Item</b>	Toggles between Activating and deactivating the selected custom action.

## Custom Actions Details Graphical User Interface

The Custom Action manager enables you to create and manage custom actions to modify events and take actions as a result of receiving particular events.

The Details pane displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Active</b>	Indicates whether the associated custom action is active.
<b>Classpath</b>	List of jar files required by the script.
<b>Description</b>	Brief description of the custom action.
<b>Name</b>	Display name of the selected custom action.
<b>Script</b>	Groovy script used to specify the custom action.
<b>Read-Only</b>	Select Read-Only for a script that must not alter the event.  If a script that is labelled as read-only attempts to alter the eventuate script is not executed and an error message is written to the ctxm logfile.
<b>Timeout</b>	Timeout value for the script. If the script execution has not completed within the specified time, the result of the script is ignored.

## General Tab — Add New and Edit Script Dialog





The General Tab displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Active</b>	Specifies whether the associated custom action script is active.
<b>Description</b>	Brief description of the custom action script.

UI Elements (A-Z)	Description
<b>Name</b>	Name of the custom action script.
<b>Script</b>	Text of the custom action script.

## **Advanced Tab — Add New and Edit Script Dialog**

The Advanced Tab displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
	Opens the Select Files ... browser dialog to locate and add jar files to the script configuration.
	Deletes the selected classpath.
	Moves the selected classpath later in the order of execution.
	Moves the selected classpath early in the order of execution.
<b>Classpath</b>	Specifies the names and locations of user-defined supporting libraries (Jar files).
<b>Event Filter</b>	Specifies the filter to select events to be processed by this custom action script.
<b>Timeout</b>	Specifies the timeout value for the custom action script. If the script execution has not completed within the specified time, the script is ignored.

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## Handling Events Automatically

### **This chapter includes:**

#### Concepts

- ▶ [Introduction to Event Automation](#) on page 424
- ▶ [CI Resolution](#) on page 425
- ▶ [Close Related Events Automatically](#) on page 434
- ▶ [Duplicate Event Suppression](#) on page 435
- ▶ [Event Processing Interface](#) on page 436

#### Tasks

- ▶ [How to Configure CI Resolution Cache Usage](#) on page 438
- ▶ [How to Limit the Number of CIs Used by CI Resolution](#) on page 440
- ▶ [How to Create an Event Processing Script](#) on page 441
- ▶ [How to Edit an Event Processing Script](#) on page 443
- ▶ [How to Duplicate an Event Processing Script](#) on page 444
- ▶ [How to Delete an Event Processing Script](#) on page 445

#### Reference

- ▶ [EPI Steps Graphical User Interface](#) on page 446
- ▶ [Event Processing Scripts Graphical User Interface](#) on page 447
- ▶ [Event Processing Scripts Details Graphical User Interface](#) on page 448
- ▶ [General Tab — Add New and Edit Script Dialog](#) on page 449
- ▶ [Advanced Tab — Add New and Edit Script Dialog](#) on page 449

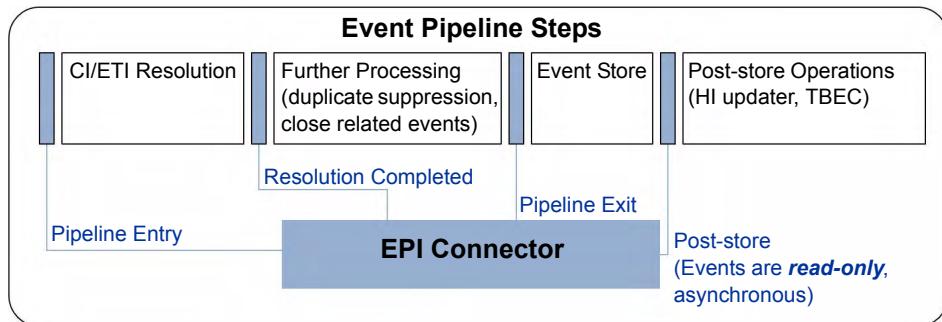
- ▶ [Troubleshooting and Limitations](#) on page 451

## Introduction to Event Automation

Events are processed using event processing rules before being stored in the database, enabling you to change or enrich an incoming event or remove a new event if it is a duplicate of an existing event.

There are dedicated pipeline steps for specific tasks, for example:

- ▶ CI, ETI, and user and group resolution
- ▶ Update of event using new state information and closing of related events
- ▶ Removal of duplicate events
- ▶ Event correlation
- ▶ EPI Script Execution





## CI Resolution

Since an event source does not have access to ODB IDs, a mechanism is required to identify the CI in the ODB that matches the CI associated with an event. Operations Management uses its CI Resolver to relate an incoming event to an impacted CI in the ODB. If the ODB ID for the associated CI is not sent with the event, the CI Resolver examines the contents of the event for hints that are used to achieve a best match.

CI resolution is used to resolve CI-related information or CI hints to CIs for the following purposes:

- Node resolution
- Source CI resolution
- Related CI resolution
- ETI hint resolution

If an ETI hint is also provided, it is used to improve CI matching.

### **CI Resolution Cache and its TQL**

The CI Resolver is used to identify the CI contained in the ODB that the event is related to. It extracts information about potential candidate CIs from the ODB using a TQL query and maintains this information in a cache. You can either provide a custom TQL query or use the OMiAutoView feature to automatically generate a suitable TQL.

A TQL query must meet the following requirements:

- Every CI that is contained by node must have a direct or transitive containment relationship to the node.
- In the TQL, the node must have one of the following attributes:
  - Primary Node DNS name
  - Association with one or more IP addresses (`ip_address`)
- At least CI type and data name of the CI must be visible.

- ▶ Site Scope Monitors or performance measures must have a `monitored_by` relationship to the monitored CI. The `monitor_id` and `session_id` must be visible.

To maximize performance, it is also possible to restrict the total number of CIs held in the cache, and restrict the CI types to those most helpful for CI resolution. Configuring the restriction of CIs and CI types is achieved using the following CI Resolver Settings:

- ▶ **CI Limit** — used to limit the number of CIs loaded into the cache.
- ▶ **Cache Modification Configuration** — used to specify which CI types and attribute types to exclude from the cache, and, if there are too many CIs being loaded into the cache, which CI types to use for CI resolution.

For detailed information, see [CI Resolver Settings](#) on page 507.

## Information Used to Identify CIs

The `hostedOn` information is very important for correctly identifying a CI, as an attempt is made to resolve the node for each CI. Since this information cannot be retrieved from the ODB directly, this information is derived by traversing all parent containment relationships of a CI. The hostname of this node is used as the `hostedOn` information. When an event is received by Operations Management, the node info value of the CI is compared to the `hostedOn` information of a CI. Only if they match, will the CI be used as a matching candidate.

If a CI does not have a node, for example, if it is a service, only events that also do not have a node info value are taken into account.

The CI type is another very important identifier. The combination of node name and CI type is very often enough information to identify the CI associated with an event. If you have a case where this information is not sufficient, check the information that you have for these CIs in the ODB and select a further attribute that can be used to differentiate the CIs. For example, the node name CI and disk drive CI is sufficient information to differentiate between drives on a computer.

## Node Resolution

The CI Resolver is used to update the node reference of an event. Three hints are examined to identify a related Node CI:

- HostInfo event attribute
- Service ID event attribute
- Cilnfo custom attribute

The HostInfo is an attribute from the HPOM agent to identify a target host. It usually contains the fully qualified domain name or the IP address of a host.

The Service ID event attribute and the Cilnfo custom attribute contain node information after the @@ separator in the event text.

The node reference is resolved as follows:

- 1** Fully qualified domain name (primary\_dnsname)
- 2** IP address taken from ODB
  - a** ip\_address.authoritative\_dns\_name
  - b** ip\_address.ip\_address
- 3** HPOM core ID taken from ODB

## Source CI Resolution

Source CI resolution is used to identify the event source CI and uses the SourceHint attribute of an event. The format of the SourceHint must be the same as that of the impacted CI resolution.

## CI Resolution

The CI Resolver uses the following strategy to resolve matching CIs:

- 1** Event contains a CI reference used to match the ODB information.
- 2** Event custom attribute contains a valid ODB ID.
- 3** Event custom attribute contains a valid SiteScope monitor ID.

- 4 Event `CilInfo` custom attribute matches a service name that can be mapped by Topology Synchronization into a valid ODB ID.
- 5 Event `Service ID` matches a service name that can be mapped by Topology Synchronization into a valid ODB ID.
- 6 Split `CilInfo` custom attribute into keywords and `hostedOn` information, and identify the best-fit CI.
- 7 Split `Service ID` into keywords and `hostedOn` information, and identify the best-fit CI.

In this context, `Service ID` is a field of an event that acquires the `Service ID` from an incoming event, for example, an HPOM message `Service ID`.

The CI Resolver uses dedicated custom attributes for the resolution process. The default custom attribute name is `CilInfo`.

Topology Synchronization provides a mapping table that allows the CI Resolver to map `Service IDs` directly to ODB IDs if the service has been synchronized by Topology Synchronization.

## CI Resolution Hints

The custom attribute and the `Service ID` are used to identify the CI related to an incoming event. If both fields use the same format, they are treated in a similar way. However, the custom attribute is evaluated before the `Service ID`, ensuring that the `Service IDs` can always be overridden by the custom attribute values should one be available.

The formats may not always be the same. The following examples illustrate how the various possible formats are handled:

ODB ID: `UCMDB:3bcbb67a6233cfdd0e400e7c1e637db5`

If a UUID prefixed by the string `UCMDB:` is found, it is assumed to be a native ODB ID. The CI Resolver verifies the validity of the ID and sets the CI reference to this ID. This is the fastest and most accurate method.

SiteScope Monitor: SiteScope:12:2

If a SiteScope ID (SiteScope:<session\_id>:<monitor\_id>) is found, the CI Resolver verifies the validity of the ID and sets the CI reference to the CI that is monitored by the SiteScope monitor.

---

**Note:** The following IDs are also resolved in the same way as for SiteScope

SiSMeasurement:<session\_id>:<measurement\_id>

OmCoreId:<omagentid>

For SiteScope and SiS Measurements, the monitored object is resolved (not the monitor or the measurement).

---

Service ID: OSSPI:svc:fs:/dev/hda@@@dbssystem.example.com

A traditional service name as used by HPOM Smart Plug-ins. If this service has been synchronized by Topology Synchronization, this name is known to the CI Resolver and can be directly mapped to a native ODB ID. After a validity check, the mapped ID is set as the CI reference.

A set of natural keys:

oracle:database:CMDBDB@@@dbssystem.example.com

If there is no exact knowledge about the target CI, a list of keywords (separated by colons in the message) is extracted from the message. The node name that contains the expected CI is specified after the @@ separator.

In our example, we are trying to find an Oracle Database instance called CMDBDB that is running on the node called dbssystem. The node information is important since there may be many occurrences of the Oracle Database instance called CMDBDB installed on different nodes. This information is used by the CI Resolver to find the best match by comparing these keys with the attribute information of the CIs in the ODB.

---

**Note:** This format is very similar to the HPOM Service ID format. This allows the CI Resolver to use the Service ID for resolving a CI when there is no direct resolution.

---

As for a set of natural keys but for an unhosted CI:

mailservice:northamerica

For CIs that are not related to a node, like the email service provided for the northamerica region. To indicate that there is no hosted on information, the @@ separator must be omitted.

An @@ separator without a node is not allowed, due to support for HPOM.

## Advanced CI Resolution Hints

There may be internal IDs that can be used to identify a CI in the ODB. However, its not always possible to identify whether the ID belongs to the same ODB instance that is used by Operations Management. For such cases, the CI Resolver provides an advanced CI Resolution hint, which may contain more than one concept to describe a CI. You can add multiple CI descriptions that can be examined by the CI Resolver. If a hint provides a match, the resulting CI is accepted, otherwise the next identifier is examined.

The new CI Resolver hint takes the following format:

<CiHint1>|<CiHint2>|...

where <CiHintX> is one of the following:

- UCMDB:<odbid>
- CiHint:<hint1>:<hint2>:...@@<node>
- SiteScope:<session\_id>:<monitor\_id>

Example:

```
UCMDB:7293479234871238947|CiHint:oracle:database:CMDBDB@@
dbsystem.example.com
```

The CI Resolver first checks whether there is a CI with the given ODB ID. If the ID does not match any CI in the ODB, the resolver uses the hints oracle, database, CMDBDB at node dbsystem.example.com to identify the CI.

## ETI Hint Resolution

The ETI hint field is also used for the matching of a CI. For example, if an event contains CIs in the CI hint and an ETI hint, the ETI resolution attempts to identify the ETI for each CI. If ETI Resolution is successful, the ETI is assumed to be assigned to the CI, and this CI is given a higher match rating.

For example, a UNIX node has a relation to its CPU CI. If an ETI is assigned, but no ETI hint is provided, no ETI resolution is possible.

## CI Enrichment

You can configure CI Resolution enrichment rules to enrich the CI Resolution cache with additional keywords for a specific CI. These keywords are provided by another CI in their neighborhood. To enrich a CI, you can use the tuneCache setting in the Settings Manager by adding an XML item *<Enrichment>* for an enrichment rule.

## Rule Syntax

Enrichment is used to mark a CI with keywords that differentiates the CI from other CIs. This allows the use of the enriched keyword as a hint in an event.

An enrichment rule follows the syntax:

```
[<source ci type>].<ref~1~><|>[<intermediate ci
type~1~>].<ref~2~><|>[<intermediate ci type~2~>]. ... . <ref~n~><|>.[<target
ci>].<attribute name>
```

An arrow after each reference indicates the direction of that reference (< incoming or > outgoing).

## Supported Types & Operators

[Operators] and [Types] are combined to form a valid CI Resolution enrichment rule.

Supported relation operators are:

- containment
- composition
- monitored\_by
- dependency

Supported relation directions are:

- <
- >

Supported types are:

- [<CITypeName>]

Supported types are any CI types contained in the ODB, specified within squared brackets. The CI Type's name attribute is the value to put into the squared brackets, for example, [host] or [sitescope\_monitor].

Keyword	Description	Example
<reference + direction>	Follow the relationship of a CI to its neighbor CI by a given direction. < = incoming > = outgoing	monitored_by<
[<Ci type name>]	Set the CI type.	[DBTable]
<CI type property name>	Property of the CI type.	[DBTable].name



**Example Rule:**

To enrich a DBTable CI type with additional information about the CI type node name attribute, you can use the following rule (given a view with a given cardinality of Composition(Host, DB) AND Composition(DB, DB Table).

```
[DBTable].composition<.[db].composition<.[host].name
```

Use Case: Two CIs have the same name, but they have different parent CIs

It is possible to have two CIs with the same name but with different parent CIs. Normally, CI Resolution cannot identify the CI from the information available within the event. If you define a rule, CI Resolution enriches the keywords cache to also include keywords from the parent CI.

**Example:**

A node has two database CIs instances of type MS SqlSrv. Each instance has a relation to a DBTableSpace CI with the same name USER. When an event is received indicating that one of the DBTableSpace CIs has a problem, the CI Resolver cannot identify the CI. If the event is enriched by the DB instance name using a CI Resolver enrichment rule, it is possible to successfully resolve the identity of the database.

For information about CI resolution configurations, see "CI Resolver Settings" on page 507.

## Close Related Events Automatically

Basic event correlation can close existing events. A new event is considered as being related to an existing event, when it provides specific information like a close-key-pattern that matches the key of the existing event, or when it contains an updated value of an ETI for a specific CI, which out-dates a value of that specific ETI that is contained in an existing event. Both conditions result in closing the existing event. In HP Operations Manager, this form of correlation is also known as good/bad message correlation.

Closing related events can be controlled using the settings available under Closed Related Events Settings in the Operations Management Infrastructure Settings. There are two ways of detecting related events:

- ▶ **Existing events must have the same CI and the same ETI contributing to health as the new event, but a different ETI value.**

Example:

- ▶ Event A for a certain CI has ETI SQL Query Performance: Low
- ▶ Event B for same CI has ETI SQL Query Performance: High
- ▶ ETI SQL Query Performance is a health indicator

Event B closes event A. Automatic close is tracked in the event history.

- ▶ **Key of existing events must match the `closeKeyPattern` value of the new event.**

Example:

- ▶ Event A has key value `om-db.server.net_VP_SM_DB_Backup:start`
- ▶ Event B has key value `om-db.server.net_VP_SM_DB_Backup:pending`
- ▶ Event C contains the `closeKeyPattern` value `om-db.server.net_VP_SM_DB_Backup<*>`

Events A and B are closed. Automatic close is tracked in the event history.

For detailed information on the available setting, see "Close Related Event Settings" on page 509.

## Duplicate Event Suppression

A new event may be a duplicate of an existing event. As new events are received, they are checked against existing events. If duplicates are found, new information is used to update the existing event and the new event is ignored.

Suppressing duplicate events is controlled using the Duplicate Events Suppression Settings in the Operations Management Infrastructure Settings and must be enabled before any settings become active. For detailed information, see "Duplicate Events Suppression Settings" on page 512.

If duplicate event suppression is enabled, new events that are duplicates of an existing event are not retained and the original event is updated. If the new event includes a key, such as `Select CI`, a search is made for an existing, active event that has the same key value, in this case the same CI, as the new event. Events must usually be received relatively soon after the original event to be regarded as a possible duplicate. This time period is also a configurable setting.

If the new event does not include a key, a search is made for an existing, active event where a set of configurable attributes have the same values as the new event.

If no original event is found yet, and the new event has a value for a health indicator, a search is made for an existing, active event that has the same value and the same CI.

Suppressing duplicate events can result in additional correlations of the original event (both as cause or as symptom). When a duplicate is identified, the timestamp for the original event is updated to the time when the duplicate was received. The event is then correlated again and may now be related to other events which were not available for correlation when the original event was received.

## Event Processing Interface

You can specify any number of user defined scripts to be executed during event processing. The Event Processing Interface (EPI) is used to enrich events with additional information from external data sources using Groovy scripts. For example, it is possible to add data to an event from a Microsoft Excel file or an SQL database. If Groovy scripts are specified in the Event Pipeline Script and Step Settings, the event undergoes the associated further processing.

- ▶ EPI scripts must be implemented using the Groovy script language.
- ▶ Scripts are stored directly in the database with JAR files.
- ▶ For each pipeline step, you can set up one or more scripts. There is no limit on the number of scripts that can be executed.
- ▶ EPI scripts can be defined in content packs and can be imported/exported using the Content Manager.
- ▶ Maximum supported script length is 250,000 characters.

---

**Note:** You should design and execute scripts in the context of overall event processing. In other words, be aware of the interaction of the scripts with other event processing settings in the Settings Manager, for example for duplicate events suppression and closing related events.

---

The event pipeline represents the various steps of event processing. There are four points within the event pipeline at which EPI scripts can be executed:

### **Before CI/ETI Resolution**

Scripts can be executed directly before the event enters the event pipeline, so before the resolution of CIs and ETIs takes place.

For example, you may want to execute a script at this point that sets further hints that affect the resolution of CIs and ETIs. An entry point further along the event pipeline would be too late to influence the resolution of CIs and ETIs.

### **After CI/ETI Resolution**

Scripts can be executed directly after CI/ETI resolution, but before further processing, such as duplicate events suppression and closing related events automatically.

For example, you may want to execute a script at this entry point in the event pipeline if you want to influence how duplicate events are handled. It could be that you have duplicate events suppression enabled in general, but you are interested in changing the duplicate events suppression setting for a particular type of event, while leaving it unchanged for all other event types. So you could execute a script at this entry point that disables duplicate events suppression for the specified event type. Any entry point further along the event pipeline would be too late to influence duplicate events suppression behavior.

### **Before Storing Events in the Database**

Scripts can be executed after all event processing has taken place, but before the event is stored in the database.

For example, at this entry point to the event pipeline, you could execute a script that makes changes to some text, or inserts a link to a knowledge base, and so on, before the event gets stored in the database.

### **After Storing Events in the Database**

Scripts can be executed after the event has been stored in the database. In this case, the scripts are all read-only scripts, since as soon as an event has been stored on the database, it can no longer be modified.


For example, you may want to execute a script at this entry point in the event pipeline to forward events of a particular type, that have already been stored in the database, to another application. Or you could execute a script that writes specified events stored in the database to an audit log.

## How to Configure CI Resolution Cache Usage

This task shows you how to configure CI Resolution to minimize the type and number of CI and attributes held in the cache.

Maintaining very large numbers of CIs in cache requires large amounts of RAM and also has an affect on performance. Therefore, controlling the maximum number of CIs held in cache is recommended and this is achieved by ignoring less relevant attributes and CI types. The CI types to be ignored are set in the Cache Modification Configuration. You can also specify which CI type should be allowed to be used for CI resolution and in which order they are to be evaluated.

**To optimize the CI Resolution cache usage, configure the CI Resolution Cache Modification Configuration settings as follows:**

- 1** Open Infrastructure Settings from the Platform Administration:  
**Admin > Platform > Setup and Maintenance > Infrastructure Settings**
- 2** Select **Applications** and use the list to set the administration context to **Operations Management**.
- 3** Go to the **CI Resolver Settings** section.
- 4** Open the **Cache Modification Configuration** (click the associated  button to open the Edit Settings dialog box).

The Edit Setting dialog box displays the CI Resolver Cache Modification Configuration settings. This information uses XML syntax to specify three types of information:

- `<IgnoreCiType>` — CI Types to always be ignored. If a CI type is specified to be ignored, it is always ignored by the CI Resolver.
- `<WhiteListCiType>` — If there are too many CI Types to be included in the available cache capacity, the CI types specified in the whitelist are included in the order that they are listed. As soon as it is no longer possible to include the CIs of the next CI type in the list, that CI type and all subsequent CI types in the whitelist are also ignored.
- `<IgnoreAttribute>` — Attributes to always be ignored. If an attribute is specified to be ignored, it is always ignored by the CI Resolver:

The following is an example of the structure of the CI Resolver Cache Modification Configuration settings

Example:

```
<?xml version="1.0" encoding="UTF-8" ?>
<CiResolver>

  <IgnoreCiTypes>
    <IgnoreCiType>service_address</IgnoreCiType>
    <IgnoreCiType>installedsoftware</IgnoreCiType>
    ...
  </IgnoreCiTypes>

  WhiteListTypes>
    <WhiteListCiType>node</WhiteListCiType>
    <WhiteListCiType>ip_address</WhiteListCiType>
    <WhiteListCiType>business_element</WhiteListCiType>
    ...
  </WhiteListTypes>

  <IgnoreAttributes>
    <IgnoreAttribute>ip_probename</IgnoreAttribute>
    <IgnoreAttribute>ip_isbroadcast</IgnoreAttribute>
    ...
  </IgnoreAttributes>

</CiResolver>
```

- 5 Specify the CI types and the attributes to always be excluded from CI resolution using the `<IgnoreCiTypes>` and the `<IgnoreAttributes>` sections.
- 6 Specify the CI types to be included if the available cache is not sufficient to load all available CIs. The order of the CI types in the list represent the order in which these CIs are included. As soon as the CIs belonging to a CI type cannot be accommodated in the cache, these CIs are excluded and no further CI Types are assessed.
- 7 Select **Save**.

---

**Note:** Alternatively, you can replace the automatically generated TQL query with a TQL query customized for your environment.

---

## How to Limit the Number of CIs Used by CI Resolution


This task shows you how to configure CI Resolution to limit the number of CI and attributes held in the cache.

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**Note:** If you have more CIs than is recommended to use for CI resolution, limit the CI types and attributes, and optimize the order in which the preferred CI types are assessed. For details, refer to [How to Configure CI Resolution Cache Usage](#) on page 438.

---

**To limit the maximum possible number of CIs used for CI resolution, configure the CI Limit setting as follows:**

- 1 Open Infrastructure Settings from the Platform Administration:  
**Admin > Platform > Setup and Maintenance > Infrastructure Settings**
- 2 Select **Applications** and use the list to set the administration context to **Operations Management**.
- 3 Go to the **CI Resolver Settings** section.
- 4 Open the **CI Limit** (click the associated  button to open the Edit Settings dialog box).  
The Edit Setting dialog box displays the CI Limit value.
- 5 Specify a new CI limit.

---

**Note:** Maintaining very large numbers of CIs in cache requires large amounts of RAM and also has an affect on performance. Increasing the total number of CI loaded into cache, increase memory usage, which can result in an unstable system. If you need to increase the number of CI allowed for CI resolution, make these increases using small increments and make sure that your installation remains stable.

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- 6 Select **Save**.



## How to Create an Event Processing Script

This task shows you how to create an event processing script.

### To create an event processing script:

- 1 Open the Event Processing Customizations manager from Operations Management Administration:
  - Admin > Operations Management > Tune Operations Management > Event Processing Customizations**
- 2 In the EPI Steps pane, select the entry point to the event processing pipeline for the script to be defined. The options are:
  - **Before CI/ETI Resolution**
  - **After CI/ETI Resolution**
  - **Before Storing Events**
  - **After Storing Events**
- 3 In the Scripts pane, click the  button to open the Add New Script dialog box.
- 4 Enter a script name and description for the script being specified.
- 5 Enter the script text in the Script field.

For information about creating scripts, see the *HP Operations Manager i Extensibility Guide* PDF.

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**Note:** [Maximum supported script length is 250,000 characters.](#)

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- 6 Select **Active**, if you want to make the script active immediately.
- 7 Click **Next** to open the Advanced page.
- 8 *Optional:* Specify Groovy script classpaths.
- 9 Select an event filter for the mapping rule from the **Events Filter** list. The filter determines which events to consider in the mapping operation.


If no appropriate filter is already configured, click the Browse (...) button, which opens the Select an Event Filter dialog box. Create a filter or edit an existing one. For information about filters, see "How to Define Basic Event Filters" on page 206.

- 10** Specify a timeout value for the script. If the script execution has not completed within the specified time, the script is ignored.
- 11** Select Read-Only for scripts that must not alter the event. An error message is displayed if a script that is labelled as read-only attempts to alter the event.
- 12** Select **Finish**.

## How to Edit an Event Processing Script

This task shows you how to edit an event processing script.

**To edit an event processing script:**

- 1** Open the Event Processing Customizations manager from Operations Management Administration:  
**Admin > Operations Management > Tune Operations Management > Event Processing Customizations**
- 2** Select the script that you want to edit.
- 3** In the Scripts pane, click the  button to open the Edit Script dialog box.
- 4** Make the required changes to the selected script.
- 5** Select **OK**.

## How to Duplicate an Event Processing Script


This task shows you how to duplicate an event processing script.

### To duplicate an event processing script:


- 1 Open the Event Processing Customizations manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Event Processing Customizations**

- 2 Select the script that you want to duplicate.

- 3 In the Scripts pane, click the  button.

A copy of the selected script is created and is available for selection from the Scripts pane.

- 4 Select the copy script and click the  button to open the Edit Script dialog box.

- 5 Make the required changes to the selected script.

- 6 Select **OK**.


## How to Delete an Event Processing Script

This task shows you how to delete an event processing script.

### To delete an event processing script:

- 1 Open the Event Processing Customizations manager from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Event Processing Customizations**

- 2 Select the script that you want to delete.
- 3 In the Scripts pane, click the  button.
- 4 Confirm the deletion by clicking **Yes**.

The selected script is deleted from the list of scripts.

## EPI Steps Graphical User Interface

The Event Processing Customizations manager enables you to create and manage Event Processing scripts. You can specify any number of user defined scripts to be executed during event processing. The Event Processing Interface (EPI) is used to enrich events with additional information from external sources data using Groovy scripts.



The EPI Steps pane displays the UI elements listed in the following table.



UI Elements	Description
<b>After CI/ETI Resolution</b>	Selects scripts that are executed directly after CI/ETI resolution, but before further processing, such as duplicate events suppression and closing related events automatically.
<b>After Storing Events</b>	Selects scripts that are executed after the event has been stored in the database. In this case, the scripts are all read-only scripts, since as soon as an event has been stored on the database, it can no longer be modified by further EPI scripts.
<b>Before CI/ETI Resolution</b>	Selects scripts that are executed directly before the event enters the event pipeline (before the resolution of CIs and ETIs takes place).
<b>Before Storing Events</b>	Selects scripts that are executed directly before the event enters the event pipeline (before the resolution of CIs and ETIs takes place).

## Event Processing Scripts Graphical User Interface

The Scripts pane lists the specified scripts for the selected EPI step. The Scripts pane enables you to create and manage EPI scripts.

The Scripts pane displays the UI elements listed in the following table.

UI Elements	Description
 <b>Refresh</b>	Reloads the Scripts list.
 <b>New Item</b>	Opens the Add New Script dialog box to create an EPI script. For more information about creating EPI scripts, see <a href="#">"How to Configure CI Resolution Cache Usage" on page 438</a> .
 <b>Duplicate Item</b>	Creates a duplicate of the selected EPI script.
 <b>Edit Item</b>	Opens the Edit Script dialog box to edit an existing script. For more information about editing EPI scripts, see <a href="#">"How to Edit an Event Processing Script" on page 443</a> .
 <b>Delete Item</b>	Deletes the selected EPI script. For more information about deleting EPI Steps, see <a href="#">"How to Delete an Event Processing Script" on page 445</a> .
 <b>Move Down</b>	Moves the selected EPI script down to a lower priority position.

UI Elements	Description
 <b>Move Up</b>	Moves the selected EPI script up to a higher priority position.
 <b>Enable/Disable Item</b>	Toggles between Activating and deactivating the selected pipeline script.

## Event Processing Scripts Details Graphical User Interface

The Event Processing Customizations Details pane displays a summary of the selected EPI script.

The Details page displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Active</b>	Indicates whether the associated event pipeline step is active.
<b>Classpath</b>	Specifies the names and locations of user-defined supporting libraries (Jar files).
<b>Description</b>	Description of the EPI script.
<b>Event Filter</b>	Filter specified to select events to be processed by this EPI script.
<b>Name</b>	Name of the EPI script.
<b>Read-Only</b>	Indicates whether the EPI script is read-only. These scripts must not alter the event. An error message is displayed if a script that is labelled as read-only attempts to alter the event



UI Elements (A-Z)	Description
<b>Script</b>	Text of the EPI script.
<b>Timeout</b>	Timeout value for the EPI script. If the script execution has not completed within the specified time, the script is ignored.

## General Tab — Add New and Edit Script Dialog

The General Tab displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Active</b>	Specifies whether the associated event pipeline step is active.
<b>Description</b>	Brief description of the EPI script.
<b>Name</b>	Name of the EPI script.
<b>Script</b>	Text of the EPI script.

## Advanced Tab — Add New and Edit Script Dialog

The Advanced Tab displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Classpath</b>	Specifies the names and locations of user-defined supporting libraries (Jar files).
<b>Event Filter</b>	Specifies the filter to select events to be processed by this EPI script.

UI Elements (A-Z)	Description
<b>Read-Only</b>	Specifies whether the EPI script is read-only. These scripts must not alter the event. An error message is displayed if a script that is labelled as read-only attempts to alter the event
<b>Timeout</b>	Specifies the timeout value for the EPI script. If the script execution has not completed within the specified time, the script is ignored.

## Troubleshooting and Limitations

This section provides help in troubleshooting problems relating to event automation.

### CI Resolution Does not Resolve Expected CIs

If expected CIs are not being resolved and you receive the following message:

OMi CI Resolver could not load all expected CIs.

the CI Resolver is unable to load the specified CI types and attributes into the cache.

More detailed information about the problem is available in the CI Resolver log file at the following location:

`<HPBSM Root Directory>\log\opr-backend\opr-ciresolver.log`

In debug mode, the handling of each CI type is documented in the log file. In normal mode, only the total number of CIs is reported.

The following steps should be taken to reduce the number of CIs being used for CI resolution:

- ▶ Restrict the types of CI used for CI resolution by using the Cache Modification Configuration. For details, see [How to Configure CI Resolution Cache Usage](#) on page 438.
- ▶ If it is not possible to load the required CIs into the cache, increase the CI limit in small increments, for example 10,000 CIs, until all essential CIs are available for CI resolution.

---

**Note:** Maintaining very large numbers of CIs in cache requires large amounts of RAM and also has an affect on performance. Increasing the total number of CI loaded into cache, increase memory usage, which can result in an unstable system.

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- ▶ Replace the automatically generated TQL query with a TQL query customized for your environment.

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## Event Assignment

### **This chapter includes:**

#### Concepts

- ▶ [Assign User Groups to Incoming Events](#) on page 453

#### Tasks

- ▶ [How to Map Events to User Groups](#) on page 455

#### Reference

- ▶ [Event Assignments Graphical User Interface](#) on page 456
- ▶ [Create New and Edit Event Assignment Rule Dialogs](#) on page 458

### **Assign User Groups to Incoming Events**

This chapter describes how to automatically assign incoming events to available user groups. Automatic assigning of events to user groups responsible for solving these events significantly improves the efficiency of event management. Each event is assigned to an appropriate user group as soon as it is received. All operators in a user group are allowed to work on those events assigned to that user group.

The information provided aims to help you understand how to configure automatic event assignment to user groups.

User groups are mapped to incoming events in accordance with the Event User Group Mapping Rules. The user group of the first rule with a matching filter is applied to an event. The following rules are ignored.

These user groups are created and managed from User Management in Operations Management Administration:

**Admin > Platform > Users and Permissions > User Management**

For information on managing user permissions, see "User Management Basics" on page 460.

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**Note:** Only users with the appropriate access permissions can use Operations Management Administration. For more information about user management, see "User Management" on page 459.

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## How to Map Events to User Groups

This task shows you how to map an incoming event to a user group.

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**Tip:** For information on button actions, see "Event Assignments Graphical User Interface" on page 456.

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### To map an event to a user group

- 1 Open the Event Assignments pane from Operations Management Administration:

**Admin > Operations Management > Tune Operations Management > Event Assignments**

- 2 In the Event Assignments pane, click the  button to open the Create New Event Assignment Rule dialog box or the  button to open the Edit Event Assignment Rule dialog box.

User groups are mapped to incoming events in accordance with the Event User Group Mapping Rules. The user group of the first rule with a matching filter is applied to an event. All following rules are ignored.

- 3 Select an existing filter from the **Filter** list or create an event filter to identify the events that are to be assigned to the user group specified by this event user group mapping rule. For details about creating filters, see [Filtering Events](#) on page 197.
- 4 Select an existing user group from the **User Group** list to assign incoming events to.

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**Note:** It can take up to one minute before newly created users are visible.







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- 5 *Optional:* Add a description for this event user group mapping rule.
- 6 Select **OK** to apply your mapping and close the Event User Group Mapping Rules dialog box.





## Event Assignments Graphical User Interface

The Event Assignments pane enables you to view and arrange event user group mapping rules to automatically assign incoming events to existing user groups.

The Event Assignments pane displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
	Reloads the list of event user group mapping rules.
 <b>New Item</b>	Opens the Event User Group Mapping Rules dialog box to create an event user group mapping rule. Enter the events filter and user group for the rule. You can select an existing filter or user group or use the Browse (...) button to create a filter or edit an existing filter.
 <b>Edit Item</b>	Opens the Event User Group Mapping Rules dialog box to edit the selected event user group mapping rule. Enter the events filter and user group for the rule. You can select an existing filter or user group or use the Browse (...) button to create a filter or edit an existing filter.
 <b>Delete Item</b>	Removes the selected event assignment from the list of event assignments.
 <b>Go to Users and Groups</b>	Opens the User Management UI for creating and modifying users and user groups.
 <b>Manage Event Filters</b>	Opens the Manage Named Filters dialog for adding, editing, and managing filters.



UI Elements (A-Z)	Description
 <b>Move Up</b>	Moves the selected event assignment up to a higher priority position.
 <b>Move Down</b>	Moves the selected event assignment down to a lower priority position.
<b>Description</b>	Description of the event user group mapping rule (optional).
<b>Filter</b>	The filter applied in the rule. The filter determines which events are mapped to the user group.
<b>Order</b>	Where more than one user group assignment mapping rule filter matches, the number in the Order column indicates the order in which the rules are applied during the mapping process. Using the  (Up) and  (Down) buttons, you can change the position of rules in the list. <b>Note:</b> If a rule matches, no further rules are applied.
<b>User Group</b>	Name of the group to which the filtered events are assigned by the selected event user group mapping rule.

## Create New and Edit Event Assignment Rule Dialogs

The Create New and Edit Event Assignment dialog boxes enables you to create and edit event user group mapping rules to automatically assign incoming events to existing user groups.

The Create New and Edit Event Assignment dialog boxes displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Description</b>	Description of the event user group mapping rule (optional).
<b>Filter</b>	<p>Use the lists to select the filter to apply in the rule. The filter determines which events to consider in the mapping operation.</p> <p>You can select an existing filter or user group or use the Browse (...) button to create a filter or edit an existing filter. For details about creating filters, see <a href="#">Filtering Events</a> on page 197.</p> <p><b>Note:</b> The filter dialog displayed for Event Assignments is customized for this task. For example, Assigned To: pane is not displayed as it is not relevant.</p>
<b>User Group</b>	Name of the group to which the filtered events are assigned by the selected event user group mapping rule.

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## User Management

### **This chapter includes:**

#### Concepts

- ▶ [User Management Basics](#) on page 460
- ▶ [Operations Management Users](#) on page 460
- ▶ [Operations Management User Views](#) on page 462

#### Tasks

- ▶ [How to Define Operations Management Users](#) on page 463
- ▶ [How to Create Operations Management User Groups](#) on page 465
- ▶ [How to Create Operations Management Users](#) on page 466
- ▶ [How to Set Operations Management User or Group Permissions](#) on page 467
- ▶ [How to Assign Views to a User](#) on page 470
- ▶ [How to Import and Export Users and Groups](#) on page 471

#### Reference

- ▶ [User Context Pane](#) on page 473
- ▶ [User Operations Tab](#) on page 474
- ▶ [Troubleshooting and Limitations](#) on page 477

## User Management Basics

This chapter introduces how to configure users, and user roles for Operations Management.

The user configuration depends on the role the user fulfills as well as the tasks that the user is likely to perform, for example:

- ▶ Event management
- ▶ Operations Management administration

You can create an Operations Management user or group configuration to provide access to the features for specialist operators, for example, email application experts.

User groups enable you to restrict the scope of a user's responsibility to predefined areas. You can specify what features are available, either by configuring a user group (and all members of this group have then access to same features) or more specifically by configuring the user directly.

For more information about the default configurations available for Operations Management users, see "Operations Management Users" on page 460. For more information about the user views, see "Operations Management User Views" on page 462.

## Operations Management Users

You can define users and user groups for a specific area of responsibility. Configuring a new user or user group involves granting the appropriate level of access to events, health indicators, administrative UIs, tools, and custom actions. For example, it is essential for domain experts to be able to see events relating to the domains that they are responsible for configuring and maintaining.

You can grant users different levels of access to events on the basis of whether:

- ▶ Events are assigned to the user or to one of the workgroups that the user is a member of.

- Events are not assigned to the user, nor any of the workgroups he is a member of (includes not assigned at all).

For example, you can allow users full access to any event that is assigned to them and only limited access to any event that is not assigned. Full access to assigned events allows the user to open or close the assigned event, change or work on it, or assign it to another user. Limited access to events that are not assigned to a user either hides the events completely or allows read-only access. You can also choose to grant a user the same access levels both assigned and unassigned events.

You can also define the actions that users or user groups can perform on events and their related CIs.

Permissions can be granted either directly or by means of a user group. Only users who log on with the appropriate credentials can view the requested object or start the desired Administration manager.

For example, Operations Management enables you to restrict access to the following elements according to individual user or user group:

- Events assigned to user
- Events not assigned to user
- Resetting health indicators
- Administration manager UIs (for example, Correlation Rules manager, and Tools manager)
- Tool categories
- Custom actions
- Configuration item types that are included in specific ODB views

To reduce the effort and complexity involved in configuring authorization for individual users, you can grant authorization at the user-group level. Configuring assignment-based authorization at the user-group level makes sure that all users in a group have the same access to any event that is assigned to the group.

For example, you can make sure that all database users have access to database-related events by setting up a group of database users, authorizing full access to assigned events for all users in the database user group, and making sure that all database-related events are assigned to the database user group.

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**Tip:** Sub groups inherit any authorizations granted to the parent group.

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The assignment of events to Operations Management user groups is essential in larger environments. It is possible to automate this assignment to particular user groups, for example, by using event categories. Where no event category exists or an event is not assigned to any event category, Operations Management can automatically assign the event to a default category, which is immediately visible to all users or user groups.

For more information about automatically assigning events, see "Event Assignment" on page 453.

## **Operations Management User Views**

Views enable you to select a specific group of configuration item types with which you can filter events. You can create views to reduce the amount of information presented to regular operators or target the needs of users with experts knowledge in particular fields, for example, database administration, or Microsoft Exchange.

For more information about Operations Management users, see "Operations Management Users" on page 460.

## How to Define Operations Management Users

This task explains how to set up a new user for Operations Management.

This task includes the following steps:

- "Prerequisites" on page 463
- "Create a User Group" on page 463
- "Create a User" on page 463
- "Define User Access and Permissions" on page 464
- "Assign ODB Views" on page 464

### 1 Prerequisites

To create and configure new users and user groups, make sure that you have access to Operations Management Administration and have a good understanding of the following areas:

- Types of users that require access to Operations Management, for example, operators, subject matter experts, and administrators.
- ODB views.
- Events and event categories.
- Stages of the event workflow, for example, Open, In Progress, Resolved, or Closed.
- Concepts of event type indicators and their values.

### 2 Create a User Group

In this step, you create the group that a particular type of user with specific tasks and objectives belongs to. For more information, see "How to Create Operations Management User Groups" on page 465.

### 3 Create a User

In this step, you create the users that you want to add to the work group you defined in the previous step. For more information, see "How to Create Operations Management Users" on page 466.

#### 4 Define User Access and Permissions

In this step, you configure the scope of the new user's role by defining the actions the new users can perform on events that are assigned to them or to other users, specifying if the user can reset a health indicator, and allowing access to Administration features. For more information, see "How to Set Operations Management User or Group Permissions" on page 467.

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**Note:** Administrators usually need access to user-related objects such as events in order to test the features they are configuring. For example, an event correlation expert needs to see the events that are referenced in the test correlation rules.

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#### 5 Assign ODB Views

In this step, you define the objects that the new user is allowed to see and work with. For more information, see "How to Assign Views to a User" on page 470.



## How to Create Operations Management User Groups


This task explains how to set up a user group. The group can contain any type of user.

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**Tip:** For information on button actions, see "User Operations Tab" on page 474.

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### To define a user group:

- 1** Open User Management from Platform Administration:  
**Admin > Platform > Users and Permissions > User Management**
- 2** If you want to add a group to an existing user group, select the existing group, click the  button and select **Create Group**.
- 3** In the Create Group dialog box, type the required details, such as: group name, a short description, and select **OK**.

## How to Create Operations Management Users


This task explains how to set up a user for Operations Management.

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**Tip:** For information on button actions, see "User Operations Tab" on page 474.

---

### To create a user:

- 1 Open User Management from Platform Administration:  
**Admin > Platform > Users and Permissions > User Management**
- 2 If you want to add a user to an existing group, select the group and then click the  button and select **Create User**.

---

**Tip:** You can create a user by cloning and renaming an existing user.

---

- 3 In the Create User dialog box, type the required details, such as: user name, log-on name, and password, and select **OK**.

The newly created user can now log on to the BSM console.

## How to Set Operations Management User or Group Permissions

In this task, you set or modify the permissions granted to Operations Management users. Regular users require permission to perform operations on Operations Management objects such as, events, event categories, and indicators. Administrative users require access to Administration features and objects.

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**Tip:** For information on button actions, see "User Operations Tab" on page 474.

---

### To set the Operations Management user permissions:

- 1 Open User Management from Platform Administration:  
**Admin > Platform > Users and Permissions > User Management**
- 2 In the Groups/Users pane, select the user or group who you want to configure.
- 3 Select the **Permissions** tab.
- 4 In the Context pane, select the context: **Operations Management**.
- 5 In the Context pane, select **Events assigned to user** and, in the **Operations** tab, specify the actions users can perform on events that are assigned to them, for example: **Change**, **Work On /Resolve**, and **Close**. Select **Apply Permissions** to save the changes you make.
- 6 In the Context pane, select **Events not assigned to user** and, in the **Operations** tab, specify the actions users can perform on events that are assigned to other users, for example: **View**, or **Close**. Select **Apply Permissions** to save the changes you make. This setting is useful for administrators who need to see events but will not usually have events assigned to them.

**Tip:** To grant access to events at a more detailed level, for example, per event category, expand the **Events not assigned to user** item and select the event category that you want to grant permission to work with. The event categories displayed in the context list are defined in the Operations Management settings page. For more information, see "Operations Management Infrastructure Settings Manager" on page 506.

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- 7 In the context pane, select **Health Indicators** and, in the Operations tab, specify the action a user can perform (Reset). Select **Apply Permissions** to save the changes you make.
- 

**Tip:** Resetting a health indicator manually returns a health indicator's severity status to a defined default value such as **Normal**. For more information, see "How to Reset Health Indicators" on page 123.

---

- 8 Administrators and subject matter experts need access to administrative functions. If you want to grant access to all administrator areas, select **Administrative UIs** and, in the Operations tab, select **Grant** for View.

To grant access to Operations Management Administration areas at a more detailed level, for example, per manager, expand the **Administrative UIs** item and select the manager that you want to grant permission to work with, for example, Indicator Mappings manager and Correlation Rules manager. Select **Apply Permissions** to save the changes you make.

- 9 You can control access to tools using tool categories. If you want to grant access to all tool categories, select **Tool Categories** and, in the Operations tab, select **Grant** for Execute.

Tool categories can be used to grant access to tools at a more detailed level. Each tool is assigned a category, and for users to be able to use the tools with a certain category, they must be granted execution permissions for this Tool Category. To grant execution permissions, expand the **Tool Categories** item and select the tool that you want to grant permission to work with. Select **Apply Permissions** to save the changes you make.

- 10** You can also control access to custom actions. If you want to grant access to all custom actions, select **Custom Actions** and, in the Operations tab, select **Grant** for Execute.

Alternatively grant execution permissions for the custom actions that you want this user to use. To grant execution permissions, expand the **Custom Actions** item and select the custom action that you want to grant permission to and, in the Operations tab, select **Grant** for Execute. Repeat for other custom actions that this user requires. Select **Apply Permissions** to save the changes you make.

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**Note:** Changes to a user account are only fully available after the user whose account has been changed logs on again to the BSM console. BSM reloads user permissions every 0 minutes by default. However, events already loaded into the browser remain unaffected.

---

## How to Assign Views to a User

In this task, you specify the views that are available to users and the type of access the user has to the view. Views define which ODB objects users can see. Access type defines what users can do with the associated view, for example, View, Change, Delete or Full Control.

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**Tip:** For information on button actions, see "User Operations Tab" on page 474.

---

### To assign a view to a user:

- 1 Open User Management from Platform Administration:  
**Admin > Platform > Users and Permissions > User Management**
- 2 In the Groups/Users pane, select the user or user group you want to configure. If no user or group yet exists, create it now.
- 3 In the Context pane, select ODB, and expand the Views item.
- 4 Scroll down the list of views and select those that you want to assign to the new user or user group. Multiple selections are possible using the **Shift** and **Ctrl** keys.
- 5 In the Operations tab, use the check boxes in the **Grant** column to indicate the type of access you want to assign to the new user, for example, **View**, **Change**, or **Delete**. Select **Full Control** if you want to grant the new user global rights to the objects referenced in the selected view.
- 6 Select **Apply Permissions** to save the changes.

---

**Note:** Changes to a user account are only fully available after a new logon to Operations Management. Operations Management reloads user permissions every 0 minutes by default. However, events already loaded into the browser remain unaffected.

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## How to Import and Export Users and Groups

In this task, you learn how to import user and group configurations exported from one BSM installation to another BSM installation.

Categories are not exported. However, the permissions for categories that do not exist on an installation are imported and stored. If a category is added on the target installation that matches a previously imported category, these existing permissions are applied accordingly.

---

**Note:** If users or groups already exist on the target installation, importing new configurations appends additional permissions. If the imported configuration is more restrictive, existing permissions on the target installation are not reduced. Descriptive information on the target installation remains unchanged.

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### To export user and group configurations:

- 1** Open the JBoss JMX Management Console on the BSM system from which you want to export the user and group configurations:  
**`http://<Source BSM Hostname>:8080/jmx-console`**
- 2** Enter a user and password for the JBoss JMX Management Console.
- 3** Under the TOPAZ section, select:  
**service=Authorization Service Data Import Export**
- 4** In the `exportAllTasEntities()` section, enter the name of the ZIP archive file (complete path) in the `toFilePath` field, and select **Invoke**.  
All users and group data is exported to this ZIP archive file.

### To import user and group configurations:

- 1** Copy the ZIP archive file containing the user and group configurations to the BSM system where you want to import the data.
- 2** Open the JBoss JMX Management Console on the BSM system to which you want to import the user and group configurations:  
**`http://<Target BSM Hostname>:8080/jmx-console`**

- 3** Enter a user and password for the JBoss JMX Management Console (default: `admin/admin`).
- 4** Under the TOPAZ section, select:  
**service=Authorization Service Data Import Export**
- 5** In the `importAllTasEntities()` section, enter the name of the zip archive file (complete path) in the `fromFilePath` field, and select **Invoke**.  
All users and group data is imported to the BSM system.
- 6** Make sure that the new users and groups are available in User Management:  
**Admin > Platform > Users and Permissions > User Management**



## User Context Pane

If you select the Operations Management context from the Context list, you can select the Operations Management areas and define the permissions to these areas.

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**Tip:** Granting access permissions to a user group automatically assigns the same access permissions to any users in the group.

---

The Operations Management context displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Administrative UIs</b>	Grants access to the Administration features in the Operations Management Administration, for example: <ul style="list-style-type: none"> <li>▶ Correlation Rules manager</li> <li>▶ Content Packs manager</li> <li>▶ Performance Graphs manager</li> <li>▶ View Mappings manager</li> <li>▶ Event Processing Customization</li> <li>▶ Custom Actions</li> </ul> Users who do not have view permissions to Operations Management Administration are not be able to see the Operations Management Administration features or see an error message when they try to start an Administration manager.
<b>Custom Actions</b>	Grants access to custom actions. Any custom actions to which a user has access can be executed by the user.
<b>Events assigned to users</b>	Specifies the type of access a user or user group should have to events that are assigned to them. You can select one or more of the available operations, for example: Work On / Resolve, Close, Reopen, or Assign to.

UI Elements (A-Z)	Description
<b>Events not assigned to users</b>	Specifies the type of access a user or user group should have to events that are not assigned to them. You can select one or more of the available operations, for example: Work On / Resolve, Close, Reopen, or Assign to.
<b>Health Indicators</b>	Indicates if the user or user group has access to the feature that enables the resetting of health indicators. For more information about resetting health indicators, see "How to Reset Health Indicators" on page 123.
<b>Tool Categories</b>	Grants access to tool categories. Any tools belonging to a tools category to which a user has access can be executed by the user.

## User Operations Tab

The Operations tab in the Users and Permissions settings displays the permissions granted to users for access to specified objects.

The User Operations tab displays the UI elements listed in the following table.

UI Elements (A-Z)	Description
<b>Add/Delete/Update Annotations</b>	Enables the user to create, modify and delete annotations for an event.
<b>Add/Delete/Update Custom Attributes</b>	Enables the user to create, modify and delete custom attributes.
<b>Add/Remove Event Relations</b>	Enables the user to add and remove relations between events in the Event Browser.
<b>Assign To</b>	Enables the user to assign the selected events to a specific user or user group.
<b>Change ...</b>	Enables the user to change events attributes of events.
<b>Close</b>	Enables the user to set the lifecycle state for the selected events to Closed.

UI Elements (A-Z)	Description
<b>Close Transferred</b>	Enables the user to close events in the Event Browser for which control has been transferred to an external manager.
<b>Execute</b>	Enables the user to execute tools belonging to the selected category or execute the selected or custom action.
<b>Grant</b>	Select one or more of the available operations to enable access to the object selected in the Context pane, for example: Work On / Resolve, Close, Reopen, or Assign to.
<b>Granted from ...</b>	Indicates with a check if access is already granted through inheritance from another object, such as a user group, a user role, or a parent object.
<b>Inherit</b>	Indicates if the permission can be passed on.
<b>Launch ...</b>	<p>Enables the user to run HP Operations Manager actions for an event containing event-related actions. There are two types of HP Operations Manager:</p> <ul style="list-style-type: none"> <li>➤ Operator actions</li> <li>➤ Automatic actions</li> </ul>
<b>Operation</b>	Type of operation to be performed, for example: View, Open, or Delete. The list of available operations depends on the context selected.
<b>Reset</b>	Enables the user to clear the current status of a health indicator and reset the health indicator to the status specified in the default health indicator value.
<b>Reopen</b>	<p>Enables the user to set the lifecycle state for the selected Closed events to Open. The events can now be reassigned to users for further investigation and resolution.</p> <p><b>Note:</b> Reopening symptom events with a closed cause is not possible.</p>
<b>Transfer Control</b>	Enables the user to transfer control of events in the Event Browser to an external manager.

UI Elements (A-Z)	Description
<b>View</b>	Enables the user to view the selected Administrative UI (for example, the ETI Mapping manager, or Correlation Rules manager).
<b>Work On / Resolve</b>	<p>Enables the user to set the lifecycle state for the selected events to <b>In Progress</b>. This indicates that the underlying problems of the events are under investigation by the user setting the status to <b>In Progress</b> or by another user assigned to the event.</p> <p>Enables the user to set the lifecycle status for the selected events to <b>Resolved</b> when the underlying problems have been solved.</p>

## Troubleshooting and Limitations

This section provides help for those people who are troubleshooting problems with users and user groups in Operations Management administration.

### **Users Not Available**

- User not configured
- Incorrect user or group configuration

### **Users has Incorrect Home Page**

- Incorrect user settings

### **Users Sees Incorrect Features on Log On**

- Incorrect user settings

### **Users Denied Access to Tools**

- Browser session started by user who does not have the authorization to launch a tool
- Tool definitions not imported into Operations Management



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## Auditing in Operations Management

### **This chapter includes:**

#### Concepts

- ▶ [Introduction to Auditing](#) on page 479

#### Tasks

- ▶ [How to Enable Auditing](#) on page 481
- ▶ [How to View Audit Information](#) on page 482

#### Reference

- ▶ [Audited Operations Management Areas](#) on page 483

### **Introduction to Auditing**

Auditing the changes to configurations of Operations Management, changes to events, and execution of tools and actions is critical to reducing security risk and achieving compliance.

You can configure Operations Management to generate and record audit events when a user changes an Operations Management configuration or an event. For example, if a user executes an action on a node, a corresponding entry is made in the Operations Management Audit Log, recording the date and time of execution, the user who started the action, and a description of the action run.

There are two audit categories to configure which type of changes are logged:

➤ **Configuration**

The default value is Configuration. When you set this category, only configuration changes are written to the Audit Log.

➤ **All**

When you set this category, both event and configuration changes are written to the Audit Log.

### **Areas Not Audited**

The Operations Management areas that are not audited are listed in the following list.

- Changes to displayed columns in the Event Browser
- Change to column sizes
- Information about which column was used for ordering
- Active filter applied



## How to Enable Auditing


This task shows you how to enable auditing of Operations Management.

### To enable auditing:

**1** Open the Infrastructure Settings manager:

**Admin > Platform > Setup and Maintenance > Infrastructure Settings**

**2** In the **Applications** list, set the context to **Operations Management**.

**3** In the Auditing Settings section, click the  button for the entry: Audit Category.

**4** In the Edit Setting dialog box, select the auditing level:

**Configuration:** Record only changes made to Operations Management configurations. Default setting.

**All:** Records all changes to Operations Management configurations and events.

**5** Select **Save**.

**6** In the Auditing Settings section, click the  button for the entry: Enable Auditing.

**7** In the Edit Setting dialog box, select **True**.

**8** Select **Save**.

Auditing is enabled immediately.

## How to View Audit Information

This task shows you how to view the audit logging information for Operations Management.

### To view the audit information for Operations Management:

- 1 Open the Audit Log manager:

**Admin > Platform > Setup and Maintenance > Audit Log**

- 2 In the **Context** list, set the context to **Operations Management**.

The contents of the audit log are displayed.

- 3 *Optional:* Set the Auditing Filters to display only the audit information that you are interested in:

**User:** Specifies user associated with the audit information that you want to view.

**Containing text:** Specifies the text string that you want to search for.

**Start after:** Specifies the start time for the time period for which you want to search the audit log.

**End before:** Specifies the end time for the time period for which you want to search the audit log.

- 4 Select **Apply**.

The filtered results are displayed.

Modification Date	Modified By	Actions
4/27/10 11:12 AM	administrator (admin)	Content Pack Definition exported, id:23edf5c3-0116-4838-b942-a528de51133 name:OMI_Demo_Assignments version:0
4/27/10 11:11 AM	administrator (admin)	Content Pack Definition created, id:23edf5c3-0116-4838-b942-a528de51133, name:OMI_Demo_Assignments, label:OMI Demo Assignments
4/27/10 10:28 AM	administrator (admin)	Content Pack Definition created, id:d1ed9f53-4d05-4d44-a0f9-4126df40b04, name:EPI_Demo, label:EPI Demo
4/27/10 10:28 AM	administrator (admin)	Content Pack import committed, mode:OVERWRITE testonly:false importer:admin
4/27/10 10:28 AM	administrator (admin)	Content Pack import start, contentPackName:EPI_Demo, contentPackVersion:1.00, mode:OVERWRITE testonly:false importer:admin
4/27/10 10:27 AM	administrator (admin)	Content Pack Definition deleted, id:8f6c2b59-2d08-4989-bdcf-25708990b904, name:t, label:t
4/27/10 10:27 AM	administrator (admin)	Content Pack Definition deleted, id:7c490778-7c8c-43e2-905c-41739ab910e6, name:t5, label:t5
4/27/10 10:27 AM	administrator (admin)	Content Pack Definition deleted, id:899c70c3-74ee-4d5e-928e-ba9e21b97d9d, name:t2, label:t2
4/27/10 10:27 AM	administrator (admin)	Content Pack Definition deleted, id:61f00191-a749-4b50-90bb-90bb26d7235e, name:hh, label:hh
4/27/10 10:27 AM	administrator (admin)	Content Pack Definition deleted, id:8f908ed7-1515-441a-9c73-784c642f5f20c, name:hkhjhk, label:hkhjhk
4/26/10 6:13 PM	administrator (admin)	CI-Type to View Mapping created, id:76722641-bb46-422b-b686-f9371d0f5368, ciType:database, viewName:OprSample
4/26/10 6:13 PM	administrator (admin)	CI-Type to View Mapping created, id:9292e7cd-74b5-43b0-b7d4-e8230b3024c0, ciType:node, viewName:OprSample
4/26/10 6:12 PM	administrator (admin)	CI-Type to View Mapping created, id:55490f3e-8c05-4884-9925-4e59905030fa, ciType:cluster, viewName:OprSample
4/26/10 6:12 PM	administrator (admin)	CI-Type to View Mapping created, id:c80b253c-1fae-4ae7-8414-b97283c0802a, ciType:dbtablespace, viewName:OprSample
4/26/10 6:12 PM	administrator (admin)	CI-Type to View Mapping created, id:aebf2341-b3a4-4714-a995-156d1b8aa126, ciType:2eeapplication, viewName:OprSample

## Audited Operations Management Areas

The following sections list of the Operations Management areas that can be audited, and include the specific changes that generate an entry in the Audit Log.

### Event Changes in the UI

The following is a list the event changes that are audited. For event-related changes to be recorded, the Audit Category must be set to All.

When a change is made, only the new value is written to the Audit log.

- Severity of event changes.
- Lifecycle State of event changes.
- Priority of event changes.
- Assign Event to User or Group changes.
- Event Title edits.
- Annotations — creating, editing, and deleting.
- Add Custom Attributes — creating, editing, and deleting.
- Action launches.
- Re-run Automatic or Operator Action.
- Tool launches.
- opr-archive-events.bat and opr-close-events.bat maintenance tools launches.

## Configuration Changes

The following is a list of the configuration changes that are audited. For configuration-related changes to be recorded, the Audit Category can be set to Configuration or All.

- ▶ Filters — creating, editing, and deleting.  
Only changes about filters created and used in the Operations Management Admin UI, for example, ETI Mapping Rules, User Group Assignment, are written to the Audit log. Filters defined by operators in the Operations Management Application UI are not audited.
- ▶ Tools for CI Type — creating, editing, and deleting.
- ▶ View Mapping for CI Type — creating, editing, and deleting.
- ▶ Content Packs — creating, editing, deleting, importing and exporting.
- ▶ Event Assignment Rules — creating, editing, and deleting.
- ▶ ETI Mapping Rules — creating, editing, and deleting.
- ▶ TBEC Rules — creating, editing, and deleting.
- ▶ Event Forwarding — WS-triggered actions using the console API.
- ▶ CI Resolver Mapping — creating, editing, and deleting.
- ▶ Downtime Configuration — creating, editing, and deleting.
- ▶ Custom Action Configurations — creating, editing, and deleting.
- ▶ EPI Configuration — creating, editing, and deleting.
- ▶ Audit Configuration — changing, enabling, and disabling.

# 24

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## Tracing and Logging Operations Management UIs

### **This chapter includes:**

#### Concepts

- ▶ [Introduction to Tracing and Logging](#) on page 485

#### Tasks

- ▶ [How to Enable Logging](#) on page 486
- ▶ [How to Save Log Information](#) on page 487

#### Reference

- ▶ [Logging Settings Graphical User Interface](#) on page 488

### **Introduction to Tracing and Logging**

The Operations Management logging and tracing capabilities help simplify on-site troubleshooting.

Logging is designed to be run on the client system and uses JavaScript to send logging and tracing output to a browser window. You can enable logging and tracing on demand and save the output to aid troubleshooting.

---

**Note:** Due to sandbox restrictions in the Adobe Flash Player and the browser, it is not possible to write logs to the clients local file system.

---

## How to Enable Logging

This task shows you how to enable logging of the UI client.

### To enable logging:

- 1 Log on to BSM:

`http://<BSM_host>/bsm`

- 2 Open the following URL to open the logging configuration application.

`http://<hostname>/opr-admin-server/logging/logging.html`

The Logging Settings dialog opens.

- 3 To enable logging, select the **Enable logging for this session** check box.

- 4 Select the required logging level. Each log level includes the higher levels:

**Critical:** Shows only problems of level Critical.

**Error:** Shows problems of level Error and Critical.

**Warning:** Shows problems of level Warning, Error, and Critical.

**Info:** Shows problems of level Info, Warning, Error, and Critical.  
The resulting information provides a brief overview over the flow of the executed steps.

**Debug:** Shows problems of level Info, Warning, Error, and Critical.  
The resulting information provides a detailed, verbose view over the flow of the executed steps.

- 5 *Optional:* Set a filter value to find instances of the specified text strings. By default, all messages that have a category starting with `com.hp.` are logged. You can restrict this to certain categories to filter the output or extend it, for example, to show messages from the Flex framework.

- 6 Click **Apply**.

The settings become effective for the current browser session.

- 7 Restart the UI that you want to trace.

As soon as the first log output is sent, a browser window opens that shows the log messages.

**Note:** Each time you change the logging settings you must restart the UI that you want to trace.

The settings are for applications that are served from the same domain as that of the current browsing session. If you restart the web browser, you must reapply the logging settings

---

## **How to Save Log Information**

This task shows you how to save the logging information of the UI client.

**To save the current logging information from the browser window:**

**1** Select the following menu options:

**File > Save As ...**

The Save Web Page dialog box opens.

**2** Select a destination directory, specify a file name, select the file type and encoding for the logging information to be saved.

**3** Click **Save**.

## Logging Settings Graphical User Interface

The Logging Settings page enables you to activate or disable logging of Operations Management Flex-based UIs, such as the Operations Management administration components.

The Logging Settings page UI elements are listed in the following table.

UI Elements (A-Z)	Description
<b>Add</b>	Adds the filter category specified in the Filter field to the list of filters to be applied.
<b>Apply</b>	Applies the logging settings for use as soon as the application being logged is reloaded.
<b>Enable logging for this browser setting</b>	Enables logging of the current browser session.
<b>Filter</b>	Field used to specify a filter category. You can the * symbol as a wildcard character to limit the output to certain categories.
<b>Log Level</b>	<p>Sets the detail level to be logged. The available levels are listed below:</p> <p><b>Critical:</b> Shows only problems of level Critical.</p> <p><b>Error:</b> Shows problems of level Error and Critical.</p> <p><b>Warning:</b> Shows problems of level Warning, Error, and Critical.</p> <p><b>Info:</b> Shows problems of level Info, Warning, Error, and Critical. The resulting information provides a brief overview over the flow of the executed steps.</p> <p><b>Debug:</b> Shows problems of level Info, Warning, Error, and Critical. The resulting information provides a detailed, verbose view over the flow of the executed steps.</p>
<b>Remove</b>	Removes the selected filter category from the list of filters to be applied.



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## Topology Synchronization

### **This chapter includes:**

#### Concepts

- ▶ [Dynamic Topology Synchronization](#) on page 489
- ▶ [Basic Topology Synchronization](#) on page 492

#### Tasks

- ▶ [How to Run Dynamic Topology Synchronization](#) on page 493
- ▶ [How to Run Basic Topology Synchronization](#) on page 495

#### Reference

- ▶ [Basic Topology Synchronization Command-Line Interface](#) on page 496
- ▶ [Troubleshooting and Limitations](#) on page 497

### **Dynamic Topology Synchronization**

Discovery is the process of populating the Operational Database (ODB) with CI and service data. Accurate CI topology information provided by discovery of the system infrastructure is essential for the health system and Topology-based Event Correlation.

Discovery ensures that topology data inside the ODB is accurate, current, and almost instantly updated whenever something changes in the environment. The discovered data can be made available to both BSM and HP Operations Manager.

Service discovery uses policies consisting of the following components:

- ▶ Discovery schedule.
- ▶ Type model.
- ▶ Parameters, for example, credentials.
- ▶ Script or instrumentation to execute the discovery.

The agent functionality incorporates delta detection, deletion detection, and communication with server. The scripts provide the data in a form that the server can handle.

## **Exchange Node and Service Configurations Automatically**

In an environment with multiple servers (HP Operations Manager and Operations Management), you can automatically synchronize node and service data with other servers by forwarding the information from one server to one or more other servers. The synchronized data includes nodes, external nodes, node groups, services, and service types.

The data synchronization by default uses both of the following synchronization methods in combination:

### **▶ Scheduled (time-based) Synchronization**

Service auto-discovery policies on the source server regularly download the node and service data. The agent on the management server processes the data to detect any changes and reports the changed elements to the management server. The management

server then establishes an HTTPS connection to one or more target servers and forwards the changed elements only.

### **▶ Event-driven synchronization**

A WMI event listener continuously listens on the source server for changes to the node and service data. When a change occurs, the management server immediately forwards the changed elements. This ensures that the node and service configuration on all servers is always accurate and up to date because it is updated at runtime each time the environment changes.

---

**Note:** In HPOM for Windows, you can also exchange node and service configuration data using the ovpmutil command line tool. This tool enables you to download the configuration data on one management server and upload it on other servers. This kind of configuration exchange must be repeated manually each time the configuration changes.

---

## Basic Topology Synchronization

Operations Management provides the command-line tool **opr-startTopologySync** that enables you to synchronize topology data, such as services and managed nodes, from HP Operations Manager to the ODB.

On startup, the **opr-startTopologySync** tool uses parameters defined and stored in the settings manager. The topology synchronization process requires the following prerequisites:

- ▶ Connection between Operations Management and the HP Operations Manager management servers
- ▶ HP Operations Manager management server configured to forward events to Operations Management
- ▶ Access to both the Operations Management installation and the ODB

You can run the **opr-startTopologySync** tool manually from the command-line or according to a defined schedule, for example, with the Windows task scheduler.

---

**Note:** For multi-system, distributed installations, the **opr-startTopologySync** tool must be run on the Data Processing Server system.

---

For more information about the settings for the topology synchronization tool, see "Topology-Based Event Correlation Settings" on page 530. For more information about the **opr-startTopologySync** command, see "Basic Topology Synchronization Command-Line Interface" on page 496.

---

**Note:** Some features are only available to users who are logged on with the appropriate authorization. If you are logged on to Operations Management without administrative authorization, you might be required to supply a user name and password to start Content Packs tools.

---

## How to Run Dynamic Topology Synchronization

Before configuring forwarding of topology (node and service) data to Operations Management from HP Operations Manager management servers, complete the following configuration steps in Operations Management:

- ▶ Add the HP Operations Manager management server as a connected server in Operations Management. For details, see [How to Create a Connection to an HPOM Server](#) on page 364.
- ▶ Establish a trust relationship between the Data Processing Server and the HP Operations Manager management server. For details, see [How to Establish a Trust Relationship for a Server Connection](#) on page 370.
- ▶ *Optional:* Use the `opr-sd-tool.bat` command-line tool to upload new or changed synchronization packages from the file system to the database. For details, see the *Operations Manager i Extensibility Guide*.

After ensuring that the HP Operations Manager management server is added in Operations Management as a connected server, configure the forwarding of topology (node and service) data on the HP Operations Manager management server as described in the following section.

**To topology data to Operations Management, complete the following steps on the HP Operations Manager management server from which you want to receive topology information:**

- 1** Configure trusted certificates for multiple servers.

In an environment with multiple servers, you must configure each server to trust certificates that the other servers issued.

- 2** Configure the list of target servers:

- a** In the console tree, right-click **Operations Manager**, and select **Configure Server**.

The Server Configuration dialog box opens.

- b** Click **Namespaces**, and select **Discovery Server**.

A list of values appears.

- c** Add the hostname of the server to **List of target servers to forward discovery data**.

If there is more than one target server, separate the hostnames with semicolons, for example:

```
server1.example.com;server2.example.com
```

- d** *Optional:* If the target server uses a port other than port 383, append the port number to the hostname, for example:

```
server1.example.com:65530;server2.example.com:65531
```

- e** *Optional:* Set the value of Enable discovery WMI listener to false if you do not want to immediately synchronize changes with other servers. The other servers are updated again the next time discovery runs.

- f** Click **OK** to save your changes and close the Server Configuration dialog box.

- g** Restart the OvAutoDiscovery Server process for your changes to take effect.

- 3** Deploy the following policy group to the source management server:

**Policy management > Policy groups > HPOM Discovery**

The policy group contains the following service auto-discovery policies:

- **DiscoverOM** — Discovers and downloads nodes, external nodes, node groups, and services.
- **DiscoverOMTypes** — Discovers and downloads service types.

## How to Run Basic Topology Synchronization

### How to Use the Topology Synchronization Tool

You start the Topology Synchronization command-line tool as follows:

- 1 Make sure the BSM platform is running.
- 2 On the Data Processing Server, execute the following command:

```
<HPBSM Root Directory>\bin\opr-startTopologySync.bat
```

---

**Note:** You can also start this tool as a scheduled task in Windows. The tool reads its required parameters from the BSM platform Settings Manager.

---

For configuration details, see [HPOM Topology Synchronization Connection Settings](#) on page 524 and [HPOM Topology Synchronization Settings](#) on page 526.

## **Basic Topology Synchronization Command-Line Interface**

This section describes the options and parameters available in the Operations Management topology synchronization command-line interface.

---

**Note:** For multi-system, distributed installations, the **opr-startTopologySync** tool must be run on the Data Processing Server system.

---

The **opr-startTopologySync** command without any options loads the complete service model and synchronizes all configured data from HPOM to the ODB. The normal mode also performs delta detection and deletes elements from the ODB that have been deleted in HPOM.

To run the **opr-startTopologySync.bat** tool in normal mode, run the following command:

```
%TOPAZ_HOME%\bin\opr-startTopologySync.bat
```

The **opr-startTopologySync** command accepts the following option:

**opr-startTopologySync -touch**

The **ContentManager** command has one option:

**-touch**

Does not perform the full synchronization. Reads the data saved from the last synchronization from the file system. This data is the same as that used for delta detection. The touch options touches every configuration item to reset configuration item aging and prevent them being deleted during the synchronization process as a result of being too old.

For more details about ODB aging, refer to the HP Business Availability Center Model Management guide.



## Troubleshooting and Limitations

This section provides help on troubleshooting problems with users and user roles in Operations Management administration, including creating, modifying, and enabling users.

### Event Synchronization Does Not Work

The exchange and synchronization of events between Operations Management and either HP Operations Manager is not working correctly:

- ▶ Make sure that the name of the HP Operations Manager server is configured in Operations Management. For details, see "HPOM Topology Synchronization Connection Settings" on page 524.
- ▶ Make sure that the names of the systems hosting the BSM gateway servers are configured as managed nodes in HP Operations Manager. HP Operations Manager for Windows only accepts messages containing nodeinfo referring to known nodes.
- ▶ Make sure that the server-based flexible management policy is configured correctly and deployed on the HP Operations Manager management server. Flexible management is also known as Manager of Manager (MoM).
- ▶ Make sure that the local time and date is the same on both the BSM server and the HP Operations Manager server. Otherwise, the certificate generated for the trust relationship between the servers fails and no communication can take place.
- ▶ Verify that the installation and configuration of BSM created a Sonic queue named **opr\_gateway\_queue**:
  - ▶ Start the Sonic Management Console:  
**Start > Programs > Sonic Software > SonicMQ\* > Management Console**
  - ▶ Select the **Configure** tab, browse to the **Queues** element, and make sure that the queue named **opr\_gateway\_queue** exists.

- ▶ Make sure that both the **Control** daemon and **bbc** (used for communication between HPOM and BSM) are running on both the BSM host system and the HP Operations Manager management server system:

**ovc -status**

```
ovcd      OV Control          CORE (8452)  Running
ovbbccb   OV Communication Broker CORE (2032)  Running
```

If the **ovc -status** command indicates that **ovc** is not running, start **ovc** with the **-start** parameter, for example: **ovc -start**.

## Security Certificates are Missing or Incorrect

If security certificates are missing or incorrect, verify security certificates on BSM and HP Operations Manager.

### Solution

Make sure that BSM and HP Operations Manager exchanged security certificates and a trust relationship exists between the servers, as indicated in the following steps.

#### To verify security certificates and trust relationships:

- 1 On the BSM system, make sure that the correct security certificate is installed:

**ovcert -check**

```
OvCoreId set          : OK
Private key installed : OK
Certificate installed  : OK
Certificate valid      : OK
Trusted certificates installed : OK
Trusted certificates valid : OK
```

**2** List the contents of the certificate**ovcert -list**

(Sample output)

```

+-----+
| Keystore Content-----|
+-----+
| Certificates           |
| 6073fd42-9326-7531-1b2d-cdab6fa099d4 (*)           |
+-----+
| Trusted Certificates:  |
| CA_14d14502-1671-7531-13d6-a06656d31bf3           |
+-----+

```

**3** Make sure that communication is possible between BSM and HP Operations Manager. Run the following command on *both* the BSM host system and the HP Operations Manager management server system:

```

bbcutil -ping https://<omw server name>
https://<omw server name>: status=eServiceOK
   coreID=14d14502-1671-7531-13d6-a06656d31bf3
   bbcV=06.10.070 appN=ovbbccb appV=06.10.070 conn=7
   time=453 ms

```

**4** Make sure that communication is possible between BSM and the HP Operations Manager Message Receiver. Run the following command on *both* the BSM host system and the HP Operations Manager management server system:

```

bbcutil -ping https://<omw server name>/com.hp.ov.opc.msgr
https://<omw server name>: status=eServiceOK
   coreID=14d14502-1671-7531-13d6-a06656d31bf3
   bbcV=06.10.070 appN=ovbbccb appV=06.10.070 conn=7
   time=453 ms

```

## **Topology Synchronization Fails to Work**

Make sure that the following settings are correctly specified:

- ▶ Database Settings: required to write the ID mapping into the database for resolution of configuration items.
- ▶ HPOM Connection Settings: required to read the topology data from the HP Operations Manager web service during synchronization.
- ▶ ODB Connection Settings: required to write the configuration item information to the ODB during the synchronization.

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---

## Infrastructure Settings for Operations Management

### **This chapter includes:**

#### Concepts

- ▶ Settings Management Basics on page 502

#### Tasks

- ▶ How to Display and Edit Operations Management Settings on page 505

#### Reference

- ▶ Operations Management Infrastructure Settings Manager on page 506

## Settings Management Basics

This chapter provides an overview of the settings required for Operations Management including information that helps to configure the Operations Management settings.

The Infrastructure Settings Manager page for Operations Management page enables you to view and modify the default configuration for Operations Management. The settings displayed on this page determine how Operations Management behaves and performs. Changing settings can affect the performance of both the application itself and the underlying platform. Only users with both the required background knowledge and access permission should attempt to change these settings.

To access the Infrastructure Settings Manager page for Operations Management page, see [How to Display and Edit Operations Management Settings](#) on page 505.

---

**Note:** Modified values are displayed in **bold** text. In some cases, the changes you make are not effective immediately. You might have to restart the browser session or a server process.

---

The Infrastructure Settings Manager page for Operations Management displays details of the following settings:

UI Elements (A-Z)	Description
<b>Audit Settings</b>	Defines whether auditing is enabled and whether just configuration changes are recorded or also changes to events.
<b>CI Resolver Settings</b>	Defines how and when configuration items should be resolved.
<b>Certificate Server Settings</b>	Configures the Certificate Server that issues certificates for secure communication.
<b>Closed Events Browser Settings</b>	Sets the maximum number of closed events to be displayed in the Closed Events Browser.

UI Elements (A-Z)	Description
<b>Close Related Events Settings</b>	Defines how and when new events are used to close one or more existing, related events.
<b>Custom Attribute Settings</b>	List of the attributes that can be added to the HP Operations Manager Event Browser as columns.
<b>Downtime Settings</b>	List of the attributes that are used for controlling the handling of events that were received while the CI was not available due to a scheduled downtime.
<b>Duplicate Events Suppression Settings</b>	List of the attributes that are used for matching new events with existing events used to suppress duplicates.
<b>EPI Server Settings</b>	Sets the Server Timeout value used for the Event Pipeline.
<b>Event Cache Settings</b>	<p>Maximum limit for the number of active top level events that are cached on a gateway server.</p> <p>This mechanism is required to prevent the gateway servers from running out of memory, for example, in case of event storms that cause lots of active events.</p>
<b>Event Forwarding Settings</b>	Controls whether events are forwarded to connected servers, the forwarding mode, and the expiration time of forward requests.
<b>Event History Settings</b>	Sets the maximum limit for the history text length.
<b>Event Type Indicator Settings</b>	Controls whether to globally enable mapping rules to override the CMA-driven Event Type Indicator assignment.
<b>Graphing Settings</b>	Defines graph characteristics, including how graphs and charts look, when they are generated, and how often they are refreshed with data.
<b>HPOM Topology Synchronization Connection Settings</b>	Specifies the connection to the HP Operations Manager for UNIX or HP Operations Manager for Windows management server (including log-on credentials).
<b>HPOM Topology Synchronization Settings</b>	Specifies the base settings to use when synchronizing the topology of the environment monitored by HP Operations Manager.

UI Elements (A-Z)	Description
<b>License Reporting Settings</b>	Specifies the address of the License Reporting Server.
<b>Reconciliation Settings</b>	Specifies the polling time to the ODB for reconciliation of changes.
<b>Topaz Authorization Service Settings</b>	Defines the event categories recognized by Operations Management, for example: Exchange, WebApp, System, or Operating Systems.
<b>Topology-Based Event Correlation Settings</b>	Defines how long Operations Management waits when gathering events before starting the correlation process.
<b>Topology View Settings</b>	Defines the distance (in hops) from a selected configuration item (that does not have a defined view) before Operations Management stops displaying any more related configuration items.
<b>User Interface Settings</b>	Specifies the interval of user interface updates.

For more information about the individual sections on the Infrastructure Settings Manager page for Operations Management, see ["Operations Management Infrastructure Settings Manager" on page 506](#).



## How to Display and Edit Operations Management Settings


This task shows you how to display a complete list of the current infrastructure settings for Operations Management. You can configure all settings using the Edit Setting dialog box.

---

**Tip:** For information on button actions, see "[Operations Management Infrastructure Settings Manager](#)" on page 506.

---


### To display and edit Operations Management settings:

- 1 Open Infrastructure Settings from the Platform Administration:  
**Admin > Platform > Setup and Maintenance > Infrastructure Settings**
- 2 Select **Applications** and use the list to set the administration context to **Operations Management**.
- 3 For any settings that you want to change, click the associated  button to open the Edit Settings dialog box.
- 4 Modify the existing settings as required and select **Save**. Alternatively, select **Restore Default** and **Save**, to reset the Operations Management defaults values.

## **Operations Management Infrastructure Settings Manager**

This section lists and briefly describes the Operations Management settings that the software administrator needs to configure after installation.

---

**Tip:** To change existing or default settings, click the  button.

---

### **Auditing Settings**

The Auditing Settings contains the available configurations used to customize how audit information is recorded. The Audit Logs can be viewed from:

**Admin > Platform > Setup and Maintenance Audit Log > Locations/  
Operations Manager**

The following elements are included in the Audit Settings pane.

UI Elements (A-Z)	Description
<b>Audit Category</b>	Configure which audit categories are logged. The default value is Configuration, which only writes configuration changes to the Audit Log. When you set the audit category to All, event and configuration changes are written to the Audit Log.
<b>Enable Auditing</b>	If enabled, Operations Management actions are written to the Audit Log.

## CI Resolver Settings

The CI Resolver Settings contains the configurations used to control how the CI Resolver manages incoming CI-related information and uses it to identify the best matching CI for a particular event. All attributes of the compared CIs are taken to calculate a similarity using a scoring function. The output of the scoring function indicates how similar two CIs are to each other. The CI with the highest score is selected as the best matching CI.

The following elements are included in the CI Resolver Settings pane.

UI Elements (A-Z)	Description
<b>Cache Modification Configuration</b>	<p>Sets, using XML format, the attributes and CI types that should be used and those that should be ignored during CI resolution.</p> <p>Some CI attributes do not provide useful information. For example, an attribute value may apply to many CIs but does not help to identify matching CI. These types are specified in the <code>&lt;IgnoreAttributes&gt;</code> and the <code>&lt;IgnoreCiTypes&gt;</code> entries.</p> <p>Any CI types and attributes included in the ignore lists are always ignore by CI resolution.</p> <p>Some types of information are essential for successful CI resolution. These types are specified in the <code>&lt;WhiteListType&gt;</code> entries. Should it not be possible to load all CIs, the CI types specified in the whitelist are used. The order of the CI types in the list represent the order in which these CIs are included. As soon as the CIs belonging to a CI type cannot be accommodated in the cache, these CIs are excluded and no further CI Types are assessed.</p> <p>Entries in the ignore lists override entries in the whitelist. Entries in the whitelist are handled in their order of appearance.</p>
<b>Cache Refresh Rate</b>	<p>Specifies the frequency with which the CI cache is refreshed (minutes).</p>
<b>CI Limit</b>	<p>Sets the maximum number of CIs that are loaded into cache by the CI Resolver.</p>

UI Elements (A-Z)	Description
<b>CI Limit Event Severity</b>	Sets the severity of the event sent to the Event Browser when the CI Limit is reached.
<b>CI Limit Fully Qualified Domain Name</b>	Sets the source attribute of the event sent to the Event Browser when the CI Limit is reached.
<b>CI Resolver Attribute Splitting Rules</b>	Semicolon separated list of attribute/pattern pairs: <CI Type name>.<attribute name>=<regular expression>;<CI Type name>.<attribute name>=<regular expression>;...
<b>CiInfo Host Separation Character</b>	Character used to divide the host name from the CiInfo text string, for example: @@
<b>CiInfo Key Separation Character</b>	Character used to divide the CiInfo text string into keywords used to find CIs in the ODB, for example, a colon (:)
<b>Ignore Resolution Hints Text Case</b>	CI Resolver ignores the case of the CI type information when set to true.
<b>TQL Queries</b>	Defines the TQL queries to run for resolving a CI. <b>Note:</b> You can replace the automatically generated TQL query with a TQL query customized for your environment.
<b>Use Topology Sync Shortcut</b>	CI Resolver can use service ID information from Topology Sync to map service IDs directly to CIs.

## Certificate Server Settings

The Certificate Server is a component used to issue the certificates required for secure communication. It runs on each of the Data Processing Servers. This setting can be used to route all incoming certificate requests from the multiple Gateway Servers to a single Data Processing Server. On this Data Processing Server incoming certificate request can be granted with the `ovcm` command-line tool.

The following elements are included in the Certificate Server Settings pane.

UI Elements (A-Z)	Description
<b>Certificate Server Host</b>	Specifies the name of Data Processing Server to which certificate requests are forwarded.

## Close Related Event Settings

A new event can be used to automatically close one or more existing, related events. When a new event is received, a search for existing, related events is made. If any related events are found, these are closed and replaced by the new event.

There are two ways in which events can be related:

### ► `closeKeyPattern` attribute

If an event comes in and its `closeKeyPattern` matches the key attribute of an existing event, the older event is closed.

### ► ETIs Contributing to Health

Events can be related when they all contain an ETI contributing to health. The value of the ETI of the new event must be different from the value of the existing, active events, but must be associated with the same CI.

If `Enable Closing Related Events` is set to true, on receiving a new event, a search is made for related events and any found related event is closed.

The following elements are included in the Close Related Events Settings pane.

UI Elements (A-Z)	Description
<b>Detected Related Events by ETI</b>	Existing events must have same CI and ETI as new event, but a different ETI value. Only if ETI contributes to health. Default value is true.
<b>Detected Related Events by Key Matching Pattern</b>	Key of existing events must match closeKeyPattern of new event. Default value is true.
<b>Enable Closing Related Events</b>	If enabled, for each new event, related events are searched for. Any found related event will be closed. Default value is true.

### Closed Events Browser Settings

The Closed Events Browser Settings contains the available configurations used to customize how closed events are displayed in the Closed Events Browser.

The following elements are included in the Closed Events Browser Settings pane.

UI Elements (A-Z)	Description
<b>Maximum Closed Events</b>	Sets the maximum number of closed events to be displayed in the Closed Events Browser. Default is 1000.

## Custom Attribute Settings

The Custom Attribute Settings contains the available configurations used to customize how custom attributes are used.

The following elements are included in the Custom Attributes Setting pane.

UI Elements (A-Z)	Description
<b>Available Custom Attributes</b>	List of custom attributes separated by semicolons (;) that you can add to the Event Browser as columns, for example: "Customer;Region;Manager;Company".

---

**Note:** Each custom attribute can then be selected as a column in the Event Browser.

---

## Downtime Settings

The Downtime Settings contains the following attributes that are used for controlling the handling of events that were received while CIs were not available due to scheduled downtimes.

The following elements are included in the Downtime Setting pane.

UI Elements (A-Z)	Description
<b>Downtime History Range</b>	Time period in minutes within which past downtime configurations are considered. All downtime periods will be ignored which have an end time that is before the beginning of the configured history time period.
<b>Future Downtime Range</b>	Ignore all maintenance windows which starts after current time plus the future downtime range in minutes.
<b>Refresh Time Interval</b>	Maximum time in minutes after changes in the maintenance windows configuration are taking effect.

## Duplicate Events Suppression Settings

A new event can be a duplicate of an existing event. When each new event is received by Operations Management, a check is made to establish whether it is a duplicate of an existing (original) event. If the original event is found, the new event is excluded from any further processing and not added to the Event Browser. The original event is updated with information from the new event. The updates include the following information:

- ▶ Duplicate count is increased by 1
- ▶ Received time is changed to that of the new event

---

**Note:** Original received time remains available in event history lines.

---

Optionally, the following updates can also be made:

- ▶ Change title to that of new event
- ▶ Change severity to one of the following states:
  - ▶ Value contained in the new event
  - ▶ Most critical value from the new and original severity

Duplicate matching operates as follows:

- ▶ If the new event has the No Duplicate Suppression flag set, no search for an original event is made.
- ▶ If the new event includes a key, a search is made for an existing, active event that has the same key as the new event, and that are separated by less than the time period specified in the Maximum Age of Duplicate Events setting.
- ▶ If the new event does not include a key, a search is made for an existing, active event where a set of configurable attributes have the same values as the new event, and that are separated by less than the time period specified in the Maximum Age of Duplicate Events setting.



- If no original event is found yet, and the new event has an ETI value for a health-contributing ETI, a search is made for an existing, active event that has the same ETI value and the same CI, and that are separated by less than the time period specified in the Maximum Age of Duplicate Events setting.

The number of duplicates received for an event is available in the Event Browser. The Time Received value reflects the time that the latest duplicate arrived. The first received time is maintained in the Event History.

You can also make the following updates to the to the original event:

- Change the title to that of the latest duplicate event
- Change the severity to that of the latest duplicate or retain the most critical value.

The following elements are included in the Duplicate Events Suppression Setting pane.

UI Elements (A-Z)	Description
<b>Detect Duplicate Events by ETI</b>	Use ETIs to find original event. Duplicate events must have same CI, ETI, and ETI value, and the ETI must contribute to health. Default value is true.
<b>Detect Duplicate Events by Identical Attributes</b>	Use selected attributes (for example Select Application or Select CI) to find the original event. All selected attributes must be identical. Default value is false.
<b>Detect Duplicate Events by Key</b>	Use key attribute to find original event. Duplicate events must have identical key. Default value is true.
<b>Enable Duplicate Events Suppression</b>	If enabled, duplicate events will be dropped and the related original event will be updated instead. Default value is true.
<b>Maximum Age of Duplicate Events</b>	Maximum number of seconds difference between received times of original and new event (0 = infinite). Default value is 0.
<b>Select Application</b>	Duplicate events must have identical application. Default value is true.

UI Elements (A-Z)	Description
<b>Select Category</b>	Duplicate events must have identical category. Default value is true.
<b>Select CI</b>	Duplicate events must have identical CI. Default value is true.
<b>Select CI Hint</b>	Duplicate events must have identical CI hint. Default value is true.
<b>Select ETI Hint</b>	Duplicate events must have identical ETI hint. Default value is true.
<b>Select ETI Value</b>	Duplicate events must have identical ETI and ETI value. Default value is true.
<b>Select HPOM Service ID</b>	Duplicate events must have identical HPOM service ID. Default value is true.
<b>Select Node</b>	Duplicate events must have identical node. Default value is true.
<b>Select Node Hints</b>	Duplicate events must have identical node hints. Default value is true.
<b>Select Object</b>	Duplicate events must have identical object. Default value is true.
<b>Select Policy Condition ID</b>	Duplicate events must have identical policy condition ID. Default value is true.
<b>Select Severity</b>	Duplicate events must have identical severity. Default value is true.
<b>Select Subcategory</b>	Duplicate events must have identical subcategory. Default value is true.
<b>Select Title</b>	Duplicate events must have identical title. Default value is true.
<b>Select Type</b>	Duplicate events must have identical type. Default value is true.

UI Elements (A-Z)	Description
<b>Update Severity of Original Event</b>	Update severity of original event based on selected mode. The mode values are: <ul style="list-style-type: none"> <li>▶ Use new (severity value)</li> <li>▶ Most critical (severity value)</li> <li>▶ No (do not change severity of event)</li> </ul> Default value is No.
<b>Update Title of Original Event</b>	Update title of original event with title of last duplicate event. Default value is false.

---

**Note:** Wrong keys can suppress events that are not actually duplicates of existing events. To avoid suppressing non-duplicate events,

- ▶ Include enough information within the key to make the key specific enough to achieve a reliable match.
- ▶ Include all necessary attributes in the identity check.

Dropping duplicates also results in the inability to update health because the following differences between the original event and duplicate event may exist:

- ▶ Original event had no ETIs.
  - ▶ Original event and the new event had different ETIs.
-

## EPI (Event Processing Interface) Server Settings

The Event Processing Interface Server Settings contains the available configurations for the Event Pipeline Server.

The Event Processing Interface (EPI) is used to enrich events with additional information from sources accessible using Groovy scripts. For example, it is possible to add data to an event from a Microsoft Excel file or an SQL database. If Groovy scripts are specified in the Event Pipeline Script and Step Settings, the event is forwarded to the EPI Server.

The following elements are included in the Event Cache Settings pane.

UI Elements (A-Z)	Description
<b>EPI Server Timeout</b>	Configures the maximum allowed time period (in msec) for event processing in the EPI Server. The value zero (0) disables the timeout which means that a problem during processing in the EPI server may block further event processing indefinitely.

## Event Cache Settings

The Event Cache Settings contains the available configurations used to customize how event information is managed.

The following elements are included in the Event Cache Settings pane.

UI Elements (A-Z)	Description
<b>Max Cache Level</b>	<p>Maximal number of active, top-level events to be kept in Event Cache. Default value: 20000</p> <p>If the configured maximum is reached the oldest 10% of the top level events are removed from the cache.</p> <p>When the number of active, top-level events is less than 80% of the maximum value, the purged events are reloaded.</p> <p>For example, if the default Event Cache Max Level of 20000 is reached, the 2000 oldest events are removed from the cache. As the number of events in the Event Browser drops to 16000, the purged events are reloaded.</p> <p>The settings are per deployment. The same setting is applied to all gateway servers within the same deployment.</p>

## Event Forwarding Settings

The Event Forwarding Settings contains the available configurations used to specify whether events are forwarded to connected servers, the forwarding mode, and the expiration time of forward requests.

The following elements are included in the Event Forwarding Settings pane.

UI Elements (A-Z)	Description
<p><b>Event Forwarding Expiration</b></p>	<p>Number of hours an event forward request or event update synchronization request is held in the queue. If the request cannot be delivered to the target server before this expiration time, it is automatically deleted from the queue.</p> <p>Default value is 12 hours. Minimum value is 1 hour.</p> <p><b>Note:</b> If the request to forward an event to a particular connected server fails, the request is deleted from the forwarding queue and the event makes an internal note that the delivery to the target server has failed. The event maintains information about the failed request to the specified connected server. Any further forwarding rule matches on this event for this connected server is ignored. If the forwarding type was set to Synchronize and Transfer Control, a standard event annotation is also added to the event, otherwise no event annotation is made.</p> <p>Failure to deliver can occur for retry timeouts, or a catastrophic delivery error. A catastrophic delivery error is a situation where it does not make sense to retry the request, for example, a mis-configuration (authentication fails), or a programming error is encountered in an External Process groovy adapter (NullPointerException). These cases require manual intervention before retrying.</p> <p>To manually retry failed requests to a particular connected server, from the Event Browser, manually transfer control of an event that has previously failed delivery to a particular server.</p>
<p><b>Forward Events</b></p>	<p>Specifies whether forwarding of events to connected servers is enabled.</p>

UI Elements (A-Z)	Description
<p><b>One-line Event Forwarding</b></p>	<p>Every forwarded event includes a list of servers that have a copy of this event. By default, when the event is modified on one server, it notifies all servers in the list of the change.</p> <p>When enabled (true), for each event change (for example, close, annotation, or add), the server only informs the server from which the event was received and to which the event was forwarded.</p> <p>This can be useful in simplifying connections in firewall environments.</p>

## Events History Settings

The Event History Settings contains the available configurations used to customize how event history information is handled.

The following elements are included in the Event History Settings pane.

UI Elements (A-Z)	Description
<p><b>Maximum Property Length</b></p>	<p>History of properties of type string or text which are longer than the configured value are ignored. Values with a fixed length like UUID cannot be limited.</p> <p>The default value is 0 which retains all information regardless of length.</p> <p>If an attribute modification where the new or old value exceeds the maximum allowed length, the following text appears in place of the value in the event history:</p> <p><i>Value exceeds the maximum allowed length of 'configured length' characters.</i></p>

## Event Lifecycle State and Assignment Propagation

The Event Lifecycle State and Assignment Propagation settings contains the available configurations used to customize how correlated events are handled when closing cause events.

The following elements are included in the Event Lifecycle State and Assignment Propagation settings pane.

UI Elements (A-Z)	Description
<p><b>Propagation of Assignment operation to symptom events</b></p>	<p>Enables the propagation of user and group assignments to symptom events.</p> <p>When enabled (True), changing the user or group assignment of a cause event also applies the change to all symptom events.</p> <p><b>Note:</b> If Enabled (True), assignments cannot be changed for symptom events.</p>
<p><b>Propagation of Lifecycle State operations to symptom events</b></p>	<p>Enables the propagation of lifecycle state changes to symptom events.</p> <ul style="list-style-type: none"> <li>▶ <b>Disabled but close operation is propagated to symptom events</b> — Lifecycle state changes are not propagated to symptom events except for closing of events.</li> <li>▶ <b>Enabled</b> — Lifecycle state changes are propagated to symptom events.</li> <li>▶ <b>Disabled but close operation unrelates symptom events</b> — Lifecycle state changes are not propagated to symptom events. Closing the cause event unrelates symptom events.</li> </ul> <p><b>Note:</b> If Enabled (True), lifecycle states cannot be changed for symptom events.</p>



## Event Type Indicator Settings

The Event Type Indicator Settings contain the configuration setting that you enables you to let ETI mapping rules override indicators specified in custom attributes.

The following elements are included in the Event Type Indicator Settings pane.

UI Elements (A-Z)	Description
<b>Allow Rule Overwrite</b>	<p>Allows ETI Mapping Rules to overwrite indicators specified in custom attributes (CAs).</p> <p>Default: False</p> <p>If set to false, and CMA-matched event type indicators are recognized, mapping rules are ignored.</p> <p>If set to true, the CMAs are still evaluated but mapping rules are used to process events.</p> <p>For example, migrating from customized, non-Operations Management-ready SPIs to Operations Management-ready SPIs can result in errors in event processing as new content packs no longer work as expected with the existing handling.</p> <p>Allowing mapping rules to override the CMA-driven event assignment leaves the Operations Management administrator in control.</p>

## Graphing Settings

The Graphing Settings contain the configuration settings that are used to determine how performance graphs are generated and displayed.

The following elements are included in the Graphing Settings pane.

UI Elements (A-Z)	Description
<b>Daily Maintenance Time</b>	Schedules the time at which regular maintenance tasks occur. The value is specified in HH:MM format, for example: 04:30.
<b>Graph Auto-Refresh Rate</b>	Specifies the interval (in seconds) used to automatically refreshes the displayed graphs.
<b>JVM Minimum Memory</b>	Prevents accepting of new performance graphs requests when there is insufficient memory available in the Java Virtual Machine (JVM). The default minimum value is 0 (zero).
<b>Maximum Instances</b>	Maximum number of Instances that can be launched in a Graph. If a CI has more instances than the value specified here, graphing cannot display those instances.
<b>Metrics Per Graph</b>	Specifies the number of metrics you want to see in a graph. The default value is 8. If you have a value specified for this parameter in the graph template, Graphing chooses the highest value between the two values while drawing the graph.
<b>Report Template</b>	Modifies the properties of the report template. The settings you configure here appear in the Print view of the graph.
<b>Show Mouse Hover</b>	<p>If enabled (<b>true</b>), hovering the mouse on the graph area of a drawn graph opens a pop-up window displaying the actual value of the data point and the time interval of the selected data.</p> <p>If disabled (<b>false</b>), no pop-up window is opened.</p> <p>The default value is <b>true</b>.</p> <p><b>Note:</b> The value selected from the user interface menu option overrides the setting specified for this parameter.</p>

UI Elements (A-Z)	Description
<b>Sort by Maximum Graph Count</b>	Limits the number of graphs drawn for an instance-comparison graph when Metric Data Display Order is specified as <i>average value</i> or <i>reverse average value</i> in the Performance Graphs, for example: 20.
<b>System Performance Classes</b>	Lists the available system performance classes. A graph template that contains any of these system performance classes is a <i>System Performance</i> graph. A system performance graph must be associated with a host CI.
<b>Table Row Count</b>	Configure the default value for the number of rows in a chart (graph in tabular form), for example: 100.
<b>Trace Level</b>	Enable (1) or disable (0) tracing.

## HPOM Topology Synchronization Connection Settings

The HPOM Topology Synchronization Connection Settings pane contains the Operations Management settings that can be used to specify connection information used to communicate with one

HP Operations Manager for UNIX or HP Operations Manager for Windows management server. These connection settings are used for synchronization of events and basic topology synchronization between Operations Management and the specified HP Operations Manager management server.

---

**Note:** The recommended method of synchronizing topology information is by using Dynamic Topology Synchronization. For details, see [Dynamic Topology Synchronization](#) on page 489.

---

The following elements are included in the HPOM Connection Settings pane.

UI Elements (A-Z)	Description
<b>Forward All Events</b>	Enables (true) forwarding of all events to this HPOM system. Use for testing only. For production systems, set up servers using the Connected Servers manager and create appropriate Event Forwarding Rules.
<b>HPOM Host</b>	Name of the system hosting the HP Operations Manager management server that is forwarding events. This setting is used for the bi-directional synchronization of events between Operations Management and one HP Operations Manager management server.  It is recommended to specify connections to external servers, including HPOM management servers, using the Connected Servers manager. For details, see " <a href="#">How to Create a Connection to an HPOM Server</a> " on page 364.
<b>HPOM Password</b>	Password for the user that Operations Management uses to connect to the configured HP Operations Manager management server.

UI Elements (A-Z)	Description
<b>HPOM Port</b>	Port number to use when establishing a connection to the HP Operations Manager management server.
<b>HPOM Type</b>	Specify the platform of the HP Operations Manager installation.
<b>HPOM User</b>	User name that Operations Management uses to connect to the configured HP Operations Manager management server.
<b>HTTPS HPOM Web Service Connection</b>	Set to true to use HTTPS to connect to the HPOM Web service.

## HPOM Topology Synchronization Settings

The HPOM Topology Synchronization contains the settings used by Operations Management to synchronize its topology with HP Operations Manager.

These settings are used for basic and dynamic synchronization of the object topology in the environments monitored by Operations Management and HP Operations Manager. The recommended method of synchronizing topology information is by using Dynamic Topology Synchronization. For details, see Chapter 25, "Dynamic Topology Synchronization".

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**Note:** For more information about the **opr-startTopologySync.bat** command, see "Basic Topology Synchronization Command-Line Interface" on page 496.

---

For the basic synchronization of Operations Management and HP Operations Manager topologies, make sure that the following settings are correctly configured:

### HPOM Connection Settings

The topology synchronization process needs to read the topology data from the HP Operations Manager web service (WS) during synchronization. For more information, see "HPOM Topology Synchronization Connection Settings" on page 524.

The following elements are included in the HPOM Topology Synchronization pane.

UI Elements (A-Z)	Description
<b>Dump Data</b>	Saves all data from the topology synchronization to the hard disk. This setting is not recommended for production systems because it can have a significant negative effect on performance. The default setting is False.
<b>Groovy Scripts</b>	Enables Groovy scripts used to manipulate the synchronization data during the synchronization process.
<b>Packages for Topology Sync</b>	Lists the packages used for the topology synchronizations.
<b>Resolve IPs During Synchronization</b>	Enable IP resolution for nodes without IP address information in HPOM. Enable IP resolution (true) has a negative effect on the synchronization performance.

## License Reporting Settings

The License Reporting Settings contains the available configurations used to specify the License Reporting Server.

The following elements are included in the License Reporting pane.

UI Elements (A-Z)	Description
<b>Server Name</b>	Specifies the fully qualified domain name of the License Reporting Server. If no server is specified, no reports are generated.

## Reconciliation Settings

The Reconciliation Settings contains the available configurations used to poll the ODB for reconciling changes.

The following elements are included in the Reconciliation Settings pane.

UI Elements (A-Z)	Description
<b>Polling Interval</b>	Specifies the interval used to poll ODB for reconciliation changes (in seconds). Use 0 to disable polling.

## Topaz Authorization Service Settings

The Topaz Authorization Service Settings contains the configurations that Operations Management uses in conjunction with user management.

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**Tip:** The list of event categories defined here is also available in the user configuration dialog box, where you can grant users or user groups access to work with events and event categories.

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The following elements are included in the Topaz Authorization Service Settings pane.

UI Elements (A-Z)	Description
<b>Categories</b>	List indicating event categories recognized by Operations Management separated by semicolons (;), for example: Exchange;WebApp;System.  Event categories are logical groups of events (for example: database, OpenVMS, or hardware) which can be assigned to Operations Management users.
<b>Refresh Interval</b>	Refresh interval in minutes for reloading user permissions from the database. Operations Management reloads user permissions every 10 minutes by default. However, events already loaded into the browser remain unaffected. Changes to a user account are only fully available after a new logon to Operations Management.

## Topology View Settings

The Topology View Settings contain the configuration setting that you can use to change how information is displayed in the Health Top View pane either in the Health Perspectives tab or the Dashboard.

The following elements are included in the Topology View Settings pane.

UI Elements (A-Z)	Description
<b>CI Centering Mode</b>	Enables updating of the view selector in the Top View when a CI is selected in the view.

## Topology-Based Event Correlation Settings

The Event Correlation Settings contain the configuration settings that correlation rules are managed.

The following elements are included in the Topology-Based Event Correlation Settings pane.

UI Elements (A-Z)	Description
<p><b>Auto-Extend Time Window Mode</b></p>	<p>Enables the automatic extension of the correlation time period whenever an additional symptom is correlated to the same cause.</p> <p>Each time that an event is correlated with a problem, the time period set in the correlation time window is restarted to help enable the correlation of a greater proportion of symptoms associated with the original event.</p> <p>The correlation time window is only automatically extended when an a new symptom is added to a cause AND the cause is not yet closed.</p> <p>If the cause is already closed, the time window is not extend anymore so that after the last time window elapses, future repetitions of symptoms are no longer correlated to the closed cause.</p> <p>This avoids ignoring new similar symptoms. Just because a cause has been closed, it is not necessarily true that the problem is solved. If the same symptoms continue to occur, they were most likely not caused by the closed cause event and should become visible in the Event Browser.</p>

UI Elements (A-Z)	Description
<b>Correlate Closed Cause Events</b>	<p>Controls whether symptoms are correlated to closed causes or not. Default is true. If set to false, no correlation is done with newly occurring symptom events after a cause has been closed. This prevents any auto-closing of new events.</p> <p>Correlation takes place regardless of the lifecycle state of cause event, as long as events occur within the correlation time window. Correlating a symptom to a closed cause closes the symptom as it is not possible to have open symptoms with a closed cause.</p>
<b>Correlation Time Window</b>	<p>Sets the period of time in seconds that correlation rules wait for all required events to occur before reporting the cause event and emptying the correlation rule cache.</p> <p>Cause and symptom events must arrive within that time frame in the correlation engine to be considered for correlation. A time window starts when a first cause or symptom event arrives that cannot be correlated with any other event.</p> <p>Default value is 960 seconds (16 minutes).</p>
<b>Max Waiting Queue Size</b>	<p>Maximum number of events waiting to be processed by the correlation engine. If this limit is exceeded, the oldest event is removed from the queue and no longer considered for correlation.</p> <p>Default value: 5000</p> <p>Valid range of Values: 100-20000</p> <p>Changes are activated immediately.</p>

## User Interface Settings

The User Interface Settings contains the time interval used to update the Operations Management user interface with new event-related data.

The following elements are included in the User Interface Settings pane.

UI Elements (A-Z)	Description
<b>User Interface Update Interval</b>	The interval of user interface updates (in milliseconds). The default value is 5000 ms (5 seconds).

# Part III

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## Content Packs



# 27

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## Content Packs

### **This chapter includes:**

#### Concepts

- ▶ [Content Management](#) on page 535

#### Tasks

- ▶ [How to Upload OO Flows](#) on page 540

### **Content Management**

Content is information that Operations Management uses to describe the configuration items that you are monitoring.

Content can include the following types of information:

- ▶ Configuration item types
- ▶ Mapping rules for topology synchronization
- ▶ Discovery sources
- ▶ Correlation rules
- ▶ Rules for HI-based key performance indicators
- ▶ Event type indicators
- ▶ Health indicators
- ▶ Graph family definitions
- ▶ Tool definitions

Content for a specific management area is typically contained in dedicated content packs. The BSM Content Packs manager helps you manage this data.

You use Content Packs to install or update items in an Operations Management instance. You can also take content from one Operations Management instance and upload it to other Operations Management instances, using the Import and Export features.

The Content Packs manager enables you to create a content pack that contains a snapshot of the rules and tools that you have defined with Operations Management and save the snapshot information in a file. The snapshot file you create includes all (or any selection of) the event type indicators, health indicators, key performance indicators, mapping rules, KPI calculation and business rules, tool definitions, view mappings, and graphing assignments that you have defined specifically for Operations Management.

The following table gives an overview of the items you can include in a content pack:

Content Type	Description
<b>Key Performance Indicators</b>	Configuration and calculation of key performance indicators (KPI).
<b>Event Indicator</b>	Configuration and calculation of event type indicators.
<b>Event Type Mapping Rules</b>	Rules that map the attributes of HP Operations Manager messages to Operations Management events.
<b>Event correlation</b>	Rules that correlate similar or related events. For more information, see "Correlation Rules" on page 330.
<b>Performance graphs</b>	Information about the graph family templates used to generate performance graphs.
<b>Tools</b>	Definitions for customized tools that the Operations Management software administrator or subject matter experts have configured for users.



Content Type	Description
<b>ODB view mappings</b>	Contents of the list of views displayed in the Selected View list in the Health Top View pane in the Health Perspective tab.
<b>Context Menus</b>	Operations Management extensions to context menus, for example, to launch Operations Management configuration tools, start custom tools for specific CI types, and display Operations Management graphs.

You can use the Content Packs manager to perform the following tasks:

- Define the contents of a content pack and save the definition in the Operations Management database.
- Export a content pack definition and the data it references to a file called a content pack.
- Import a content pack definition and the data it references.
- Exchange content packs between installed instances of Operations Management

## Content Manager Interfaces

The Content Packs manager has two interfaces:

- **BSM Content Packs graphical user interface (GUI)**

You can also start the BSM Content Pack manager using the following menu option:

**Admin > Operations Management > Manage Content > Content Packs**

- **ContentManager command-line interface (CLI)**

The features and functionality of the Content Pack manager are also accessible using the **ContentManager** command-line interface. You can access the ContentManager command-line interface directly, in a shell, or remotely, for example, in a script.

**Note:** You cannot use the ContentManager command-line interface to create a content pack definition.

---

## Operations Management Content Packs

Content Packs are for first-time installation. The installation setup copies files to the local file system on the management server system.

Content Packs include CI types, their relationships and dependencies, TQLs, enrichment rules, KPI assignments, health indicators, event indicators, view mappings, tool definitions, correlation rules, graph definitions, graphing family definitions, menu extensions, and details of the underlying architectural model. The Content Packs are stored on the Data Processing server in a two machine deployment. You need to manually import the content pack using the content manager.

Installation packages are available for a variety of different application areas and are installed using patches after the setup. The installation packages include content packs that extend the functionality of Operations Management, for example: so that Operations Management can use events reported by Smart Plug-ins (SPIs) on the HP Operations Manager management server.

The content packs provide a collection of preconfigured rules, tools, HIs, ETIs, graphs, and views to help you monitor events reported to the HP Operations Manager management server by the SPIs. If a SPI is installed on an HP Operations Manager management server and this server is configured to forward messages to Operations Management, you can make use of the tools, rules, and definitions listed in the respective installation package.

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**Note:** If you change any HI/ETI name, you must change the custom message attribute (CMA) value of the underlying policies to ensure proper functioning of the Content Pack.

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The following table lists the available Content Packs:

Content Pack Name	Application Monitored
HPOprOra	Oracle Database Server
HPOprMss	Microsoft SQL Server
HPOprJee	J2EE Server (WebSphere Application Server and WebLogic Application Server)
HPOprAds	Microsoft Active Directory Server
HPOprExc	Microsoft Exchange Server 2007
HPOprInf	Infrastructure which includes UNIX and Windows operating systems, Virtualization Systems, and Cluster Systems

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**Note:** For more detailed information about the contents of an Content Pack, start the Content Packs manager or the and browse to the respective Content Pack.

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The following packages are either installed by default or available separately:

- "Oracle Content Pack" on page 543
- "Microsoft SQL Server Content Pack" on page 568
- "J2EE Application Server Content Pack" on page 585
- "Infrastructure Content Pack" on page 653
- "Microsoft Active Directory Server Content Pack" on page 711
- "Microsoft Exchange Server 2007 Content Pack" on page 748
- "BlackBerry Enterprise Server Software" Content Pack

A separate document titled "BlackBerry SPI Content Pack" is located at:

`<HPBSM_install_dir>/AppServer/webapps/site.war/amdocs/eng/pdfs/BlackBerrySPI_OMcontentpack.pdf`

## How to Upload OO Flows

This task shows you how to upload OO Flows available with Operations Management content packs.

### To upload OO Flows from Operations Management content packs:

- 1 On the HP Business Service Management system where the content packs have been installed, go to the directory:

```
<HPBSM Root Directory>/conf/opr/oo
```

- 2 Copy the required OO jar file to a temporary location on a system where HP OO Studio (version 07.51.02 or greater) is installed.

The file names take the following form:

```
HPOprOO<content_name>.jar
```

For example:

- HPOprOOADS.jar for Microsoft Active Directory
- HPOprOOEXC.jar for Microsoft Exchange
- HPOprOOMss.jar for Microsoft SQL Server
- HPOprOOOra.jar for Oracle

- 3 To install and upload the OO flows, for each required content pack, run the command:

```
java -jar "<temp>\HPOprOO<content_name>" -centralPassword <centralpassword>
```

For example:

```
java -jar "<temp>\HPOprOOMss" -centralPassword <centralpassword>
```

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**Note:** If the admin user in HP OO is not the default user, another parameter is required. For further details about installing content and the options available, see the *HP Operations Orchestration Software Development Kit Guide*.

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Using HP OO Studio, the uploaded OO flows are accessed under:

**../Library/Operations Management/..**

- 4 From BSM, complete the mapping of OO flows to CIs in:

**Admin > Integration > Operations Orchestration**

and map the OO flow input variables to CI attributes.



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## Databases Content Packs

**This appendix includes:**

Reference

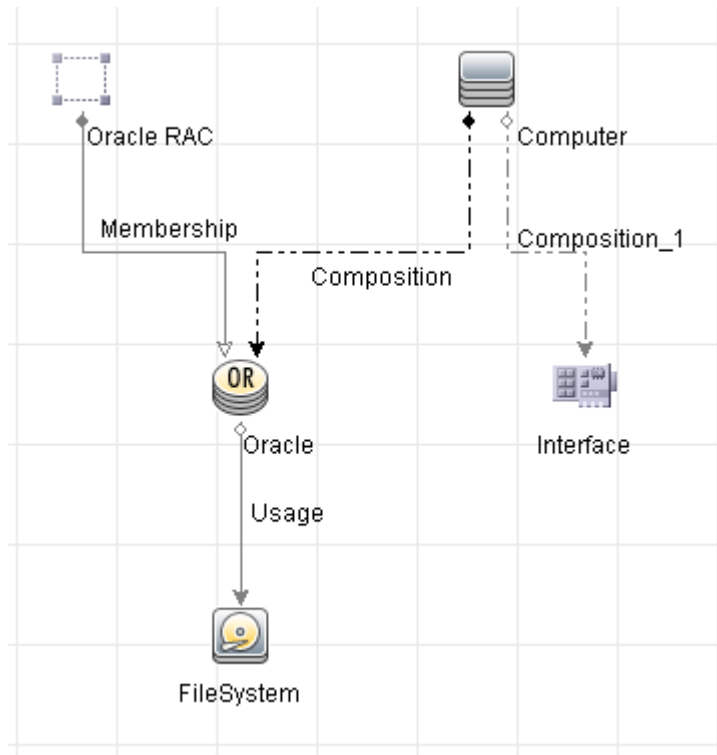
- ▶ [Oracle Content Pack](#) on page 543
- ▶ [Microsoft SQL Server Content Pack](#) on page 568

### **Oracle Content Pack**

The Oracle Content Pack contains the following artifacts:

#### **ODB Views**

The ODB package in the Oracle Content Pack includes the ORA\_Deployment view, which refers to the Oracle, Oracle RAC, Computer, and File System CI types. The following image shows the relationship among the CI types.



## Health Indicators

The content pack includes the following Health Indicators (HIs) to monitor the Oracle-related events:

CI Type	HI	Description	Value
Database	CPU Usage by SQL	Indicates SQL statements with high CPU time per execution	Normal
Oracle	Database Object Status	Indicates database object status	Valid, Enabled
Oracle	Database Segment Status	Indicates the status of segments in a Oracle Database Instance	Normal



CI Type	HI	Description	Value
Oracle	Database Segment Usage Level	Indicates the usage of segments in a Oracle Database Instance	Normal
Database	Database Server Status	Indicates database server availability	Up
Oracle	Datafiles Status	Indicates oracle datafiles status	Online
Oracle	Default Bufferpool Busy Ratio	Indicates the ratio of buffered data requests of the Oracle Default Bufferpool	Normal, High
Oracle	Default Bufferpool Hit Ratio	Indicates the ratio of buffered data requests of the Oracle Default Bufferpool	Normal
Oracle	Dictionary Cache Miss Ratio	Indicates the effectiveness of the Oracle Dictionary Cache	Normal
Oracle	Dispatcher Busy Ratio by Network	Indicates the workload of the Oracle Dispatcher	Normal
Oracle	Dispatcher Process Queue Response Time	Indicates the average time an item in the Oracle Dispatcher queue waits before being processed	Normal, High
Oracle	Flash Recovery Area Usage Level	Indicates the availability of an Oracle Instance as affected by the percentage of space used by Flash Recovery Area	Normal
Oracle	Library Cache Functioning	Indicates the performance of a Oracle Database Instance as affected by 1 - library cache misses to executions 2 - library cache get hits to gets 3 - library cache pin hits to pins	Normal
Oracle	Logical Read Rate	Indicates the performance of an Oracle Instance as affected by the number of logical reads per min	Normal

CI Type	HI	Description	Value
Oracle	Long Table Scans Percentage	Indicates the percentage of Long Table Scans performed	Normal
Oracle	Oracle Background Dump Device Usage Level	Indicates Oracle background dump device space usage	Normal
Oracle	Oracle Core Dump Device Usage Level	Indicates Oracle core dump device space usage	Normal
Oracle	Oracle Opened Cursor Current	Indicates the oracle current opened cursor	Normal, High
Oracle	Oracle Parse Count (Hard)	Indicates the hard parses during this sample period	Normal, High
Oracle	Oracle Parse Count (Failures)	Indicates the oracle parse failures	Normal, High
Oracle	Oracle Session Connect Time	Indicates the connect time for the Oracle session	Normal, High
Oracle	Oracle User Dump Device Usage Level	Indicates Oracle user dump device space usage	Normal
Oracle	Oracle Users Call Rate	Indicates rate of recursive calls to user calls and rate of recursive calls to cumulative opened cursors	Normal
Oracle	Physical Read Rate	Indicates the performance of an Oracle Instance as affected by the number of physical reads per min	Normal
Oracle	Row Cache Hit Ratio	Indicates the ratio of which row data requests could be served from the cache	Normal, High
Database	Replication Status	Indicates database server replication status	Normal

CI Type	HI	Description	Value
Database	Server Transaction Rate	Indicates the rate of transactions for the entire database server	Normal
Oracle	Shared Pool Memory	Indicates the performance of a Oracle Database Instance as affected by the free space in shared pool memory	Normal
Oracle	SQL Disk ReadWrite Rate	Indicates SQL statement with high disk read-write per execution	Normal
Database	SQL Query Performance	Indicates SQL statements with high elapsed time per execution	Normal
Oracle	Streams Apply Status	Indicates the performance of an Oracle Instance as affected by apply processes having errors in an oracle streams environment	Normal
Oracle	Streams Capture Status	Indicates the performance of an Oracle Instance as affected by capture processes having errors in an oracle streams environment	Normal
Oracle	Streams Propagation Status	Indicates the performance of an Oracle Instance as affected by propagation processes having errors in an oracle streams environment	Normal
Oracle	Tablespace Temp Segment Usage	Indicates the high use of temp segments to allocated of tablespaces in a Oracle Database Instance	Normal
Oracle	Tablespaces Availability	Indicates the availability of DB Tablespaces in a Oracle Database Instance	Normal

CI Type	HI	Description	Value
Oracle	Tablespace Physical Read Ratio	Indicates the ratio of block to physical reads of tablespaces in a Oracle Database Instance	Normal
Oracle	Tablespace Usage Level	Indicates the usage of tablespaces in a Oracle Database Instance	Normal
Oracle	Wait Locked Sessions	Indicates the performance of a Oracle Database Instance as affected by the number of sessions held by locks	Normal
Oracle	Waits On Redo Log Space	Indicates the performance of a Oracle Database Instance as affected by the number of waits for redo log space	Normal

## Event Type Indicators

The content pack includes the following Event Type Indicators (ETIs) to monitor Oracle-related events:

CI Type	ETI	Description	Value
Oracle	Archive Status	Indicates the status of an Oracle Archive Log	Normal
Oracle	Checkpoint Rate	Indicates high checkpoint rate	Normal
Oracle	Control File ReadWrite Status	Indicates oracle control file read/write error	Normal
Oracle	Flash Recovery Errors	Indicates the errors related to flash recovery in an Oracle Instance	Normal
Oracle	Heavy SQL Statements	Indicates the number of heavy SQL statements in an Oracle Instance	Normal
Oracle	Latch Contention Ratio	Indicates possible latching problems	Normal

CI Type	ETI	Description	Value
Oracle	Latch Hit Ratio	Indicates possible latching problems	Normal, High
Oracle	Locks Usage Level	Indicates the ratio of locks used in an Oracle Database Instance	Normal, High
Oracle	Materialized View Errors	Indicates the errors related to materialized views in an Oracle Instance	Normal
Oracle	Memory Sort Rate	Indicates the ratio of which sorts have been performed solely on memory. A low memory sort ratio implies a high disk sort ratio.	Normal
Oracle	Oracle Database Process Status	Indicates Oracle database service/process status	Running
Oracle	Oracle Disk ReadWrite Errors	Indicates oracle disk read write errors	Normal
Oracle	Oracle Session Count	Indicates oracle session count to configured	Normal
Oracle	Streams Errors	Indicates the errors in an oracle streams environment	Normal
Database	SQL Query Tuning	Indicates SQL statements with low query tuning	Normal
Oracle	Tablespaces Free Space Fragmentation Index	Indicates the worse fragmented tablespaces in a Oracle Database Instance	Normal, Moderate, High
Oracle	Total Sort Rate	Indicates the total sorts on disk and in memory in an Oracle Database Instance	Normal

## Correlation Rules

The content pack in the Oracle Content Pack includes the following rules to correlate Oracle-related events:

For more information on how the correlation rules work, see the *Operations Manager i Concepts Guide*.

### Database::FileSystem:Disk Usage Level >> Oracle Device Usage Level HIs

<b>Description:</b> Filesystem usage level impacts Oracle Space Usage (Background, User and Core dump device free space)		
Cause		
CIT: File system	ETI: Disk Usage Level	Value: Near Capacity
Symptom 1		
CIT: Oracle	ETI: Oracle Background Dump Device Usage Level	Value: High
Symptom 2		
CIT: Oracle	ETI: Oracle Core Dump Device Usage Level	Value: High
Symptom 3		
CIT: Oracle	ETI: Oracle User Dump Device Usage Level	Value: High

### Database::Computer:Disk Usage Level >> Oracle Device Usage Level HIs

<b>Description:</b> Host's filesystem usage level impacts Oracle Space Usage (Background, User and Core dump device free space)		
Cause		
CIT: Computer	ETI: Disk Usage Level	Value: Near Capacity
Symptom 1		
CIT: Oracle	ETI: Oracle Core Dump Device Usage Level	Value: High
Symptom 2		

<b>Description:</b> Host's filesystem usage level impacts Oracle Space Usage (Background, User and Core dump device free space)		
CIT: Oracle	ETI: Oracle Background Dump Device Usage Level	Value: High
Symptom 3		
CIT: Oracle	ETI: Oracle User Dump Device Usage Level	Value: High

**Database::Computer:Memory Usage Level >> Oracle Performance HIs**

<b>Description:</b> Memory Usage Impacts Oracle Performance		
Cause		
CIT: Computer	ETI: Memory Usage Level	Value: Near Capacity/ Much Higher Than Normal
Symptom 1		
CIT: Oracle	ETI: Dictionary Cache Miss Ratio	Value: High
Symptom 2		
CIT: Oracle	ETI: Library Cache Functioning	Value: HighReload, LowGetHits, LowPinHits
Symptom 3		
CIT: Oracle	ETI: Memory Sort Rate	Value: Low
Symptom 4		
CIT: Oracle	ETI: SQL Query Performance	Value: Low

**Database::Computer:Oracle Tablespace Temp Segment Usage Level >> Disk Usage Level**

<b>Description:</b> Correlates High Disk Space Usage by Db Tablespace to Near Capacity Disk Usage Level of Host		
Cause		
CIT: Oracle	ETI: Tablespace Temp Segment Usage	Value: High
Symptom		
CIT: Computer	ETI: Disk Usage Level	Value: Near Capacity

**Database::Computer:Oracle Tablespace Usage Level >> Disk Usage Level**

<b>Description:</b> Correlates High Disk Space Usage by Db Tablespace to Near Capacity Disk Usage Level of Host		
Cause		
CIT: Oracle	ETI: Tablespace Usage Level	Value: High
Symptom		
CIT: Computer	ETI: Disk Usage Level	Value: Near Capacity

**Database::FileSystem: Oracle Tablespace Usage Level >> Disk Usage Level**

<b>Description:</b> Correlates High Disk Space Usage by Db Tablespace to Near Capacity Disk Usage Level of FileSystem		
Cause		
CIT: Oracle	ETI: Tablespace Usage Level	Value: High
Symptom		
CIT: File System	ETI: Disk Usage Level	Value: Near Capacity



### Database::FileSystem:Oracle Tablespace Temp Segment Usage Level >> Disk Usage Level

<b>Description:</b> Correlates High Disk Space Usage by Db Tablespace Temp Usage to Near Capacity Disk Usage Level of FileSystem		
Cause		
CIT: Oracle	ETI: Tablespace Temp Segment Usage	Value: High
Symptom		
CIT: File System	ETI: Disk Usage Level	Value: Near Capacity

### Database::Computer:Oracle CPU Usage by SQL >> CPU Load

<b>Description:</b> CPU usage by Oracle SQL query and Heavy SQL statements increase CPU Load on Computer		
Cause		
CIT: Oracle	ETI: CPU Usage by SQL	Value: High
Symptom		
CIT: Computer	ETI: CPU Load	Value: Bottlenecked, Constrained, Busy, Overloaded

### Database::Computer:Oracle Heavy SQL Statement >> CPU Load

<b>Description:</b> Oracle Heavy SQL statements increase CPU Load on Computer		
Cause		
CIT: Oracle	ETI: Heavy SQL Statements	Value: High
Symptom		
CIT: Computer	ETI: CPU Load	Value: Bottlenecked, Constrained, Busy, Overloaded

**Database::Computer: Node Status >> Oracle Database Server Status**

<b>Description:</b> Correlates Unavailability of node to that of Database		
Cause		
CIT: Computer	ETI: Node Status	Value: Down, Unknown, Suspended, Hang
Symptom		
CIT: Oracle	ETI: Database Server Status	Value: Down

**Database::Computer: Ping Availability >> Oracle Database Server Status**

<b>Description:</b> Correlates Unavailability of node to that of Database		
Cause		
CIT: Computer	ETI: Ping Availability	Value: Unavailable
Symptom		
CIT: Oracle	ETI: Database Server Status	Value: Down

**Database::Interface: InterfaceUtilization >> Oracle Database Replication Status**

<b>Description:</b> Correlates Interface Utilization of node to Oracle Database Replication and SQL Query Performance Health		
Cause		
CIT: Interface	ETI: Network IQ	Value: High, Higher Than Normal, Much Higher Than Normal
Symptom 1		
CIT: Oracle	ETI: Replication Status	Value: Broken, Failed

<b>Description:</b> Correlates Interface Utilization of node to Oracle Database Replication and SQL Query Performance Health		
Symptom 2		
CIT: Oracle	ETI: Dispatcher Busy Ratio by Network	Value: High
Symptom 3		
CIT: Oracle	ETI: SQL Query Performance	Value: Low

## Tool Definitions

**Oracle Product Manual:** Starts a web browser and connects to the Oracle product manuals web site.

**Oracle Database Connection Check:** Checks the connection of all Oracle database instances configured to the Smart Plug-in for Databases (Oracle).

## Graph Templates

The content pack includes the SPI for Databases - Oracle graph family, which is mapped to the Oracle CI type.

The following table lists the graph templates present in the SPI for Databases - Oracle graph family and the mapped policies:

Graph Templates	Metric Name	Policy Description
Archive Device	DBSPI-0058	Percentage of free space on archive device
Archive Logs	DBSPI-0056	Number of archive logs in archive device
	DBSPI-0057	Average time of archive log writes
Calls	DBSPI-0049	Rate of user calls
	DBSPI-0050	Ratio of recursive calls to user calls
	DBSPI-0075	Ratio of recursive calls to cumulative opened cursors
	DBSPI-0044	Commit rate

Graph Templates	Metric Name	Policy Description
Checkpoints	DBSPI-0035	Rate of background checkpoints completed
	DBSPI-0083	Rate of DBWR checkpoints
Dump Devices	DBSPI-0062	Percentage of space used on background dump device
	DBSPI-0064	Percentage of space used on user dump device
	DBSPI-0065	Percentage of space used on core dump device
	DBSPI-0066	Size in MB of alert log
Initialization Limits	DBSPI-0028	Percentage of DML locks used to total configured
	DBSPI-0031	Number of users with percentage of open cursors to maximum configured
	DBSPI-0085	Percentage of current transactions to configured
	DBSPI-0087	Percentage of current processes to configured
	DBSPI-0089	Percentage of enqueues to configured
Multi-threaded Server	DBSPI-0090	Percentage of busy (average) for all dispatchers
	DBSPI-0091	Number of clients currently connected to all dispatchers
	DBSPI-0092	Percentage of shared servers waiting for requests
	DBSPI-0093	Percentage of busy to max shared server processes
	DBSPI-0094	Current percentage of shared pool allocated to UGA
	DBSPI-0095	Maximum percentage of shared pool allocated to UGA
	DBSPI-0096	Percentage of highwater to max shared server processes

Graph Templates	Metric Name	Policy Description
Parallel Query Option	DBSPI-0070	Percentage of parallel query servers busy
	DBSPI-0071	Percentage of parallel query servers busy highwatermark
	DBSPI-0074	Rate of parallel queries initiated
	DBSPI-0076	Percentage of full table scans via rowid range scans compared to total full table scans
Rollbacks	DBSPI-0068	Number of rollback segment shrinks
	DBSPI-0069	Percentage of rollback segment waits
RollBacks Generated	DBSPI-0054	Rate of generated rollbacks
Redo	DBSPI-0032	Number of waits for redo log space
	DBSPI-0033	Percentage of redo allocation latch misses
	DBSPI-0034	Percentage of redo copy latch misses
Sessions	DBSPI-0037	Number of current user logons
	DBSPI-0082	Maximum number of sessions from startup
Sharedpool	DBSPI-0022	Total buffer cache hit percentage
	DBSPI-0023	Current buffer cache hit percentage
	DBSPI-0026	Percentage of cache get misses to gets in dictionary cache
	DBSPI-0027	Percentage of library cache misses to executions
	DBSPI-0039	Percentage of gethits to gets in dictionary cache
	DBSPI-0040	Percentage of pinhits to pins in dictionary cache
	DBSPI-0045	Percentage of free pool memory
	DBSPI-0059	Percentage of cursors in cache parameter

<b>Graph Templates</b>	<b>Metric Name</b>	<b>Policy Description</b>
Sorts	DBSPI-0019	Disk sort rate
	DBSPI-0052	Rate of total sorts on disk and in memory
Sorts Memory/ Rows	DBSPI-0020	Percentage of memory sorts
	DBSPI-0051	Average number of rows per sort
Tablespace	DBSPI-0006	Number of tablespaces with low free space percentage
	DBSPI-0007	Number of tablespaces not ONLINE
	DBSPI-0008	Number of tablespaces with high ratio of block to physical reads
	DBSPI-0009	Number of tablespaces with high use of temp segments to total
	DBSPI-0011	Number of fragmented tablespaces
	DBSPI-0016	Number of segments that cannot extend
	DBSPI-0017	Number of segments approaching max extent
	DBSPI-0018	Number of segments adding extents rapidly
Table Scan	DBSPI-0030	Rate at which full table scans (long tables) occur
	DBSPI-0041	Rate at which full table scans (Short tables occur)
Tables and Indexes	DBSPI-0042	Percentage of the tables and indexes which were never analyzed
	DBSPI-0046	Percentage of the rows fetched by index
	DBSPI-0047	Number of tables cached
	DBSPI-0048	Percentage of chained rows fetched

Graph Templates	Metric Name	Policy Description
Waits	DBSPI-0021	Percentage of buffer busy waits to logical reads
	DBSPI-0024	Percentage of enqueue waits to enqueue requests
	DBSPI-0038	Number of latches with high contention ratio greater than threshold
	DBSPI-0043	Percentage of enqueue timeouts to enqueue requests
	DBSPI-0029	Number of sessions waiting for release of a lock

### Policies Setting ETIs

The following table lists the content pack ETIs and SPI policies that set the ETIs.

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**Note:** For more information on the measurement threshold policies and events, refer to the HP Operations Smart Plug-in for Databases documents.

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ETI/HI	Policy Name	Policy Description
Archive Status	ORA-00270	Error creating archive log
	ORA-00272	Error writing archive log
	ORA-00290	Operating system archiving error
	ORA-00255	Error archiving log
Background Dump Device Usage Level	DBSPI_0062	Background dump device free space is low

ETI/HI	Policy Name	Policy Description
Checkpoint Rate	DBSPI_0035	Rate of background checkpoints completed
	DBSPI_0083	Rate of DBWR checkpoints
Control File ReadWrite Status	ORA-00204	Error reading control file
	ORA-00206	Error writing control file
	ORA-00210	Cannot open control file
	ORA-00221	Error on write to control file
Oracle Core Dump Device Usage Level	DBSPI_0065	Core dump device free space is low
CPU Usage by SQL	DBSPI_0107	Number of seconds used by SQL server to total amount of elapsed time since last probing 1. SQL server has excessive load 2. Thread is in an endless CPU loop
Database Object Status	DBSPI_0077	SYS.DUAL status, row status invalid
	DBSPI_0078	Database Objects invalid



ETI/HI	Policy Name	Policy Description
Oracle Database Process Status	DBSPI_0002	The critical Oracle process indicated either aborted or was killed
	ORA-00348	Single process redo failure
	ORA-00443	Background process did not start
	ORA-00444	Background process failed while starting
	ORA-00445	Background process did not start after n seconds
	ORA-00447	Fatal error in background process
	ORA-00470	LGWR process terminated with error
	ORA-00471	DBWR process terminated with error
	ORA-00472	PMON process terminated with error
	ORA-00473	ARCH process terminated with error
	ORA-00474	SMON process terminated with error
	ORA-00475	TRWR process terminated with error
	ORA-00476	RECO process terminated with error
	ORA-00477	SNP <sub>x</sub> process terminated with error
	ORA-00480	LCK <sub>x</sub> process terminated with error
ORA-00483	During shutdown a process abnormally terminated	
Database Segment Status	DBSPI_0016	Number of segments that cannot extend
Database Segment Usage Level	DBSPI_0017	Number of segments approaching max extent
Database Server Status	DBSPI_0001	Database status check
Datafiles Status	DBSPI_0014	Number of data files not online
Default Buffer Pool Hit Ratio	DBSPI_0022	Total buffer cache hit percentage

ETI/HI	Policy Name	Policy Description
Dictionary Cache Miss Ratio	DBSPI_0026	Percentage of cache get misses to gets in dictionary cache
Dispatcher Busy Ratio by Network	DBSPI_0090	Average percentage busy for all Dispatchers
Flash Recovery Area Usage Level	DBSPI_0136	Percentage of space used by Flash Recovery Area
Flash Recovery Errors	ORA-38767	Flashback retention target parameter mismatch
	ORA-38776	Cannot begin flashback generation - flash recovery area is disabled
	ORA-38786	Recovery area is not enabled
	ORA-38791	Flashback did not start because file string was not in a valid incarnation
	ORA-38861	Flashback recovery stopped before reaching recovery target
Heavy SQL Statements	DBSPI_0119	Number of heavy SQL statements
SQL Disk ReadWrite Rate	DBSPI_0101	Number of SQL statement with high disk reads per execution
Oracle User Dump Device Usage Level	DBSPI_0064	Percentage of space used on user dump device
Latch Contention Ratio	DBSPI_0038	Number of latches with high contention ratio threshold
Latch Hit Ratio	DBSPI_0033	Percentage of redo allocation latch misses
	DBSPI_0034	Percentage of redo copy latch misses

ETI/HI	Policy Name	Policy Description
Library Cache Functioning	DBSPI_0027	Percentage of library cache misses to executions
	DBSPI_0039	Percentage of gethits to gets in dictionary cache
	DBSPI_0040	Percentage of pinhits to pins in dictionary cache
Locks Usage Level	DBSPI_0028	Percentage of DML locks used to total configured
Long Table Scan Percentage	DBSPI_0103	SQL statements with long table scans
Logical Read Rate	DBSPI_0088	Number of logical reads per minute
Materialized View Errors	ORA-12008	Error in materialized view refresh path
	ORA-12057	Materialized view "string"."string" is invalid and must complete. refresh
	ORA-12096	Error in materialized view log on "string"."string"
	ORA-12097	Changes in the master tables during refresh. Try refresh again.
	ORA-19809	Limit exceeded for recovery files
	ORA-19816	WARNING: Files may exist in location that are not known to database
Memory Sort Rate	DBSPI_0019	Disk sort rate
	DBSPI_0020	Percentage of memory sorts

ETI/Hi	Policy Name	Policy Description
Oracle Disk Read Write Errors	ORA-01114	IO error writing block to file
	ORA-01115	IO error reading block from file
	ORA-01116	Error in opening datafile
	ORA-01242	Data file suffered media failure
	ORA-01243	System tablespace file suffered media failure
Oracle Session Count	ORA-00018	Maximum number of sessions exceeded
	ORA-00019	Maximum number of sessions licenses exceeded
	ORA-00020	Maximum number of processes exceeded
Oracle Users Call Rate	DBSPI_0050	Ratio of recursive calls to user calls
	DBSPI_0075	Ratio of recursive calls to cumulative opened cursors
Physical Read Rate	DBSPI_0086	Number of physical reads per min
Replication Status	DBSPI_0113	Number of broken DBMS jobs
	DBSPI_0114	Number of failed DBMA jobs
Server Transaction Rate	DBSPI_0085	Percentage of current transactions to configured
Shared Pool Memory	DBSPI_0045	Percentage of shared pool memory
SQL Query Performance	DBSPI_0106	SQL statement with high elapsed time per execution

ETI/HI	Policy Name	Policy Description
SQL Query Tuning	DBSPI_0030	Rate at which full table scans (long tables) occur
	DBSPI_0042	Percentage of never analyzed tables and indexes
	DBSPI_0046	Percentage of rows retrieved by index
	DBSPI_0048	Percentage of chained rows retrieved
	DBSPI_0070	Percentage of busy parallel query servers
	DBSPI_0071	Percentage of busy highwater to maximum parallel query servers
	DBSPI_0074	Rate of parallel queries initiated
	DBSPI_0076	Percentage of full table scans using rowid range scans compared to total full table scans
Streams Apply Status	ORA-00143	Monitors the apply processes having errors in an oracle streams environment
Streams Capture Status	ORA-00141	Monitors the capture processes having errors in an oracle streams environment
Streams Propagation Status	ORA-00142	Monitors propagation errors in an oracle streams environment

ETI/HI	Policy Name	Policy Description
Streams Errors	ORA-24093	AQ agent string is not granted privileges of database user string
	ORA-26662	Unable to process STREAMS Data Dictionary information for object
	ORA-26666	Cannot alter STREAMS process string
	ORA-26671	Maximum number of STREAMS processes exceeded
	ORA-26672	Timeout occurred while stopping STREAMS process string
	ORA-26713	Remote object does not exist or is inaccessible
	ORA-26715	Time limit reached
	ORA-26745	Cursors (string) are not sufficient
	ORA-26786	A row with key string exists but has conflicting column(s) string in table string
	ORA-26816	STREAMS apply process "string" (OS id string) is exiting due to ORA-number
	ORA-26819	STREAMS capture server for apply "string" and capture "string"encounters disabled or aborted propagation "string"
	ORA-26826	STREAMS apply coordinator and apply slave are unable to communicate
Tablespaces Availability	DBSPI_0007	Number of tablespaces not ONLINE
Tablespaces Free Space Fragmentation Index	DBSPI_0011	Number of fragmented tablespaces
Tablespace Physical Read Ratio	DBSPI_0008	Number of table spaces with high ratio of block to physical reads

ETI/HI	Policy Name	Policy Description
Tablespace Temp Segment Usage	DBSPI_0009	Number of tablespaces with high use of temp segments to total
Tablespace Usage Level	DBSPI_0206	Number of tablespaces with low free space percentage
Total Sort Rate	DBSPI_0052	Drill down data for # of segments approaching max extent
Wait Locked Sessions	DBSPI_0029	Number of sessions waiting for release of a lock
Waits On Redo Log Space	DBSPI_0032	Number of waits for redo log space

## Operations Orchestration Flow

The following table lists the Oracle Operations Orchestration (OO) Flows:

OO Flows	Flow input	CI Type	CI attribute	Event Attribute
Oracle database performance check	omServer	oracle	database_dbsid	Originating Server
Oracle database health check				

User input when executing OO flows:

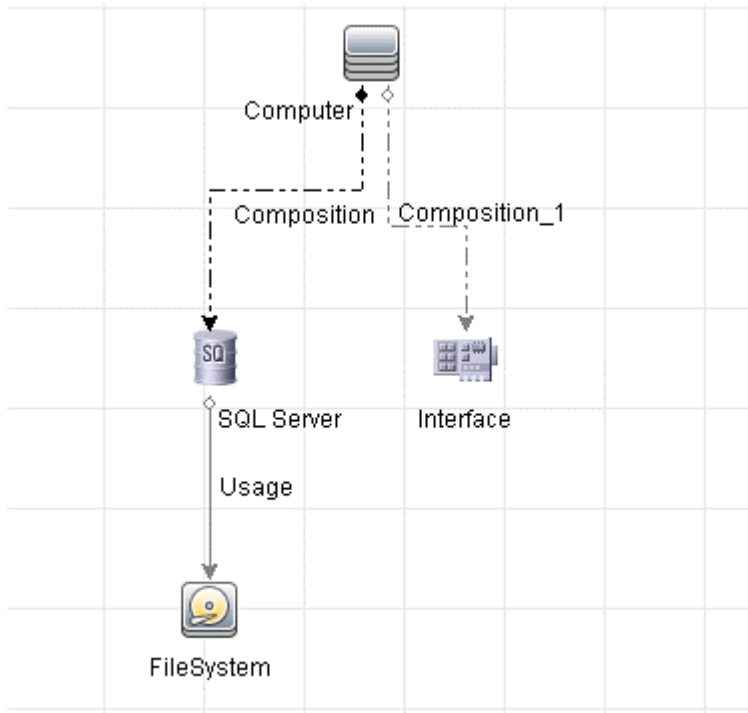
Flow input	CI Type
omServerPort	Port number of the HPOM Tool WS
omServerUser	The user name for the HPOM Server that will use used in the HPOM Tool WS
omServerPassword	The password for the HPOM Server that will use used in the HPOM Tool WS
omNode	The DNS name of the Oracle node

## Microsoft SQL Server Content Pack

The Microsoft SQL Server Content Pack contains the following artifacts.

### ODB Views

The ODB package in the Microsoft SQL Server Content Pack includes the MSSQL\_Deployment view, which refers to the SQL Server, File System, and Computer CI type. The following image shows the relationship among the CI types.





## Health Indicators

The content pack includes the following Health Indicators (HIs) to monitor Microsoft SQL Server-related events:

CI Type	HI	Description	Value
SQL Server	Cache Performance	Indicates cache hit percentage	Normal
Database	CPU Usage by SQL	Indicates SQL statements with high CPU time per execution	Normal
SQL Server	Database Deadlock Rate	Indicates the performance of a SQL Server instance based on the rate of deadlocks in the database	Normal
SQL Server	Database FileGroup Space Usage Level	Indicates availability of a Database in the SQL Server Instance as the percentage of space used per filegroup per database and the percentage of space available per filegroup per database	Normal
SQL Server	Database Latch Wait Rate	Indicates the performance of a SQL Server instance based on number of latch waits	Normal
SQL Server	Database Lock Timeout Rate	Indicates the performance of a SQL Server instance based on the rate of deadlocks in the database	Normal
SQL Server	Database Mirroring Transaction Delay	Indicates the delay in waiting for unterminated commit acknowledgement	Normal, High
SQL Server	Database Reads Outstanding	Indicates the performance of a SQL Server instance wrt the number of outstanding read requests to the host operating system	Normal

CI Type	HI	Description	Value
Database	Database Server Status	Indicates database server availability	Up
SQL Server	Database Status	Indicates the availability of a Database in an SQL Server Instance	Up
SQL Server	Database Space Usage Level	Indicates availability of Database in the SQL Server Instance as the percentage of database space used	Normal
SQL Server	Database Writes Outstanding	Indicates the performance of a SQL Server instance wrt the number of outstanding write requests to the host operating system	Normal
SQL Server	Lock Memory Used Pct	Indicates percentage of used lock memory	Normal
SQL Server	Lock Wait Rate	Indicates number of lock requests per second that could not be satisfied immediately and required the caller to wait, for all object types combined: Extent, Key, Page, Table, RID, Database. Also indicates number of lock requests per second that resulted in a deadlock.	Normal
SQL Server	Locks in Use Percentage	Indicates percentage total locks currently held to the total number of locks configured for SQL Server	Normal
Database	Replication Status	Indicates database server replication status	Normal

CI Type	HI	Description	Value
SQL Server	Runnable Workers Ratio	Indicates the ratio between SQL Server workers currently running and workers potentially runnable. A ratio above 100.00 means more workers are currently running than runnable.	Normal, Full Capacity, High
Database	SQL Query Performance	Indicates SQL statements with high elapsed time per execution	Normal
SQL Server	SQL Server Active Cursor	Indicates Microsoft SQL Server active cursors	Normal, High
SQL Server	SQL Server Cursor Memory Usage	Indicates amount of memory consumed by cursors	Normal, High
SQL Server	SQL Server Database Active Transactions	Indicates the number of active transactions with the database	Normal
SQL Server	SQL Server Databases Data File Size	Indicates the cumulative size of all the data files in the database including any automatic growth	Normal, High
SQL Server	SQLServer Databases Transaction Rate	Indicates Number transactions started for the database per second	Normal, High
SQL Server	SQL Server Service Status	Indicates the availability of a SQL Server Service that corresponds to a given SQL Server Instance	Up
Database	Server Transaction Rate	Indicates the rate of transactions for the entire database server	Normal

CI Type	HI	Description	Value
SQL Server	Transaction Log Usage Level	Indicates the availability of an SQL Server instance as affected by the percentage of transaction log space used	Normal
SQL Server	Users Connected Percentage	Indicates percentage of the current user connections to the total number of user connections configured for SQL Server	Normal
SQL Server	Virtual Device Space Usage Level	Indicates percentage of space used on a virtual device	Normal

## Event Type Indicators

The content pack includes the following Event Type Indicators (ETIs) to monitor Microsoft SQL Server-related events:

CI Type	ETI	Description	Value
SQL Server	Database Mirroring Status	Indicates mirroring state of the SQL Server	Normal
SQL Server	Inactive Database Connections	Indicates the number of total connections that are active versus sleeping in a SQL Server instance	Normal
SQL Server	Merge Conflicts	Indicates the number of conflicts per second during Publisher or Subscriber upload and download in a SQL Server instance	Normal
Database	SQL Query Tuning	Indicates SQL statements with low query tuning	Normal
SQL Server	SQL Server Disk Read/Write Errors	Indicates SQL Server disk read/write errors	Normal

## Correlation Rules

The content pack includes the following rules to correlate Microsoft SQL Server-related events.

For more information on how the correlation rules work, see the *Operations Manager i Concepts Guide*.

### Database::FileSystem:SQLServer Space Usage Level HIs >> Disk Usage Level

<b>Description:</b> Correlates the High Usage of Virtual Device Space by SQL Server to Near Capacity Disk Usage Level of FileSystem		
Cause		
CIT: SQL server	ETI: Database Space Usage Level	Value: High
Symptom		
CIT: File System	ETI: Disk Usage Level	Value: Near Capacity

### Database::FileSystem:SQLServer Transaction Log Usage Level HIs >> Disk Usage Level

<b>Description:</b> Correlates the High Usage of Virtual Device Space by SQL Server to Near Capacity Disk Usage Level of FileSystem		
Cause		
CIT: SQL server	ETI: Transaction Log Usage Level	Value: High
Symptom		
CIT: File System	ETI: Disk Usage Level	Value: Near Capacity

**Database::FileSystem:SQLServer Virtual Device Space Usage Level HIs >> Disk Usage Level**

<b>Description:</b> Correlates the High Usage of Virtual Device Space by SQL Server to Near Capacity Disk Usage Level of FileSystem		
Cause		
CIT: SQL server	ETI: Virtual Device Space Usage Level	Value: High
Symptom		
CIT: File System	ETI: Disk Usage Level	Value: Near Capacity

**Database::FileSystem:SQLServer FileGroup Space Usage Level HIs >> Disk Usage Level**

<b>Description:</b> Correlates the High Usage of Virtual Device Space by SQL Server to Near Capacity Disk Usage Level of FileSystem		
Cause		
CIT: SQL server	ETI: Database FileGroup Space Usage Level	Value: High
Symptom		
CIT: File System	ETI: Disk Usage Level	Value: Near Capacity

**Database::Computer:SQLServer Space Usage Level HIs >> Disk Usage Level**

<b>Description:</b> Correlates the High Usage of Virtual Device Space by SQL Server to Near Capacity Disk Usage Level of FileSystem at the host level for SIS monitoring		
Cause 1		
CIT: SQL Server	ETI: Database Space Usage Level	Value: High
Cause 2		
CIT: SQL Server	ETI: Transaction Log Usage Level	Value: High

<b>Description:</b> Correlates the High Usage of Virtual Device Space by SQL Server to Near Capacity Disk Usage Level of FileSystem at the host level for SiS monitoring		
Cause 3		
CIT: SQL Server	ETI: Virtual Device Space Usage Level	Value: High
Symptom		
CIT: Computer	ETI: Disk Usage Level	Value: Near Capacity

### Database::Computer:SQLServer FileGroup Space Usage Level HIs >> Disk Usage Level

<b>Description:</b> Correlates the High Usage of Virtual Device Space by SQL Server to Near Capacity Disk Usage Level of FileSystem at the host level for SiS monitoring		
Cause		
CIT: SQL Server	ETI: Database FileGroup Space Usage Level	Value: High
Symptom		
CIT: Computer	ETI: Disk Usage Level	Value: Near Capacity

### Database::Computer: Node Status >> SQL Server Status

<b>Description:</b> Correlates Unavailability of node to that of Database		
Cause		
CIT: Computer	ETI: Node Status	Value: Down, Unknown, Hang
Symptom		
CIT: SQL Server	ETI: Database Server Status	Value: Down

**Database::Computer:Ping Availability >> SQL Server Status**

<b>Description:</b> Correlates Unavailability of node to that of Database		
Cause		
CIT: Computer	ETI: Ping Availability	Value: Unavailable
Symptom		
CIT: SQL Server	ETI: Database Server Status	Value: Down

**Database::Interface: InterfaceUtilization >> SQLServer Database Replication Status**

<b>Description:</b> Correlates Interface Utilization of node to SQL Server Database Replication and SQL Query Performance Health		
Cause		
CIT: Interface	ETI: Network IQ	Value: High, Much Higher Than Normal
Symptom 1		
CIT: SQL Server	ETI: Replication Status	Value: Broken, Failed
Symptom 2		
CIT: SQL Server	ETI: SQL Query Performance	Value: Low

**Database::Computer:SQL Server CPU Usage by SQL >> CPU Load**

<b>Description:</b> CPU usage by MSSQL SQL query increases CPU load on Computer		
Cause		
CIT: SQL Server	ETI: CPU Usage by SQL	Value: High



<b>Description:</b> CPU usage by MSSQL SQL query increases CPU load on Computer		
Symptom		
CIT: Computer	ETI: CPU Load	Value: Bottlenecked, Busy, Constrained, Overloaded

### Database::Computer:Memory Usage Level >> SQL Server SQL Performance HIs

<b>Description:</b> Memory Usage Level on host impacts SQL Server Performance		
Cause		
CIT: Computer	ETI: Memory Usage Level	Value: Near Capacity, Much Higher Than Normal
Symptom 1		
CIT: SQL Server	ETI: Cache Performance	Value: Low
Symptom 2		
CIT: SQL Server	ETI: SQL Query Performance	Value: Low

## Tool Definitions

**Microsoft SQL Server Connection Check:** Checks the connection of the all Microsoft SQL Servers configured to the Smart Plug-in for Microsoft SQL Server.

**Microsoft SQL Server Documents:** Starts a web browser and connects to the Microsoft SQL Server product manuals web site.

## Graph Templates

The content pack includes the SPI for Databases - Microsoft SQL Server graph family, which is mapped to the SQL Server CI type.

The following table lists the graph templates present in the SPI for Databases - Microsoft SQL graph family and the mapped policies.

Graph Templates	Metric Name	Policy Description
Cache	DBSPI_3019	Percentage of procedure cache used
	DBSPI_3020	Percentage of procedure cache consumed
	DBSPI_3022	Buffer chain average length
Data Access	DBSPI_3051	Full Scans Rate
	DBSPI_3052	Index searches rate
	DBSPI_3053	Pages allocated rate
	DBSPI_3054	Extents allocated rate
	DBSPI_3055	Page splits rates
	DBSPI_3056	Table lock escalation rate
Errors	DBSPI_3023	Number of SQL Server read/write errors since the last probing
	DBSPI_3024	Number of packet errors while reading or writing packets
	DBSPI_3028	Number of databases marked as suspect

Graph Templates	Metric Name	Policy Description
IO Utilization	DBSPI_3003	Logical pages written per physical write for transaction log
	DBSPI_3004	Number of multiple pages written to disk in a batch per minute is too high
	DBSPI_3005	Number of 2K pages read from disk (physical reads) per minute
	DBSPI_3006	Number of 2K pages written individually to disk per minute
	DBSPI_3007	Number of read requests issued to OS that are not completed
	DBSPI_3008	Number of write requests issued to the OS not completed
	DBSPI_3021	Number of single page writes performed per second by logging and cache flushes. This does not include lazywriter batch statistics.
Latches	DBSPI_3068	Number of latch requests that was not immediately granted and had to wait before being granted
	DBSPI_3069	Average latch wait time for latch requests that had to wait from the time server started
	DBSPI_3076	Average latch wait time for latch requests that had to wait during the current collection interval
Locks and its Memory Utilization	DBSPI_3013	Percentage of locks in use
	DBSPI_3075	Percentage of lock memory in use
Lock Requests	DBSPI_3070	Lock timeout rate
	DBSPI_3071	Deadlocks rate
	DBSPI_3072	Locks wait rate
	DBSPI_3073	Average lock wait time

Graph Templates	Metric Name	Policy Description
Least Recently Used	DBSPI_3001	Percentage of times a data page was found in the cache
	DBSPI_3002	Percentage of free buffers in the procedure cache
Read Ahead	DBSPI_3010	Read Ahead Manager Effectiveness
	DBSPI_3012	'Read Ahead slots used' is designed to monitor availability of RA slots
Server Status	DBSPI_3017	Percentage of the command queue length used
	DBSPI_3025	Percentage of the CPU time used by SQL server
	DBSPI_3029	The number of databases currently opened by SQL Server users
	DBSPI_3074	Batch requests rate
Transactions	DBSPI_3009	Server transaction rate
	DBSPI_3066	Number of the log expansions for the server
Server Status for processes and transactions	DBSPI_3014	Number of blocked processes
	DBSPI_3064	Number of active transactions for the entire server
Users	DBSPI_3011	Percentage of the current users connected
	DBSPI_3026	Percentage of the total connections that are active vs. sleeping
	DBSPI_3031	Number of users

## Policies Setting ETIs

The following table lists the content pack ETIs and SPI policies that set the ETIs.

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**Note:** For more information on the measurement threshold policies and events, refer to the HP Operations Smart Plug-in for Databases documents.

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ETI/Hi	Policy Name	Policy Description
Cache Performance	DBSPI_3001	Percentage of times a data page was found in the cache
CPU Usage by SQL	DBSPI_3025	CPU time percentage used by SQL Server
Database Mirroring Status	DBSPI_3084	Mirroring state of the Server instance
	DBSPI_3085	Unsent log on the principle
	DBSPI_3086	Unrestored log on the mirror
Database Space Usage Level	DBSPI_3218	Percentage of database space used
Database Status	DBSPI_3230	Number of databases marked as suspect
Database Server Status	DBSPI_3030	Ability to connect to a database
SQL Server Disk ReadWrite Errors	DBSPI_3023	Number of SQL Server read/write errors since the last probing
	DBSPI_3024	Number of packet errors while reading or writing packets
Locks in Use Percentage	DBSPI_3013	Percentage total locks currently held to the total number of locks configured for SQL Server

ETI/Hi	Policy Name	Policy Description
Lock Memory Used Percentage	DBSPI_3075	Percentage of lock memory in use
Database Lock Timeout Rate	DBSPI_3070	Lock timeout rate
Lock Wait Rate	DBSPI_3072	Locks wait rate
Replication Status	DBSPI_3081	Replication agents status
SQL Server Service Status	DBSPI_3057	Checks the status of SQL Server service
	DBSPI_3058	Checks the status of the SQL Agent service
SQL Query Performance	DBSPI_3035	Long running transaction
SQL Query Tuning	DBSPI_3051	Full scans rate
	DBSPI_3052	Index searches rate
	DBSPI_3053	Pages allocation rate
	DBSPI_3054	Extents allocation rate
	DBSPI_3055	Page splits rate
Users Connected Percentage	DBSPI_3011	Percentage of current users connected
Virtual Device Space Used	DBSPI_3215	Percentage of space used on a specific virtual device

## Operations Orchestration Flow

The following table lists the Microsoft SQL Server Operations Orchestration (OO) Flows:

OO Flows	Flow input	CI Type	CI attribute	Event Attribute
Microsoft SQL Server Performance check	sqlServerName omServer	sqlserver	database_dbsid	Originating Server
Oracle database health check				

User input when executing OO flows:

Flow input	CI Type
omServerPort	Port number of the HPOM Tool WS
omServerUser	The user name for the HPOM Server that will use used in the HPOM Tool WS
omServerPassword	The password for the HPOM Server that will use used in the HPOM Tool WS
omNode	The DNS name of the Microsoft SQL Server node





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## J2EE Content Pack

**This appendix includes:**

Reference

► [J2EE Application Server Content Pack](#) on page 585

### J2EE Application Server Content Pack

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**Note:** To display the impact of the database instance on J2EE Application Server, you must specify the appropriate Application IP and database instance name in the JDBC URL. These properties are used to create the link between the J2EE Application Server and database instance.

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The J2EE Application Server Content Pack contains the following artifacts.

## **ODB Views**

The ODB package in the J2EE Content Pack contains the J2EE\_Deployment view, which refers to the J2EE Cluster, J2EE Domain, JDBC Data Source, J2EE Application, Database, and Computer CI types. The following image shows



## Health Indicators

The content pack includes the following Health Indicators (HIs) to monitor J2EE related events.

CI Type	HI	Description	Value
J2EE Server	Active Sockets Count	Number of HTTP socket connections opened to the server	High, Normal
	Application Server Load	Load on the application server	High, Normal
	Deferred Thread Requests	The number of requests that were denied a thread for execution because of the max-threads-constraint	High, Normal
	Http Request Average Service Time	Average time required to service an HTTP request	High, Normal
	Http Request Total Service Time	Total time required to service HTTP requests	High, Normal
	Http Server Active Connections	Number of connections currently open	High, Normal
	Http Server Active Request	Child servers currently in the request processing phase	High, Normal
	Http Server Connection Time	Total time spent servicing HTTP connections	High, Normal
	JMS Active Connection Count	Number of active JMS connections	High, Normal
	JMS Server Utilization	The JMS Server queue utilization	High, Normal

CI Type	HI	Description	Value
J2EE Server	Oracle Web Cache Average Latency Current Interval	Average latency for 10 second intervals to process requests for Oracle Web Cache	High, Normal
	Oracle Web Cache Latency Since Start	Average number of seconds to process requests for Oracle Web Cache since the application Web server started	High, Normal
	Server Sessions	The number of sessions opened to this server	High, Normal
	Server Status	Shows the server status in terms of availability	Unavailable, Available
	Servlets Loaded	The number of servlets currently loaded for a web application (cumulative value per server)	High, Normal
	Thread Hung Rate	The rate at which the threads are declared hung	High, Normal
	Thread Pool Availability	The availability of the threads in the Thread Pool	Low, Normal
	Thread Pool Utilization	The number of threads utilized in the server to execute tasks	High, Normal
	Thread Request Service Time	Time a request had to wait for a thread	High, Normal
	Thread Request Wait Time	The time (in milliseconds) a request had to wait for a thread	High, Normal
	Threads Request Pending	Requests that are pending because they are waiting for an available thread	High, Normal
Transaction Application Errors	Transaction errors due to application errors	High, Normal	

CI Type	HI	Description	Value
J2EE Server	Transaction Capacity Utilization	The number of simultaneous in-progress transactions	High, Normal
	Transaction Commit Rate	The number of transactions that were committed per second	High, Normal
	Transaction Resource Errors	Transaction errors caused due to system resource errors	High, Normal
	Transaction Rollback Rate	The number of transactions rolled back due to system, resource, or others	High, Normal
	Transaction Start Rate	The number of transactions that were begun per second	High, Normal
	Transaction System Errors	Transaction errors caused due to system errors	High, Normal
	Transaction Time	Time taken to complete a transaction	High, Normal
	Transaction Timeout Errors	Transaction errors caused due to transaction timeout	High, Normal
	Transaction Timeout Rate	The number of transactions that timed out per second	High, Normal
	Transactions Rolled Back	Number/Percentage of Transactions rolled back due to system, resource, or other errors.	High, Normal
	EJB Concurrent Lives	The average number of bean objects in the pool	High, Normal
	EJB Utilization	The utilization of the EJB pool	High, Normal
	Execute Queue Wait Count	The number of client requests waiting to be serviced by the execute queue	High, Normal

CI Type	HI	Description	Value
J2EE Server	HTTP Sessions	Number of open HTTP sessions	High, Normal
	EJB Missed Count Rate	The total number of times a failed attempt was made to get an instance from the free pool	High, Normal
	EJB Free Pool Wait Rate	The number of times per minute no EJBs were available from the free pool	High, Normal
	EJB Performance	The performance statistics such as cache utilization	Low, Normal
	EJB Timeout Rate	The number of times per minute a client timed out waiting for an EJB	High, Normal
	EJB Transaction Rollback Rate	Number of EJB Transaction Rolled back in unit time	High, Normal
	Servlet Performance	The performance statistics such as execution time	Low, Normal
	Servlet Requests	Number of incoming requests to the servlet	High, Normal
	Connections in Use	Number of currently used JDBC connections	High, Normal
	JDBC Connection Pool Wait Count	The number of clients waiting for a JDBC connection	High, Normal
	Data Source Connection Pool Availability	Availability of JDBC connections in the connection pool	Low, Normal
	Data Source Connection Pool Failures	The number of failed attempts to refresh a connection in the connection pool	Critical, Normal
	Data Source Connection Pool Utilization	DataSource Connection Pool Utilization	High, Normal

CI Type	HI	Description	Value
J2EE Server	Data Source Connection Pool Performance	DataSource Connection Pool Performance	Low, Normal
	Data Source Connection Waiters	The average number of threads waiting for a connection from the connection pool	High, Normal
	JDBC Active Connection Count	Active JDBC connections	High, Normal
	Total Number of Threads	Total number of threads for garbage collection	High, Normal
	Total Garbage Collection Count	Number of times garbage collector has run	High, Normal
	Total Garbage Collection Time	Total time taken for garbage collection	High, Normal
	JVM Memory Utilization	The percentage of heap size utilized	High, Normal
	Heap Free Current	Amount of free heap available	Low, Normal
	Heap Size Current	Amount of heap in use	High, Normal
	All Processors Average Load	Average load on all the processors on the system	High, Normal



CI Type	HI	Description	Value
J2EE Cluster	Cluster Health	Cluster health in terms of performance	Poor, Normal
	Cluster Incoming Message Failure Rate	The number of multicast messages that were lost from the cluster	High, Normal
	Cluster Outgoing Message Failure Rate	The number of multicast messages that were send to the cluster	High, Normal
	Cluster Status	Cluster Status in terms of availability	Started, Partial Stopped, Stopped

CI Type	HI	Description	Value
JDBC Data Source	Connections in Use	Number of currently used JDBC connections	High, Normal
	Data Source Connection Waiters	The average number of threads waiting for a connection from the connection pool	High, Normal
	Data Source Connection Pool Availability	Availability of JDBC connections in the connection pool	Low, Normal
	Data Source Connection Pool Failures	The number of failed attempts to refresh a connection in the connection pool	Normal, Critical
	Data Source Connection Pool Performance	Data source connection pool performance	Low, Normal
	Data Source Connection Pool Utilization	Data source connection pool utilization	High, Normal
	Data Source Leaked Connections Rate	The rate of new leaked JDBC connections	High, Normal
	JDBC Active Connections Count	Active JDBC connections	High, Normal
	JDBC Connection Pool Wait Count	The number of clients waiting for a JDBC connection	High, Normal

CI Type	HI	Description	Value
J2EE Application	EJB Concurrent Lives	The average number of bean objects in the pool	High, Normal
	EJB Free Pool Wait Rate	The number of times per minute no EJBs were available from the free pool	High, Normal
	EJB Missed Count Rate	The total number of times a failed attempt was made to get an instance from the free pool	High, Normal
	EJB Performance	The performance statistics such as cache utilization	Low, Normal
	EJB Timeout Rate	The number of times per minute a client timed out waiting for an EJB	High, Normal
	EJB Transaction Rollback Rate	Number of EJB Transaction Rolled back in unit time	High, Normal
	EJB Transaction Throughput Rate	Number of EJBs Transactions completed in unit time	High, Normal
	EJB Utilization	The utilization of the EJB pool	High, Normal
	HTTP Sessions	Number of open HTTP sessions	High, Normal
	Servlet Performance	The performance statistics such as execution time	Low, Normal
Servlet Requests	Number of incoming requests to the servlet	High, Normal	

CI Type	HI	Description	Value
JVM	All Processors Average Load	Average load on all the processors on the system	High, Normal
	Heap Free Current	Amount of free heap available	Low, Normal
	Heap Size Current	Amount of heap in use	High, Normal
	JVM Memory Utilization	The percentage of heap size utilized	High, Normal
	Total Garbage Collection Count	Number of times garbage collector has run	High, Normal
	Total Garbage Collection Time	Total time taken for garbage collection	High, Normal
	Total Number of Threads	Total number of threads for garbage collection	High, Normal
J2EE Domain	Domain Status	The status of domain	Normal, Poor

## Event Type Indicators

The Content Pack includes the following Event Type Indicators (ETIs) that do not contribute to health to monitor the J2EE related events:

CI Type	ETI	Description	Value
J2EE Server	Active Sockets Count	Number of HTTP socket connections opened to the server	High, Normal
	Execute Queue Wait Count	The number of client requests waiting to be serviced by the execute queue	High, Normal
	Threads Request Pending	Requests that are pending because they are waiting for an available thread	High, Normal
	Server Sessions	The number of sessions opened to this server	High, Normal
JVM	Total Garbage Collection Count	Number of times garbage collector has run	High, Normal
	Total Garbage Collection Time	Total time taken for garbage collection	High, Normal
	Total Number of Threads	Total number of threads used for garbage collection	High, Normal
J2EE Application	Servlet Requests	Number of incoming requests to the servlet	High, Normal
	HTTP Sessions	Number of open servlet sessions	High, Normal
	EJB Concurrent Lives	The average number of bean objects in the pool	High, Normal
JDBC	Datasource Connection Waiters	The average number of threads waiting for a connection from the connection pool	High, Normal

## Correlation Rules

The content pack in the J2EE Content Pack contains the following correlation rules.

For more information on how the correlation rules work, see the *Operations Manager i Concepts Guide*.

### J2EE::Computer:CPU Load >> JVM Memory Utilization & JMS Server Utilization & Transaction System Errors & EJB Performance

<b>Description:</b> Computer CPU Load Impacts JVM Memory Utilization and JMS Server Utilization and Transaction System Errors and EJB Performance		
Cause		
CIT: Computer	ETI: CPU Load	Value: Overloaded
Symptom 1		
CIT: J2EE Application	ETI: EJB Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: EJB Performance	Value: Low
Symptom 3		
CIT: J2EE Server	ETI: JMS Server Utilization	Value: High
Symptom 3		
CIT: J2EE Server	ETI: Transaction System Errors	Value: High
Symptom 4		
CIT: JVM	ETI: JVM Memory Utilization	Value: High

### J2EE::Computer:CPU Load >> Real User Transaction Performance & Real User Sessions Performance

<b>Description:</b> Computer CPU Load Impacts Real User Transaction Performance and Real User Sessions Performance		
Cause		
CIT: Computer	ETI: CPU Load	Value: Overloaded
Symptom 1		
CIT: Business Application	ETI: Real User Sessions Performance	Value: Critical
Symptom 2		
CIT: Business Transaction	ETI: Real User Transaction Performance event	Value: Critical

### J2EE::Computer:CPU Load >> Synthetic User Transaction Performance

<b>Description:</b> Computer CPU Load Impacts Synthetic User Transaction Performance		
Cause		
CIT: Computer	ETI: CPU Load	Value: Overloaded
Symptom 1		
CIT: Business Transaction	ETI: Synthetic User Transaction Performance event	Value: Critical

**J2EE::Computer:Memory Usage Level >> Server Status & Transaction System Errors & Thread Hung Rage**

<b>Description:</b> Computer Memory Usage Level Impacts Server Status and Transaction System Errors and Thread Hung Rate		
Cause		
CIT: Computer	ETI: Memory Usage Level	Value: Much Higher Than Normal
Symptom 1		
CIT: J2EE Server	ETI: Server Status	Value: Unavailable
Symptom 2		
CIT: J2EE Server	ETI: Thread Hung Rate	Value: High
Symptom 3		
CIT: J2EE Server	ETI: Transaction System Errors	Value: High

**J2EE::Database:CPU Usage By SQL >> Transaction Timeout Errors & Transactions Rolled Back & EJB Performance & DataSource ConnectionPool Performance**

<b>Description:</b> Database CPU Usage By SQL Impacts Transaction Timeout Errors and Transactions Rolled Back and EJB Performance and DataSource ConnectionPool Performance		
Cause		
CIT: Database	ETI: CPU Usage by SQL	Value: High
Symptom 1		
CIT: J2EE Application	ETI: EJB Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: DataSource Connection Pool Performance	Value: Low
Symptom 3		



<b>Description:</b> Database CPU Usage By SQL Impacts Transaction Timeout Errors and Transactions Rolled Back and EJB Performance and DataSource ConnectionPool Performance		
CIT: J2EE Server	ETI: EJB Performance	Value: Low
Symptom 4		
CIT: J2EE Server	ETI: Transaction Timeout Errors	Value: High
Symptom 5		
CIT: J2EE Server	ETI: Transactions Rolled Back	Value: High
Symptom 6		
CIT: JDBC Data	ETI: Datasource Connection Pool Performance	Value: Low

### J2EE::Database:Database Server Status >> DataSource ConnectionPool Availability

<b>Description:</b> Database Server Status Impacts DataSource ConnectionPool Availability		
Cause		
CIT: Database	ETI: Database Server Status	Value: Down
Symptom 1		
CIT: J2EE Server	ETI: Data Source Connection Pool Availability	Value: Low
Symptom 2		
CIT: JDBC Data Source	ETI: Data Source Connection Pool Availability	Value: Low

**J2EE::Database:Database Server Status >> Real User Transaction Availability & Real User Sessions Availability**

<b>Description:</b> Database Server Status Impacts Real User Transaction Availability and Real User Sessions Availability		
Cause		
CIT: Database	ETI: Database Server Status	Value: Down
Symptom 1		
CIT: Business Application	ETI: Real User Sessions Availability	Value: Critical
Symptom 2		
CIT: Business Transaction	ETI: Real User Transaction Availability event	Value: Critical

**J2EE::Database:Database Server Status >> Synthetic User Transaction Availability**

<b>Description:</b> Database Server Status Impacts Synthetic User Transaction Availability		
Cause		
CIT: Database	ETI: Database Server Status	Value: Down
Symptom 1		
CIT: Business Transaction	ETI: Synthetic User Transaction Availability event	Value: Critical

## J2EE::Database:SQL Query Performance >> Transaction Timeout Errors & Transactions Rolled Back & EJB Performance & DataSource ConnectionPool Performance

<b>Description:</b> Database SQL Query Performance Impacts Transaction Timeout Errors and Transactions Rolled Back and EJB Performance and DataSource ConnectionPool Performance		
Cause		
CIT: Database	ETI: SQL Query Performance	Value: Low
Symptom 1		
CIT: J2EE Application	ETI: EJB Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: Datasource Connection Pool Performance	Value: Low
Symptom 3		
CIT: J2EE Server	ETI: EJB Performance	Value: Low
Symptom 4		
CIT: J2EE Server	ETI: Transaction Timeout Errors	Value: High
Symptom 5		
CIT: J2EE Server	ETI: Transactions Rolled Back	Value: High
Symptom 4		
CIT: JDBC Data Source	ETI: Data Source Connection Pool Performance	Value: Low

**J2EE::File System:Disk Usage Level >> Server Status & Transaction Resource Errors & Transaction System Errors**

<b>Description:</b> File System Disk Usage Level Impacts Server Status and Transaction Resource Errors and Transaction System Errors		
Cause		
CIT: FileSystem	ETI: Disk Usage Level	Value: Near Capacity
Symptom 1		
CIT: J2EE Server	ETI: Server Status	Value: Unavailable
Symptom 2		
CIT: J2EE Server	ETI: Transaction Resource Errors	Value: High
Symptom 3		
CIT: J2EE Server	ETI: Transactions System Errors	Value: High

**J2EE::J2EE Application:EJB Concurrent Lives >> EJB Utilization**

<b>Description:</b> EJB Concurrent Lives Impacts EJB Utilization		
Cause		
CIT: J2EE Application	ETI: EJB Concurrent Lives	Value: High
Symptom 1		
CIT: J2EE Application	ETI: EJB Utilization	Value: High
Symptom 2		
CIT: J2EE Server	ETI: EJB Utilization	Value: High

**J2EE::J2EE Application:EJB Free Pool Wait Rate >> Servlet Performance**

<b>Description:</b> EJB Free Pool Wait Rate Impacts Servlet Performance		
Cause		
CIT: J2EE Application	ETI: EJB Free Pool Wait Rate	Value: High
Symptom 1		
CIT: J2EE Application	ETI: Servlet Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: Servlet Performance	Value: Low

**J2EE::J2EE Application:EJB Performance >> EJB Free Pool Wait Rate & EJB Missed Count Rate & Servlet Performance**

<b>Description:</b> EJB Performance Impacts EJB Free Pool Wait Rate and EJB Missed Count Rate and Servlet Performance		
Cause		
CIT: J2EE Application	ETI: EJB Performance	Value: Low
Symptom 1		
CIT: J2EE Application	ETI: EJB Free Pool Wait Rate	Value: High
Symptom 2		
CIT: J2EE Application	ETI: EJB Missed Count Rate	Value: High
Symptom 3		
CIT: J2EE Application	ETI: Servlet Performance	Value: Low
Symptom 4		
CIT: J2EE Server	ETI: EJB Free Pool Wait Rate	Value: High
Symptom 5		
CIT: J2EE Server	ETI: EJB Missed Count Rate	Value: High

<b>Description:</b> EJB Performance Impacts EJB Free Pool Wait Rate and EJB Missed Count Rate and Servlet Performance		
Symptom 6		
CIT: J2EE Server	ETI: Servlet Performance	Value: Low

**J2EE::J2EE Application:EJB Timeout Rate >> Servlet Performance & EJB Transaction Throughput Rate & EJB Transaction Rollback Rate**

<b>Description:</b> EJB Timeout Rate Impacts Servlet Performance and EJB Transaction Throughput Rate and EJB Transaction Rollback Rate		
Cause		
CIT: J2EE Application	ETI: EJB Timeout Rate	Value: High
Symptom 1		
CIT: J2EE Application	ETI: EJB Transaction Rollback Rate	Value: High
Symptom 2		
CIT: J2EE Application	ETI: EJB Transaction Throughput Rate	Value: High
Symptom 3		
CIT: J2EE Application	ETI: Servlet Performance	Value: Low
Symptom 4		
CIT: J2EE Server	ETI: EJB Transaction Rollback Rate	Value: High
Symptom 5		
CIT: J2EE Server	ETI: Servlet Performance	Value: Low

### J2EE::J2EE Application:EJB Utilization >> DataSource Connection Waiters & DataSource Connection Pool Utilization

<b>Description:</b> EJB Utilization Impacts DataSource Connection Waiters and DataSource Connection Pool Utilization		
Cause		
CIT: J2EE Application	ETI: EJB Utilization	Value: High
Symptom 1		
CIT: J2EE Server	Data Source Connection Pool Utilization	Value: High
Symptom 2		
CIT: J2EE Server	ETI: Data Source Connection Waiters	Value: High
Symptom 3		
CIT: JDBC Data Source	ETI: Data Source Connection Waiters	Value: High
Symptom 4		
CIT: JDBC Data Source	ETI: Data Source Connection Pool Utilization	Value: High

### J2EE::J2EE Application:HTTP Sessions >> JVM Memory Utilization

<b>Description:</b> J2EE Application HTTP Sessions Impacts JVM Memory Utilization		
Cause		
CIT: J2EE Application	ETI: HTTP Sessions	Value: High
Symptom 1		
CIT: J2EE Server	ETI: JVM Memory Utilization	Value: High
Symptom 2		
CIT: JVM	ETI: JVM Memory Utilization	Value: High

**J2EE::J2EE Application:Servlet Requests >> Real User Transaction Performance & Real User Sessions Performance**

<b>Description:</b> J2EE Application Servlet Requests Impacts Real User Transaction Performance and Real User Sessions Performance		
Cause		
CIT: J2EE Application	ETI: Servlet Requests	Value: High
Symptom 1		
CIT: Business Application	ETI: Real User Sessions Performance	Value: Critical
Symptom 2		
CIT: Business Transaction	ETI: Real User Transaction Performance event	Value: Critical

**J2EE::J2EE Application:Servlet Requests >> Synthetic User Transaction Performance**

<b>Description:</b> J2EE Application Servlet Requests Impacts Synthetic User Transaction Performance		
Cause		
CIT: J2EE Application	ETI: Servlet Requests	Value: High
Symptom 1		
CIT: Business Application	ETI: Synthetic User Transaction Performance event	Value: Critical



## J2EE::J2EE Application:Servlet Requests >> Thread Pool Utilization & Active Sockets Count & JVM Memory Utilization & HTTP Sessions & Thread Requests Pending & Servlets Loaded & Interface Discard Rate & Interface Utilization

<b>Description:</b> J2EE Application Servlet Requests Impacts Thread Pool Utilization and Active Sockets Count and JVM Memory Utilization and HTTP Sessions and Thread Requests Pending and Servlets Loaded and Interface Discard Rate and Interface Utilization		
Cause		
CIT: J2EE Application	ETI: Servlet Requests	Value: High
Symptom 1		
CIT: Interface	ETI: Interface Discard Rate	Value: High
Symptom 2		
CIT: Interface	ETI: Interface Utilization	Value: High
Symptom 3		
CIT: Interface	ETI: Interface Utilization	Value: Higher Than Normal
Symptom 4		
CIT: J2EE Application	ETI: HTTP Sessions	Value: High
Symptom 5		
CIT: J2EE Server	ETI: Active Sockets Count	Value: High
Symptom 6		
CIT: J2EE Server	ETI: HTTP Sessions	Value: High
Symptom 7		
CIT: J2EE Server	ETI: JVM Memory Utilization	Value: High
Symptom 8		
CIT: J2EE Server	ETI: Servlets Loaded	Value: High
Symptom 9		
CIT: J2EE Server	ETI: Thread Pool Utilization	Value: High

<b>Description:</b> J2EE Application Servlet Requests Impacts Thread Pool Utilization and Active Sockets Count and JVM Memory Utilization and HTTP Sessions and Thread Requests Pending and Servlets Loaded and Interface Discard Rate and Interface Utilization		
Symptom 10		
CIT: J2EE Server	ETI: Thread Requests Pending	Value: High
Symptom 11		
CIT: JVM	ETI: JVM Memory Utilization	Value: High

**J2EE::J2EE Cluster:Cluster Health >> Domain Status**

<b>Description:</b> J2EE Cluster Health Impacts Domain Status		
Cause		
CIT: J2EE Cluster	ETI: Cluster Health	Value: Poor
Symptom 1		
CIT: J2EE Domain	ETI: Domain Status	Value: Poor

**J2EE::J2EE Cluster:Cluster Health >> Real User Transaction Performance & Real User Sessions Performance**

<b>Description:</b> J2EE Cluster Health Impacts Real User Transaction Performance and Real User Sessions Performance		
Cause		
CIT: J2EE Cluster	ETI: Cluster Health	Value: Poor
Symptom 1		
CIT: Business Application	ETI: Real User Sessions Performance	Value: Critical
Symptom 2		
CIT: Business Application	ETI: Real User Transaction Performance event	Value: Critical

### J2EE::J2EE Cluster:Cluster Health >> Synthetic User Transaction Performance

<b>Description:</b> J2EE Cluster Health Impacts Synthetic User Transaction Performance		
Cause		
CIT: J2EE Cluster	ETI: Cluster Health	Value: Poor
Symptom 1		
CIT: Business Application	ETI: Synthetic User Transaction Performance event	Value: Critical

### J2EE::J2EE Cluster:Cluster Status >> Domain Status

<b>Description:</b> J2EE Cluster Status Impacts Domain Status		
Cause		
CIT: J2EE Cluster	ETI: Cluster Status	Value: Stopped
Symptom 1		
CIT: J2EE Domain	ETI: Domain Status	Value: Poor

### J2EE::J2EE Cluster:Cluster Status >> Real User Transaction Availability & Real User Sessions Availability

<b>Description:</b> J2EE Cluster Status Impacts Real User Transaction Availability and Real User Sessions Availability		
Cause		
CIT: J2EE Cluster	ETI: Cluster Status	Value: Stopped
Symptom 1		
CIT: Business Application	ETI: Real User Sessions Availability	Value: Critical

<b>Description:</b> J2EE Cluster Status Impacts Real User Transaction Availability and Real User Sessions Availability		
Symptom 2		
CIT: Business Application	ETI: Real User Transaction Availability event	Value: Critical

**J2EE::J2EE Cluster:Cluster Status >> Synthetic User Transaction Availability**

<b>Description:</b> J2EE Cluster Status Impacts Synthetic User Transaction Availability		
Cause		
CIT: J2EE Cluster	ETI: Cluster Status	Value: Stopped
Symptom 1		
CIT: Business Transaction	ETI: Synthetic User Transaction Availability event	Value: Critical

**J2EE::J2EE Server:DataSource Connection Pool Availability >> EJBPerformance & Transaction Timeout Rate & Transaction Commit Rate**

<b>Description:</b> J2EE Server DataSource Connection Pool Availability Impacts EJBPerformance and Transaction Timeout Rate and Transaction Commit Rate		
Cause		
CIT: J2EE Server	ETI: Data Source Connection Pool Availability	Value: Low
Symptom 1		
CIT: J2EE Application	ETI: EJB Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: EJB Performance	Value: Low
Symptom 3		
CIT: J2EE Server	ETI: Transaction Commit Rate	Value: High

<b>Description:</b> J2EE Server DataSource Connection Pool Availability Impacts EJBPerformance and Transaction Timeout Rate and Transaction Commit Rate		
Symptom 4		
CIT: J2EE Server	ETI: Transaction Timeout Rate	Value: High

### J2EE::J2EE Server:DataSource Connection Pool Performance >> EJB Performance

<b>Description:</b> J2EE Server DataSource Connection Pool Performance Impacts EJB Performance		
Cause		
CIT: J2EE Server	ETI: Data Source Connection Pool Performance	Value: Low
Symptom 1		
CIT: J2EE Application	ETI: EJB Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: EJB Performance	Value: Low

### J2EE::J2EE Server:DataSource Connection Waiters >> DataSource Connection Pool Availability

<b>Description:</b> J2EE Server DataSource Connection Waiters Impacts DataSource Connection Pool Availability		
Cause		
CIT: J2EE Server	ETI: Data Source Connection Waiters	Value: High
Symptom 1		
CIT: J2EE Server	ETI: Data Source Connection Pool Availability	Value: Low
Symptom 2		
CIT: JDBC Data Source	ETI: Data Source Connection Pool Availability	Value: Low

**J2EE::J2EE Server:DataSource ConnectionPool Utilization >>  
Transaction Capacity Utilization & JDBC Connection Pool Wait Count &  
Transaction Time & Transaction Commit Rate & Transaction Start Rate  
& DataSource Connection Pool Availability**

<b>Description:</b> J2EE Server DataSource ConnectionPool Utilization Impacts Transaction Capacity Utilization and JDBC Connection Pool Wait Count and Transaction Time and Transaction Commit Rate and Transaction Start Rate and DataSource Connection Pool Availability		
Cause		
CIT: J2EE Server	ETI: Data Source Connection Pool Utilization	Value: High
Symptom 1		
CIT: J2EE Server	ETI: Data Source Connection Pool Availability	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: JDBC Connection Pool Wait Count	Value: High
Symptom 3		
CIT: J2EE Server	ETI: Transaction Capacity Utilization	Value: High
Symptom 4		
CIT: J2EE Server	ETI: Transaction Commit Rate	Value: High
Symptom 5		
CIT: J2EE Server	ETI: Transaction Start Date	Value: High
Symptom 6		
CIT: J2EE Server	ETI: Transaction Time	Value: High
Symptom 7		
CIT: JDBC Data Source	ETI: Data Source Connection Pool Availability	Value: Low

<b>Description:</b> J2EE Server DataSource ConnectionPool Utilization Impacts Transaction Capacity Utilization and JDBC Connection Pool Wait Count and Transaction Time and Transaction Commit Rate and Transaction Start Rate and DataSource Connection Pool Availability		
Symptom 8		
CIT: JDBC Data Source	ETI: JDBC Connection Pool Wait Count	Value: High

### J2EE::J2EE Server:EJB Concurrent Lives >> EJB Utilization

<b>Description:</b> EJB Concurrent Lives Impacts EJB Utilization		
Cause		
CIT: J2EE Server	ETI: EJB Concurrent Lives	Value: High
Symptom 1		
CIT: J2EE Application	ETI: EJB Utilization	Value: High
Symptom 2		
CIT: J2EE Server	ETI: EJB Utilization	Value: High

### J2EE::J2EE Server:EJB Free Pool Wait Rate >> Servlet Performance

<b>Description:</b> EJB Free Pool Wait Rate Impacts Servlet Performance		
Cause		
CIT: J2EE Server	ETI: EJB Free Pool Wait Rate	Value: High
Symptom 1		
CIT: J2EE Application	ETI: Servlet Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: Servlet Performance	Value: Low

**J2EE::J2EE Server:EJB Performance >> EJB Free Pool Wait Rate & EJB Missed Count Rate & Servlet Performance**

<b>Description:</b> EJB Performance Impacts EJB Free Pool Wait Rate and EJB Missed Count Rate and Servlet Performance		
Cause		
CIT: J2EE Server	ETI: EJB Performance	Value: Low
Symptom 1		
CIT: J2EE Application	ETI: EJB Free Pool Wait Rate	Value: High
Symptom 2		
CIT: J2EE Application	ETI: EJB Missed Count Rate	Value: High
Symptom 3		
CIT: J2EE Application	ETI: Servlet Performance	Value: Low
Symptom 4		
CIT: J2EE Server	ETI: EJB Free Pool Wait Rate	Value: High
Symptom 5		
CIT: J2EE Server	ETI: EJB Missed Count Rate	Value: High
Symptom 6		
CIT: J2EE Server	ETI: Servlet Performance	Value: Low

**J2EE::J2EE Server:EJB Timeout Rate >> Servlet Performance & EJB Transaction Throughput Rate & EJB Transaction Rollback Rate**

<b>Description:</b> EJB Timeout Rate Impacts Servlet Performance and EJB Transaction Throughput Rate and EJB Transaction Rollback Rate		
Cause		
CIT: J2EE Server	ETI: EJB Timeout Rate	Value: High
Symptom 1		
CIT: J2EE Application	ETI: EJB Transaction Rollback Rate	Value: High
Symptom 2		



<b>Description:</b> EJB Timeout Rate Impacts Servlet Performance and EJB Transaction Throughput Rate and EJB Transaction Rollback Rate		
CIT: J2EE Application	ETI: EJB Transaction Throughput Rate	Value: High
Symptom 3		
CIT: J2EE Application	ETI: EJB Transaction Rollback Rate	Value: High
Symptom 4		
CIT: J2EE Server	ETI: Servlet Performance	Value: Low

### J2EE::J2EE Server:EJB Utilization >> DataSource Connection Waiters & DataSource Connection Pool Utilization

<b>Description:</b> EJB Utilization Impacts DataSource Connection Waiters and DataSource Connection Pool Utilization		
Cause		
CIT: J2EE Server	ETI: EJB Utilization	Value: High
Symptom 1		
CIT: J2EE Server	ETI: DataSource Connection Pool Utilization	Value: High
Symptom 2		
CIT: J2EE Server	ETI: DataSource Connection Waiters	Value: High
Symptom 3		
CIT: JDBC Data Source	ETI: DataSource Connection Waiters	Value: High
Symptom 4		
CIT: JDBC Data Source	ETI: DataSource Connection Pool Utilization	Value: High

**J2EE::J2EE Server:HTTP Sessions >> JVM Memory Utilization**

<b>Description:</b> J2EE Server HTTP Sessions Impacts JVM Memory Utilization		
Cause		
CIT: J2EE Server	ETI: HTTP Sessions	Value: High
Symptom 1		
CIT: J2EE Server	ETI: JVM Memory Utilization	Value: High
Symptom 2		
CIT: JVM	ETI: JVM Memory Utilization	Value: High

**J2EE::J2EE Server:JVM Memory Utilization >> Real User Transaction Performance & Real User Sessions Performance**

<b>Description:</b> J2EE Server Memory Utilization Impacts Real User Transaction Performance and Real User Sessions Performance		
Cause		
CIT: J2EE Server	ETI: JVM Memory Utilization	Value: High
Symptom 1		
CIT: Business Application	ETI: Real User Sessions Performance	Value: Critical
Symptom 2		
CIT: Business Application	ETI: Real User Transaction Performance event	Value: Critical
Symptom 3		
CIT: J2EE Application	ETI: EJB Transaction Rollback Rate	Value: High
Symptom 4		
CIT: J2EE Server	ETI: Servlet Performance	Value: Low

### J2EE::J2EE Server:JVM Memory Utilization >> Synthetic User Transaction Performance

<b>Description:</b> J2EE Server Memory Utilization Impacts Synthetic User Transaction Performance		
Cause		
CIT: J2EE Server	ETI: JVM Memory Utilization	Value: High
Symptom 1		
CIT: Business Application	ETI: Synthetic User Transaction Performance event	Value: Critical

### J2EE::J2EE Server:JVM Memory Utilization >> Transaction Time & Transaction System Errors & Servlet Performance

<b>Description:</b> J2EE Server JVMMemoryUtilization Impacts Transaction Time and Transaction System Errors and Servlet Performance		
Cause		
CIT: J2EE Server	ETI: JVM Memory Utilization	Value: High
Symptom 1		
CIT: J2EE Application	ETI: Servlet Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: Servlet Performance	Value: Low
Symptom 3		
CIT: J2EE Server	ETI: Transaction System Errors	Value: High
Symptom 4		
CIT: J2EE Server	ETI: Transaction Time	Value: High

**J2EE::J2EE Server:Server Sessions >> JVM Memory Utilization**

<b>Description:</b> J2EE Cluster Status Impacts Real User Transaction Availability and Synthetic User Transaction Availability and Real User Sessions Availability		
Cause		
CIT: J2EE Server	ETI: Server Sessions	Value: High
Symptom 1		
CIT: J2EE Server	ETI: JVM Memory Utilization	Value: High
Symptom 2		
CIT: JVM	ETI: JVM Memory Utilization	Value: High

**J2EE::J2EE Server:Server Status >> Domain Status & Cluster Health & Cluster Status**

<b>Description:</b> J2EE Server Status Impacts Domain Status and Cluster Health and Cluster Status		
Cause		
CIT: J2EE Server	ETI: Server Status	Value: Unavailable
Symptom 1		
CIT: J2EE Cluster	ETI: Cluster Health	Value: Poor
Symptom 2		
CIT: J2EE Cluster	ETI: Cluster Status	Value: Partial Stop
Symptom 3		
CIT: J2EE Cluster	ETI: Cluster Status	Value: Stopped

### J2EE::J2EE Server:Server Status >> Real User Transaction Availability & Real User Sessions Availability

<b>Description:</b> J2EE Server Status Impacts Real User Transaction Availability and Real User Sessions Availability		
Cause		
CIT: J2EE Server	ETI: Server Status	Value: Unavailable
Symptom 1		
CIT: Business Application	ETI: Real User Sessions Availability	Value: Critical
Symptom 2		
CIT: Business Application	ETI: Real User Transaction Availability event	Value: Critical

### J2EE::J2EE Server:Server Status >> Synthetic User Transaction Availability

<b>Description:</b> J2EE Server Status Impacts Synthetic User Transaction Availability		
Cause		
CIT: J2EE Server	ETI: Server Status	Value: Unavailable
Symptom 1		
CIT: Business Application	ETI: Synthetic User Transaction Availability event	Value: Critical

### J2EE::J2EE Server:Servlet Requests >> Real User Transaction Performance & Real User Sessions Performance

<b>Description:</b> J2EE Server Servlet Requests Impacts Real User Transaction Performance and Real User Sessions Performance		
Cause		
CIT: J2EE Server	ETI: Servlet Requests	Value: High

<b>Description:</b> J2EE Server Servlet Requests Impacts Real User Transaction Performance and Real User Sessions Performance		
Symptom 1		
CIT: Business Application	ETI: Real User Sessions Performance	Value: Critical
Symptom 2		
CIT: Business Application	ETI: Real User Transaction Performance event	Value: Critical

**J2EE::J2EE Server:Servlet Requests >> Synthetic User Transaction Performance**

<b>Description:</b> J2EE Server Servlet Requests Impacts Synthetic User Transaction Performance		
Cause		
CIT: J2EE Server	ETI: Servlet Requests	Value: High
Symptom 1		
CIT: Business Application	ETI: Synthetic User Transaction Performance event	Value: Critical

**J2EE::J2EE Server:Servlet Requests >> Thread Pool Utilization & Active Sockets Count & JVM Memory Utilization & HTTP Sessions & Thread Requests Pending & Servlets Loaded & Interface Discard Rate & Interface Utilization**

<b>Description:</b> J2EE Server Servlet Requests Impacts Thread Pool Utilization and Active Sockets Count and JVM Memory Utilization and HTTP Sessions and Thread Requests Pending and Servlets Loaded and Interface Discard Rate and Interface Utilization		
Cause		
CIT: J2EE Server	ETI: Servlet Requests	Value: High
Symptom 1		
CIT: Interface	ETI: Interface Discard Rate	Value: High

<b>Description:</b> J2EE Server Servlet Requests Impacts Thread Pool Utilization and Active Sockets Count and JVM Memory Utilization and HTTP Sessions and Thread Requests Pending and Servlets Loaded and Interface Discard Rate and Interface Utilization		
Symptom 2		
CIT: Interface	ETI: Interface Utilization	Value: Higher Than Normal
Symptom 3		
CIT: J2EE Server	ETI: Active Sockets Count	Value: High
Symptom 4		
CIT: J2EE Server	ETI: Active Sockets Count	Value: High
Symptom 5		
CIT: J2EE Server	ETI: JVM Memory Utilization	Value: High
Symptom 6		
CIT: J2EE Server	ETI: Servlets Loaded	Value: High
Symptom 7		
CIT: J2EE Server	ETI: Thread Pool Utilization	Value: High
Symptom 8		
CIT: J2EE Server	ETI: Thread Requests Pending	Value: High
Symptom 9		
CIT: JVM	ETI: JVM Memory Utilization	Value: High

### J2EE::J2EE Server:Servlets Loaded >> JVM Memory Utilization

<b>Description:</b> J2EE Server Status Impacts Real User Transaction Availability and Synthetic User Transaction Availability and Real User Sessions Availability		
Cause		
CIT: J2EE Server	ETI: Servlets Loaded	Value: High
Symptom 1		

<b>Description:</b> J2EE Server Status Impacts Real User Transaction Availability and Synthetic User Transaction Availability and Real User Sessions Availability		
CIT: J2EE Server	ETI: JVM Memory Utilization	Value: High
Symptom 1		
CIT: JVM	ETI: JVM Memory Utilization	Value: High

**J2EE::J2EE Server:ThreadPoolUtilization >> ExecuteQueueWaitCount & ActiveSocketsCount & ServletPerformance & DeferredThreadRequests & ThreadRequestWaitTime & ThreadRequestsPending & ThreadRequestServiceTime & ThreadPoolAvailability & JVMMemoryUtilization**

<b>Description:</b> J2EE Server Thread Pool Utilization Impacts Execute Queue Wait Count and Active Sockets Count and Servlet Performance and Deferred Thread Requests and Thread Request Wait Time and Thread Requests Pending and Thread Request Service Time and Thread Pool Availability and JVM Memory Utilization		
Cause		
CIT: J2EE Server	ETI: Thread Pool Utilization	Value: High
Symptom 1		
CIT: J2EE Application	ETI: Servlet Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: Active Sockets Count	Value: High
Symptom 3		
CIT: J2EE Server	ETI: Deferred Thread Requests	Value: High
Symptom 4		
CIT: J2EE Server	ETI: Execute Queue Wait Count	Value: High
Symptom 5		
CIT: J2EE Server	ETI: JVM Memory Utilization	Value: High
Symptom 6		
CIT: J2EE Server	ETI: Servlet Performance	Value: Low



<b>Description:</b> J2EE Server Thread Pool Utilization Impacts Execute Queue Wait Count and Active Sockets Count and Servlet Performance and Deferred Thread Requests and Thread Request Wait Time and Thread Requests Pending and Thread Request Service Time and Thread Pool Availability and JVM Memory Utilization		
Symptom 7		
	ETI: Thread Pool Availability	Value: Low
Symptom 8		
CIT: J2EE Server	ETI: Thread Request Service Time	Value: High
Symptom 9		
CIT: J2EE Server	ETI: Thread Request Wait Time	Value: High
Symptom 10		
CIT: J2EE Server	ETI: Thread Requests Pending	Value: High
Symptom 11		
CIT: JVM	ETI: JVM Memory Utilization	Value: High

### J2EE::J2EE Server:Total Garbage Collection Count >> CPU Load

<b>Description:</b> J2EE Server Total Garbage Collection Count Impacts CPU Load		
Cause		
CIT: J2EE Server	ETI: Total Garbage Collection Count	Value: High
Symptom 1		
CIT: Computer	ETI: CPU Load	Value: Overloaded

### J2EE::J2EE Server:Total Garbage Collection Time >> CPU Load

<b>Description:</b> J2EE Server Total Garbage Collection Time Impacts CPU Load		
Cause		
CIT: J2EE Server	ETI: Total Garbage Collection Time	Value: High

<b>Description:</b> J2EE Server Total Garbage Collection Time Impacts CPU Load		
Symptom 1		
CIT: Computer	ETI: CPU Load	Value: Overloaded

**J2EE::J2EE Server:Total Number of Threads >> CPU Load & Memory Usage Level**

<b>Description:</b> J2EE Server Total Number Of Threads Impacts CPU Load and Memory Usage Level		
Cause		
CIT: J2EE Server	ETI: Total Number Of Threads	Value: High
Symptom 1		
CIT: Computer	ETI: CPU Load	Value: Overloaded
Symptom 2		
CIT: Computer	ETI: Memory Usage Level	Value: Higher Than Normal
Symptom 3		
CIT: Computer	ETI: Memory Usage Level	Value: Much Higher Than Normal

**J2EE::J2EE Server:Transaction Application Errors >> Transactions Rolled Back**

<b>Description:</b> J2EE Server Transaction Application Errors Impacts Transactions Rolled Back		
Cause		
CIT: J2EE Server	ETI: Transaction Application Errors	Value: High

<b>Description:</b> J2EE Server Transaction Application Errors Impacts Transactions Rolled Back		
Symptom 1		
CIT: J2EE Server	ETI: Transactions Rolled Back	Value: High

### J2EE::J2EE Server:Transaction Resource Errors >> Transactions Rolled Back

<b>Description:</b> J2EE Server Transaction Resource Errors Impacts Transactions Rolled Back		
Cause		
CIT: J2EE Server	ETI: Transaction Resource Errors	Value: High
Symptom 1		
CIT: J2EE Server	ETI: Transactions Rolled Back	Value: High

### J2EE::J2EE Server:Transaction System Errors >> Transactions Rolled Back

<b>Description:</b> J2EE Server Transaction System Errors Impacts Transactions Rolled Back		
Cause		
CIT: J2EE Server	ETI: Transaction System Errors	Value: High
Symptom 1		
CIT: J2EE Server	ETI: Transactions Rolled Back	Value: High

### J2EE::J2EE Server:Transaction Time >> JDBC Connection Pool Wait Count

<b>Description:</b> J2EE Server Transaction System Errors Impacts Transactions Rolled Back		
Cause		
CIT: J2EE Server	ETI: Transaction Time	Value: High
Symptom 1		

<b>Description:</b> J2EE Server Transaction System Errors Impacts Transactions Rolled Back		
CIT: J2EE Server	ETI: JDBC Connection Pool Wait Count	Value: High
Symptom 2		
CIT: JDBC Data Source	ETI: JDBC Connection Pool Wait Count	Value: High

**J2EE::J2EE Server:Transaction Timeout Errors >> Transactions Rolled Back**

<b>Description:</b> J2EE Server Transaction Timeout Errors Impacts Transactions Rolled Back		
Cause		
CIT: J2EE Server	ETI: Transaction Timeout Errors	Value: High
Symptom 1		
CIT: J2EE Server	ETI: Transactions Rolled Back	Value: High

**J2EE::JDBC Data Source:DataSource Connection Pool Availability >> EJBPerformance & Transaction Timeout Rate & Transaction Commit Rate**

<b>Description:</b> JDBC DataSource Connection Pool Availability Impacts EJBPerformance and Transaction Timeout Rate and Transaction Commit Rate		
Cause		
CIT: JDBC Data Source	ETI: Data Source Connection Pool Availability	Value: Low
Symptom 1		
CIT: J2EE Application	ETI: EJB Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: EJB Performance	Value: Low
Symptom 3		

<b>Description:</b> JDBC DataSource Connection Pool Availability Impacts EJBPerformance and Transaction Timeout Rate and Transaction Commit Rate		
CIT: J2EE Server	ETI: Transaction Commit Rate	Value: High
Symptom 4		
CIT: J2EE Server	ETI: Transaction Timeout Rate	Value: High

### J2EE::JDBC Data Source:DataSource Connection Pool Performance >> EJB Performance

<b>Description:</b> JDBC DataSource Connection Pool Performance Impacts EJB Performance		
Cause		
CIT: JDBC Data Source	ETI: Data Source Connection Pool Performance	Value: Low
Symptom 1		
CIT: J2EE Application	ETI: EJB Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: EJB Performance	Value: Low

### J2EE::JDBC Data Source:DataSource Connection Waiters >> DataSource Connection Pool Availability

<b>Description:</b> JDBC DataSource Connection Waiters Impacts DataSource Connection Pool Availability		
Cause		
CIT: JDBC Data Source	ETI: Data Source Connection Waiters	Value: High
Symptom 1		
CIT: J2EE Server	ETI: Data Source Connection Pool Availability	Value: Low

<b>Description:</b> JDBC DataSource Connection Waiters Impacts DataSource Connection Pool Availability		
Symptom 2		
CIT: JDBC Data Source	ETI: Data Source Connection Pool Availability	Value: Low

**J2EE::JDBC Data Source:DataSource ConnectionPool Utilization >> Transaction Capacity Utilization & JDBC Connection Pool Wait Count & Transaction Time & Transaction Commit Rate & Transaction Start Rate & DataSource Connection Pool Availability**

<b>Description:</b> JDBC DataSource ConnectionPool Utilization Impacts Transaction Capacity Utilization and JDBC Connection Pool Wait Count and Transaction Time and Transaction Commit Rate and Transaction Start Rate and DataSource Connection Pool Availability		
Cause		
CIT: JDBC Data Source	ETI: Data Source Connection Pool Utilization	Value: High
Symptom 1		
CIT: J2EE Server	ETI: Data Source Connection Pool Availability	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: JDBC Connection Pool Wait Count	Value: High
Symptom 3		
CIT: J2EE Server	ETI: Transaction Capacity Utilization	Value: High
Symptom 4		
CIT: J2EE Server	ETI: Transaction Commit Rate	Value: High
Symptom 5		
CIT: J2EE Server	ETI: Transaction Start Rate	Value: High
Symptom 6		

<b>Description:</b> JDBC DataSource ConnectionPool Utilization Impacts Transaction Capacity Utilization and JDBC Connection Pool Wait Count and Transaction Time and Transaction Commit Rate and Transaction Start Rate and DataSource Connection Pool Availability		
CIT: J2EE Server	ETI: Transaction Time	Value: High
Symptom 7		
CIT: JDBC Data Source	ETI: DataSource Connection Pool Availability	Value: Low
Symptom 8		
CIT: JDBC Data Source	ETI: JDBC Connection Pool Wait Count	Value: High

### J2EE::JDBC Data Source:DataSource Leaked Connections Rate >> DataSource ConnectionPool Utilization

<b>Description:</b> JDBC DataSource Leaked Connections Rate Impacts DataSource ConnectionPool Utilization		
Cause		
CIT: JDBC Data Source	ETI: DataSource Leaked Connections Rate	Value: High
Symptom 1		
CIT: J2EE Server	ETI: DataSource ConnectionPool Utilization	Value: High
Symptom 2		
CIT: JDBC Data Source	ETI: DataSource ConnectionPool Utilization	Value: High

### J2EE::JVM:All Processors Average Load >> CPU Load

<b>Description:</b> JVM All Processors Average Load Impacts CPU Load		
Cause		
CIT: JVM	ETI: All Processors Average Load	Value: High

<b>Description:</b> JVM All Processors Average Load Impacts CPU Load		
Symptom 1		
CIT: Computer	ETI: CPU Load	Value: Overloaded

**J2EE::JVM:JVM Memory Utilization >> Real User Transaction Performance & Real User Sessions Performance**

<b>Description:</b> JVM Memory Utilization Impacts Real User Transaction Performance and Synthetic User Transaction Performance and Real User Sessions Performance		
Cause		
CIT: JVM	ETI: JVM Memory Utilization	Value: High
Symptom 1		
CIT: Business Application	ETI: Real User Sessions Performance	Value: Critical
Symptom 2		
CIT: Business Application	ETI: Real User Transaction Performance event	Value: Critical

**J2EE::JVM:JVM Memory Utilization >> Synthetic User Transaction Performance**

<b>Description:</b> JVM Memory Utilization Impacts Synthetic User Transaction Performance		
Cause		
CIT: JVM	ETI: JVM Memory Utilization	Value: High
Symptom 1		
CIT: Business Application	ETI: Synthetic User Transaction Performance event	Value: Critical



### J2EE::JVM:JVM Memory Utilization >> Transaction Time & Transaction System Errors & Servlet Performance

<b>Description:</b> JVMMemoryUtilization Impacts Transaction Time and Transaction System Errors and Servlet Performance		
Cause		
CIT: JVM	ETI: JVM Memory Utilization	Value: High
Symptom 1		
CIT: J2EE Application	ETI: Servlet Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: Servlet Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: Transaction System Errors	Value: High
Symptom 3		
CIT: J2EE Server	ETI: Transaction Time	Value: High

### J2EE::JVM:Total Garbage Collection Count >> CPU Load

<b>Description:</b> JVM Total Garbage Collection Count Impacts CPU Load		
Cause		
CIT: JVM	ETI: Total Garbage Collection Count	Value: High
Symptom 1		
CIT: Computer	ETI: CPU Load	Value: Overloaded

**J2EE::JVM:Total Garbage Collection Time >> CPU Load**

<b>Description:</b> JVM Total Garbage Collection Time Impacts CPU Load		
Cause		
CIT: JVM	ETI: Total Garbage Collection Time	Value: High
Symptom 1		
CIT: Computer	ETI: CPU Load	Value: Overloaded

**J2EE::JVM:Total Number Of Threads >> CPU Load & Memory Usage Level**

<b>Description:</b> JVM Total Number Of Threads Impacts CPU Load and Memory Usage Level		
Cause		
CIT: JVM	ETI: Total Number Of Threads	Value: High
Symptom 1		
CIT: Computer	ETI: CPU Load	Value: Constrained
Symptom 2		
CIT: Computer	ETI: Memory Usage Level	Value: Higher Than Normal

**J2EE::Network Interface:Interface Utilization >> Real User Transaction Performance & Real User Sessions Performance**

<b>Description:</b> Network Interface Utilization Impacts Real User Transaction Performance and Real User Sessions Performance		
Cause		
CIT: Interface	ETI: Interface Utilization	Value: Higher Than Normal

<b>Description:</b> Network Interface Utilization Impacts Real User Transaction Performance and Real User Sessions Performance		
Symptom 1		
CIT: Business Application	ETI: Real User Sessions Performance	Value: Critical
Symptom 2		
CIT: Business Transaction	ETI: Real User Transaction Performance event	Value: Critical

### J2EE::Network Interface:Interface Utilization >> Servlet Performance

<b>Description:</b> Network Interface Utilization Impacts Servlet Performance		
Cause		
CIT: Interface	ETI: Interface Utilization	Value: Higher Than Normal
Symptom 1		
CIT: J2EE Application	ETI: Servlet Performance	Value: Low
Symptom 2		
CIT: J2EE Server	ETI: Servlet Performance	Value: Low

### J2EE::Network Interface:Interface Utilization >> Synthetic User Transaction Performance

<b>Description:</b> Network Interface Utilization Impacts Synthetic User Transaction Performance		
Cause		
CIT: Interface	ETI: Interface Utilization	Value: Higher Than Normal
Symptom 1		
CIT: Business Application	ETI: Synthetic User Transaction Performance	Value: Critical

## HI Assignment

The following table lists the HI assignments for J2EE Content Pack.

HI Mapping	HI Assignment
J2EE Application	J2EE Application Mapping for HIs assignment
	J2EE Application Mapping for HIs assignment with empty monitor
J2EE Cluster	J2EE Cluster for HIs assignment
	J2EE Cluster for HIs assignment with empty monitor
J2EE Domain	J2EE Domain Mapping for HIs assignment
	J2EE Domain Mapping for HIs assignment with empty monitor
J2EE Server	J2EE Server Mapping for HIs assignment
	J2EE Server Mapping for HIs assignment with empty monitor
JDBC Data Source	JDBC Data Source Mapping for HIs assignment
	JDBC Data Source Mapping for HIs assignment with empty monitor
JVM	JVM Mapping for HIs assignment
	JVM Mapping for HIs assignment with empty monitor

## KPI Assignment

The following table lists the KPI assignments for J2EE Content Pack.

CI Type	KPI Assignment
J2EE Application	J2EE Application Mapping for Service Health
	J2EE Application Mapping for SLM
J2EE Cluster	J2EE Cluster Mapping for Service Health
	J2EE Cluster Mapping for SLM

CI Type	KPI Assignment
J2EE Domain	J2EE Domain Mapping for Service Health
	J2EE Domain Mapping for SLM
J2EE Server	J2EE Server Mapping for Service Health
	J2EE Server Mapping for SLM
JDBC Data Source	JDBC Data Source Mapping for Service Health
	JDBC Data Source Mapping for SLM
JVM	JVM Mapping for Service Health
	JVM Mapping for SLM

## Dependent Content Packs

The J2EE Content Pack is dependent on the following Content Packs:

- HPOprInf
- HPOprOra
- HPOprMss
- EUM\_BPM
- EUM\_RUM

The J2EE Content Pack depends on EUM Content Pack for its deployment. You must deploy the EUM Content Pack in CREATE mode.

## Referenced Content from other Content Packs

Indicator	CI Type	Dependent Content Pack	Content Pack Version
Real User Transaction Availability event	Business Application	EUM_RUM	1.00
Real User Transaction Performance event	Business Application	EUM_RUM	1.00
Synthetic User Transaction Availability event	Business Application	EUM_BPM	1.00

<b>Indicator</b>	<b>CI Type</b>	<b>Dependent Content Pack</b>	<b>Content Pack Version</b>
Synthetic User Transaction Performance event	Business Application	EUM_BPM	1.00
CPU Load	Computer	HPOprInf	9.00
Memory Usage Level	Computer	HPOprInf	9.00
Disk Usage Level	FileSystem	HPOprInf	9.00
Interface Discard Rate	Interface	HPOprInf	9.00
Interface Utilization	Interface	HPOprInf	9.00
CPU Usage by SQL	Database	HPOprOra	9.00
Database Server Status	Database	HPOprMss	9.00
SQL Query Performance	Database	HPOprMss	9.00

## Tool Definitions

**J2EE Standards:** Starts a web browser and connects to the J2EE Management Specifications site.

**View Collection Status:** Displays the collection status for the servers.

## Graph Templates for SPI for WebSphere Server

The content pack contains the SPI for WebSphere graph family mapped to the WebSphere CI type.

The following table lists the graph templates present in the SPI for WebSphere graph family and the mapped policies.

Graph Templates	Metric Name	Metric Description
ThreadPool	I013_THREADPOOLPCTMAX	Percentage of time the number of threads in pool reached the configured maximum size
	I014_THRDPOOLCRTRT	Number of threads created per minute (used only for graphing)
	I812_THRDPOOLHUNGR	Number of threads hung per minute
	I813_CCRTTHDPLHNGCT	Number of concurrent hung threads
EJB Pool	I020_EJBPOOLUTIL	Percentage of beans in the pool
	I025_EJBPOOLMISSPCT	Average percentage of time a call to retrieve an EJB from the pool failed

Graph Templates	Metric Name	Metric Description
EJB Activity	I022_EJBMETHCALL SRT	Number of EJB method calls per minute
	I024_EJBENTDATAL DSTRT	Number of times an EJB was written to or loaded from the database per minute
	I810_MSGBACKOUT RATE	Message backout rate
	I811_RETURNDISCR DRT	Returns discard rate
EJB Pool Size	I026_EJBCONCLIVES	Average percentage of bean objects in the pool
Servlet Session Activity	I040_SERVSESSAVER AGELIFE	Average lifetime for a servlet session
	I041_SERVSESSACTS ESS	Active servlet sessions
Servlet Session Invalidations	I042_SERVINVSESSR T	Servlet invalidated session rate
	I045_WEBAPPSERVR EQRT	Number of request for a servlet per second
	I047_WEBAPPSERVE RRRT	Number of errors in a servlet per second
Web Application	I048_WEBAPPSERVL OAD	Web application servlet load
	I049_WEBAPPSERVR ELRT	Number of servlets reloaded for a web application per minute
JDBC Pool Waits	I061_JDBCCONPOO LWAIT	Average percentage of threads waiting for a connection from connection pools
	I062_JDBCONPOOL WTTIM	Average time that a client waited for a connection in msec



Graph Templates	Metric Name	Metric Description
JDBC Pool Performance	I065_JDBCONPOOLTIMRT	Number of times a client timed out waiting for a connection from the pool per minute
	I066_JDBCONPOOLTHRU	Number of connections allocated and returned by applications per second
JDBC SQL Statistics	I814_PRDSTCCHDSRDRT	Prepared statement discard rate
Transaction Duration Times	I070_TRANGLOBALDURATION	Transaction global duration
	I071_TRANLOCALDURATION	Transaction local duration
	I072_TRANGLOBALCOMMITDURATION	Transaction global commit duration
	I073_TRANLOCALCOMMITDURATION	Transaction local commit duration
Transaction Activity	I074_TRANROLLBACKRATE	Transaction rollback rate
	I075_TRANTIMEOUTRATE	Transaction timeout rate
	I076_TRANCOMMITRATE	Transaction commit rate
	I077_TRANTHRUPUT	Number of global and local transactions that were completed per second
	I078_TRANSTARTRATE	Transaction start rate

<b>Graph Templates</b>	<b>Metric Name</b>	<b>Metric Description</b>
JVM Utilization	I005_JVMMEMUTILPCT	JVM memory utilization percent
	I807_JVMMEMFREEPCT	JVM memory free percent
	I808_JVMCPUUSAGEPCT	JVM memory CPU usage percent
	I809_GCINTERVALTIME	Garbage collection value

## Graph Templates for SPI for WebLogic Server

The following table lists the graph templates present in the SPI for WebLogic graph family and the mapped policies.

Graph Templates	Metric Name	Metric Description
Transaction Performance	B070_TRANAVETIME	Transaction average time
	B076_TRANTHRURATE	Number of transactions processed per second
	B077_TRANHEURCNT	Transaction heuristic count
	B079_TRANCAPUTIL	Transaction capacity utilization
JDBC Pool Waits	B061_JDBCCONPLWTCNT	JDBC connection pool wait count
	B063_JDBCCONLKRTSUM	Number of connections which are not closed

Graph Templates	Metric Name	Metric Description
ThreadPool	B010_EXQUETHRURATE	Requests services by execute queue
	B011_EXQTHRUTILPCT	Execute queue thread utilization percent
	B012_EXQUEWAITCNT	Execute queue wait count
	B283_DEFERREDREQSCNT	Number of deferred requests
	B284_REQWAITTIMTHRD	Thread request wait time
	B285_PENDINGREQCOUNT	Number of pending request
	B286_PENDINGREQPCT	Percentage of requests pending
	B287_REQMAXWAITTIME	Maximum time a request had to wait for a thread
	B288_STANDBYTHRD CNT	Number of threads in a standby pool
EJB Performance	B025_EJBPOOLWTRT SUM	Aggregate EJB free pool wait rate
	B026_EJBTIMEOUTRT SUM	EJB timeout rate
	B035_EJBTRANTRHUR T	EJB transaction throughput rate
	B036_EJBTRANRBRT	EJB transaction rollback rate
EJB Pool Statistics	B822_DSTROYDTLCNT	Destroyed total count
	B823_EJBMSSDCNTR TSUM	Aggregate miss total count rate

Graph Templates	Metric Name	Metric Description
Cluster	B080_CLSOUTMESFA ILRT	Cluster Outgoing Message Failure Rate
	B081_CLSINMESFAIL RT	Cluster Incoming Message Failure Rate
Server Statistics	B013_SOCKETTRAFFI CRT	Socket Traffic Rate
	B014_ACTIVESOCKE TCNT	Active Socket Count
	B015_SRVRRSTARTS PCT	Server Restarts Percentage
	B078_CNCTRLEAKRT SUM	Connector Connections Pool Leakage
JVM Utilization	B005_JVMMEMUTILP CT	JVM Memory Utilization Percent
JVM Free Memory	B819_JVMHEAPFREE MEM	JVM Heap Free Memory
Transaction Rollback Analysis	B072_TRANRESERRR B PCT	Transaction Resource Error Rollback Percent
	B073_TRANAPPERRR B PCT	Transaction Application Error Rollback Percent
	B074_TRANTIMERRR B PCT	Transaction Time Error Rollback Percent
	B075_TRANSYSERRR B PCT	Transaction System Error Rollback Percent
Transaction Rollback Percent	B071_TRANROLLBAC K PCT	Transaction Rollback Percent
Security	B085_INVLOGINATT CNT	Invalid Login Attempts Count

## Policies Setting ETIs

The following table lists the content pack ETIs and SPI policies that set the ETIs.

ETI/HI	Policy Name	Policy Description
Server Status	WLSSPI_0001	The server status in terms of availability
	WBSSPI_0001	
Thread Pool Utilization	WLSSPI_0011	The number of threads utilized in the server to execute tasks
	WLSSPI_0016	
Active Sockets Count	WLSSPI_0014	The number of HTTP socket connection opened to the server
Server Sessions	WBSSPI_0041	The number of sessions opened to the server
Servlets Loaded	WBSSPI_0048	The number of servlets currently loaded for a web application
Thread Pool Availability	WLSSPI_0288	The availability of threads in the thread pool
Thread Pool Utilization	WBSSPI_0212	The number of threads utilized in the server to execute the tasks
Thread Hung Rate	WBSSPI_0812	The rate at which the threads are declared hung
Transaction Time	WLSSPI_0070	Time taken to complete a transaction
Transactions Rolled Back	WLSSPI_0071	Number/Percentage of transactions rolled back due to system, resource or other errors
Transactions Rolled Back Rate	WBSSPI_0074	Number/Percentage of transactions rolled back due to system, resource or other errors
Transaction Timeout Rate	WBSSPI_0075	The number of transactions that timed out per second

ETI/HI	Policy Name	Policy Description
Transaction Commit Rate	WBSSPI_0076	The number of transactions that were committed per second
Transaction Start Date	WBSSPI_0078	The number of transactions that were begun per second
Transaction Capacity Utilization	WLSSPI_0079	The number of simultaneous in progress transactions
JMS Server Utilization	WLSSPI_0251	The JMS server queue utilization
	WLSSPI_0252	
Execute Queue Wait Count	WLSSPI_0012	The number of client requests waiting to be serviced by the execute queue
Transaction Resource Errors	WLSSPI_0072	Transaction errors caused due to system resource errors
Transaction Application Errors	WLSSPI_0073	Transaction errors caused due to application errors
Transaction Timeout Errors	WLSSPI_0074	Transaction errors caused due to timeout errors
Transaction System Errors	WLSSPI_0075	Transaction errors caused due to system errors
Deferred Thread Requests	WLSSPI_0283	Number of threads that were denied a thread for execution because of the maximum thread constraint
Thread Request Wait Time	WLSSPI_0284	The time a request had to wait for a thread
Threads Request Pending	WLSSPI_0286	The requests that are pending because of available threads
Thread Request Service Time	WLSSPI_0287	The time a request had to wait for a thread
JVM Memory Utilization	WLSSPI_0005	The percentage of heap size used
	WBSSPI_0005	

ETI/Hi	Policy Name	Policy Description
Total Garbage Collection Count	WLSSPI_0006	The number of times garbage collector has run
	WBSSPI_0804	
Total Garbage Collection Time	WLSSPI_0007	Total time taken for garbage collection
	WBSSPI_0805	
Total Number of Threads	WLSSPI_0008	Total number of threads spawned for garbage collection
	WBSSPI_0803	
All Processors Average Load	WLSSPI_0009	Average load on all the processors on the system
	WBSSPI_0801	
Cluster Outgoing Message Failure Rate	WLSSPI_0080	The number of multicast messages to the cluster that were resent
Cluster Incoming Message Failure Rate	WLSSPI_0081	The number of multicast messages from the cluster that were lost
Cluster Health	WLSSPI_0082	Cluster Health in terms of performance
Cluster Status	WBSSPI_0006	Cluster Status in terms of availability
EJB Transaction Throughput Rate	WLSSPI_0235	Number of EJBs Transactions completed in unit time
EJB Transaction Rollback Rate	WLSSPI_0236	Number of EJB Transaction rolled back in unit time
EJB FreePool Wait Rate	WLSSPI_0225	The number of times per minute no EJBs were available from the free pool
EJB Concurrent Lives	WBSSPI_0226	The average number of bean objects in the pool
EJB Timeout Rate	WLSSPI_0226	The number of times per minute a client timed out waiting for an EJB



ETI/HI	Policy Name	Policy Description
EJB Performance	WLSSPI_0238	The performance statistics namely cache utilization
	WBSSPI_0221	
EJB Missed Count Rate	WLSSPI_0824	The total number of times a failed attempt was made to get an instance from the free pool
EJB Utilization	WBSSPI_0220	The utilization of the EJB pool
Servlet Performance	WLSSPI_0240	The performance statistics such as execution time
	WBSSPI_0246	
Servlet Requests	WLSSPI_0242	Number of incoming requests to the servlet
	WBSSPI_0245	
HTTP Sessions	WLSSPI_0245	Number of open servlet sessions
JDBC Connection Pool Wait Count	WLSSPI_0061	The number of clients waiting for a JDBC connection
Data Source Connection Waiters	WBSSPI_0261	The average number of threads waiting for a connection from the connection pool
Data Source Connection Pool Utilization	WLSSPI_0260	DataSource connection pool utilization
	WBSSPI_0263	
Data Source Leaked Connections Rate	WLSSPI_0263	The rate of new leaked JDBC connections
Data Source Connection Pool Availability	WLSSPI_0264	Availability of JDBC connections in the connection pool
	WLSSPI_0265	
	WBSSPI_0262	
	WBSSPI_0265	
Data Source Connection Pool Performance	WBSSPI_0266	DataSource connection pool performance

## Operations Orchestration Flow

The following table list the Operations Orchestration (OO) flows for J2EE Content Pack.

### Application Server Health Check and Application Server Performance Check

OO Flow	Flow Input	CI Type	CI Attribute	Event Attribute
Application Server Health Check	omServer jeeserverName	J2EEServer	J2eeserver_fullname	Originating Server
Application Server Performance Check				

The following are the user input values when you execute OO flow for Application Server Health Check and Application Server Performance Check.

User Input	Value
omServerPort	Port number of the HPOM Tool WS
omServerUser	The user name for the HPOM Server
omServerPassword	The password for the HPOM Server
omNode	Target node with an HPOM Agent (DNS name of the HPOM managed node)
jeeserver	Valid values are wls and wbs

**JDBC Health Check**

OO Flow	Flow Input	CI Type	CI Attribute	Event Attribute
JDBC Health Check	omServer instance	jdbcdatasource	name	Originating Server

The following are the user input when you execute OO Flow for Application Server Performance Check.

User Input	Value
omServerPort	Port number of the HPOM Tool WS
omServerUser	The user name for the HPOM Server
omServerPassword	The password for the HPOM Server
omNode	Target node with an HPOM Agent (DNS name of the HPOM managed node)
jeeserver	Valid values are wls and wbs
jeeservername	J2EE server name (full name)



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## Infrastructure Content Pack

### **This appendix includes:**

#### Reference

- ▶ [Infrastructure Content Pack](#) on page 653

### **Infrastructure Content Pack**

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**Note:** You can use the Infrastructure Content Pack with Smart Plug-ins for Infrastructure 1.60 suite that includes: Smart Plug-ins for Virtualization Infrastructure 1.60, Smart Plug-ins for Systems Infrastructure 1.60, and Smart Plug-ins for Cluster Infrastructure 1.60.

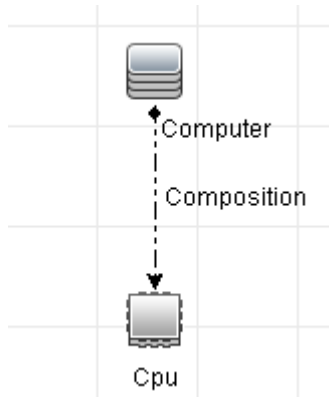
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The Infrastructure Content Pack contains the following artifacts.

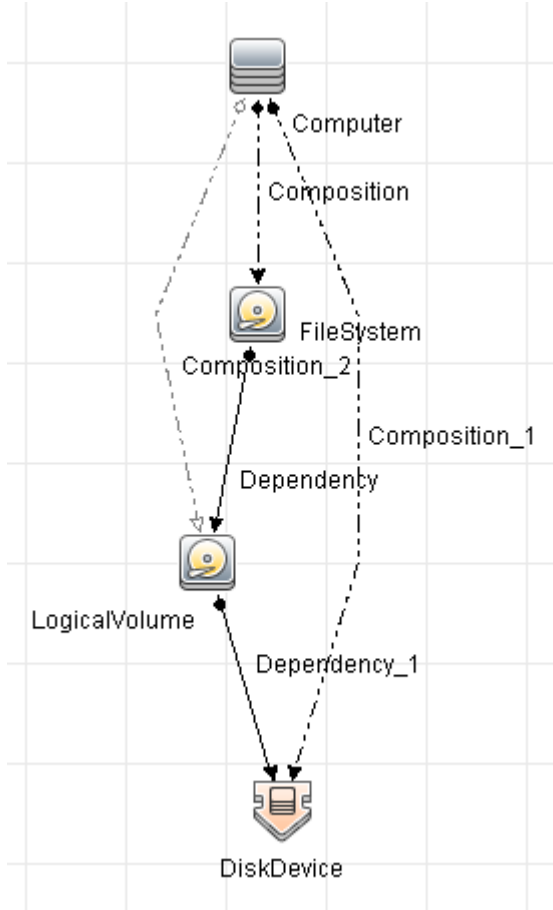
### **ODB Views**

The ODB package in the Infrastructure Content Pack contains the following views:

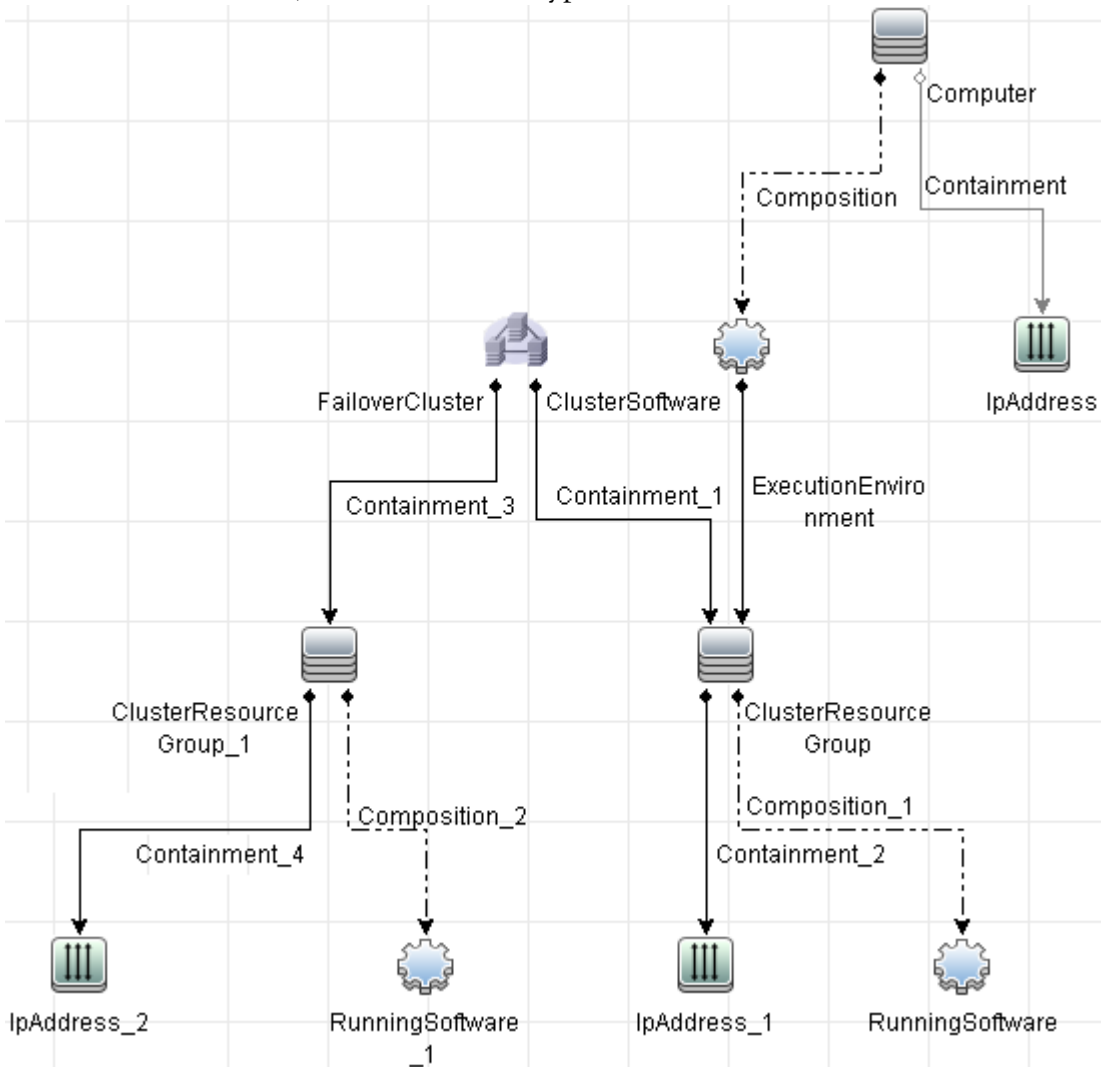
- ▶ **CPU\_Infrastructure:** This view refers to the CPU and Computer CI types.



- **Filesystem\_Infrastructure:** This view refers to the File System and Computer CI types.

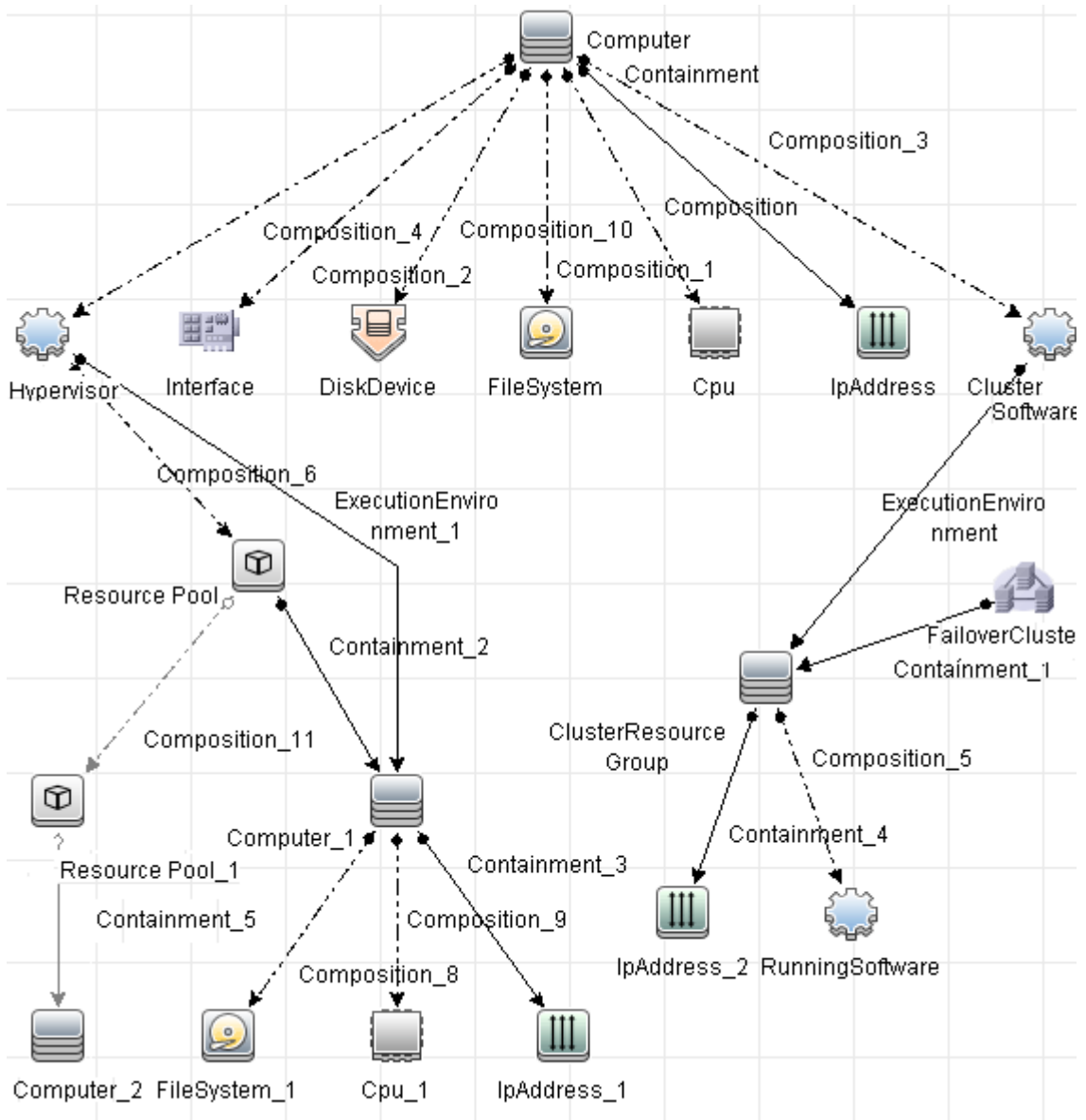


- **HACluster\_Infrastructure:** This view refers to the Computer (Windows or UNIX), Cluster Software, Clustered Server, Failover Cluster, Software Element, and IP Address CI types.

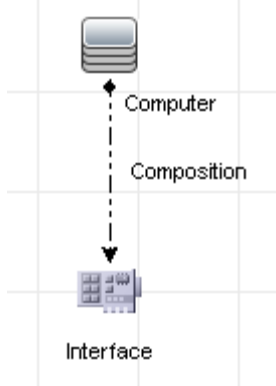




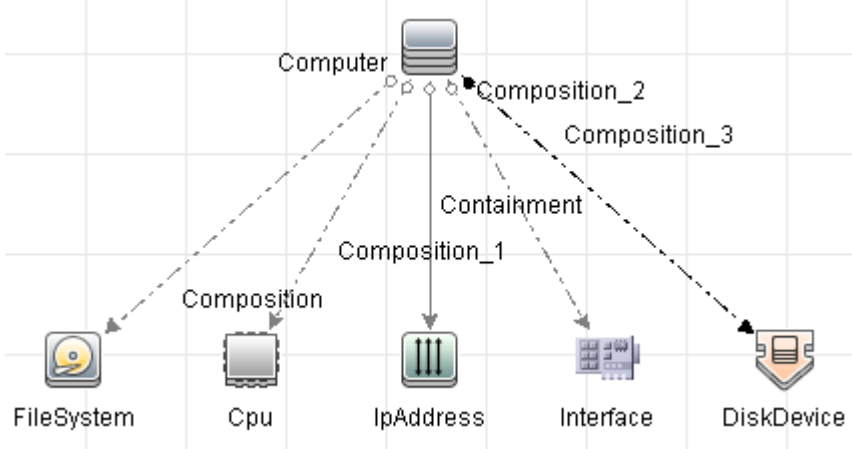
- **Infrastructure\_Common:** This view represents a combined view for the HACluster\_Infrastructure, Systems\_Infrastructure, and Virtualization\_Infrastructure views.



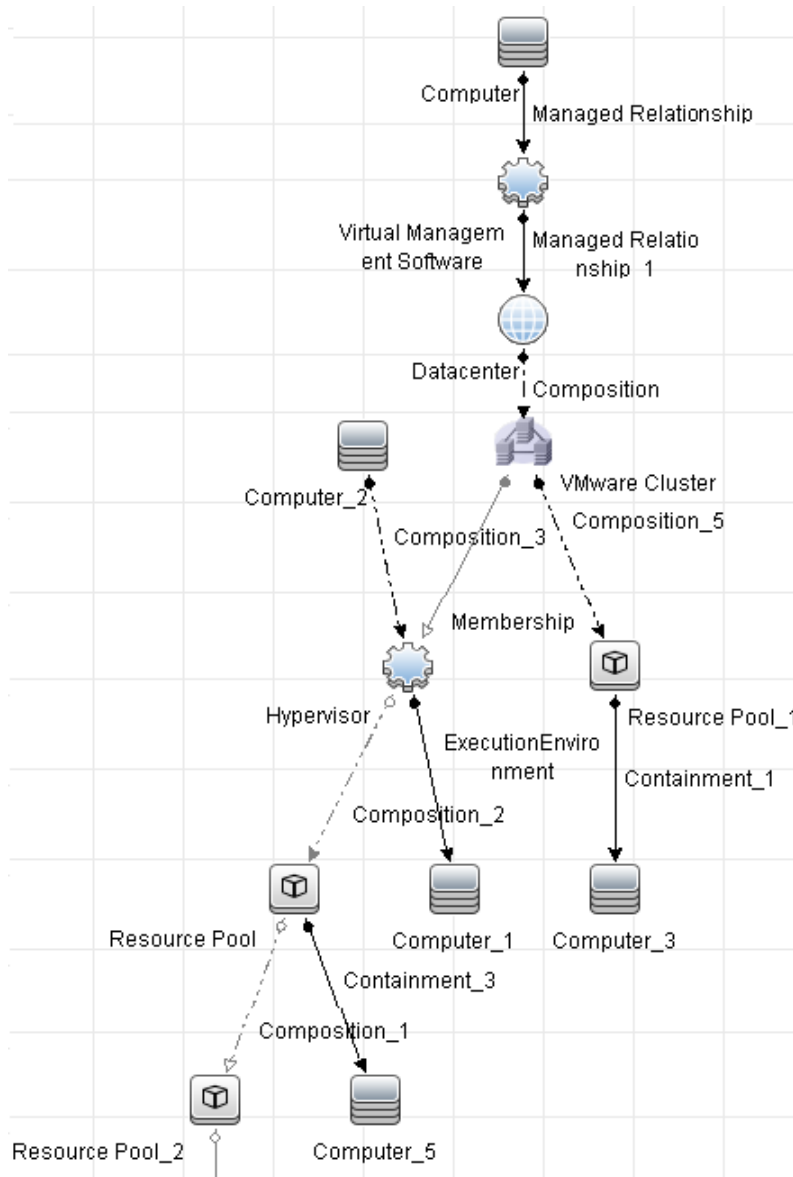
- ▶ **NetworkInterface\_Infrastructure:** This view refers to the Network Interface and Computer CI types.



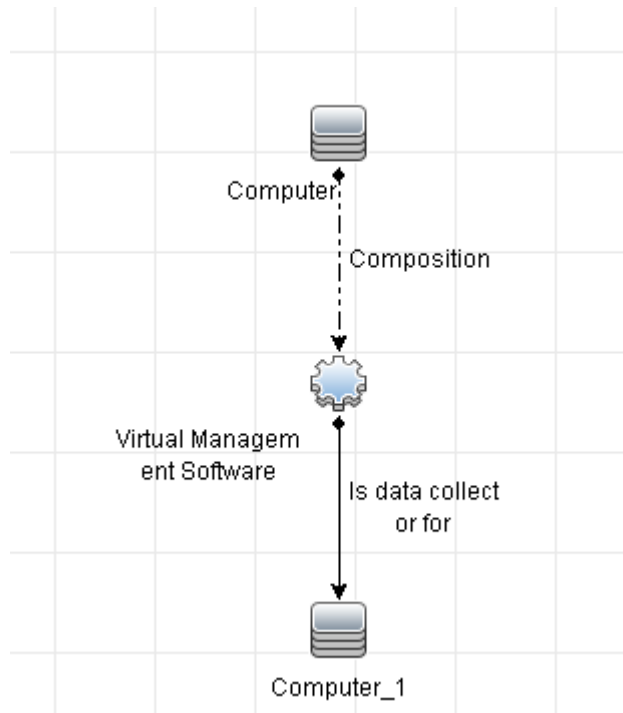
- ▶ **Systems\_Infrastructure:** This view refers to the Computer (Windows or UNIX), CPU, File System, Network Interface, and IP Address CI types. The following image shows the relationship between the CI types.



- **Virtualization Infrastructure:** This view refers to the Computer and Hypervisor CI types. The following image shows the relationship between the CI types.



► vMA\_Infrastructure:



## Health Indicators

The content pack includes the following Health Indicators (HIs) to monitor Infrastructure-related events:

CI Type	HI	Description	Value
Layer2Connection	L2ConnectionStatus	This incident indicates that both (or all) ends of a connection are not responding to SNMP queries.	Unavailable, Available (default)
VMware Cluster	DRSStatus		Enabled (default), Disabled
Node	Ping Availability	Indicates the Processing System is reachable via ping.	Available (default), Unavailable
Node	NodeStatus	Indicates the current state of the managed node. The states Unknown, Hang, and Suspended apply only to virtual machines.	Up (default), Down, Hang, Maintenance, Suspended, Unknown
Computer	CPU Entitlement UsageLevel	Indicates the percentage of entitlement (CPU cycles allotted) used by a virtual machine. May exceed 100%.	Much Lower Than Normal Higher Than Normal Normal (default) Lower Than Normal Much Higher Than Normal

CI Type	HI	Description	Value
Computer	CPULoad	Indicates if the system is undergoing heavy processing load.	Normal (default), Bottlenecked, Overloaded, Busy, Constrained
Computer	CPURunQueue	Indicates the load on the processor job queue.	Normal (default), Overloaded, Much Lower Than Normal Higher Than Normal Lower Than Normal Much Higher Than Normal
Computer	HostDisk Utilization	Indicates the utilization level for disks.	Normal (default), Much Lower Than Normal, Higher Than Normal, Lower Than Normal, Much Higher Than Normal
Computer	InterfaceError Rate	Indicates the input error rate based on the reported change in the number of input packets and the packet error count on the interface.	High, Normal (default)

CI Type	HI	Description	Value
Computer	Interface Utilization	Indicates the network utilization based on interface speed, and the change in number of output bytes on the interface. The queried MIB (Management Information Bases) values can vary depending on the speed of the interface and whether the system supports high speed counters for the interface.	Normal (default), HigherThanNormal, MuchHigherThanNormal, MuchLowerThanNormal, LowerThanNormal, High, Low, none
Computer	Interface DiscardRate	Indicates the output discard rate based on the change in the number of output packets on the interface and the discarded packet count. Packets may be discarded due to issues like buffer overflows, congestion, or system specific issues.	Normal (default), High

CI Type	HI	Description	Value
Computer	MemoryLoad	Indicates the memory pressure on a computer - high memory utilization and pressure to obtain more memory via paging. If left unattended the system may reach point of excessive paging and an unstable state.	Normal (default), Paging, Starving for Memory, Bottleneck
Computer	MemoryUsageLevel	Indicates the memory usage level for the system.	Normal (default), MuchLowerThanNormal, MuchHigherThanNormal, LowerThanNormal, HigherThanNormal, NearCapacity, Low
Computer	NetworkFileShareUsageLevel	Indicates the usage level for network file shares - MS Windows Network Drives (mounts) and NFS, CIFS mounts.	Normal (default), Near Capacity
Computer	PageFile_UsageWIN	Indicates how much of the paging file capacity is utilized on a Window.	Normal (default), High, Near Capacity



CI Type	HI	Description	Value
Computer	VirtualizationOverhead	Indicates the additional memory used by the VMware ESX/ESXi server to store the runtime information for virtual machines. Typically there is little variation in the value. The variation depends on size of the memory and the operating system running on the virtual machine.	Normal (default), MuchLowerThanNormal, MuchHigherThanNormal, LowerThanNormal, HigherThanNormal
Computer	ResourceUsage	Indicates the system resource (CPU and memory) used by the processes and services running on the system.	Normal (default), High

CI Type	HI	Description	Value
Computer	Root_disk_Usage_level	Indicates the disk usage on primary (root) disk on system. This would refer to space utilization on root (/) filesystem on UNIX and Linux systems. This would refer to C: or whatever is defined via SystemDrive setting on Windows systems.	Normal (default), High
Computer	SwapUsage Level	Indicates the swap space usage level on the system.	Normal (default), NearCapacity, MuchHigherThanNormal, MuchLowerThanNormal, HigherThanNormal, LowerThanNormal
Computer	KernelHandlesUsage	Indicates capacity utilization by the kernel handles such as file handles, process handles, semaphores, and message queues.	Normal (default), NearCapacity

CI Type	HI	Description	Value
Computer	BatchJob Service	Indicates the availability of the batch job services on the system such as Schedule Task Service on MS Windows, and Cron services on UNIX/ Linux.	Available (default), Unavailable
Computer	EventLogging Service	Indicates the availability of event logging services on the system such as event log service on MS Windows, and syslog services on UNIX/ Linux.	Available (default), Unavailable
Computer	PrintService	Indicates the status of print services on the system such as the print spooler service on MS Windows, print server role services on windows 2008, and lp and cupsd services on UNIX/ Linux.	Available (default), Unavailable

CI Type	HI	Description	Value
Computer	FileServer Service	Indicates the status of the file server services on the system such as FileServer role services on MS Windows, and NFS server and CIFS server services on UNIX/ Linux.	Available (default), Unavailable
Computer	EmailService	Indicates the status of E-Mail service on the system such as SMTP service on MS Windows, and sendmail, delivermail services on UNIX/ Linux.	Available (default), Unavailable
Computer	WebServer Service	Indicates the status of web server services on system such as IIS services on MS Windows, and Apache service on Linux/ UNIX.	Available (default), Unavailable
Computer	RPCService	Indicates the availability of the RPC service on the system.	Available (default), Unavailable

CI Type	HI	Description	Value
Computer	FirewallService	Indicates the status of firewall service on the system such as Windows Firewall service on MS Windows and iptables service on Linux.	Available (default), Unavailable
Computer	DNSService	Indicates the status of DNS (Domain Nameserver) service on the system.	Available (default), Unavailable
Computer	FTPService	Indicates the state of FTP services on the system. FTP protocol is used for transferring files between systems.	Available (default), Unavailable
Computer	DHCPService	Indicates the status of DHCP Server Service on the DHCP server system.	Available (default), Unavailable
Computer	SecureLogin Service	Indicates the availability of SSH (Secure Shell) service on the system.	Available (default), Unavailable
Unix	Filesystem Usage	Indicates the file system usage on the UNIX system.	Normal (default), High

CI Type	HI	Description	Value
Unix	SwapSpace Available	Indicates the swap space available on the system.	Normal (default), Depleted, Near Capacity
Windows	LogicalDisk FreeSpaceWIN	Indicates the degree of logical free disk space on the system.	Normal (default), Near Capacity
Windows	TerminalServerService	Indicates the status of services for Windows Terminal Server on the MS Windows system.	Available (default), Unavailable
ClusterResourceGroup	Cluster Resource Group Status	Indicates the status of the resource group in a failover cluster.	Online (default) Failed, Offline, Reached SPOF condition
CPU	CPUUsage Level	Indicates the CPU usage level.	Normal (default), Idle, Busy, Spike, MuchHigherThanNormal, MuchLowerThanNormal, HigherThanNormal, LowerThanNormal, High
File System	DiskUsage Level	Indicates the disk usage level.	Normal (default), NearCapacity, Low

CI Type	HI	Description	Value
Disk Device	DiskUtilization	Indicates the disk utilization level.	Normal (default), MuchHigherThanNormal, MuchLowerThanNormal, HigherThanNormal, LowerThanNormal
Disk Device	DiskService Time	Indicates the average of disk I/O service time.	Normal (default), MuchHigherThanNormal, MuchLowerThanNormal, HigherThanNormal, LowerThanNormal
Interface	InterfaceError Rate	Indicates the input error rate based on the change in the number of input packets on the interface and the packet error count.	Normal (default), High

CI Type	HI	Description	Value
Interface	Interface Utilization	Indicates the network utilization based on the interface speed, and the change in the number of output bytes on the interface. The queried MIB (Management Information Base) values vary based on the speed of the interface and whether the system supports high speed counters for interface.	Normal (default), LowerThanNormal, MuchLowerThanNormal, High, HigherThanNormal, MuchHigherThanNormal, Low, None
Interface	Interface DiscardRate	Indicates the output discard rate based on the change in the number of output packets on the interface and the discarded packet count. Packets may be discarded due to reasons such as receive buffer overflows, congestion, or system specific issues.	Normal (default), High



CI Type	HI	Description	Value
Interface	Interface Communication Status	Indicates the availability status of the interface.	Available (default), Unavailable
IpAddress	AddressStatus	Indicates the availability status of the IpAddress.	Available (default), Unavailable
Cluster Software	Cluster Software Service	Indicates the availability status of the Cluster Service.	Available (default), Unavailable
Failover Cluster	Cluster Strength	Indicates the cluster availability status based on node strength.	QuorumMet (default), NotAllNodesDown, RedundantOkay, QuorumNotMet, SPOF, AllNodesDown
VMware ESX Server	VMFSUsage Level	Indicates the usage level of the VMFS (Virtual Machine File System). VMFS is a clustered file system that is used by the VMware host systems to store virtual machines and virtual disk files.	Normal (default), NearCapacity

CI Type	HI	Description	Value
VMware ESX Server	VMwareHost NetworkUsage	Data on all network interfaces, received at or dispatched from the VMware ESX/ESXi Host (in MBs).	Normal (default), MuchHigherThanNormal, MuchLowerThanNormal, HigherThanNormal, LowerThanNormal
Hypervisor	Virtualization Service	Indicates the status of virtualization service running on Host such as Hyper-V service running on MS Windows 2008 Server. The service is essential for running of virtual machines.	Available (default), Unavailable

### Event Type Indicators

The Content Pack includes the following Event Type Indicators (ETIs) to monitor Infrastructure-related events:

CI Type	ETI	Description	Value
Computer	Batch Jobs	Indicates when one or more scheduled tasks/cron jobs fail on the system.	Failed
	VMCreation	Indicates when a VM is created.	Occurred
	VMMigration	Indicates when a VM is migrated.	Occurred
	VMRemoval	Indicates when a VM is removed.	Occurred
	VMRename	Indicates when a VM is renamed.	Occurred

## Correlation Rules

The content pack includes the following rules to correlate Infrastructure-related events.

For more information on how the correlation rules work, see the *Operations Manager i Concepts Guide*.

### System::Computer:CPU Load >> CPU Usage Level

<b>Description:</b> CPU usage of one or more CPUs on the system is high as the system is in a CPU bottleneck.		
Cause		
CIT: Computer	ETI: CPU Load	Value: Bottlenecked
Symptom		
CIT: CPU	ETI: CPU Usage Level	Value: High/ Much higher Than Normal/ Spike

### System::Computer:Memory Load >> CPU Load

<b>Description:</b> CPU bottleneck caused by paging		
Cause		
CIT: Computer	ETI: Memory Load	Value: Paging
Symptom		
CIT: Computer	ETI: CPU Load	Value: Bottlenecked

### System::Computer:Memory Load >> Memory Usage Level

<b>Description:</b> Memory usage on system is high as the system is in a memory bottleneck		
Cause		
CIT: Computer	ETI: Memory Load	Value: Paging

<b>Description:</b> Memory usage on system is high as the system is in a memory bottleneck		
Symptom		
CIT: Computer	ETI: Memory Usage Level	Value: Much Higher Than Normal/ Near Capacity

**System::Computer:Memory Usage Level >> Swap Usage Level**

<b>Description:</b> High memory usage results in swapping		
Cause		
CIT: Computer	ETI: Memory Usage Level	Value: Near Capacity
Symptom		
CI: Computer	ETI: Swap Usage Level	Value: Much Higher Than Normal/ Near Capacity

**System Down >> System Applications Down**

<b>Description:</b> Services or applications are unavailable as the system is down		
Cause		
CIT: Computer	ETI: Node Status	Value: Down/ Suspended
Symptom		
CI: Computer	ETI:	Value:
	Batch Jobs	Job Failed
	E-Mail Service	Unavailable
	Event Logging Service	Unavailable
	Firewall Service	Unavailable
	Ping Availability	Unavailable
	Print Services	Unavailable

**System::Computer:Resource Usage >> CPU Usage Level**

<b>Description:</b> Process using high amount of cpu on system causing system cpu usage high		
Cause		
CIT: Computer	ETI: Resource Usage	Value: High
Symptom		
CIT: CPU	ETI: CPU Usage Level	Value: High/ Much Higher Than Normal/ Spike

**System::Computer:Resource Usage >> Memory Usage Level**

<b>Description:</b> Process using high amount of memory on system causing system memory usage high		
Cause		
CIT: Computer	ETI: Resource Usage	Value: High
Symptom		
CIT: Computer	ETI: Memory Usage Level	Value: Higher Than Normal/ Much Higher Than Normal/ Near Capacity

**System::File System:Disk Usage Level >> Swap Usage Level**

<b>Description:</b> Swap usage caused by system drive full		
Cause		
CIT: FileSystem	ETI: Disk Usage Level	Value: Near Capacity

<b>Description:</b> Swap usage caused by system drive full		
Symptom		
CIT: Computer	ETI: Swap Usage Level	Value: Higher Than Normal/ Much Higher Than Normal/ Near Capacity

**Virtual::Computer:Memory Usage Level >> Hypervisor Memory Usage Level**

<b>Description:</b> Hypervisor is constrained by high memory usage done by VM		
Cause		
CIT: Computer	ETI: Memory Usage Level	Value: Much Higher Than Normal
Symptom		
CIT: Computer	ETI: Memory Usage Level	Value: Much Higher Than Normal/ Near Capacity

**Virtual::Computer::CPU Usage >> Hypervisor System CPU Load**

<b>Description:</b> A VM using high amount of physical CPU cycles on the hypervisor can cause bottleneck in Hypervisor.		
Cause		
CIT: Computer	ETI: CPU Load	Value: Bottlenecked/ Busy/ Overloaded
Symptom		
CIT: Computer	ETI: CPU Load	Value: Bottlenecked/ Busy/ Overloaded

**Hypervisor::Ping Availability >> VM::Ping Availability**

<b>Description:</b> VMs are unavailable as the hypervisor host running the VMs is down		
Cause		
CIT: Computer	ETI: Ping Availability	Value: Unavailable
Symptom		
CIT: Computer	ETI: Ping Availability	Value: Unavailable

**Cluster Software Service Unavailable >> Clustered Server Offline**

<b>Description:</b> Cluster software Services on cluster systems failing to run causes clustered servers (resource groups) to be inactive		
Cause		
CIT: ClusterSoftware	ETI: Cluster Software Service	Value: Unavailable
Symptom		
CIT: ClusterResourceGroup	ETI: Cluster Resource Group Status	Value: Offline

**Cluster Nodes Down >> Cluster Resource Group Impacted**

<b>Description:</b> When 1 or more cluster nodes are down, clustered servers (resource groups) running in failover mode on these nodes are impacted		
Cause		
CIT: Computer	ETI: Node Status	Value: Down/ Hang/ Suspended/ Unknown
Symptom		
CIT: ClusterResourceGroup	ETI: Cluster Resource Group Status	Value: Offline

**Cluster Members Down >> FailoverCluster Impacted (many symptoms)**

<b>Description:</b> When a few cluster members are unavailable, the cluster is down.		
Cause		
CIT: Computer	ETI: Node Status	Value: Down/ Hang/ Suspended/ Unknown
Symptom		
CIT: FailoverCluster	ETI: Cluster Strength	Value: All Nodes Down/ Quorum Not met/ SPOF

**Cluster Member Down >> Cluster Software Service Down**

<b>Description:</b> When the cluster member is down, the cluster software service on the node is down.		
Cause		
CIT: Computer	ETI: Node Status	Value: Down/ Suspended
Symptom		
CIT: ClusterSoftware	ETI: Cluster Software Service	Value: Unavailable

**Graph Templates**

The content pack includes the Systems Infrastructure and Virtualization Infrastructure graph family, which is mapped to the Computer CI type.



## Systems Infrastructure Graph Templates

Graph Templates for Systems Infrastructure	Metric Name
Configuration Details	GBL_SYSTEM_ID
	GBL_OSNAME
	GBL_OSRELEASE
	GBL_MACHINE_MODEL
	GBL_COLLECTOR
	GBL_NUM_CPU
	GBL_NUM_DISK
	GBL_NUM_NETWORK
	GBL_MEM_PHYS
	GBL_SWAP_SPACE_AVAIL_KB
	TBL_PROC_TABLE_AVAIL
	GBL_LOGGING_TYPES
	GBL_THRESHOLD_CPU
	GBL_THRESHOLD_PROCMEM
	GBL_THRESHOLD_DISK
	GBL_LOGFILE_VERSION
	GBL_MACHINE
	GBL_OSKERNELTYPE_INT
	GBL_MEM_AVAIL
	TBL_BUFFER_CACHE_AVAIL
	GBL_OSVERSION
MEMORY_MEMFREE	
MEMORY_AVAILABLE_MBYTES	

Graph Templates for Systems Infrastructure	Metric Name
Configuration Details	MEMORY_MEMTOTAL
	MEMORY_SWAP_AVAIL
	MEMORY_SWAP_FREE
	Free swap space available
Process Details	PROC_PROC_NAME
	PROC_PROC_CMD
	PROC_PROC_ID
	PROC_CPU_TOTAL_UTIL
	PROC_DISK_PHYS_IO_RATE
	PROC_INTEREST
	PROC_STOP_REASON
	PROC_APP_ID
	PROC_PRI
	PROC_MEM_RES
	PROC_MEM_VIRT
	PROC_CPU_USER_UTIL
	PROC_CPU_SYS_MODE_UTIL
	PROC_PARENT_PROC_ID
	PROC_USER_NAME
	PROC_RUN_TIME
	PROC_INTERVAL_ALIVE
	PROCESS_PID
	PROCESS
	PROCESS_CPU0D37
PROCESS_MEMSIZE	

Graph Templates for Systems Infrastructure	Metric Name
Process Details	PROCESS_USER
	PROCESS_PPID
	PROCESS_OD37_PROCESSOR_TIME
	PROCESS_IO_DATA_OPERATIONS_SEC
	PROCESS_PRIORITY_BASE
	PROCESS_PRIVATE_BYTES
	PROCESS_VIRTUAL_BYTES
	PROCESS_OD37_USER_TIME
	PROCESS_CREATING_PROCESS_ID
	PROCESS_ELAPSED_TIME
CPU Gauges	GBL_CPU_TOTAL_UTIL
CPU Utilization Baseline	GBL_CPU_TOTAL_UTIL
CPU Summary	GBL_CPU_INTERRUPT_UTIL
	GBL_CPU_SYS_MODE_UTIL
	GBL_CPU_USER_MODE_UTIL
	CPU_UTILIZATION_OD37SYS
	CPU_UTILIZATION_OD37USER
	PROCESSOR_OD37_INTERRUPT_TIME

Graph Templates for Systems Infrastructure	Metric Name
Disk Summary	GBL_DISK_UTIL_PEAK
	GBL_FS_SPACE_UTIL_PEAK
	GBL_DISK_PHYS_BYTE_RATE
	GBL_DISK_PHYS_IO_RATE
	GBL_DISK_LOGL_READ_RATE
	BLOCK_DEVICE_ACTIVITY_ROD43W_S
	PHYSICALDISK_DISK_BYTES_SEC
	LOGICALDISK_READS_SEC
Global CPU Forecast	GBL_CPU_TOTAL_UTIL
Global Details	GBL_CPU_TOTAL_UTIL
	GBL_ACTIVE_PROC
	GBL_PRI_QUEUE
	GBL_RUN_QUEUE
	GBL_DISK_UTIL_PEAK
	GBL_DISK_PHYS_IO_RATE
	GBL_DISK_PHYS_BYTE_RATE
	GBL_DISK_LOGL_IO_RATE
	GBL_MEM_CACHE_HIT_PCT
	GBL_MEM_PAGEOUT_RATE
	GBL_MEM_SWAPOUT_RATE
	GBL_MEM_UTIL
	GBL_MEM_USER_UTIL
	GBL_MEM_SYS_AND_CACHE_UTIL
GBL_SWAP_SPACE_UTIL	

Graph Templates for Systems Infrastructure	Metric Name
Global Details	GBL_FS_SPACE_UTIL_PEAK
	GBL_NET_PACKET_RATE
	GBL_NET_IN_PACKET_RATE
	GBL_NET_OUT_PACKET_RATE
	GBL_NFS_CALL_RATE
	GBL_NET_COLLISION_1_MIN_RATE
	GBL_NET_ERROR_1_MIN_RATE
	GBL_SYSCALL_RATE
	GBL_CPU_SYS_MODE_UTIL
	GBL_CPU_USER_MODE_UTIL
	GBL_NUM_USER
	GBL_ALIVE_PROC
	GBL_STARTED_PROC_RATE
	CPU__UTILIZATION_0D37USR
	CPU__UTILIZATION_0D37SYS
	SYSTEM__SWAPPING__AND__SWITCHING__ACTIVITY_SWPOT_S
	SYSTEM__SWAPPING__AND__SWITCHING__ACTIVITY_SWPIN_S
	PAGING__ACTIVITY_PGIN_S
	PAGE0D45OUT__AND__MEMORY__FREEING__ACTIVITIES_PGOUT_S
	5MINAVG
MEMORY_FREEMEM	
MEMORY_PERCENT__USED	
BLOCK__DEVICE__ACTIVITY_R0D43W_S	

Graph Templates for Systems Infrastructure	Metric Name
Global Details	CACHE_COPY_READ_HITS_0D37
	SYSTEM_SYSTEM_CALLS_SEC
	SYSTEM_PROCESSOR_QUEUE_LENGTH
Global History	GBL_CPU_TOTAL_UTIL
	GBL_DISK_UTIL_PEAK
	GBL_SWAP_SPACE_UTIL
	GBL_MEM_UTIL
	GBL_ACTIVE_PROC
Global Run Queue Baseline	GBL_RUN_QUEUE
	SCALLS_S
	5MINAVG
	SYSTEM_PROCESSOR_QUEUE_LENGTH
Memory Summary	GBL_MEM_UTIL
	GBL_MEM_USER_UTIL
	GBL_MEM_SYS_AND_CACHE_UTIL
	GBL_MEM_CACHE_HIT_PCT
	GBL_MEM_QUEUE
	GBL_MEM_SWAPOUT_RATE
	GBL_MEM_PAGEOUT_RATE
	GBL_MEM_PG_SCAN_RATE
	MEMORY_SWAP_FREE
	MEMORY_MEMFREE
	MEMORY_PERCENT_USED
	SYSTEM_SWAPPING_AND_SWITCHING_ACTIVITY_SWPOT_S

Graph Templates for Systems Infrastructure	Metric Name
Memory Summary	CACHE_COPY_READ_HITS_0D37
Multiple Global Forecasts	GBL_CPU_TOTAL_UTIL
	GBL_DISK_UTIL_PEAK
	GBL_SWAP_SPACE_UTIL
	GBL_RUN_QUEUE
	GBL_MEM_PAGEOUT_RATE
	GBL_NET_IN_PACKET_RATE
	GBL_NET_OUT_PACKET_RATE
	GBL_ACTIVE_PROC
	5MINAVG
	SYSTEM_PROCESSOR_QUEUE_LENGTH
Network Summary	GBL_NET_OUT_PACKET_RATE
	GBL_NET_IN_PACKET_RATE
	GBL_NET_ERROR_RATE
Seasonal CPU Forecast	GBL_CPU_TOTAL_UTIL
System Configuration	GBL_SYSTEM_ID
	GBL_MACHINE
	GBL_MACHINE_MODEL
	GBL_CPU_CLOCK
	GBL_OSNAME
	GBL_OSVERSION
	GBL_OSRELEASE
	GBL_MEM_PHYS
	GBL_ACTIVE_CPU

Graph Templates for Systems Infrastructure	Metric Name
System Configuration	GBL_NUM_CPU
	GBL_NUM_DISK
	GBL_NUM_NETWORK
	GBL_COLLECTOR
	GBL_SWAP_SPACE_AVAIL
	GBL_LOGGING_TYPES
	GBL_THRESHOLD_CPU
	GBL_GMTOFFSET
	MEMORY_SWAP_FREE
	MEMORY_MEMTOTAL
CPU Comparison	GBL_CPU_TOTAL_UTIL
Disk Throughput	BYDSK_PHYS_BYTE_RATE
	LOGICALDISK_DISK_BYTES_SEC
Individual Networks	BYNETIF_IN_BYTE_RATE
	BYNETIF_OUT_BYTE_RATE
	BYNETIF_IN_PACKET_RATE
	BYNETIF_OUT_PACKET_RATE
	NETWORK_INTERFACE_IPKTS
	NETWORK_INTERFACE_OPKTS
	NETWORK_INTERFACE_IPACKETS
	NETWORK_INTERFACE_OPACKETS
Individual CPUs	BYCPU_CPU_TOTAL_UTIL
Disk Space	FS_SPACE_UTIL



Graph Templates for Systems Infrastructure	Metric Name
Disk Details	BYDSK_DEVNAME
	BYDSK_PHYS_READ_BYTE_RATE
	BYDSK_PHYS_READ_RATE
	BYDSK_PHYS_WRITE_BYTE_RATE
	BYDSK_PHYS_WRITE_RATE
	BYDSK_UTIL
	BYDSK_REQUEST_QUEUE
	BYDSK_AVG_SERVICE_TIME
	BYDSK_LOGL_READ_RATE
	BYDSK_LOGL_WRITE_RATE
	BYDSK_DIRNAME
	BYDSK_ID
	PHYSICALDISK_DISK__READS_SEC
	PHYSICALDISK_DISK__WRITES_SEC
Filesystem Details	FS_DIRNAME
	FS_SPACE_UTIL
	FS_MAX_SIZE
	FS_SPACE_USED
	FS_SPACE_RESERVED
	FS_TYPE
	FS_DEVNAME
	FS_DEVNO
	FS_INODE_UTIL
	FS_MAX_INODES

Graph Templates for Systems Infrastructure	Metric Name
Filesystem Details	FS_BLOCK_SIZE
	FS_FRAG_SIZE
	FS_BLOCK_SIZE
	FS_FRAG_SIZE
	FILESYSTEMS_KBYTES
	FILESYSTEMS_10240D45BLOCKS
	FILESYSTEMS_USED
	FILESYSTEMS_AVAIL
	FILESYSTEMS_FILESYSTEM
CPU Details	BYCPU_ID
	BYCPU_CPU_SYS_MODE_UTIL
	BYCPU_CPU_USER_MODE_UTIL
	BYCPU_CSWITCH_RATE
	BYCPU_INTERRUPT_RATE
	BYCPU_STATE
	BYCPU_CPU_CLOCK
	BYCPU_CPU_TOTAL_UTIL
	PROCESSOR_SYSTEM
	PROCESSOR_USER
	PROCESSOR_SYSEXEC
	PROCESSOR__INFO_CPU__MHZ
	CPU__UTILIZATION_0D37SYS
	CPU__UTILIZATION_0D37USR

Graph Templates for Systems Infrastructure	Metric Name
Network Interface Details	BYNETIF_NAME
	BYNETIF_IN_BYTE_RATE
	BYNETIF_IN_PACKET_RATE
	BYNETIF_OUT_BYTE_RATE
	BYNETIF_OUT_PACKET_RATE
	BYNETIF_QUEUE
	BYNETIF_COLLISION_RATE
	BYNETIF_ERROR_RATE
	NETWORK__INTERFACE
	NETWORK__INTERFACE_RECEIVEBYTES
	NETWORK__INTERFACE_RBYTES
	NETWORK__INTERFACE_IPACKETS
	NETWORK__INTERFACE_PACKETS__RECEIVED__SEC
	NETWORK__INTERFACE_TRANSMITBYTES
	NETWORK__INTERFACE_RBYTES
	NETWORK__INTERFACE_OPACKETS
	NETWORK__INTERFACE_PACKETS__SENT__SEC
	NETWORK__INTERFACE_COLLIS
	NETWORK__INTERFACE_COLLISIONS
	NETWORK__INTERFACE_ERRS
	NETWORK__STATS
	NETWORK__STATS_IPKTS
NETWORK__STATS_OPKTS	
NETWORK__STATS_COLL	

## Virtualization Infrastructure Graph Templates

Graph Templates for Virtualization Infrastructure	Metric Name
Virtualization Configurations	GBL_SYSTEM_ID
	GBL_OSNAME
	GBL_OSVERSION
	GBL_OSRELEASE
	GBL_LS_TYPE
	GBL_LS_ROLE
	GBL_NUM_LS
	GBL_NUM_CPU
	GBL_SYSTEM_ID
	GBL_OSNAME
	GBL_OSVERSION
	GBL_OSRELEASE
	GBL_LS_TYPE
	GBL_LS_ROLE
	GBL_NUM_LS
	GBL_NUM_CPU
	BYLS_LS_ID
	BYLS_LS_NAME
	BYLS_NUM_CPU
	BYLS_NUM_NETIF
BYLS_NUM_DISK	
BYLS_LS_OSTYPE	

Graph Templates for Virtualization Infrastructure	Metric Name
Virtualization Configurations	BYLS_CPU_ENTL_MIN
	BYLS_CPU_ENTL_MAX
	BYLS_MEM_ENTL_MIN
	BYLS_MEM_ENTL_MAX
CPU Entitlement by Logical Systems	BYLS_CPU_ENTL_MIN
	BYLS_CPU_ENTL_MAX
	VMWARE_GUARANTEED0D46SUMMATION0D910D93
Percentage Utilization of CPU Entitlement by Logical Systems	BYLS_CPU_ENTL_UTIL
Percentage Utilization of Total Physical CPU by Logical Systems	BYLS_CPU_PHYS_TOTAL_UTIL
	VMWARE_USAGE0D46AVERAGE0D910D93
CPU Details of Logical System	GBL_CPU_ENTL_UTIL
	GBL_CPU_PHYS_USER_MODE_UTIL
	GBL_CPU_PHYS_SYS_MODE_UTIL
	GBL_CPU_PHYS_TOTAL_UTIL
	GBL_CPU_SHARES_PRIO
	GBL_CPU_ENTL_UTIL
	GBL_CPU_PHYS_USER_MODE_UTIL
	GBL_CPU_PHYS_SYS_MODE_UTIL
	GBL_CPU_PHYS_TOTAL_UTIL
	GBL_CPU_SHARES_PRIO
	CPU__UTILIZATION_0D37SYS
	CPU__UTILIZATION_0D37USR

Graph Templates for Virtualization Infrastructure	Metric Name
CPU Summary by Logical Systems	BYLS_LS_ID
	BYLS_CPU_ENTL_UTIL
	BYLS_CPU_USER_MODE_UTIL
	BYLS_CPU_SYS_MODE_UTIL
	BYLS_CPU_PHYS_TOTAL_UTIL
	BYLS_CPU_SHARES_PRIO
	VMWARE_USAGE0D46AVERAGE0D910D93
	VMWARE_READY0D46SUMMATION0D910D93
	VMWARE_EXTRA0D46SUMMATION0D910D93
Percentage Utilization of Memory Entitlement by Logical Systems	BYLS_MEM_ENTL_UTIL
Memory Summary by Logical Systems	BYLS_LS_ID
	BYLS_MEM_ENTL_UTIL
	BYLS_MEM_PHYS_UTIL
	BYLS_MEM_SWAPPED
	BYLS_MEM_OVERHEAD
	BYLS_MEM_SHARES_PRIO
	VMWARE_ACTIVE0D46AVERAGE0D910D93
	VMWARE_USAGE0D46AVERAGE0D910D93
	VMWARE_SWAPPED0D46AVERAGE0D910D93
	VMWARE_OVERHEAD0D46AVERAGE0D910D93
CPU Entitlement Utilization Baseline	BYLS_CPU_ENTL_UTIL
VMware ESX/ESXi Host Memory Utilization	BYLS_MEM_PHYS_UTIL
	VMWARE_USAGE0D46AVERAGE0D910D93

Graph Templates for Virtualization Infrastructure	Metric Name
VMware ESX/ESXi Host Memory Utilization Baseline	BYLS_MEM_PHYS_UTIL
	VMWARE_USAGE0D46AVERAGE0D910D93
VMware ESX/ESXi Host Disk Utilization	BYLS_DISK_UTIL
	VMWARE_USAGE0D46AVERAGE0D910D93
	VMWARE_READ0D46AVERAGE0D910D93
	VMWARE_WRITE0D46AVERAGE0D910D93
VMware ESX/ESXi Host - Network MB	BYLS_NET_IN_BYTE
	BYLS_NET_OUT_BYTE
	VMWARE_USAGE0D46AVERAGE0D910D93
VMware ESX/ESXi - CPU Utilization across Resource Pools	BYLS_CPU_PHYS_TOTAL_UTIL
	VMWARE_USAGE0D46AVERAGE0D910D93

## Policies Setting HIs/ETIs

The following table lists the content pack HIs/ETIs and SPI policies that set the HIs/ETIs.

HI/ETI	Policy Name	Policy Description
L2Connection Status	-	-
DRSStatus	VI-VMwareDRS Event	The policy monitors the log file /var/opt/OV/tmp/vispi/vmeventlist.log and alerts in case of any occurrence of DRS related events.
PingAvailability	-	-

HI/ETI	Policy Name	Policy Description
NodeStatus	VI-StateMonitor	The policy monitors and reports the state of the host servers and the guest virtual machines configured on them.
	VI-VMwareDRS Event	The policy monitors the log file / var/opt/OV/tmp/vispi/vmeventlist.log and alerts in case of any occurrence of DRS related events.
	VI-VMwareVM Powered OnOffEvent	The policy monitors the log file / var/opt/OV/tmp/vispi/vmeventlist.log and alerts whenever a VM is powered on or powered off.
CPULoad	SI-CPUBottleneck Diagnosis	The policy detects CPU bottlenecks like exceeding the thresholds for CPU utilization percentage, processor queue length, total number of CPU on the system, and operating systems.
	VI-HostCPU Utilization Monitor	The policy monitors CPU utilization along with ready utilization on the host machine and sends an alert in case of any violation.
	VI-VMCpu Entitlement UtilizationMonitor -AT	The policy calculates (as a percentage) the current CPU utilization and compares it to the minimum CPU entitlement utilization of virtual machines. The policy uses automatic threshold determination to automatically calculate threshold values according to the memory utilization of the virtual machines on previous days.



HI/ETI	Policy Name	Policy Description
CPUUsageLevel	SI-CPUSpikeCheck	The policy monitors CPU spikes per CPU busy time in system mode, per CPU busy time in user mode, and total busy time per CPU. A system experiences CPU spike when there is a sharp rise in the CPU usage immediately followed by a decrease in usage.
	SI-PerCPU Utilization-AT	The policy monitors the utilization for each CPU on the managed node. This policy processes each CPU instance separately for every interval. The policy uses automatic threshold determination to automatically calculate the threshold values according to the CPU utilization on previous days.
DiskUsageLevel	SI-DiskCapacity Monitor	The policy monitors capacity parameters of the disks on the managed node. For each disk, the policy checks for space utilization and free space available. It also checks for inode utilization on the Linux nodes. In case the free space availability, space utilization, or inode utilization exceeds the threshold values specified, the policy sends out an alert to the HPOM console.
InterfaceError Rate	SI-NetworkUsage AndPerformance	The policy monitors the system's network usage and shows error rates and collisions to identify potential network bottlenecks.

HI/ETI	Policy Name	Policy Description
Interface Utilization	SI-NetworkUsage AndPerformance	The policy monitors the system's network usage and shows error rates and collisions to identify potential network bottlenecks.
	SI-PerNetifInbyte Baseline-AT	The policy monitors the incoming bytes on each network interface on the managed node individually for every interval. The policy uses the automatic threshold determination to automatically calculate the threshold values according to the network interface inbyte rate on previous days.
	SI-PerNetifOutbyte Baseline-AT	The policy monitors the network interface outbyte rate each network interface on the managed node individually for every interval. The policy uses automatic threshold determination to automatically calculate the threshold values according to the network interface outbyte rate on previous days.
InterfaceDiscard Rate	SI-NetworkUsage AndPerformance	This policy monitors the system's network usage and shows error rates and collisions to identify potential network bottlenecks.

HI/ETI	Policy Name	Policy Description
MemoryUsage Level	SI-Memory Utilization-AT	The policy monitors the overall memory usage by operating systems. The policy uses the automatic threshold determination to automatically calculate the threshold values according to the memory usage on previous days.
	VI-VMwareHostMemoryHealth Monitor	The policy monitors the health of the host machines on VMware vMA in terms of memory utilization. It can be used to monitor the availability or utilization of the memory on the host machine.
	VI-VMwareVMMemoryUsage-AT	The policy monitors how much memory is being used by the guest virtual machines and resource pools in MBs. The policy uses a multi-instance baseline for monitoring the memory usage for virtual machines and resource pools. It uses automatic threshold determination to automatically calculate the threshold values.
Virtualization Overhead	VI-VMMemory OverheadMonitor-AT	The policy monitors the memory overhead on the VM.

HI/ETI	Policy Name	Policy Description
ResourceUsage	SI-JavaProcessCPU UsageTracker	The policy monitors the CPU usage for the Java process running on your system.
	SI-JavaProcess MemoryUsage Tracker	The policy monitors memory usage for Java process running on your system.
	SI-MSWindowsSvc hostCPUUsage Tracker	The policy monitors the CPU usage for the svchost processes running on your system.
	SI-MSWindowsSvc hostMemoryUsage Tracker	The policy monitors the memory usage for the svchost processes running on your system.

HI/ETI	Policy Name	Policy Description
MemoryLoad	SI-Memory Bottleneck Diagnosis	<p>The policy monitors the physical memory utilization and the bottlenecks. The policy first checks for memory bottleneck threshold violations, if the condition is not met it checks for memory usage threshold violations. If both conditions for memory bottleneck and memory usage, are not met, the policy checks for free page table condition.</p> <p>By default the free page table thresholds contain Microsoft recommended values on the Windows systems. In case of violation of multiple threshold values indicating a high utilization, the policy sends a message to the HPOM console with appropriate message attributes. The message also displays a list of top 10 memory hogging processes.</p>
	VI-VMwareVM Memory Performance Monitor	<p>The policy monitors the memory performance of the virtual machines. It compares the memory utilized by the virtual machine against the amount of virtual memory entitled to it.</p>

HI/ETI	Policy Name	Policy Description
SwapUsageLevel	SI-SwapCapacity Monitor	The policy monitors the swap space utilization of the system
	SI-SwapUtilization-AT	The policy monitors the overall swap space used by the systems on the managed node. The policy uses the automatic threshold determination to automatically calculate the threshold values according to the swap space usage on previous days.
KernelHandles Usage	SI-KernelTable UsageMonitor	
BatchJobService	SI-LinuxAtdProcess Monitor	The policy monitors availability of the corresponding process and sends out an alert message to HPOM when not available.
	SI-RHELCron ProcessMonitor	The policy monitors availability of the corresponding process and sends out an alert message to HPOM when not available.
	SI-SLESCron ProcessMonitor	The policy monitors availability of the corresponding process and sends out an alert message to HPOM when not available.
EventLogging Service	SI-SLESSyslog ProcessMonitor	The policy monitors availability of the corresponding process and sends out an alert message to HPOM when not available.
	SI-RHELSyslog ProcessMonitor	The policy monitors availability of the corresponding process and sends out an alert message to HPOM when not available.

HI/ETI	Policy Name	Policy Description
PrintService	SI-LinuxCups ProcessMonitor	The policy monitors availability of the corresponding process and sends out an alert message to HPOM when not available.
	SI-MSWindows PrintService RoleMonitor	The policy monitors availability of the corresponding service and sends out an alert message to HPOM when not available.
FileServer Service	SI-MSWindowsFile ServerRoleMonitor	The policy monitors availability of the corresponding process and sends out an alert message to HPOM when not available.
	SI-LinuxSmbServer ProcessMonitor	The policy monitors availability of the corresponding process and sends out an alert message to HPOM when not available.
	SI-LinuxNfsServer ProcessMonitor	The policy monitors availability of the corresponding process and sends out an alert message to HPOM when not available.
EmailService	SI-LinuxSendmail ProcessMonitor	The policy monitors availability of the corresponding process and sends out an alert message to HPOM when not available.
WebServer Service	SI-MSWindows WebServerRole Monitor	The policy monitors availability of the corresponding process and sends out an alert message to HPOM when not available.
RPCService	-	-
FirewallService	-	-
DNSService	-	-
FTPService	-	-

HI/ETI	Policy Name	Policy Description
DHCPService	-	-
SecureLoginService	-	-
BatchJobs (ETI)	-	-
VMRename (ETI)	VI-VMwareRename Event	This policy monitors the log file / var/opt/OV/tmp/vispi/vmeventlist.log and alerts whenever a VM is renamed.
VMCreation (ETI)	VI-VMwareVM CreationRemoval Event	This policy monitors the log file / var/opt/OV/tmp/vispi/vmeventlist.log and alerts whenever a VM is created.
VMRemoval (ETI)	VI-VMwareVM CreationRemoval Event	This policy monitors the log file / var/opt/OV/tmp/vispi/vmeventlist.log and alerts whenever a VM is removed.
VMMigration (ETI)	VI-VMwareDRS Event	The policy monitors the log file / var/opt/OV/tmp/vispi/vmeventlist.log and alerts in case of any occurrence of DRS related events.
FilesystemUsage	-	-
SwapSpace Available	-	-
LogicalDiskFreeSpaceWIN	-	-
TerminalServer Service	-	-



HI/ETI	Policy Name	Policy Description
ClusterResource GroupStatus	CI-ClusterRes GroupMonitor	The policy monitors the state and availability of resource groups in a cluster. Before deploying this policy, make sure you have deployed the CI-ClusterDataCollector policy for cluster data collection.
CPUUsageLevel	SI-CPUSpikeCheck	The policy monitors CPU spikes per CPU busy time in system mode, per CPU busy time in user mode, and total busy time per CPU. A system experiences CPU spike when there is a sharp rise in the CPU usage immediately followed by a decrease in usage.
	SI-PerCPU Utilization-AT	The policy monitors the utilization for each CPU instance separately for every interval. The policy uses automatic threshold determination to automatically calculate the threshold values according to the CPU utilization on previous days.
DiskUsageLevel	SI-DiskCapacity Monitor	The policy monitors capacity parameters of the disks on the managed node. For each disk, the policy checks for space utilization and free space available. It also checks for inode utilization on the Linux nodes. In case the free space availability, space utilization, or inode utilization exceeds the threshold values specified, the policy sends out an alert to the HPOM console.

HI/ETI	Policy Name	Policy Description
DiskUtilization	SI-PerDisk Utilization-AT	The policy monitors utilization for each disk on the managed node. This policy processes each disk instance separately for every interval. The policy uses the automatic threshold determination to automatically calculate the threshold values according to the disk utilization on previous days. This policy requires HP Performance Agent to be running on the managed node.
	VI-VMwareHost DiskUtilization-AT	The policy monitors the duration for which the physical disks are utilized for input/output. The policy uses a multi-instance baseline for monitoring the disk input/output utilization. It uses automatic threshold determination to automatically calculate the threshold values.
InterfaceError Rate	SI-NetworkUsage AndPerformance	The policy monitors the system's network usage and shows error rates and collisions to identify potential network bottlenecks.

HI/ETI	Policy Name	Policy Description
Interface Utilization	SI-NetworkUsage AndPerformance	This policy monitors the system's network usage and shows error rates and collisions to identify potential network bottlenecks.
	SI-PerNetifInbyte Baseline-AT	This policy monitors the incoming bytes on each network interface separately for every interval. The policy uses the automatic threshold determination to automatically calculate the threshold values according to the network interface inbyte rate on previous days.
	SI-PerNetifOutbyte Baseline-AT	This policy monitors the network interface outgoing bytes on each network interface separately for every interval. The policy uses automatic threshold determination to automatically calculate the threshold values according to the network interface outbyte rate on previous days.
InterfaceDiscard Rate	SI-NetworkUsage AndPerformance	This policy monitors the system's network usage and shows error rates and collisions to identify potential network bottlenecks.
Interface Communication Status	-	-
AddressStatus	-	-

HI/ETI	Policy Name	Policy Description
ClusterSoftware Service	CI-LinuxVCS_Process Monitor_data	The policy monitors the state and availability of the Veritas cluster server process on RHEL and SUSE operating systems and sends out an alert in case the process is not running on the managed node.
	CI-MCSGCluster Process Monitor_data	The policy monitors the state and availability of HP MC/ServiceGuard Cluster process on Linux, for RHEL and SLES systems. It monitors the process <i>cmcl</i> d and sends out an alert in case the process is not running on the managed node. The <i>cmcl</i> d process runs on every cluster node and helps to initialize and monitor the health of the cluster.
	CI-MSWindowsCluster ServiceMonitor_data	The policy checks for the state and availability of Microsoft Windows services. It monitors the Microsoft Windows services on the managed cluster nodes and sends out an alert in case the service is unavailable or stopped.
	CI-MSWindowsVCS_Process Monitor_data	The policy monitors the state and availability of the Veritas cluster server process or service on Microsoft Windows systems and sends out an alert in case the monitored process or service is not running on the managed node.
	CI-RHClusterCCSD ProcessMonitor_data	The policy monitors the state and availability of the Red Hat Cluster process on Linux, for RHEL systems. It monitors the process <i>ccsd</i> (Cluster Configuration System Daemon) and sends out an alert in case the process is not running on the managed node

HI/ETI	Policy Name	Policy Description
ClusterStrength	CI-ClusterMonitor	<p>The CI-ClusterMonitor policy monitors the availability and strength of a cluster group. This is helpful to ensure high availability of services running on the cluster servers.</p> <p>Before deploying this policy, make sure you have deployed the CI-ClusterDataCollector policy for cluster data collection.</p>
VMFSUsageLevel	VI-VMwareVMFS UtilizationMonitor	<p>This policy monitors the disk space utilization on the Virtual Machine File System (VMFS) on the vMA system. VMFS represents the data storage volumes on which the VMware guest disk files are stored.</p>
Virtualization Service	VI-MSHyperV HostService Monitor	<p>This policy monitors the availability of services on the host operating system of the Microsoft Hyper-V server.</p>

## Operations Orchestration Flow

The following table list the Operations Orchestration (OO) flows for Infrastructure Content Pack

OO Flows	Description	Flow input	CI Type	CI attribute	Event Attribute
ESX Server health check	Checks the health of memory and performance of CPU for VMware ESX server	omServer ESX Name	vmware_esx_server	name	Originating Server
VM health check	Checks the health of memory and performance of CPU for guest machines (VMs)	omServer VM Name	host_node		
Sanity check for VISPI	Checks the correctness of VISPI installation (VISPI 1.5 or later)	omServer VM Name	unix/nt		

The following are the user input values when you execute OO flow for ESX Server and VM Health Check, and Sanity check for VISPI:

Flow input	CI Type
omServerPort	Port number of the HPOM Tool WS
omServerUser	The user name for the HPOM Server that will use used in the HPOM Tool WS

Flow input	CI Type
omServerPassword	The password for the HPOM Server that will use used in the HPOM Tool WS
omNode	Target node with an HPOM Agent

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## Microsoft Content Packs

### **This appendix includes:**

#### Reference

- ▶ Microsoft Active Directory Server Content Pack on page 711
- ▶ Microsoft Exchange Server 2007 Content Pack on page 748

### **Microsoft Active Directory Server Content Pack**

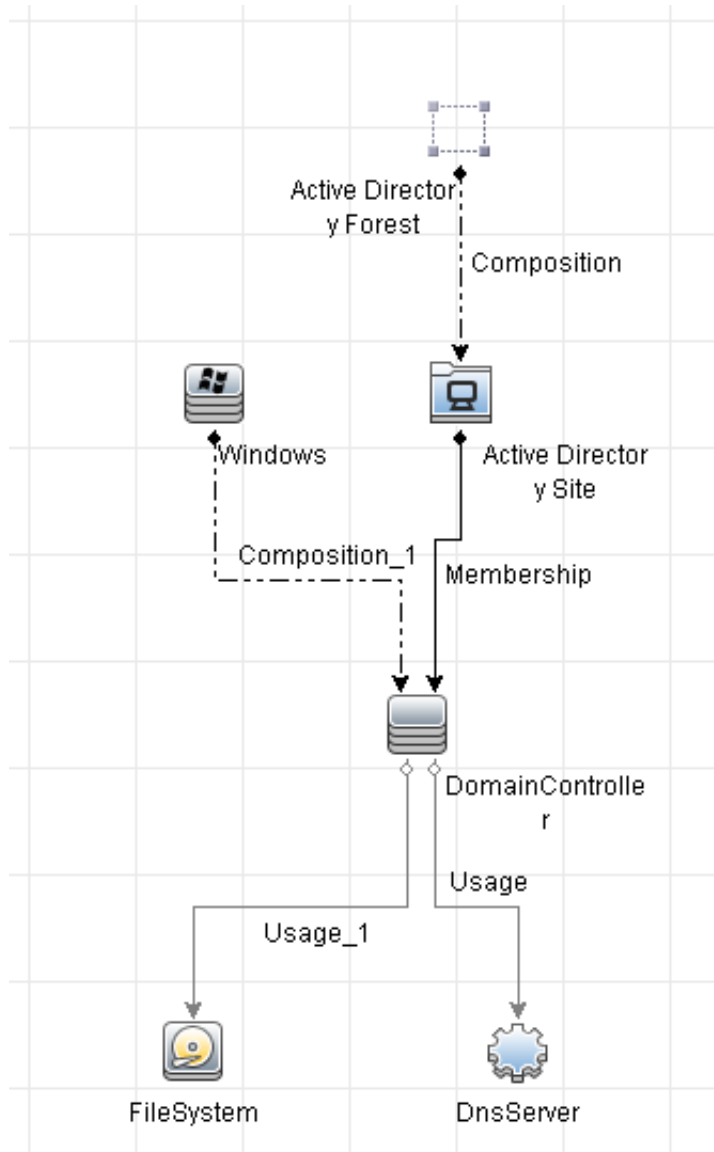
The Microsoft Active Directory Server Content Pack contains the following artifacts.

#### **ODB Views**

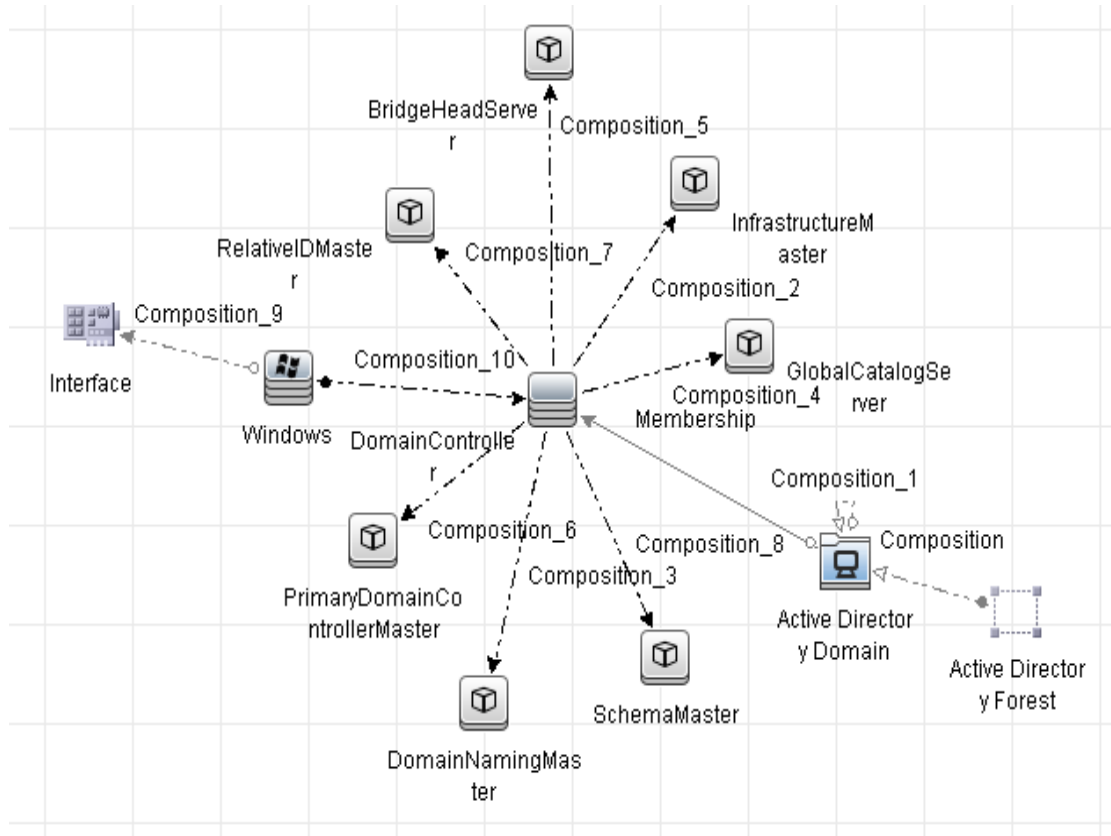
The ODB package in the Microsoft Active Directory Server Content Pack contains the following views:



- ▶ **AD\_Physical\_View:** This view refers to the Active Directory System, Active Directory Site, Domain Controller, DomainNamingMaster, and Computer (Windows) CI types.



- **AD\_Logical\_view:** This view refers to the Active Directory System, Active Directory Forest, Active Directory Domain, Domain Controller, SchemaMaster, DomainNamingMaster, PrimaryDomainControllerMaster, RelativeIDMaster, InfrastructureMaster, BridgeHeadServer, GlobalCatalogServer, and Computer CI types.



## Enrichment Rules

The Microsoft Active Directory Server Content Pack contains the following Enrichment Rules:

- DomainController\_Uses\_DnsServer
- DomainController\_Uses\_Log\_FileSystem

- ▶ DomainController\_Uses\_NTDS\_FileSystem
- ▶ DomainController\_Uses\_SysVol\_FileSystem

## Health Indicators

The content pack includes the following health indicators (HIs) to monitor Active Directory-related events:

CI Type	HI	Description	Value
Domain Controller Role	Response Time	Indicates the ping response time of FSMO roles	Normal, High, Very High
Domain Controller	Access Permissions Errors	Indicates the number of Access Permission Errors on the Domain Controller	Normal, High, Very High
Domain Controller	CName Records Availability	Indicates the availability of CName Records on the DNS Server of the Domain Controller	Found, Not Found
Domain Controller	DC LDAP Bind Response Time	Indicates the response time to bind to LDAP on domain controller	Normal, High, Very High
Domain Controller	DC LDAP Query Response Time	Indicates the response time of a sample LDAP query on domain controller	Normal, High, Very High
Domain Controller	DFRS Service State	Indicates the status of DFRS Service on the Domain Controller	Up, Down
Domain Controller	DIT Disk Queue Length	Indicates the queue length of DIT disk	Normal, High, Very High
Domain Controller	DIT Disk Space Availability	Indicates the availability of free space on DIT disk	Normal, Low, Near Capacity

CI Type	HI	Description	Value
Domain Controller	DIT Log Files Disk Queue Length	Indicates the queue length of DIT Log Files disk	Normal, High, Very High
Domain Controller	DIT Log Files Disk Space Availability	Indicates the availability of free space on DIT Log Files Disk.	Normal, Low, Near Capacity
Domain Controller	DNS Query Response	Indicates the response time of a sample DNS Query on domain controller	Normal, High, Very high
Domain Controller	FRS Status	Indicates the status of File Replication Service	Up, Down
Domain Controller	Host Records Availability	Indicates the availability of Host Records on the DNS Server of the Domain Controller	Found, Not found
Domain Controller	Inbound Object Updates Remaining	Indicates the number of Inbound Object Updates remaining	Normal, High, Very High
Domain Controller	Inter site Replication Latency	Indicates the replication latency of the Domain Controller across AD Sites	Normal, High, Very High
Domain Controller	Intra site Replication Latency	Indicates the Replication Latency of the Domain Controller within the AD Site	Normal, High, Very High
Domain Controller	ISM Service Status	Indicates the status of Intersite Messaging Service	Up, Down
Domain Controller	KDC Service Status	Indicates the status of Kerberos Distribution Centre Service	Up, Down
Domain Controller	Kerberos Authentication Rate	Indicates the rate of Kerberos Authentication on the Domain Controller	Normal, High, Very High

CI Type	HI	Description	Value
Domain Controller	Kerberos SrvRecords Availability	Indicates the availability of Kerberos Server Records on the DNS Server	Found, Not Found
Domain Controller	LDAP Active Threads	Indicates the number of LDAP threads which are active on the Domain Controller	Normal, High, Very High
Domain Controller	LDAP Client Sessions	Indicates the number LDAP Client Sessions on the Domain Controller	Normal, High, Very High
Domain Controller	LDAP SrvRecords Availability	Indicates the availability of LDAP Server Records on the DNS Server of the DomainController	Found, Not Found
Domain Controller	Logon Errors	Indicates the number of Logon Errors on the Domain Controller	Normal, High, Very High
Domain Controller	LSASS Page Faults Rate	Indicates rate of Page Faults for Local Security Authority Subsystem Service	Normal, High, Very High
Domain Controller	LSASS Private Bytes	Indicates the Private Bytes used by Local Security Authority Subsystem Service on the Domain Controller	Normal, High, Very High
Domain Controller	LSASS Processor Time	Indicates the Processor Time used by Local Security Authority Subsystem Service on the Domain Controller	Normal, High, Very High
Domain Controller	LSASS Working Set	Indicates the Working Set of the Local Security Authority Subsystem Service	Normal, High, Very High
Domain Controller	Net Logon Service State	Indicates the status of Net Logon Service on the Domain Controller	Up, Down

CI Type	HI	Description	Value
Domain Controller	Non Transitive Membership Evaluations	Indicates the number of non transitive membership evaluations performed	Normal, High, Very High
Domain Controller	Notify Queue Size	Indicates the size of notify queue	Normal, High, Very High
Domain Controller	NTDS Service State	Indicates the status of NTDS Services on the Domain Controller	Up, Down
Domain Controller	NTFRS Page Faults Rate	Indicates rate of Page Faults for NTFRS process	Normal, High, Very High
Domain Controller	NTFRS Private Bytes	Indicates the Private Bytes used by the File Replication Service	Normal, High, Very High
Domain Controller	NTFRS Processor Time	Indicates the processor time utilized by the File Replication Service on the Domain Controller	Normal, High, Very High
Domain Controller	NTFRS Working Set	Indicates the Working Set of the File Replication Service on the Domain Controller	Normal, High, Very High
Domain Controller	NTLM Authentication Rate	Indicates the rate of NTLM Authentication on the Domain Controller	Normal, High, Very High
Domain Controller	Pending Replication Synchronizations	Indicates the number of pending replication synchronizations	Normal, High, Very High
Domain Controller	SamSs Service State	Indicates the state of Security Accounts Manager Service on the Domain Controller	Up, Down

CI Type	HI	Description	Value
Domain Controller	Security Descriptor Propagator Queue	Indicates the length of Security Descriptor Propagator Queue on the Domain Controller	Normal, High, Very High
Domain Controller	Sysvol Connectivity	Indicates the connectivity to Sysvol folder	Up, Down
Domain Controller	Sysvol Disk Space Availability	Indicates the availability of free space on Sysvol disk	Normal, Low, Near Capacity
Domain Controller	Transitive Membership Evaluations	Indicates the number of Transitive Membership Evaluations performed on the Domain Controller	Normal, High, Very High
Global Catalog	GC LDAP Bind Response Time	Indicates the response time to bind to LDAP on global catalog	Normal, High, Very High
Global Catalog	GC LDAP Query Response Time	Indicates the response time of a sample LDAP Query on Global Catalog	Normal, High, Very High
Global Catalog	GC Replication Latency	Indicates the replication latency on global catalog	Normal, High, Very High
Domain Controller	Directory Read Rate	Indicates the rate of Directory Read	Normal, High, Very High
Domain Controller	Directory Search Rate	Indicates the rate of Directory Search	Normal, High, Very High
Domain Controller	Directory Write Rate	Indicates the rate of Directory Write	Normal, High, Very High
Domain Controller	Inbound Replication Object Rate	Indicates the rate of Inbound Replication Objects	Normal, High, Very High

CI Type	HI	Description	Value
Domain Controller	LDAP Connectivity	Indicates the LDAP Connectivity	Up, Down
Domain Controller	GC Connectivity	Indicates the GC Connectivity	Up, Down
Domain Controller	Outbound Replication Object Rate	Indicates the rate of Outbound Replication Objects	Normal, High, Very High
Domain Controller	Synchronization Failure Rate	Indicates the rate of synchronization failures	Normal, High, Very High
Domain Controller	Sysvol Disk Queue Length	Indicates the length of Sysvol Disk Queue	Normal, High, Very High

## Correlation Rules

The content pack includes the following rules to correlate Active Directory-related events.

For more information on how the correlation rules work, see the *Operations Manager i Concepts Guide*.

### AD::DomainController:CNameRecordsAvailability >> InterSiteReplicationLatency & IntraSiteReplicationLatency

<b>Description:</b> CName Records Availability on the DNS Server of the Domain Controller Impacts Inter and Intra Site Replication Latency		
Cause		
CIT: Domain Controller	ETI: CName Records Availability	Value: Not Found
Symptom 1		
CIT: Domain Controller	ETI: Inter Site Replication Latency	Value: Very High



<b>Description:</b> CName Records Availability on the DNS Server of the Domain Controller Impacts Inter and Intra Site Replication Latency		
Symptom 2		
CIT: Domain Controller	ETI: Intra Site Replication Latency	Value: Very High

**AD::DomainController:DIT Disk Queue Length >> DomainController Performance**

<b>Description:</b> DIT Disk Queue Length Impacts DC Performance		
Cause		
CIT: Domain Controller	ETI: DIT Disk Queue Length	Value: Very High
Symptom 1		
CIT: Domain Controller	ETI: DC LDAP Bind Response Time	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: DC LDAP Query Response Time	Value: Very High
Symptom 3		
CIT: Domain Controller	ETI: Inbound Object Updates Remaining	Value: Very High
Symptom 4		
CIT: Domain Controller	ETI: Pending Replication Synchronizations	Value: Very High

**AD::DomainController:DIT Disk Queue Length >> GlobalCatalog Performance**

<b>Description:</b> DIT Disk Queue Length Impacts GC Performance		
Cause		
CIT: Domain Controller	ETI: DIT Disk Queue Length	Value: Very High

<b>Description:</b> DIT Disk Queue Length Impacts GC Performance		
Symptom 1		
CIT: Global Catalog Server	ETI: GC LDAP Bind Response Time	Value: Very High
Symptom 2		
CIT: Global Catalog Server	ETI: GC LDAP Query Response Time	Value: Very High

### **AD::DomainController:DIT Disk Space Availability >> DIT Disk Queue Length & Inbound Object Updates Remaining**

<b>Description:</b> Available DIT Disk Space Impacts DIT Disk Queue Length and Inbound Object Updates Remaining		
Cause		
CIT: Domain Controller	ETI: DIT Disk Space Availability	Value: Near Capacity
Symptom 1		
CIT: Domain Controller	ETI: DIT Disk Queue Length	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: Inbound Object Updates Remaining	Value: Very High

### **AD::DomainController:DIT Log Files Disk Space Availability >> DIT Log Files Disk Queue Length**

<b>Description:</b> Available Disk Space for DIT Log Files Impact DIT Log Files Disk Queue Length		
Cause		
CIT: Domain Controller	ETI: DIT Log Files Disk Space Availability	Value: Near Capacity
Symptom		
CIT: Domain Controller	ETI: DIT Log Files Disk Queue Length	Value: Very High

**AD::DomainController:FRS Status >> InterSiteReplicationLatency & IntraSiteReplicationLatency**

<b>Description:</b> File Replication Service Status Impacts DC Replication Latency		
Cause		
CIT: Domain Controller	ETI: FRS Status	Value: Down
Symptom 1		
CIT: Domain Controller	ETI: Inter Site Replication Latency	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: Intra Site Replication Latency	Value: Very High

**AD::DomainController:HostRecordsAvailability >> InterSiteReplicationLatency & IntraSiteReplicationLatency**

<b>Description:</b> Host Records Availability on the DNS Server of the Domain Controller Impacts Inter and Intra Site Replication Latency		
Cause		
CIT: Domain Controller	ETI: Host Records Availability	Value: Not Found
Symptom 1		
CIT: Domain Controller	ETI: Inter Site Replication Latency	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: Intra Site Replication Latency	Value: Very High

### AD::DomainController:ISMServiceStatus >> InterSiteReplicationLatency & IntraSiteReplicationLatency

<b>Description:</b> ISM Service Status Impacts Inter and Intra Site Replication Latency on the Domain Controller		
Cause		
CIT: Domain Controller	ETI: ISM Service Status	Value: Down
Symptom 1		
CIT: Domain Controller	ETI: Inter Site Replication Latency	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: Intra Site Replication Latency	Value: Very High

### AD::DomainController:KDCServiceStatus >> InterSiteReplicationLatency & IntraSiteReplicationLatency

<b>Description:</b> KDC Service Status Impacts Inter and Intra Site Replication Latency on the Domain Controller		
Cause		
CIT: Domain Controller	ETI: KDC Service Status	Value: Down
Symptom 1		
CIT: Domain Controller	ETI: Inter Site Replication Latency	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: Intra Site Replication Latency	Value: Very High

**AD::DomainController:KerberosSrvRecordsAvailability >>  
InterSiteReplicationLatency & IntraSiteReplicationLatency**

<b>Description:</b> Kerberos Server Records Availability on the DNS Server of the Domain Controller Impacts Inter and Intra Site Replication Latency		
Cause		
CIT: Domain Controller	ETI: Kerberos Server Records Availability	Value: Not Found
Symptom 1		
CIT: Domain Controller	ETI: Inter Site Replication Latency	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: Intra Site Replication Latency	Value: Very High

**AD::DomainController:LDAPsSrvRecordsAvailability >>  
InterSiteReplicationLatency & IntraSiteReplicationLatency**

<b>Description:</b> LDAP Server Records Availability on the DNS Server of the Domain Controller Impacts Inter and Intra Site Replication Latency		
Cause		
CIT: Domain Controller	ETI: LDAP Server Records Availability	Value: Not Found
Symptom 1		
CIT: Domain Controller	ETI: Inter Site Replication Latency	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: Intra Site Replication Latency	Value: Very High

### AD::DomainController:LSASS Page Faults Rate >> DomainController Performance

<b>Description:</b> LSASS Page Faults Rate Impacts DC Performance		
Cause		
CIT: Domain Controller	ETI: LSASS Page Faults Rate	Value: Very High
Symptom 1		
CIT: Domain Controller	ETI: DC LDAP Bind Response Time	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: DC LDAP Query Response Time	Value: Very High
Symptom 3		
CIT: Domain Controller	ETI: Inbound Object Updates Remaining	Value: Very High
Symptom 4		
CIT: Domain Controller	ETI: Pending Replication Synchronizations	Value: Very High

### AD::DomainController:LSASS Page Faults Rate >> GlobalCatalog Performance

<b>Description:</b> LSASS Page Faults Rate Impacts GC Performance		
Cause		
CIT: Domain Controller	ETI: LSASS Page Faults Rate	Value: Very High
Symptom 1		
CIT: Global Catalog Server	ETI: GC LDAP Bind Response Time	Value: Very High
Symptom 2		
CIT: Global Catalog Server	ETI: GC LDAP Query Response Time	Value: Very High

**AD::DomainController:Sysvol Connectivity >> Notify Queue Size**

<b>Description:</b> Sysvol Connectivity Impacts Notify Queue Size		
Cause		
CIT: Domain Controller	ETI: Sysvol Connectivity	Value: Down
Symptom		
CIT: Domain Controller	ETI: Notify Queue Size	Value: Very High

**AD::DomainController:Sysvol Disk Space Availability >> DC Replication Latency & Inbound Replication Object Rate**

<b>Description:</b> Available Disk Space for Sysvol Impacts DC Replication Latency and Inbound Replication Object Rate		
Cause		
CIT: Domain Controller	ETI: Sysvol Disk Space Availability	Value: Near Capacity
Symptom 1		
CIT: Domain Controller	ETI: Inbound Replication Object Rate	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: Inter Site Replication Latency	Value: Very High
Symptom 3		
CIT: Domain Controller	ETI: Intra Site Replication Latency	Value: Very High

**AD::DomainController:Sysvol Disk Queue Length >> DC Replication Latency & Inbound Replication Object Rate**

<b>Description:</b> Sysvol Disk Queue Length Impacts REplication Latency		
Cause		
CIT: Domain Controller	ETI: Sysvol Disk Queue Length	Value: Very High

<b>Description:</b> Sysvol Disk Queue Length Impacts REplication Latency		
Symptom 1		
CIT: Domain Controller	ETI: Inbound Replication Object Rate	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: Inter Site Replication Latency	Value: Very High
Symptom 3		
CIT: Domain Controller	ETI: Intra Site Replication Latency	Value: Very High

### AD::FileSystem:Disk Usage Level >> DomainController Performance

<b>Description:</b> DIT Disk Queue Length Impacts DC Performance		
Cause		
CIT: File System	ETI: Disk Usage Level	Value: Near Capacity
Symptom 1		
CIT: Domain Controller	ETI: DITDiskQueueLength	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: DIT LogFiles DiskQueue Length	Value: Very High
Symptom 3		
CIT: Domain Controller	ETI: Sysvol Disk Queue Length	Value: Very High
Symptom 4		
CIT: Domain Controller	ETI: Pending Replication Synchronizations	Value: Very High
Symptom 5		
CIT: Domain Controller	ETI: Inbound Object Updates Remaining	Value: Very High



**AD::Network Interface:Network IO >> Domain Naming Master Connectivity**

<b>Description:</b> Network IO Impacts Domain naming master connectivity		
Cause		
CIT: Network Interface	ETI: Interface Utilization	Value: High
Symptom 1		
CIT: Domain Naming Master	ETI: Response Time	Value: Very High

**AD::Network Interface:Network IO >> DomainController Connectivity**

<b>Description:</b> Network IO Impacts DomainController Connectivity		
Cause		
CIT: Network Interface	ETI: Interface Utilization	Value: High
Symptom 1		
CIT: Domain Controller	ETI: Inter Site Replication Latency	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: Intra Site Replication Latency	Value: Very High
Symptom 3		
CIT: Domain Controller	ETI: Notify Queue Size	Value: Very High

**AD::Network Interface:Network IO >> DomainController Performance**

<b>Description:</b> Network IO Impacts DomainController Performance		
Cause		
CIT: Network Interface	ETI: Interface Utilization	Value: High
Symptom 1		

<b>Description:</b> Network IO Impacts DomainController Performance		
CIT: Domain Controller	ETI: DC LDAP Query Response Time	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: DC LDAP Bind Response Time	Value: Very High
Symptom 3		
CIT: Domain Controller	ETI: Pending Replication Synchronizations	Value: Very High
Symptom 4		
CIT: Domain Controller	ETI: Inbound Object Updates Remaining	Value: Very High

#### AD::Network Interface:Network IO >> Global Catalog Performance

<b>Description:</b> Network IO Impacts Global Catalog Performance		
Cause		
CIT: Network Interface	ETI: Interface Utilization	Value: High
Symptom 1		
CIT: Global Catalog	ETI: GC LDAP Query Response Time	Value: Very High
Symptom 2		
CIT: Global Catalog	ETI: GC LDAP Bind Response Time	Value: Very High

#### AD::Network Interface:Network IO >> Infrastructure Master Connectivity

<b>Description:</b> Network IO Impacts Infrastructure master Connectivity		
Cause		
CIT: Network Interface	ETI: Interface Utilization	Value: High

<b>Description:</b> Network IO Impacts Infrastructure master Connectivity		
Symptom 1		
CIT: Infrastructure Master	ETI: Response Time	Value: Very High

**AD::Network Interface:Network IO >> PDC Master Connectivity**

<b>Description:</b> Network IO Impacts PDC master Connectivity		
Cause		
CIT: Network Interface	ETI: Interface Utilization	Value: High
Symptom 1		
CIT: Primary Domain Controller Master	ETI: Response Time	Value: Very High

**AD::Network Interface:Network IO >> RID Master Connectivity**

<b>Description:</b> Network IO Impacts RID master Connectivity		
Cause		
CIT: Network Interface	ETI: Interface Utilization	Value: High
Symptom 1		
CIT: Relative ID Master	ETI: Response Time	Value: Very High

**AD::Network Interface:Network IO >> Schema Master Connectivity**

<b>Description:</b> Network IO Impacts Schema master Connectivity		
Cause		
CIT: Network Interface	ETI: Interface Utilization	Value: High
Symptom 1		
CIT: Schema Master	ETI: Response Time	Value: Very High

**AD::Windows:CPU Load >> DomainController Performance**

<b>Description:</b> CPU Load Impacts DomainController Performance		
Cause		
CIT: Windows	ETI: CPU Load	Value: Bottlenecked
Symptom 1		
CIT: Domain Controller	ETI: DC LDAP Bind Response Time	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: DC LDAP Query Response Time	Value: Very High
Symptom 3		
CIT: Domain Controller	ETI: Inbound Object Updates Remaining	Value: Very High
Symptom 4		
CIT: Domain Controller	ETI: Pending Replication Synchronizations	Value: Very High

**AD::Windows:CPU Load >> GlobalCatalog Performance**

<b>Description:</b> CPU Load Impacts Global Catalog Performance		
Cause		
CIT: Windows	ETI: CPU Load	Value: Bottlenecked
Symptom 1		
CIT: Global Catalog Server	ETI: GC LDAP Bind Response Time	Value: Very High
Symptom 2		
CIT: Global Catalog Server	ETI: GC LDAP Query Response Time	Value: Very High

**AD::Windows:Logical Disk Free Space >> DomainController Performance**

<b>Description:</b> Available Logical Disk Free Space Impacts DC Performance		
Cause		
CIT: Windows	ETI: Logical Disk Free Space	Value: Near Capacity
Symptom 1		
CIT: Domain Controller	ETI: DIT Disk Queue Length	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: DIT Log Files Disk Queue Length	Value: Very High
Symptom 3		
CIT: Domain Controller	ETI: Inbound Object Updates Remaining	Value: Very High
Symptom 4		
CIT: Domain Controller	ETI: Pending Replication Synchronizations	Value: Very High

**AD::Windows:RPC Service >> DomainController Replication & Notify Queue Size**

<b>Description:</b> RPC Service Status impacts DC Replication Latency and Notify Queue Size		
Cause		
CIT: Windows	ETI: RPC Service	Value: Unavailable
Symptom 1		
CIT: Domain Controller	ETI: Inter Site Replication Latency	Value: Very High
Symptom 2		
CIT: Domain Controller	ETI: Intra Site Replication Latency	Value: Very High

<b>Description:</b> RPC Service Status impacts DC Replication Latency and Notify Queue Size		
Symptom 3		
CIT: Domain Controller	ETI: Notify Queue Size	Value: Very High

## Tool Definitions

**Start File Replication Service:** Starts the File Replication service on the Domain Controller.

## Graph Templates

The following table lists the graph templates present in the content pack and mapped policies.

Graph Templates	Policy Name	Policy Description
Active Directory DNS Query Response Time Graph	ADSPI-DNS_Server_Response / ADSPI-DNS_Server_Response_2K8+	Monitors the response time given by the DNS server
Active Directory SYSVOL Disk Queue Length Graph	ADSPI-SYSVOL_Disk QueueLength / ADSPI-SYSVOL_Disk QueueLength_2K8+	Monitors the queue length on the SYSVOL disk drive
Active Directory SYSVOL Disk Utilization Graph	ADSPI-Sysvol_Percent Full / ADSPI-Sysvol_Percent Full_2K8+	Monitors the amount of free space on the Sysvol disk drive in terms of percentage used
Active Directory DIT Log File Disk Queue Length Graph	ADSPI-DIT_LogFiles QueueLength / ADSPI-DIT_LogFiles QueueLength_2K8+	Monitors the queue length on the DIT log files disk drive
Active Directory DIT Log File Disk Utilization Graph	ADSPI-DIT_LogFiles PercentFull / ADSPI-DIT_LogFiles PercentFull_2K8+	Monitors the amount of free space on the DIT log files disk drive

Graph Templates	Policy Name	Policy Description
Active Directory DIT File Growth Graph	ADSPI-DIT_TotalDit Size / ADSPI-DIT_TotalDit Size_2K8+	Monitors the total amount of free space on the DIT disk drive in MB
Active Directory DIT Disk Queue Length Graph	ADSPI-DIT_DITQueue Length / ADSPI-DIT_DITQueue Length_2K8+	Monitors the queue length on the DIT disk drive
Active Directory DIT Disk Utilization Graph	ADSPI-DIT_DITPercent Full / ADSPI-DIT_DITPercent Full_2K8+	Monitors the amount of free space on the DIT disk drive
Active Directory Bind Response Time	ADSPI-Response_Logging / ADSPI-Response_Logging_2K8+	Logs active directory response times
Active Directory Query Response Time	ADSPI-Response_Logging / ADSPI-Response_Logging_2K8+	Logs active directory response times
Active Directory Replication Time by Global Catalog	ADSPI-Rep_GC_Check_and_Threshold / ADSPI-Rep_GC_Check_and_Threshold_2K8+	Calculate, store and threshold Global Catalog Replication Latency in hours.
Active Directory GC Availability	ADSPI-Response_Logging / ADSPI-Response_Logging_2K8+	Logs active directory response times
Active Directory Replication Latency Graph	ADSPI-Rep_Monitor InterSiteReplication / ADSPI-Rep_Monitor InterSiteReplication_2K8+	Monitor InterSite Replication in Active Directory
	ADSPI-Rep_MonitorIntraSiteReplication / ADSPI-Rep_Monitor IntraSiteReplication_2K8+	Monitor IntraSite Replication in Active Directory

## Policies Setting ETIs

The following table lists the content pack ETIs and SPI policies that set the ETIs.

**Note:** For more information on the measurement threshold policies and events, refer to the HP Operations Smart Plug-in for Microsoft Active Directory documentation.

ETI/Hi	Policy Name	Policy Description
Access Permissions Errors	ADSPI_SecErr Access Permissions	Checks the errors access permissions
	ADSPI_SecErr Access Permissions_2k8+	
CName Records Availability	ADSPI-DNS_DC_CNAME_Chk	Ensures that DNS contains the expected CNAME resource records for the LDAP service.
	ADSPI-DNS_DC_CNAME_Chk_2k8+	
DC LDAP Query Response Time	ADSPI-Response Time_Query	Monitors the response time of queries made to the domain controller in seconds.
	ADSPI-Response Time_Query_2k8+	
DC LDAP Bind Response Time	ADSPI-Response Time_Bind	Monitors the bind response time of the domain controller in seconds.
	ADSPI-Response Time_Bind_2k8+	
DFSR Service State	ADSPI_DFSR_2K8+	Checks the distributed file service replication service.



ETI/Hi	Policy Name	Policy Description
Directory Read Rate	ADSPI_DSReads	Number of reads every second in the Directory Service
	ADSPI_DSReads_2K8+	
	ADSPI_GlobalCatalog Reads	Number of reads from the GC
	ADSPI_GlobalCatalog Reads_2K8+	
Directory Search Rate	ADSPI_DSSearches	Number of searches every second in the Directory Service
	ADSPI_DSSearches_2K8+	Number of searches every second in the Directory Service
	ADSPI_GlobalCatalog Searches	Number of searches of the Global Catalog.
	ADSPI_GlobalCatalog Searches_2K8+	
Directory Write Rate	ADSPI_DSWrites	Number of writes every second in the Directory Service
	ADSPI_DSWrites_2K8+	
	ADSPI_GlobalCatalog Writes	Number of writes to the GC
	ADSPI_GlobalCatalog Writes_2K8+	
DIT Disk Space Availability	ADSPI- DIT_DIT Percent Full	Monitors the amount of free space on the DIT disk drive.
	ADSPI- DIT_DIT Percent Full _2k8+	
DIT Disk Queue Length	ADSPI- DIT_ DITQueue Length	Monitors the length on the DIT disk drive.
	ADSPI- DIT_ DITQueue Length _2k8+	

ETI/HI	Policy Name	Policy Description
DIT LogFiles Disk Space Availability	ADSPI- DIT_LogFiles Percent Full	Monitors the amount of free space on the DIT log files disk drive.
	ADSPI- DIT_LogFiles Percent Full _2k8+	
DIT LogFiles Disk Queue Length	ADSPI- DIT_LogFiles Queue Length	Monitors the queue length on the DIT log files disk drive.
	ADSPI- DIT_LogFiles Queue Length _2k8+	
DNS Query Response	ADSPI- DNS_DC_ Response	Monitors the response time of DNS queries made by the domain controller in milliseconds.
	ADSPI- DNS_DC_ Response _2k8+	
FRS Status	ADSPI_ NTFRS	Checks the File replication service.
	ADSPI_ NTFRS _2k8+	
GC Connectivity	ADSPI-GC_CheckStatus	Executes a GC Query and checks the status of the GC query
	ADSPI-GC_CheckStatus_ 2K8+	
GC LDAP Bind Response Time	ADSPI- Response Time_ GCBind	Monitors the bind response time of the global catalog on the domain controller in seconds.
	ADSPI- Response Time_ GCBind _2k8+	
GC LDAP Query Response Time	ADSPI- Response Time_ GCQuery	Monitors the response time of queries made to the global catalog domain controller in seconds.
	ADSPI- Response Time_ GCQuery _2k8+	
GC Replication Latency	ADSPI- Rep_GC_ Check_ and_ Threshold	Calculates, stores, and threshold global Catalog replication latency in hours.
	ADSPI- Rep_GC_ Check_ and_ Threshold _2k8+	

ETI/HI	Policy Name	Policy Description
Host Records Availability	ADSPI-DNS_DC_A_Chk	Ensures that DNS contains the expected host resource records for the LDAP service.
	ADSPI-DNS_DC_A_Chk_2k8+	
Inbound Object Updates Remaining	ADSPI_ ADSRep InBound Object Updates Remaining_ 2K8+	Checks the inbound object updates remaining in packet.
	ADSPI_ ADSRepIn Bound Object Updates Remaining	
Inbound Replication Object Rate	ADSPI- Rep_Inbound Objs	Monitors the number of inbound replication objects.
	ADSPI- Rep_Inbound Objs_ 2k8+	
Inter Site Replication Latency	ADSPI- Rep_Monitor InterSite Replication	Monitors intersite replication in active directory.
	ADSPI- Rep_Monitor InterSite Replication_2k8+	
Intra Site Replication Latency	ADSPI- Rep_Monitor IntraSite Replication	Monitors intrasite replication in active directory.
	ADSPI- Rep_Monitor IntraSite Replication_2k8+	
ISM Service Status	ADSPI- Rep_ISM_ Chk	Checks the intersite messaging service.
	ADSPI- Rep_ISM_ Chk_2k8+	
KDC Service Status	ADSPI_KDC	Checks the kerberos key distribution center service.
	ADSPI_KDC_2k8+	

ETI/Hi	Policy Name	Policy Description
Kerberos Authentication Rate	ADSPI_IQKerberos Authentications _2K8+	Checks the kerberos authentications
	ADSPI_IQKerberos Authentications	
Kerberos Srv Records Availability	ADSPI- DNS_ Kerberos_ SRV_ Chk	Checks for expected DNS SRV resource records registered for the kerberos service.
	ADSPI- DNS_ Kerberos_ SRV_ Chk _2k8+	
LDAP Active Threads	ADSPI_IQLDAP Active Threads _2K8+	Checks the LDAP active threads.
	ADSPI_IQLDAP Active Threads	
LDAP Client Sessions	ADSPI_IQLDAP Client Sessions _2K8+	Checks the LDAP client sessions.
	ADSPI_IQLDAP Client Sessions	
LDAP Connectivity	ADSPI-LDAP_ Check Status	Executes a LDAP Query and checks the status of the LDAP query
	ADSPI-LDAP_ Check Status_2K8+	
LDAP Srv Records Availability	ADSPI- DNS_ LDAP_ SRV_ Chk	Ensures that DNS contains the expected SRV resource records for the LDAP service.
	ADSPI- DNS_ LDAP_ SRV_ Chk _2k8+	
Logon Errors	ADSPI_ SecErrors Logon	Checks the errors logon.
	ADSPI_ SecErrors Logon _2k8+	
LSASS Page Faults Rate	ADSPI_ HMLSASS PageFaults	Checks the LSASS page faults per second.
	ADSPI_ HMLSASS PageFaults _2k8+	

ETI/HI	Policy Name	Policy Description
LSASS Private Bytes	ADSPI_ HMLSASS Private Bytes	Checks the LSASS Private Bytes.
	ADSPI_ HMLSASS Private Bytes _2k8+	
LSASS Processor Time	ADSPI_ HMLSASS Processor Time	Checks the LSASS processor time.
	ADSPI_ HMLSASS Processor Time _2k8+	
LSASS Working Set	ADSPI_ HMLSASS Working Set	Checks the LSASS working set.
	ADSPI_ HMLSASS Working Set _2k8+	
Net Logon Service State	ADSPI_ Net Logon	Checks the Net Logon service.
	ADSPI_ Net Logon _2k8+	
Non Transitive Membership Evaluations	ADSPI_ Sec NonTrans Memb Eval_ 2K8+	Checks the Non-Transitive Membership Evaluations/sec.
	ADSPI_ Sec NonTrans Memb Eval	
Notify Queue Size	ADSPI_ ADSRep Notify QueueSize_ 2K8+	Checks the notify queue size.
	ADSPI_ ADSRep Notify QueueSize	
NTDS Service State	ADSPI_ NTDS _2k8+	Checks the active directory domain service.
NTFRS Page Faults Rate	ADSPI_ HM NTFRS PageFaults	Checks the NTFRS page faults.
	ADSPI_ HM NTFRS PageFaults _2k8+	

ETI/Hi	Policy Name	Policy Description
NTFRS Private Bytes	ADSPI_HM NTFRS Private Bytes	Checks the NTFRS private bytes.
	ADSPI_HM NTFRS Private Bytes _2k8+	
NTFRS Processor Time	ADSPI_HM NTFRS Processor Time	Checks the NTFRS processor time.
	ADSPI_HM NTFRS Processor Time _2k8+	
NTFRS Working Set	ADSPI_HM NTFRS Working Set	Checks the NTFRS working set.
	ADSPI_HM NTFRS Working Set	
NTLM Authentication Rate	ADSPI_IQNTLM Authentications _2K8+	Checks the NTLM Authentications.
	ADSPI_IQNTLM Authentications	
Outbound Replication Object Rate	ADSPI-Rep_Outbound Objs	Monitors the number of outbound replication objects.
	ADSPI-Rep_Outbound Objs_2K8+	
Pending Replication Synchronizations	ADSPI_ADSPending Synchronizations_ 2K8+	Checks the pending replication synchronizations.
	ADSPI_ADSPending Synchronizations	

ETI/Hi	Policy Name	Policy Description
Response Time	ADSPI- FSMO_ INFRA_Ping	Monitors the ping response time of the infrastructure FSMO in seconds.
	ADSPI- FSMO_ INFRA_Ping _2k8+	
	ADSPI-FSMO_ NAMING_ Ping	Monitors the ping response time of the domain naming FSMO in seconds.
	ADSPI-FSMO_ NAMING_ Ping _2k8+	
	ADSPI- FSMO_ PDC_Ping	Monitors the ping response time of the PDC FSMO in seconds
	ADSPI- FSMO_ PDC_Ping _2k8+	
	ADSPI- FSMO_ RID_Ping	Monitors the ping response time of the RID FSMO in seconds
	ADSPI- FSMO_ RID_Ping _2k8+	
	ADSPI- FSMO_ Schema_Ping	Monitors the ping response time of the schema FSMO in seconds
	ADSPI- FSMO_ Schema_Ping _2k8+	
SamSs Service State	ADSPI_ SamSs	Checks the security account manager service.
	ADSPI_ SamSs _2k8+	
Security Descriptor Propagator Queue	ADSPI_ Sec SDPropagator Queue _2K8+	Checks the Security Descriptor Propagator Queue.
	ADSPI_ SecSD Propagator Queue	
Synchronization Failure Rate	ADSPI_ SyncSchema MissMatch	Checks the sync failures on schema mismatch.
	ADSPI_ SyncSchema MissMatch _2K8+	

ETI/Hi	Policy Name	Policy Description
Sysvol Disk Queue Length	ADSPI-SYSVOL_Disk QueueLength	Monitors the queue length on the SYSVOL disk drive.
	ADSPI-SYSVOL_Disk QueueLength_2K8+	
Sysvol Connectivity	ADSPI- Sysvol_ Connectivity	Connects to each replication partner's sysvol to validate connectivity.
	ADSPI- Sysvol_ Connectivity _2k8+	
Sysvol Disk Space Availability	ADSPI- Sysvol_ PercentFull	Monitors the amount of free space on the sysvol disk drive in terms of MB.
	ADSPI- Sysvol_ PercentFull _2k8+	
Transitive Membership Evaluations	ADSPI_ SecTrans MembEval _2K8+	Checks the Transitive Member Evaluations/sec.
	ADSPI_ SecTrans Memb Eval	

## Operations Orchestration Flow

The following table lists the Microsoft Active Directory Operations Orchestration (OO) Flows:

### OO Flow: Check DIT Disk Space Availability

Flow input	Mapping CI	Event Attribute
omServer	domaincontroller	Originating Server

User input when executing OO flow: Check DIT Disk Space Availability

Flow input	CI Type
omServer	DNS name of the HPOM management server. The HPOM server will launch commands on managed nodes
omServerPort	Port number of the HPOM Tool WS



Flow input	CI Type
omServerUser	The user name for the HPOM Server that will use used in the HPOM Tool WS
omServerPassword	The password for the HPOM Server that will use used in the HPOM Tool WS
omNode	Target node with an HPOM Agent.
omCmdTimeout	The timeout value to be used when running the remote command on the node. By default set to 100000.
threshold	The threshold value for the minimum disk space (in MB) that should be free (available) on the DIT disks. Default is set to 2048 MB (2 GM).

**OO Flow: Check DomainController Health**

Flow input	Mapping CI	Event Attribute
omServer	domaincontroller	Originating Server

User input when executing OO flow: Check DomainController Health

Flow input	CI Type
omServer	DNS name of the HPOM management server. The HPOM server will launch commands on managed nodes
omServerPort	Port number of the HPOM Tool WS
omServerUser	The user name for the HPOM Server that will use used in the HPOM Tool WS
omServerPassword	The password for the HPOM Server that will use used in the HPOM Tool WS
omNode	Target node with an HPOM Agent
omCmdTimeout	The timeout value to be used when running the remote command on the node. By default set to 100000.

Flow input	CI Type
diskthreshold	The threshold value for the minimum disk space in MB that should be free (available) on the DIT disks. Default is set to 2048 MB (2 GB).
ldapthreshold	The threshold value for LDAP latency

### OO Flow: Check if DomainController

Flow input	Mapping CI	Event Attribute
omServer	domaincontroller	Originating Server

User input when executing OO flow: Check if DomainController

Flow input	CI Type
omServer	DNS name of the HPOM management server. The HPOM server will launch commands on managed nodes
omServerPort	Port number of the HPOM Tool WS
omServerUser	The user name for the HPOM Server that will use used in the HPOM Tool WS
omServerPassword	The password for the HPOM Server that will use used in the HPOM Tool WS
omNode	Target node with an HPOM Agent
omCmdTimeout	The timeout value to be used when running the remote command on the node. By default set to 100000
diskthreshold	The threshold value for the minimum disk space in MB that should be free (available) on the DIT disks. Default is set to 2048 MB (2 GB)
ldapthreshold	The threshold value for LDAP latency

**OO Flow: Check Replication Health**

Flow input	Mapping CI	Event Attribute
omServer	domaincontroller	Originating Server

User input when executing OO flow: Check Replication Health

Flow input	CI Type
omServer	DNS name of the HPOM management server. The HPOM server will launch commands on managed nodes
omServerPort	Port number of the HPOM Tool WS
omServerUser	The user name for the HPOM Server that will use used in the HPOM Tool WS
omServerPassword	The password for the HPOM Server that will use used in the HPOM Tool WS
omNode	Target node with an HPOM Agent
omCmdTimeout	The timeout value to be used when running the remote command on the node. By default set to 100000
replicationlatency threshold	The threshold for maximum time since last replication happened from a source in milliseconds

**OO Flow: GC Query Response Time**

Flow input	Mapping CI	Event Attribute
omServer	domaincontroller	Originating Server

User input when executing OO flow: GC Query Response Time

Flow input	CI Type
omServer	DNS name of the HPOM management server. The HPOM server will launch commands on managed nodes
omSeverPort	Port number of the HPOM Tool WS

Flow input	CI Type
omServerUser	The user name for the HPOM Server that will use used in the HPOM Tool WS
omServerPassword	The password for the HPOM Server that will use used in the HPOM Tool WS
omNode	Target node with an HPOM Agent
omCmdTimeout	The timeout value to be used when running the remote command on the node. By default set to 100000

### OO Flow: LDAP Query Response Time

Flow input	Mapping CI	Event Attribute
omServer	domaincontroller	Originating Server

User input when executing OO flow: LDAP Query Response Time

Flow input	CI Type
omServer	DNS name of the HPOM management server. The HPOM server will launch commands on managed nodes
omServerPort	Port number of the HPOM Tool WS
omServerUser	The user name for the HPOM Server that will use used in the HPOM Tool WS
omServerPassword	The password for the HPOM Server that will use used in the HPOM Tool WS
omNode	Target node with an HPOM Agent
omCmdTimeout	The timeout value to be used when running the remote command on the node. By default set to 100000

### OO Flow: Get Replication Latency

Flow input	Mapping CI	Event Attribute
omServer	domaincontroller	Originating Server

User input when executing OO flow: Get Replication Latency

Flow input	CI Type
omServer	DNS name of the HPOM management server. The HPOM server will launch commands on managed nodes
omServerPort	Port number of the HPOM Tool WS
omServerUser	The user name for the HPOM Server that will use used in the HPOM Tool WS
omServerPassword	The password for the HPOM Server that will use used in the HPOM Tool WS
omNode	Target node with an HPOM Agent
omCmdTimeout	The timeout value to be used when running the remote command on the node. By default set to 100000
omReplication Source	The node from which is the source of the replication for the time is calculated

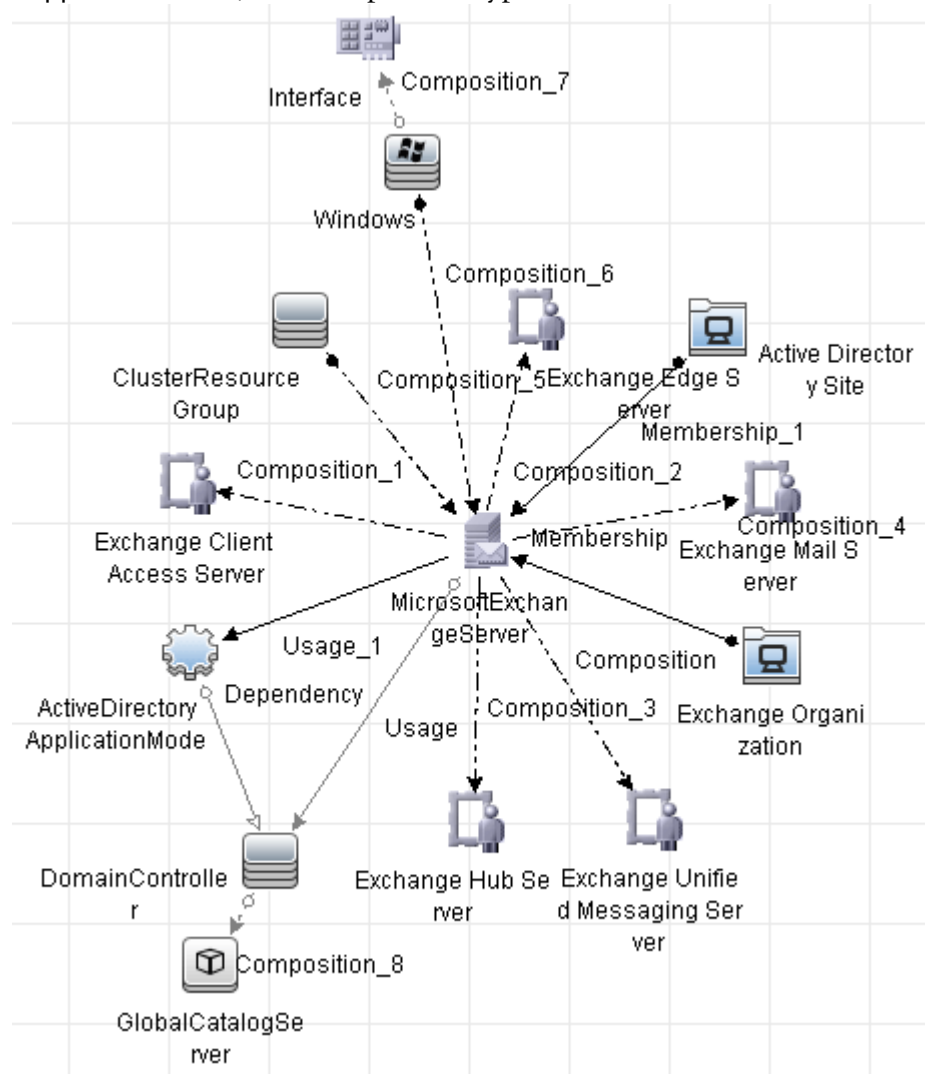
## Microsoft Exchange Server 2007 Content Pack

The Microsoft Exchange Server 2007 Content Pack contains the following artifacts.

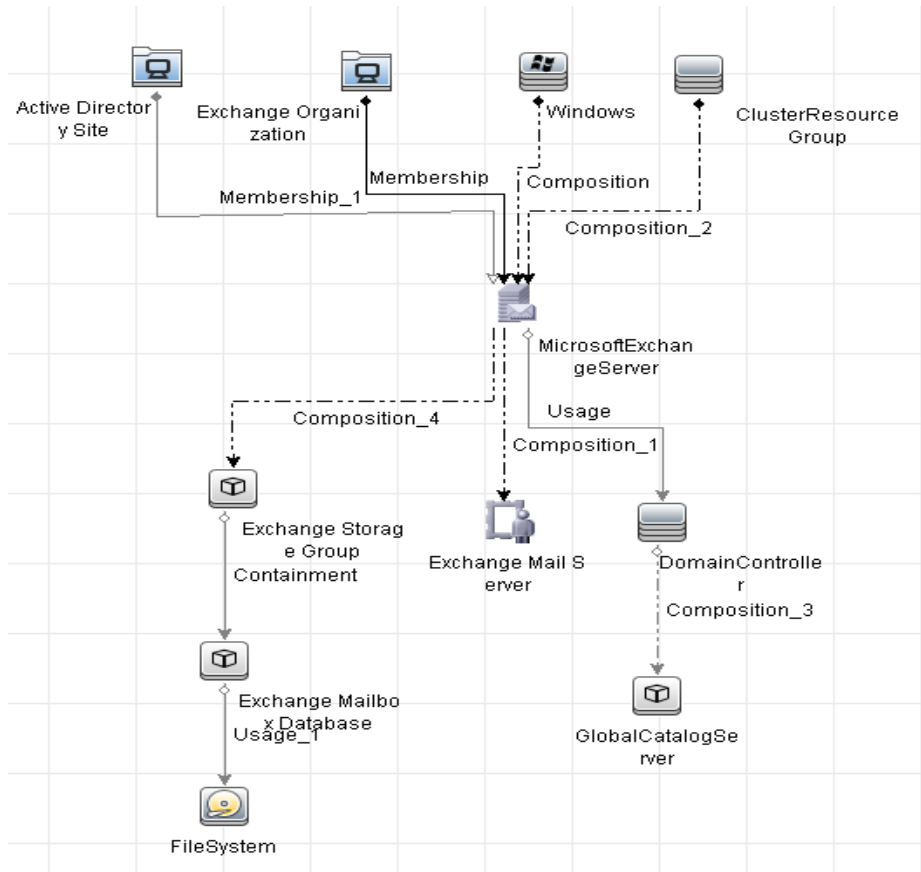
### **ODB Views**

The ODB package in the Microsoft Exchange Server Content Pack contains the following views:

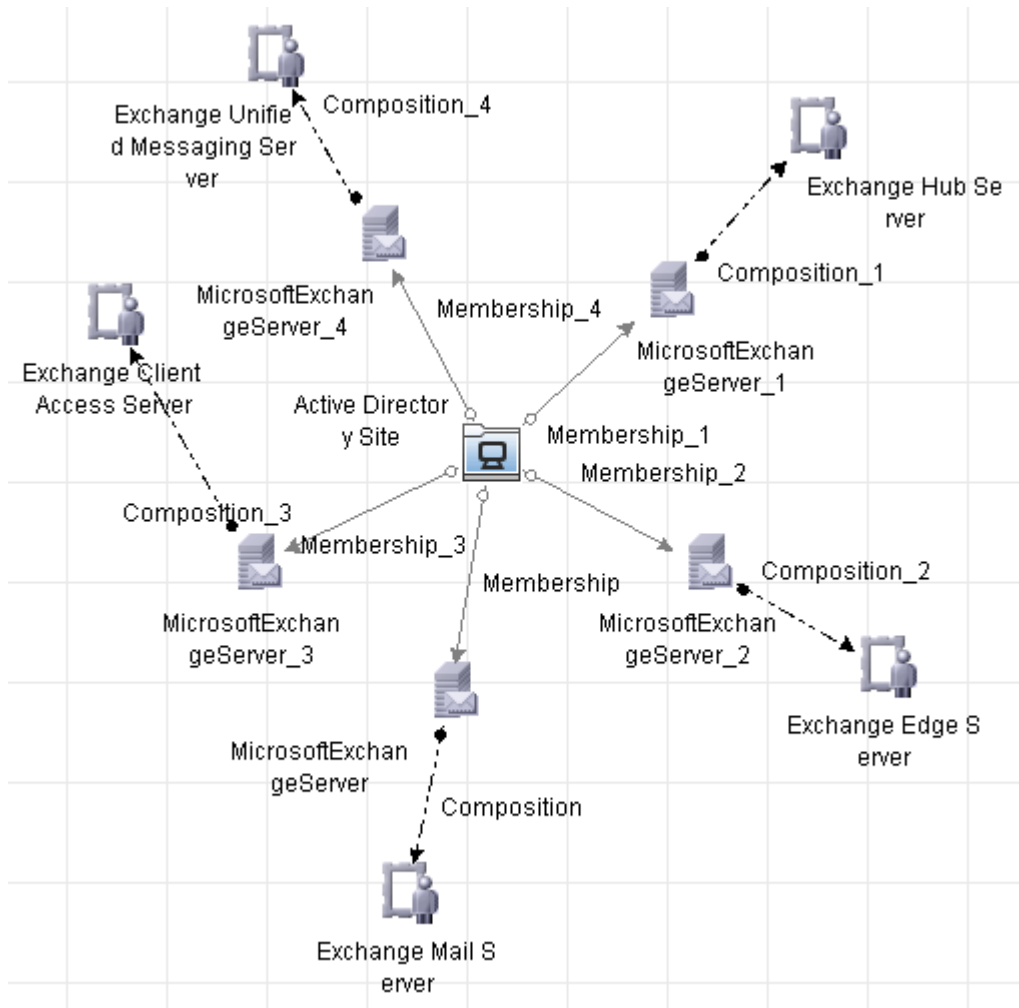
- **Exchange\_Org\_View:** This view refers to the Exchange System, Exchange Unified Messaging Server, Exchange Client Access Server, Exchange Edge Server, Exchange Hub Server, Microsoft Exchange Server, Active Directory Application Mode, and Computer CI types.



- **Exchange\_Mail\_View:** This view refers to the Exchange System, Exchange Mail Server, Domain Controller, Microsoft Exchange Server, Clustered Server, Active Directory Site, and Computer (Windows) CI types.



- **Exchange\_Site\_View:** This view refers to the Exchange System, Exchange Mail Server, Exchange Hub Server, Exchange Edge Server, Active Directory Site, and Exchange Unified Messaging Server types.





## Enrichment Rules

The Microsoft Exchange Server Content Pack contains the following Enrichment Rules:

- ▶ ADAM\_Depends\_DomainController
- ▶ ExchangeServer\_Uses\_GlobalCatalog
- ▶ ExchangeServer\_IsMemberOf\_ActiveDirectorySite
- ▶ ExchangeServer\_Uses\_DomainController

## Health Indicators

The content pack includes the following Health Indicators (HIs) to monitor Exchange Server-related events:

CI Type	HI	Description	Value
Exchange Client Access Server	Active Sync Connectivity	Indicates the availability of Active Sync Connections on the Exchange Client Access Server	Up, Down
Exchange Client Access Server	Active Sync Latency	Indicates the latency in accessing a user mailbox using Active Sync	Normal, High, Very high
Exchange Client Access Server	IMAP4 Latency	Indicates the latency in IMAP4 Connections on the Client Access Server	Normal, High, Very high
Exchange Client Access Server	Exchange Service Host Status	Indicates the status of Microsoft Exchange Service Host	Up, Down
Exchange Client Access Server	File Distribution Service Status	Indicates the status of Microsoft Exchange File Distribution Service	Up, Down
Exchange Client Access Server	POP3 Latency	Indicates the latency in POP3 Connections on the Client Access Server	Normal, High, Very high

CI Type	HI	Description	Value
Exchange Client Access Server	IMAP4 Connectivity	Indicates the availability of IMAP4 connections on the Exchange Client	Up, Down
Exchange Client Access Server	IMAP4 Service Status	Indicates the status of Microsoft Exchange IMAP4 Service	Up, Down
Exchange Client Access Server	IMAP4 Status	Indicates the status of IMAP4 operations on the Exchange Client Access Server	Critical, Normal
Exchange Client Access Server	OWA Connectivity	Indicates the availability of OWA Connections on the Exchange Client Access Server	Up, Down
Exchange Client Access Server	OWA Latency	Indicates the latency in performing OWA operations on the Exchange Client Access Server	Normal, High, Very high
Exchange Client Access Server	POP3 Connectivity	Indicates the availability of POP3 Connections on the Exchange Client Access Server	Up, Down
Exchange Client Access Server	POP3 Service Status	Indicates the status of Microsoft Exchange POP3 Service	Up, Down
Exchange Client Access Server	POP3 Status	Indicates the status of POP3 Operations on the Exchange Client Access Server	Critical, Normal
Exchange Mail Server	Exchange Service Host Status	Indicates the status of Microsoft Exchange Service Host	Up, Down
Exchange Unified Messaging Server	File Distribution Service Status	Indicates the status of Microsoft Exchange File Distribution Service	Up, Down
Exchange Edge Server	ADAM Service Status	Indicates the status of Microsoft Exchange ADAM Service	Up, Down

CI Type	HI	Description	Value
Exchange Edge Server	Edge Credential Service Status	Indicates the status of credential service status for Exchange Edge server.	Up, Down
Exchange Email Server	Active Directory Access	Indicates the status of Active Directory Accessibility from Exchange Mail Server	Up, Down
Exchange Email Server	Average Mail Delivery Time	Indicates the Average Mail Delivery Time on the Exchange Mail Server	Normal, High, Very high
Exchange Email Server	Average Time for PF Delivery	Indicates the average time taken for Public Folder Posts or messages to be delivered to recipients on the Exchange Mail Server	Normal, High, Very high
Exchange Email Server	Database Instance Status	Indicates the status of Exchange Database Instance	Critical, Normal
Exchange Email Server	Exchange Service Host Status	Indicates the status of Microsoft Exchange Service Host	Up, Down
Exchange Email Server	Exchange Memory Status	Indicates the status of memory utilized and available for Microsoft Exchange Process.	Normal, Critical
Exchange Email Server	Information Store Service Status	Indicates the status of Microsoft Exchange Information Store Service	Up, Down
Exchange Email Server	Mailbox Assistant Service Status	Indicates the status of Microsoft Exchange Mailbox Assistants Service	Up, Down
Exchange Email Server	Mailbox Receive Queue Length	Indicates the number of messages in the Mailbox Store's Receive Queue	Normal, High, Very high
Exchange Email Server	MailFlow Latency	Indicates the latency in Mail Flow from the given Exchange Mail Server	Normal, High, Very high

CI Type	HI	Description	Value
Exchange Email Server	MailFlow Status	Indicates the status of Mail Flow on the Exchange Mail Server.	Up, Down
Exchange Email Server	Mail Submission Service Status	Indicates the status of Microsoft Exchange Mail Submission Service	Up, Down
Exchange Email Server	Mapi Connectivity	Indicates the status of MAPI Connectivity on the Exchange Mail Server	Up, Down
Exchange Email Server	Mapi Latency	Indicates the latency in MAPI Connectivity on the Exchange Mail Server	Normal, High, Very high
Exchange Email Server	Public Receive Queue Length	Indicates the number of messages in Public Store's Receive Queue	Normal, High, Very high
Exchange Email Server	Public Replication Queue Length	Indicates the number of Replication messages waiting to be processed	Normal, High, Very high
Exchange Email Server	Replication Service Status	Indicates the status of Microsoft Exchange Replication Service	Up, Down
Exchange Email Server	Search Status	Indicates the status of Search Operation	Up, Down
Exchange Email Server	Search Latency	Indicates the latency in performing an Exchange Search	Normal, High, Very high
Exchange Email Server	System Attendant Status	Indicates the status of Microsoft Exchange System Attendant Service	Up, Down
Exchange Hub Server	Edge Sync Service Status	Indicates the status of Synchronization service status for Exchange Hub server.	Up, Down

CI Type	HI	Description	Value
Exchange Mailbox Database	Available Transaction Log Disk Space	Indicates the degree of Available Free Disk Space for Exchange Transaction Logs on the Exchange Mail Server	Near Capacity, Low , Normal
Exchange Mailbox Database	Available Database Disk Space	Indicates the space available in the Disk containing the Database	Near Capacity, Low , Normal
MicrosoftExchangeServer	AD Topology Service Status	Indicates the status of Microsoft Exchange Active Directory Topology Service	Up, Down
MicrosoftExchangeServer	Active Directory Access	Indicates whether the Exchange Server is able to access the Active Directory	Up, Down
Exchange Server	Create Item Status	Indicates the status of Create Item operation performed via Exchange Web Services	Up, Down
Exchange Server	Create Item Latency	Indicates the latency in performing the operation Create Item via Exchange Web Services	Normal, High, Very high
Exchange Server	Delete Item Status	Indicates the status of Delete Item operation performed via Exchange Web Services	Up, Down
Exchange Server	Delete Item Latency	Indicates the latency in performing the operation Delete Item via Exchange Web Services	Normal, High, Very high
Exchange Server	GC Bind Time	Indicates the time taken to bind with the GC	Normal, High, Very high
Exchange Server	GC Search Time	Indicates the time taken to perform GC Search	Normal, High, Very high

CI Type	HI	Description	Value
Exchange Server	Get Folder Status	Indicates the status of Get Folder operation performed via Exchange Web Services	Up, Down
Exchange Server	Get Folder Latency	Indicates the latency in performing the operation Get Folder via Exchange Web Services	Normal, High, Very high
Exchange Server	Sync Folder Status	Indicates the status of Sync Folder operation performed via Exchange Web Services	Up, Down
Exchange Server	Sync Folder Latency	Indicates the latency in performing the operation Sync Folder via Exchange Web Services	Normal, High, Very high
Exchange Transport Server	Active Mailbox Delivery Queue Length	Indicates the number of messages in the Active Mailbox Queues.	Normal, High, Very high
Exchange Transport Server	Aggregate Delivery Queue Length	Indicates the number of messages queued for delivery in all queues.	Normal, High, Very high
Exchange Transport Server	Delayed DSN Count	Indicates the number of Delayed Delivery Status Notifications which were generated on the Exchange Transport Server. Very High Values might indicate overload.	Normal, High, Very high
Exchange Transport Server	Failed DSN Count	Indicates the number of Failure Delivery Status Notifications generated	Normal, High, Very high
Exchange Transport Server	Largest Delivery Queue Length	Indicates the number of messages in the largest delivery queue.	Normal, High, Very high

CI Type	HI	Description	Value
Exchange Transport Server	Poison Queue Length	Indicates the length of Poison Queue on the Exchange Transport Server	Normal, High, Very high
Exchange Transport Server	Remote Delivery Queue Length	Indicates the length of Remote Delivery Queues on the Exchange Transport Server	Normal, High, Very high
Exchange Transport Server	Retry Non Smtп Delivery Queue Length	Indicates the number of messages in retry in the non-SMTP gateway delivery queues.	Normal, High, Very high
Exchange Transport Server	Submission Queue Length	Indicates the length of Submission Queue on the Exchange Transport Server	Normal, High, Very high
Exchange Transport Server	Transport Service Status	Indicates the status of Microsoft Exchange Transport Service	Up, Down
Exchange Transport Server	Unreachable Queue Length	Indicates the length of the Unreachable Queue on the Exchange Transport Server	Normal, High, Very high
Exchange Unified Messaging Server	Speech Engine Status	Indicates the status of Microsoft Exchange Speech Engine Service	Up, Down
	Unified Messaging Connectivity	Indicates the availability of Unified Messaging Connections on the Microsoft Exchange Unified Messaging Server	Up, Down
	Unified Messaging Status	Indicates the status of Microsoft Exchange Unified Messaging Service	Up, Down

## Event Type Indicators

The Content Pack includes the following Event Type Indicators (ETIs) to monitor Exchange Server-related events:

CI Type	ETI	Description	Value
Exchange Hub Server	Edge Synchronization Status	Indicates the status of Edge Synchronization	Up
	Load Exchange Topology	Indicates if Exchange Topology Information could be read or loaded from Active Directory	Down
	Submission ThreadCount	Indicates the percentage of Submission Threads currently running on the Exchange Hub Server. If the value is Very High then no new threads will be created and mail submission will fail.	Normal, High, Very High
Exchange Mail Server	Hub Server Reachability	Indicates if Exchange Hub Servers are reachable from the Exchange Mail Server.	Up, Down
	Mail Submission Status	Indicates the status of Mail Submission on the Exchange Mail Server	Up, Down



## Correlation Rules

The content pack includes the following rules to correlate Exchange Server-related events.

For more information on how the correlation rules work, see the *Operations Manager i Concepts Guide*.

### Exchange::Clustered Server:Memory Load >> Exchange Memory Status

<b>Description:</b> Memory Load Impacts Memory Available for Exchange		
Cause		
CIT: Cluster Resource Group	ETI: Memory Load	Value: Paging
Symptom		
CIT: Exchange Mail Server	ETI: Exchange Memory Status	Value: Critical

### Exchange::Clustered Server:Memory Usage Level >> Exchange Memory Status

<b>Description:</b> Memory Usage Level Impacts Memory Available for Exchange		
Cause		
CIT: Cluster Resource Group	ETI: Memory Usage Level	Value: Near Capacity
Symptom		
CIT: Exchange Mail Server	ETI: Exchange Memory Status	Value: Critical

**Exchange::Clustered Server:PageFile Usage >> Exchange Memory Status**

<b>Description:</b> Page File Usage on the Computer which hosts Exchange Mail Server Impacts Exchange Memory Status		
Cause		
CIT: Cluster Resource Group	ETI: Page File Usage	Value: Near Capacity
Symptom		
CIT: Exchange Mail Server	ETI: Exchange Memory Status	Value: Critical

**Exchange::Clustered Server:Ping Availability >> Hub Server Reachability & Mail Submission Status**

<b>Description:</b> Ping Availability of Exchange Mail Server Impacts Mail Submission and Hub Server Reachability		
Cause		
CIT: Cluster Resource Group	ETI: Ping Availability	Value: Unavailable
Symptom 1		
CIT: Exchange Mail Server	ETI: Hub Server Reachability	Value: Down
Symptom 2		
CIT: Exchange Mail Server	ETI: Mail Submission Status	Value: Down

**Exchange::DomainController:DC LDAP Bind Response Time >> Client Accessibility**

<b>Description:</b> LDAP Bind Response Time Impacts Client Accessibility		
Cause		
CIT: Domain Controller	ETI: DC LDAP Bind Response Time	Value: Very High
Symptom 1		
CIT: Exchange Client Access Server	ETI: OWA Latency	Value: Very High
Symptom 2		
CIT: Exchange Client Access Server	ETI: Active Sync Latency	Value: Very High

**Exchange::DomainController:DC LDAP Bind Response Time >> MailFlow Latency**

<b>Description:</b> LDAP Bind Response Time Impacts Mail flow Latency		
Cause		
CIT: Domain Controller	ETI: DC LDAP Bind Response Time	Value: Very High
Symptom		
CIT: Exchange Client Access Server	ETI: Mail Flow Latency	Value: Very High

### Exchange::DomainController:DC LDAP Bind Response Time >> Transport Queue Length

<b>Description:</b> LDAP Bind Response Time Impacts Transport Queue Length		
Cause		
CIT: Domain Controller	ETI: DCLDAPBindResponseTime	Value: Very High
Symptom 1		
CIT: Exchange Hub Server	ETI: Active Mailbox Delivery Queue Length	Value: Very High
Symptom 2		
CIT: Exchange Hub Server	ETI: Remote Delivery Queue Length	Value: Very High
Symptom 3		
CIT: Exchange Hub Server	ETI: Delayed DSN Count	Value: Very High
Symptom 4		
CIT: Exchange Hub Server	ETI: Submission Queue Length	Value: Very High

### Exchange::DomainController:DC LDAP Query Response Time >> Client Accessibility

<b>Description:</b> LDAP Query Response Time Impacts Client Accessibility		
Cause		
CIT: Domain Controller	ETI: DC LDAP Query Response Time	Value: Very High
Symptom 1		
CIT: Exchange Client Access Server	ETI: OWA Latency	Value: Very High

<b>Description:</b> LDAP Query Response Time Impacts Client Accessibility		
Symptom 2		
CIT: Exchange Client Access Server	ETI: Active Sync Latency	Value: Very High

**Exchange::DomainController:DC LDAP Query Response Time >> MailFlow Latency**

<b>Description:</b> LDAP Query Response Time Impacts Mail flow Latency		
Cause		
CIT: Domain Controller	ETI: DC Query Response Time	Value: Very High
Symptom		
CIT: Exchange Mail Server	ETI: Mail Flow Latency	Value: Very High

**Exchange::DomainController:DC LDAP Query Response Time >> Transport Queue Length**

<b>Description:</b> LDAP Query Response Time Impacts Transport Queue Length		
Cause		
CIT: Domain Controller	ETI: DC LDAP Query Response Time	Value: Very High
Symptom 1		
CIT: Exchange Hub Server	ETI: Active Mailbox Delivery Queue Length	Value: Very High
Symptom 2		
CIT: Exchange Hub Server	ETI: Remote Delivery Queue Length	Value: Very High
Symptom 3		
CIT: Exchange Hub Server	ETI: Delayed DSN Count	Value: Very High

<b>Description:</b> LDAP Query Response Time Impacts Transport Queue Length		
Symptom 4		
CIT: Exchange Hub Server	ETI: Submission Queue Length	Value: Very High

**Exchange::Exchange Client Access Server:IMAP4 Service Status >> IMAP4 Connectivity**

<b>Description:</b> IMAP4 Service impacts IMAP4 Connectivity		
Cause		
CIT: Exchange Client Access Server	ETI: IMAP4 Service Status	Value: Down
Symptom		
CIT: Exchange Client Access Server	ETI: IMAP4 Connectivity	Value: Down

**Exchange::Exchange Client Access Server:POP3 Service Status >> POP3 Connectivity**

<b>Description:</b> POP3 Service impacts POP3 Connectivity		
Cause		
CIT: Exchange Client Access Server	ETI: POP3 Service Status	Value: Down
Symptom		
CIT: Exchange Client Access Server	ETI: POP3 Connectivity	Value: Down

**Exchange::Exchange Hub Server:Active Mailbox Delivery Queue Length >> Mail Flow Latency**

<b>Description:</b> Active Mailbox Delivery Queue Length Impacts Mail Flow Latency		
Cause		
CIT: Exchange Hub Server	ETI: Active Mailbox Delivery Queue Length	Value: Very High
Symptom		
CIT: Exchange Mail Server	ETI: Mail Flow Latency	Value: Very High

**Exchange::Exchange Hub Server:Submission Queue Length >> MailFlow Latency**

<b>Description:</b> Submission Queue Length Impacts Mail Flow Latency		
Cause		
CIT: Exchange Hub Server	ETI: Submission Queue Length	Value: Very High
Symptom		
CIT: Exchange Mail Server	ETI: Mail Flow Latency	Value: Very High

**Exchange::Exchange Hub Server:Submission Thread Count >> Mail Submission Status**

<b>Description:</b> Submission Thread Count Impacts Mail Submission on Exchange Mail Server		
Cause		
CIT: Exchange Hub Server	ETI: Submission Thread Count	Value: Very High
Symptom		
CIT: Exchange Mail Server	ETI: Mail Submission Status	Value: Down

### Exchange::Exchange Hub Server:Transport Service Status >> Mail Submission Status & Mail Flow Status

<b>Description:</b> Transport Service Impacts Mail Submission and Mail Flow		
Cause		
CIT: Exchange Hub Server	ETI: Transport Service Status	Value: Down
Symptom 1		
CIT: Exchange Mail Server	ETI: Mail Flow Status	Value: Down
Symptom 2		
CIT: Exchange Mail Server	ETI: Mail Submission Status	Value: Down

### Exchange::Exchange Mailbox Database:Available Database Log Disk Space >> Information Store Service Status

<b>Description:</b> Available Database Log Disk Space Impacts Information Store Service		
Cause		
CIT: Exchange Mailbox Database	ETI: Available Database Disk Space	Value: Near Capacity
Symptom		
CIT: Exchange Mail Server	ETI: Information Store Service Status	Value: Down

### Exchange::Exchange Mailbox Database:Available Database Disk Space >> Information Store Service Status

<b>Description:</b> Available Database Disk Space Impacts Information Store Service		
Cause		
CIT: Exchange Mailbox Database	ETI: Available Transaction Log Disk Space	Value: Down



<b>Description:</b> Available Database Disk Space Impacts Information Store Service		
Symptom		
CIT: Exchange Mail Server	ETI: Information Store Service Status	Value: Down

**Exchange::Exchange Mail Server:Hub Server Reachability >> Mail Submission Status**

<b>Description:</b> Hub Server Reachability Impacts Mail Submission		
Cause		
CIT: Exchange Mail Server	ETI: Hub Server Reachability	Value: Down
Symptom		
CIT: Exchange Mail Server	ETI: Mail Submission Status	Value: Down

## Exchange::Exchange Mail Server:Information Store Service Status >> Client Accessibility

<b>Description:</b> Information Store Service Impacts Client Accessibility		
Cause		
CIT: Exchange Mail Server	ETI: Information Store Service Status	Value: Down
Symptom 1		
CIT: Exchange Client Access Server	ETI: Active Sync Connectivity	Value: Down
Symptom 2		
CIT: Exchange Client Access Server	ETI: IMAP4 Connectivity	Value: Down
Symptom 3		
CIT: Exchange Client Access Server	ETI: OWA Connectivity	Value: Down
Symptom 4		
CIT: Exchange Client Access Server	ETI: POP3 Connectivity	Value: Down

**Exchange::Exchange Mail Server:Information Store Service Status >> Mail Flow Status & Mapi Connectivity**

<b>Description:</b> Information Store Service Impacts Mail Flow and Mapi Connectivity		
Cause		
CIT: Exchange Mail Server	ETI: Information Store Service Status	Value: Down
Symptom 1		
CIT: Exchange Mail Server	ETI: Mail Flow Status	Value: Down
Symptom 2		
CIT: Exchange Mail Server	ETI: Mapi Connectivity	Value: Down

**Exchange::Exchange Mail Server:Mail Submission Service Status >> Mail Flow Status**

<b>Description:</b> Mail Submission Service Impacts Mail Flow		
Cause		
CIT: Exchange Mail Server	ETI: Mail Submission Service Status	Value: Down
Symptom		
CIT: Exchange Mail Server	ETI: Mail Flow Status	Value: Down

### Exchange::Exchange Unified Messaging Server:Speech Engine Status >> Unified Messaging Status

<b>Description:</b> Speech Engine Service Impacts Unified Messaging Service		
Cause		
CIT: Exchange Unified Messaging Server	ETI: Speech Engine Status	Value: Down
Symptom		
CIT: Exchange Unified Messaging Server	ETI: Unified Messaging Status	Value: Down

### Exchange::File System:Disk Usage Level >> Available Database Disk Space

<b>Description:</b> Disk Usage Level Impacts Available Database Disk space		
Cause		
CIT: FileSystem	ETI: Disk Usage Level	Value: Near Capacity
Symptom 1		
CIT: Exchange Mailbox Database	ETI: Available Database Disk Space	Value: Near Capacity
Symptom 2		
CIT: Exchange Mailbox Database	ETI: Available Transaction Log Disk Space s	Value: Near Capacity

**Exchange::GlobalCatalog:GC Query Response Time >> Exchange GC Search Time**

<b>Description:</b> GC Query Response Time Impacts Exchange GC Search		
Cause		
CIT: Global Catalog	ETI: GC LDAP Query Response Time	Value: Very High
Symptom		
CIT: MicrosoftExchangeServer	ETI: GC Search Time	Value: Very High

**Exchange::Microsoft Exchange Server:AD Topology Service Status >> Client Access Services**

<b>Description:</b> Active Directory Topology Service Impacts Client Access Services		
Cause		
CIT: MicrosoftExchangeServer	ETI: AD Topology Service Status	Value: Down
Symptom 1		
CIT: Exchange Client Access Server	ETI: File Distribution Service Status	Value: Down
Symptom 2		
CIT: Exchange Client Access Server	ETI: Exchange Service Host Status	Value: Down
Symptom 3		
CIT: Exchange Client Access Server	ETI: IMAP4 Service Status	Value: Down
Symptom 4		
CIT: Exchange Client Access Server	ETI: POP3 Service Status	Value: Down

### Exchange::Microsoft Exchange Server:AD Topology Service Status >> Hub Transport Services

<b>Description:</b> Active Directory Topology Service Impacts Hub Transport Services		
Cause		
CIT: MicrosoftExchangeServer	ETI: AD Topology Service Status	Value: Down
Symptom 1		
CIT: Exchange Hub Server	ETI: Transport Service Status	Value: Down
Symptom 2		
CIT: Exchange Hub Server	ETI: Edge Sync Service Status	Value: Down

### Exchange::Microsoft Exchange Server:AD Topology Service Status >> Mail Server Services

<b>Description:</b> Active Directory Topology Service Impacts Mail Server Services		
Cause		
CIT: ExchangeServer	ETI: AD Topology Service Status	Value: Down
Symptom 1		
CIT: Exchange Mail Server	ETI: Mail Submission Service Status	Value: Down
Symptom 2		
CIT: Exchange Mail Server	ETI: Mailbox Assistant Service Status	Value: Down
Symptom 3		
CIT: Exchange Mail Server	ETI: Replication Service Status	Value: Down
Symptom 4		

<b>Description:</b> Active Directory Topology Service Impacts Mail Server Services		
CIT: Exchange Mail Server	ETI: Exchange Service Host Status	Value: Down
Symptom 5		
CIT: Exchange Mail Server	ETI: Active Directory Access	Value: Down
Symptom 6		
CIT: Exchange Mail Server	ETI: Mapi Connectivity	Value: Down
Symptom 7		
CIT: Exchange Mail Server	ETI: Mail Flow Status	Value: Down

**Exchange::Microsoft Exchange Server:AD Topology Service Status >> Unified Messaging Services**

<b>Description:</b> Active Directory Topology Service Impacts Unified Messaging Services		
Cause		
CIT: ExchangeServer	ETI: AD Topology Service Status	Value: Down
Symptom 1		
CIT: Exchange Unified Messaging Server	ETI: File Distribution Service Status	Value: Down
Symptom 2		
CIT: Exchange Unified Messaging Server	ETI: Unified Messaging Status	Value: Down

### Exchange::Microsoft Exchange Server:GC Search Time >> Client Accessibility

<b>Description:</b> GC Search Time Impacts Client Accessibility		
Cause		
CIT: MicrosoftExchangeServer	ETI: GC Search Time	Value: Very High
Symptom 1		
CIT: Exchange Client Access Server	ETI: OWA Latency	Value: Very High
Symptom 2		
CIT: Exchange Client Access Server	ETI: Active Sync Latency	Value: Very High

### Exchange::Microsoft Exchange Server:GC Search Time >> Mail Flow Latency

<b>Description:</b> GC Search Time Impacts Mail Flow Latency		
Cause		
CIT: MicrosoftExchangeServer	ETI: GC Search Time	Value: Very High
Symptom		
CIT: Exchange Mail Server	ETI: Mapi Flow Latency	Value: Very High

### Exchange::Microsoft Exchange Server:GC Search Time >> Transport Queue Length

<b>Description:</b> GC Search Time Impacts Transport Queue		
Cause		
CIT: MicrosoftExchangeServer	ETI: GC Search Time	Value: Very High



<b>Description:</b> GC Search Time Impacts Transport Queue		
Symptom 1		
CIT: Exchange Hub Server	ETI: Active Mailbox Delivery Queue Length	Value: Very High
Symptom 2		
CIT: Exchange Hub Server	ETI: Remote Delivery Queue Length	Value: Very High
Symptom 3		
CIT: Exchange Hub Server	ETI: Delayed DSN Count	Value: Very High
Symptom 2		
CIT: Exchange Hub Server	ETI: Submission Queue Length	Value: Very High

**Exchange::Network Interface:Network IO >> Client Accessibility**

<b>Description:</b> Network IO Impacts Client Accessibility		
Cause		
CIT: Interface	ETI: Interface Utilization	Value: High
Symptom 1		
CIT: Exchange Client Access Server	ETI: Active Sync Latency	Value: Very High
Symptom 2		
CIT: Exchange Client Access Server	ETI: OWA Latency	Value: Very High

**Exchange::Network Interface:Network IO >> Mail Flow Latency**

<b>Description:</b> Network IO Impacts Mail Flow Latency		
Cause		
CIT: Interface	ETI: Interface Utilization	Value: High

<b>Description:</b> Network IO Impacts Mail Flow Latency		
Symptom		
CIT: Exchange Mail Server	ETI: MailFlowLatency	Value: Very High

### Exchange::Network Interface:Network IO >> Transport Queue Length

<b>Description:</b> Network IO Impacts Transport Queue Length		
Cause		
CIT: Interface	ETI: Interface Utilization	Value: High
Symptom 1		
CIT: Exchange Hub Server	ETI: Active Mailbox Delivery Queue Length	Value: Very High
Symptom 2		
CIT: Exchange Hub Server	ETI: Remote Delivery Queue Length	Value: Very High
Symptom 3		
CIT: Exchange Hub Server	ETI: Delayed DSN Count	Value: Very High
Symptom 4		
CIT: Exchange Hub Server	ETI: Submission Queue Length	Value: Very High

### Exchange::Windows:CPU Load >> Edge TransportQueueLength

<b>Description:</b> CPU Load Impacts Edge Transport Queue Length		
Cause		
CIT: Windows	ETI: CPU Load	Value: Bottlenecked
Symptom 1		
CIT: Exchange Edge Server	ETI: Submission Queue Length	Value: Very High

<b>Description:</b> CPU Load Impacts Edge Transport Queue Length		
Symptom 2		
CIT: Exchange Edge Server	ETI: Active Mailbox Delivery Length	Value: Very High
Symptom 3		
CIT: Exchange Edge Server	ETI: Aggregate Delivery Queue Length	Value: Very High

**Exchange::Windows:CPU Load >> Hub TransportQueueLength**

<b>Description:</b> CPU Load Impacts Hub Transport Queue Length		
Cause		
CIT: Windows	ETI: CPU Load	Value: Bottlenecked
Symptom 1		
CIT: Exchange Hub Server	ETI: Submission Queue Length	Value: Very High
Symptom 2		
CIT: Exchange Hub Server	ETI: Active Mailbox Delivery Length	Value: Very High
Symptom 3		
CIT: Exchange Hub Server	ETI: Aggregate Delivery Queue Length	Value: Very High

**Exchange::Windows:CPU Load >> OWA Latency & Active Sync Latency**

<b>Description:</b> CPU Load Impacts OWA and Active Sync Latency		
Cause		
CIT: Windows	ETI: CPU Load	Value: Bottlenecked
Symptom 1		
CIT: Exchange Client Access Server	ETI: OWA Latency	Value: Very High

<b>Description:</b> CPU Load Impacts OWA and Active Sync Latency		
Symptom 2		
CIT: Exchange Client Access Server	ETI: Active Sync Latency	Value: Very High

### Exchange::Windows:Logical Disk Free Space >> Exchange Database

<b>Description:</b> Available Disk Space on Logical Disk Impacts Exchange Database		
Cause		
CIT: Windows	ETI: LogicalDisk Free Space	Value: Near Capacity
Symptom		
CIT: Exchange Mail Server	ETI: Database Instance Status	Value: Critical

### Exchange::Windows:Memory Load >> Exchange Memory Status

<b>Description:</b> Memory Load Impacts Memory Available for Exchange		
Cause		
CIT: Windows	ETI: Memory Load	Value: Paging
Symptom		
CIT:Exchange Mail Server	ETI: Exchange Memory Status	Value: Critical

### Exchange::Windows:Memory Usage Level >> Exchange Memory Status

<b>Description:</b> Memory Usage Level Impacts Memory Available for Exchange		
Cause		
CIT: Windows	ETI: Memory Usage Level	Value: Near Capacity
Symptom		
CIT: Exchange Mail Server	ETI: Exchange Memory Status	Value: Critical

**Exchange::Windows:PageFile Usage >> Exchange Memory Status**

<b>Description:</b> Page File Usage on the Computer which hosts Exchange Mail Server Impacts Exchange Memory Status		
Cause		
CIT: Windows	ETI: Page File Usage	Value: Near Capacity
Symptom		
CIT: Exchange Mail Server	ETI: Exchange Memory Status	Value: Critical

**Exchange::Windows:Ping Availability >> Hub Server Reachability & Mail Submission Status**

<b>Description:</b> Ping Availability of Hub Server Impacts Mail Submission and Hub Server Reachability		
Cause		
CIT: Windows	ETI: Ping Availability	Value: Unavailable
Symptom 1		
CIT: Exchange Mail Server	ETI: Mail Submission Status	Value: Down
Symptom 2		
CIT: Exchange Mail Server	ETI: Hub Server Reachability	Value: Down

## Tool Definitions

**Start MS Exchange Information Store Service:** Starts the Microsoft Exchange Information service on a Microsoft Exchange 2007 Mailbox server.

**Start MS Exchange Transport Service:** Starts the Microsoft Exchange Transport Service on a Microsoft Exchange 2007 Transport server.

## Graph Templates

The following table lists the graph templates present in the content pack and mapped policies.

Graph Templates	Metric Name	Policy Description
Virtual Memory Largest Block Size	EXSPI-8X Dc-Information Store Performance	Collect Performance Data on MExchangeIS Object
Virtual Memory Large Free Block Megabytes Usage		Collect Performance Data on MExchangeIS Object
Virtual Memory 16MB Free Block Trend		Collect Performance Data on MExchangeIS Object
Information Store Users and Connections		Collect Performance Data on MExchangeIS Object
MAPI RPC Performance		Collect Performance Data on MExchangeIS Object
MAPI RPC Latency Levels	EXSPI-8X Dc-Outlook Client	Log Outlook Client Metrics
Outlook Client RPC Performance		Log Outlook Client Metrics
Outlook Client Failures		Log Outlook Client Metrics

Graph Templates	Metric Name	Policy Description
Exchange 2007 Public Folder Store EDB Database Statistics	EXSPI-8X Get Public IS Sum Data	Gets Public Folder Database Details
Exchange 2007 Mailbox Store EDB Database Statistics	EXSPI-8X Get Mailbox IS Sum Data	Gets Mailbox Database Details
Transport Server Queues	EXSPI-8X Dc Transport Queues	This policy will log performance data of Transport Queues

### Policies Setting ETIs

The following table lists the content pack ETIs and SPI policies that set the ETIs.

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**Note:** For more information on the measurement threshold policies and events, refer to the HP Operations Smart Plug-in for Microsoft Exchange Server documentation.

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ETI/Hi	Policy Name	Policy Description
Active Directory Access	-	-
Active Mailbox Delivery Queue Length	EXSPI-8X Edge Th-Active Mailbox Delivery Queue Length	Active Mailbox Delivery Queue Length is the number of messages in the active mailbox queues.
	EXSPI-8X Hub Th-Active Mailbox Delivery_ QLength	Alarm on Active Mailbox Delivery Queue Length perfmon counter.

ETI/Hi	Policy Name	Policy Description
ADAM Service Status	EXSPI-8X_ Check_ ADAM Service Status	Checks the status of Microsoft Exchange ADAM Service
AD Topology Service Status	EXSPI-8X_ Check_AD Topology Service Status	Checks the status of Microsoft Exchange Active Directory Topology Service
Aggregate Delivery Queue Length	EXSPI-8X Edge Th-Agg Delivery QLength -All_Queues	Aggregate Delivery Queue Length -All_Queues is the number of messages queued for delivery in all queues.
	EXSPI-8X Hub Th-Agg Del_ QLength -All_ Queues	Alarm on Aggregate Delivery Queue Length -All_Queues perfmon counter.
Available Database Disk Space	-	-
ActiveSyncConnectivity	EXSPI-8X-Async Connectivity_Latency	Monitor the ActiveSync Latency on the server
ActiveSyncLatency	EXSPI-8X-Async Connectivity_Result	Monitor the status of ActiveSync Connectivity
Available Transaction Log Disk Space	-	-
Average Mail Delivery Time	EXSPI-8X IS Mailbox Average Delivery Time	Information Store mailbox average delivery time.
Average Time for PF Delivery	EXSPI-8X IS Public Average Delivery Time	Information store public average delivery time.
Create Item Latency	SiteScope	-
Create Item Status	SiteScope	-
Database Instance Status	EXSPI-8X Information Store Db Log Threads Waiting	Alarm on information store threads waiting to write to transaction log



ETI/Hi	Policy Name	Policy Description
Delete Item Latency	-	-
Delete Item Status	SiteScope	-
Delayed DSN Count	EXSPI-8X Edge Th-Delay DSNs	Delay DSNs is the number of delivery status notification (DSNs) messages that have been generated.
	EXSPI-8X Hub Th-Delay DSNs	Alarm on delay DSNs perfmon counter
Edge Credential Service Status	EXSPI-8X_ Check_ Edge Credential Service Status	Checks the status of Microsoft Exchange Credential Service
Edge Synchronization Status	-	-
Edge Sync Service Status	EXSPI-8X_ Check_HUB Exchange Edge Sync Service Status	Checks the status of Microsoft Exchange EdgeSync Service
Exchange Memory Status	EXSPI-8X Information Store Memory Errors	Alarm on the number of Microsoft Exchange memory errors.
Exchange Service Host Status	EXSPI-8X_ Check_ CAS ExchangeServiceHost Status	Checks the status of Microsoft Exchange Mailbox Service Host
	EXSPI-8X_ Check_ MBE xchangeServiceHost Status	Checks the status of Microsoft Exchange Mailbox Service Host
Failed DSN Count	EXSPI-8X Edge Th-Failure DSNs Total	Failure DSNs is the number of failure delivery status notifications (DSNs) messages that have been generated.
	EXSPI-8X Hub Th-FailureDSNsTotal	Alarm on failure DSNs total perfmon counter

ETI/Hi	Policy Name	Policy Description
File Distribution Service Status	EXSPI-8X_ Check_ CASFile Distribution Service Status	Checks the status of Microsoft Exchange File Distribution Service
	EXSPI-8X_ Check_ UM FileDistributionService Status	Checks the status of Microsoft Exchange File Distribution Service
GC Search Time	-	-
GC Bind Time	-	-
Get Folder Latency	SiteScope	-
Get Folder Status	SiteScope	-
Hub Server Reachability	EXSPI-8X- MExchange Mail Submission Events'	Reports Microsoft Exchange mail submission events.
IMPA4 Connectivity	EXSPI-8X-Imap Connectivity_Result	Monitor the status of Imap Connectivity
IMAP4 Latency	EXSPI-8X-Imap Connectivity Latency	Monitor the IMAP4 Latency on the server
IMAP4 Service Status	EXSPI-8X_ Check_ IMAP4 Service Status	Checks the status of Microsoft Exchange IMPA4 Service
IMAP4 Status	EXSPI-8X IMAP4 Failed Connection Rate	IMAP4 failed connections percentage
Information Store Service Status	EXSPI-8X_ Check_ Information Store Service Status	Checks the status of Microsoft Exchange Information Store Service
Largest Delivery Queue Length	EXSPI-8X Edge Th-Largest Delivery Queue Length	Largest Delivery Queue Length is the number of messages in the largest delivery queue.
	EXSPI-8X Hub Th-Largest Delivery_ QLength	Alarm on Largest Delivery Queue Length perfmon counter.

ETI/Hi	Policy Name	Policy Description
Load Exchange Topology	EXSPI-8X MsExchange EdgeSync Events	Reports Microsoft Exchange edgesync events.
Mailbox Assistant Service Status	EXSPI-8X_ Check_ Mailbox Assistant Service Status	Checks the status of Microsoft Exchange Mailbox Assistants Service.
Mailbox Receive Queue Length	EXSPI-8X IS Mailbox Receive Queue Length	Checks the information store mailbox receive queue length.
Mail Submission Service Status	EXSPI-8X_ Check_ Mail Submission Service Status	Checks the status of Microsoft Exchange Mail Submission Service
Mail Submission Status	EXSPI-8X- MSEExchange Mail Submission Events	Reports Microsoft Exchange mail submission events.
MapiConnectivity	EXSPI-8X-Mapi Connectivity_Result	Monitor the status of MAPI Connectivity
MapiLatency	EXSPI-8X-Mapi Connectivity_Latency	Monitor the MAPI Latency on the server
MailFlowLatency	EXSPI-8X-MailFlow Status_Latency	Monitor the MailFlowLatency on the server
MailFlowStatus	EXSPI-8X-MailFlow Status_Result	Monitor the status of Mail Flow
OWAConnectivity	EXSPI-8X-Owa Connectivity_Result	Monitor the status of OWA Connectivity
OWALatency	EXSPI-8X-Owa Connectivity_Latency	Monitor the OWA Latency on the server
Poison Queue Length	EXSPI-8X Hub Th-Poison _QLength	Alarm on poison queue length perfmon counter
	EXSPI-8X Edge Th-Poison Queue Length	Poison message queue length is the number of messages in the poison message queue.
POP3Connectivity	EXSPI-8X-Pop Connectivity_Result	Monitor the status of Pop3 Connectivity

ETI/Hi	Policy Name	Policy Description
POP3 Latency	EXSPI-8X-Pop Connectivity Latency	Monitor the status of Pop3 Latency
POP3 Service Status	EXSPI-8X_ Check_ POP3 Service Status	Checks the status of Microsoft Exchange POP3 Service
POP3 Status	EXSPI-8X POP3 Failed Connection Rate	POP3 failed connections percentage
Public Receive Queue Length	EXSPI-8X IS Public Receive Queue Length	Checks the information store public receive queue length.
Public Replication Queue Length	EXSPI-8X IS Public Replication Queue Length	Checks the information store replication queue length.
Remote Delivery Queue Length	EXSPI-8X Edge Th-Active Remote Delivery Queue Length	Reports the number of messages in the active remote delivery queues.
	EXSPI-8X Hub Th-Active Remote Delivery_ QLength	Alarm on active remote delivery queue length perfmon counter.
Replication Service Status	EXSPI-8X_ Check_ Replication Service Status	Checks the status of Microsoft Exchange Mailbox Replication Service
Retry Non Smt Delivery Queue Length	EXSPI-8X Edge Th-Retry Non-SMTP Delivery Queue Length	Retry Non-SMTP Delivery Queue Length is the number of messages in retry in the non-SMTP gateway delivery queues.
	EXSPI-8X Hub Th-RetryNon-Smt Delivery_ QLength	Alarm on Retry Non-Smt Delivery Queue Length perfmon counter.
Search Latency	SearchLatency	-
Search Status	SearchLatency	-
Speech Engine Status	EXSPI-8X_ Check_ Speech Engine Status	Checks the status of Microsoft Exchange Speech Engine Service

ETI/Hi	Policy Name	Policy Description
Submission Thread Count	EXSPI-8X MsExchange Store Driver Events	Reports the events generated for the source Microsoft Exchange store driver.
Submission Queue Length	EXSPI-8X Edge Th-Submission Queue Length	Number of messages in the submission queue.
	EXSPI-8X Hub Th-Submission _QLength	Alarm on submission queue length perfmon counter.
Sync Folder Latency	SiteScope	-
Sync Folder Status	SiteScope	-
System Attendant Status	EXSPI-8X_ Check_ System Attendant Status	Checks the status of Microsoft Exchange Mailbox System Attendant Service
Transport Service Status	EXSPI-8X_ Check_ HUB Exchange Transport Service Status	Checks the status of Microsoft Exchange Transport Service
	EXSPI-8X_ Check_ EDGE Exchange Transport Service Status	Checks the status of Microsoft Exchange Transport Service
Unified Messaging Status	EXSPI-8X_ Check_ Unified Messaging Status	Checks Unified Messaging service status.
Unified Messaging Connectivity	-	-

ETI/HI	Policy Name	Policy Description
Unreachable Queue Length	EXSPI-8X Hub Th-Unreachable_QLength	Alarm on unreachable queue length perfmon counter
	EXSPI-8X Edge Th-Unreachable Queue Length	Unreachable queue length is the number of messages in the unreachable queue.

## Operations Orchestration Flow

The following table lists the Microsoft Exchange Server 2007 Operations Orchestration (OO) Flows:

### OO Flow: Check Client Access Server Health

Flow input	Mapping CI	Event Attribute
omServer	exchangeclientaccessserver	Originating Server

User input when executing OO flow: Check Client Access Server Health

Flow input	CI Type
omServer	DNS name of the HPOM management server. The HPOM server will launch commands on managed nodes
omServerPort	Port number of the HPOM Tool WS
omServerUser	The user name for the HPOM Server that will use used in the HPOM Tool WS
omServerPassword	The password for the HPOM Server that will use used in the HPOM Tool WS
omNode	Target node with an HPOM Agent.
omCmdTimeout	The timeout value to be used when running the remote command on the node. By default set to 100000.
threshold	The threshold for GC Query Latency in milliseconds

**OO Flow: Check Mailbox Server Health**

Flow input	Mapping CI	Event Attribute
omServer	exchangemailserver	Originating Server

User input when executing OO flow: Check Mailbox Server Health

Flow input	CI Type
omServer	DNS name of the HPOM management server. The HPOM server will launch commands on managed nodes
omServerPort	Port number of the HPOM Tool WS
omServerUser	The user name for the HPOM Server that will use used in the HPOM Tool WS
omServerPassword	The password for the HPOM Server that will use used in the HPOM Tool WS
omNode	Target node with an HPOM Agent.
omCmdTimeout	The timeout value to be used when running the remote command on the node. By default set to 100000.
threshold	The threshold for GC Query Latency in milliseconds
maillatency	The threshold for MailFlow Latency in milliseconds

**OO Flow: Check Replication Health**

Flow input	Mapping CI	Event Attribute
omServer	exchangemailserver	Originating Server

User input when executing OO flow: Check Replication Health

Flow input	CI Type
omServer	DNS name of the HPOM management server. The HPOM server will launch commands on managed nodes
omServerPort	Port number of the HPOM Tool WS

Flow input	CI Type
omServerUser	The user name for the HPOM Server that will use used in the HPOM Tool WS
omServerPassword	The password for the HPOM Server that will use used in the HPOM Tool WS
omNode	Target node with an HPOM Agent.
omCmdTimeout	The timeout value to be used when running the remote command on the node. By default set to 100000.
threshold	The threshold for GC Query Latency in milliseconds





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