

HP Operations Manager i

for the Windows® operating system

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Concepts Guide

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1 Welcome to this Guide

Overview

The information in this book explains how HP Operations Manager i (HP OMi) works from the perspective of an individual user's work flow, that is: the daily tasks the user performs and the order in which the tasks typically occur. This book also provides information about the concepts underlying the different management tools that are available to the various types of users and, where appropriate, explains why the tools work the way they do. This book helps users understand why they need the tools that HP OMi provides to manage the operational environment and how to use HP OMi to investigate and solve the problems that occur.

How this Guide is Organized

The HP OMi Concepts Guide includes information about the background to the following concepts:

- [Introduction to HP Operations Manager i](#) on page 13:

A high-level overview of the most important features helps you to understand how you can use HP OMi to improve the performance, availability, and efficiency of your IT environment, both from the perspective of business-services and the perspective of system infrastructure.

- [User Management](#) on page 31:

HP OMi enables you to define users and user groups with a defined work flow and a specific area of responsibility. Configuring the individual users or the groups to which the users belong involves granting authorization so that the members of user groups can see the events they are best qualified to investigate and start any necessary event-related tools.

- [Event Management](#) on page 43:

HP OMi provides a comprehensive set of tools to enable users manage the events that occur in the operational environment. The tools that are available to individual users depend on the responsibilities assigned to the users, the demands of the users' (or user group's) work flow, and the context in which the users perform their tasks.

- [Topology-Based Event Correlation](#) on page 97:

In HP OMi, users with the appropriate authorization can define and enable rules that correlate the events occurring in the managed IT environment. Correlating events greatly reduces the number of events displayed in the browser, and the reduced number of events in the browser enables the user to locate and fix the cause of the underlying problems more quickly and efficiently.

- [Health-Based Monitoring](#) on page 121:
HP OMi extends the concept of event severity to include health status. Health status provides a much broader and more accurate view of the current and historical state of the objects in the monitored environment. The additional health-related information enables HP OMi to display a detailed overview of the overall health of configuration items in the monitored environment from different perspectives.
- [HP OMi Content](#) on page 165:
HP OMi provides a set of tools to help users manage HP OMi content, which is the data that HP OMi uses to describe the objects it monitors in the operational environment. The content-management tools that are available to individual users depend on the responsibilities assigned to the group the user belongs to, the demands of a user's work flow, and the context in which the users perform their tasks.
- [Custom Tools](#) on page 189:
HP OMi provides an administrative feature that aims to help authorized users such as domain experts create, configure, and manage custom tools. Custom tools are self-configured commands, scripts, or URLs that are intended to help domain operators resolve and close specific types of events that occur in the operational environment.

Who Should Read this Guide

This guide is intended for the following users of HP BSM console:

- HP OMi software administrators
- Domain (subject matter) experts, for example: DB, Exchange, SAP, and so on
- HP OMi operators and domain operators

Users of this guide should be knowledgeable about and comfortable with navigating and using enterprise applications. The users should also be familiar not only with the HP BSM Console but also the concepts underlying enterprise monitoring and management. The standard user types used to help describe the contents of this manual are explained in more detail in [User Management](#) on page 31.

Table 1 HP OMi Concepts Guide: Target Audience

Page	Section Contents	HP OMi Admin	Domain Expert	Domain Operator
11	Welcome to this Guide	✓	✓	✓
13	Introduction to HP Operations Manager i	✓	✓	✓
31	User Management	✓	✓	-
43	Event Management	-	✓	✓
97	Topology-Based Event Correlation	✓	✓	-
121	Health-Based Monitoring	✓	✓	-
165	HP OMi Content	✓	✓	-
189	Custom Tools	✓	✓	✓

2 Introduction to HP Operations Manager i

Overview

The information in this section provides a high-level overview of HP OMi that is designed to help you understand how you can use HP OMi to improve the efficiency of your IT services and infrastructure. The conceptual areas introduced in this chapter are discussed in a wider context and in more detail later in the book. For more information about the contents of the *HP Operations Manager i Concepts Guide* see [How this Guide is Organized](#) on page 11.

This section introduces the following HP OMi-related concepts:

- [What is HP OMi?](#) on page 14
- [Architecture and Design](#) on page 16
- [Installation and Deployment](#) on page 18
- [The Event Perspective](#) on page 19
- [The Health Perspective](#) on page 22
- [Topology-Based Event Correlation](#) on page 24
- [Extendable Management Configuration](#) on page 28
- [User Roles and Responsibilities](#) on page 30

What is HP OMi?

HP Operations Manager i (HP OMi) is the latest in a long line of successful management solutions from HP Software. HP OMi brings together business-service management and infrastructure management to enable you to monitor and manage the wide variety of problems that occur in IT environments from different but complimentary perspectives at the same time.

The collated data that these different perspectives provide can help you to improve the performance and availability of infrastructure and services in the IT environment. If you want to monitor a heterogeneous network from the perspective of its operational infrastructure and, at the same time, from the perspective of business services, but the network is so large and complex that you need help to keep track of the all the events that occur, then a management solution with the features and functionality of HP OMi is for you.

HP OMi provides the following high-level features:

- Central, consolidated browser-based console:

- Event Perspective:

The event perspective enables centralized event-management which consolidates and correlates IT-infrastructure events of all types and categories and from multiple sources, for example: HP Operations Manager agents, HP Network Node Manager i (HP NNMi), HP SiteScope, HP Business Process Monitor, and so on. For more information about the HP OMi event perspective, see [The Event Perspective](#) on page 19.

- Health Perspective:

The health perspective uses health indicators and key performance indicators to provide a broader, more detailed, and much more accurate view of the health of the system infrastructure, networks, and IT infrastructure and display it in a consolidated, central console. For more information about the HP OMi health perspective, see [The Health Perspective](#) on page 22.

- Topology-based event correlation:

Topology-based event correlation enables you not only to determine the root cause of an event but also to establish a link between the cause of an event and any symptoms of the event. The link between correlated events is made automatically and in real time by causal rules and refined using topological information concerning the configuration items impacted by the events. For more information about HP OMi topology-based event correlation, see [Topology-Based Event Correlation](#) on page 24.

HP OMi has access to (and unrestricted use of) the central configuration-management database that is shared with other HP BSM software applications. This means that HP OMi always has immediate access to the very latest updates to the precise and detailed topology data stored in the universal configuration-management database (UCMDB). HP OMi does not require system administrators to invest any additional effort for the maintenance of topology data in the UCMDB.

For more information about the UCMDB and the benefits it brings to HP OMi, see [HP OMi and the UCMDB](#) on page 25.

- Integrated problem solving:

HP OMi provides a variety of ways to help the investigation into an event's underlying problems:

- Tools:

HP OMi provides a suite of integrated tools to help you configure HP OMi itself and enables you to configure custom tools to help solve specific, event-related problems. Note that you can configure custom tools to use the HP Operations Manager's distributed agents to run commands directly on managed systems.

- Graphs:

HP OMi provides graphs and charts that can help you visualize performance-related problems and trends affecting the configuration items impacted by an event.

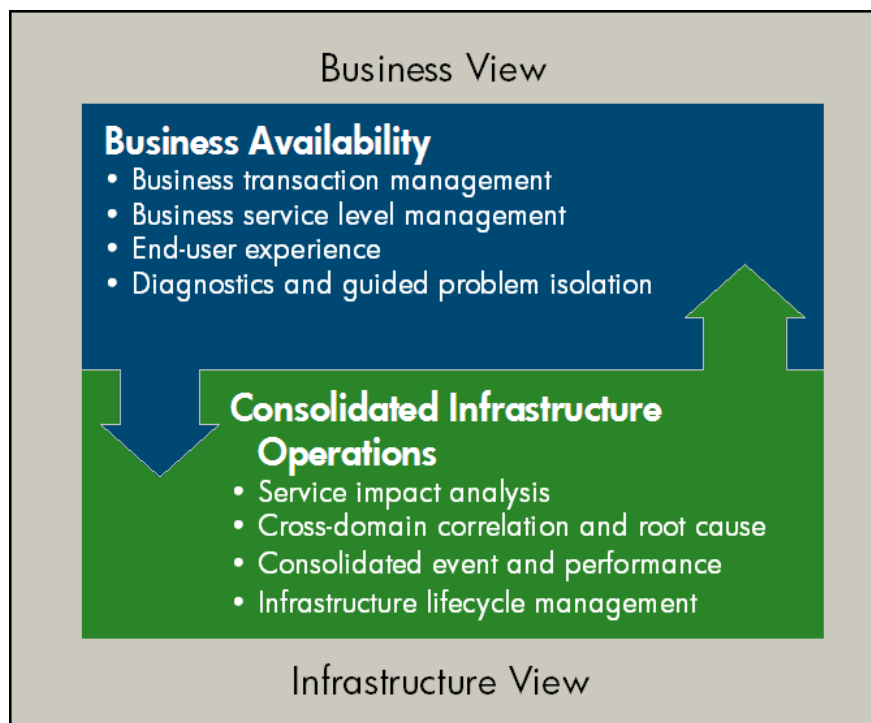
- Actions:

HP OMi enables you to use either automatic or user-initiated actions to solve event-related problems either remotely or at source.

Architecture and Design

HP's Business Service Management (BSM) solution combines the strength of the top-down view of business processes provided by HP Business Availability Center with the advantages of the bottom-up view of infrastructure provided by solutions such as HP Operations Manager i (HP OMi) and HP Network Node Manager i (HP NNMi). The combined solution enables infrastructure (system and applications) administrators to take advantage of the benefits of a common model that is applied to processes in both business-service management and IT-infrastructure management.

Figure 1 HP OMi Architecture Overview



The approach that HP OMi uses to merge these management themes and improve the monitoring scope is based on the following central points:

- Central, consolidated console:

One central, browser-based console provides a clear and consolidated view not only of the current but also the historical state of the monitored environment. The console also provides access to configuration and analysis tools that meet the different needs of a variety of user types.

HP OMi also enables users to collect, view, correlate, and manage events from End User Management (EUM) in the consolidated console. EUM events can include events from Real User Management (RUM) and the Business Process Monitor (BPM).

- Event perspective

HP OMi collects and displays details of the problems that occur in the monitored environment in terms of the events themselves, as reported by the various applications, for example: the type and category of event, the source of the event, the time and location of the event, the object or application that caused the event, and so on.

HP OMi also enables users to collect, view, correlate, and manage events from End User Management (EUM). EUM includes events from Real User Management (RUM) and Business Process Monitor (BPM) probes.

For more information, see [The Event Perspective](#) on page 19.

- Health perspective:

HP OMi collects and displays details of the problems that occur in the monitored environment in terms of the health status of the object impacted by an event. The health status is determined by rules that use information defined in key performance indicators (KPI). The KPIs use data provided by a collection of specific health indicators to calculate the so-called health of a monitored object.

HP OMi enables you to use health-based severity-calculation rules that consider relationships with other monitored objects and take into account their impact on dependent objects up and down the object hierarchy. The consolidated health status can then be propagated up the object hierarchy to enable a much more accurate view of the status of a monitored object's health. For more information, see [The Health Perspective](#) on page 22.

- Topology-Based Event Correlation

HP OMi uses the event type as the basis for topology-based event correlation, which uses rules that establish relationships between symptom and cause events from all sources to reduce and refine the number and type of events displayed in the console.

HP OMi uses the central configuration-management database that is shared with other HP BSM software applications. This means that HP OMi always has immediate access to the very latest updates to the precise and detailed topology data stored in the UCMDb. One of the many advantages of this approach is that changes to topological data do not require modifications to rules and tools that use the data.

For more information, see [Topology-Based Event Correlation](#) on page 24.

Installation and Deployment

HP OMi's primary role is at the top of the flexible-management hierarchy, where it provides a central, consolidated platform from which you can manage multiple HP Operations Manager servers. Although it is designed to run in larger enterprise environments, HP OMi supports a number of different deployment strategies. The deployment strategy you adopt for HP OMi depends on the deployment and configuration of the underlying BSM platform, the size of the IT environment you want to monitor and manage with HP OMi, and the available hardware.

If hardware is limited, for example in a test environment, you can install all HP OMi components on one machine. In production environments, where performance is critical and hardware more widely available, you can split the HP OMi components by installing them on different machines.

If you need to support large numbers of requests from many different users logged in at the same time, and the network you want to monitor is so large that topology discovery takes a long time and large numbers of events occur, you can extend the two-machine deployment to support load-balancing strategies, too. Load balancing shares requests across multiple servers to improve response times and the availability of HP OMi services.

If your network contains mission-critical applications or machines that are expected to provide round-the-clock services, you can deploy HP OMi in such a way as to support high availability needs, too. HP OMi works in a high-availability environment where the availability of redundant hardware enables the provision of services to switch seamlessly to a backup machine if the primary server fails or needs to be taken offline for any reason. You can install HP OMi in high-availability environments and configure HP OMi to provide highly available services, too.

However you deploy HP OMi, it provides you with an "operations bridge", a central location that enables the end-to-end monitoring and management of events. The operations bridge enables you to route event notifications to the appropriate operators and ensure that the operators can concentrate on managing the events and fixing the underlying problems automatically, with the relevant tools, or with technical assistance from colleagues in their work group.

The advantage of HP OMi's global view of what is happening in the monitored environment at any one time is that you can configure and deploy structured processes that automate the investigation and resolution of underlying problems that cause the most common events. Where automation is not possible or allowed, HP OMi enables you to provide guidance and assistance from domain experts, who have experience in particular fields.

For example, by automating the resolution of common events, you enable users to concentrate their efforts on the events that *do* need user intervention. If you categorize events into technical domains and deploy user groups that are responsible for a particular technical domain, you can further improve event-resolution efficiency. And if you enable domain experts to enrich events with tips and tricks that help others understand and solve the event's underlying problem, you can reduce and refine the number of the events that reach and cross the operations bridge.

The correct deployment and configuration of HP OMi enables you to extract the maximum value from the concept of the operations bridge by enabling users to solve problems before the problems lead to degradation in the quality of the business services. This, in turn, enables operators of all types to focus on strategic activities.

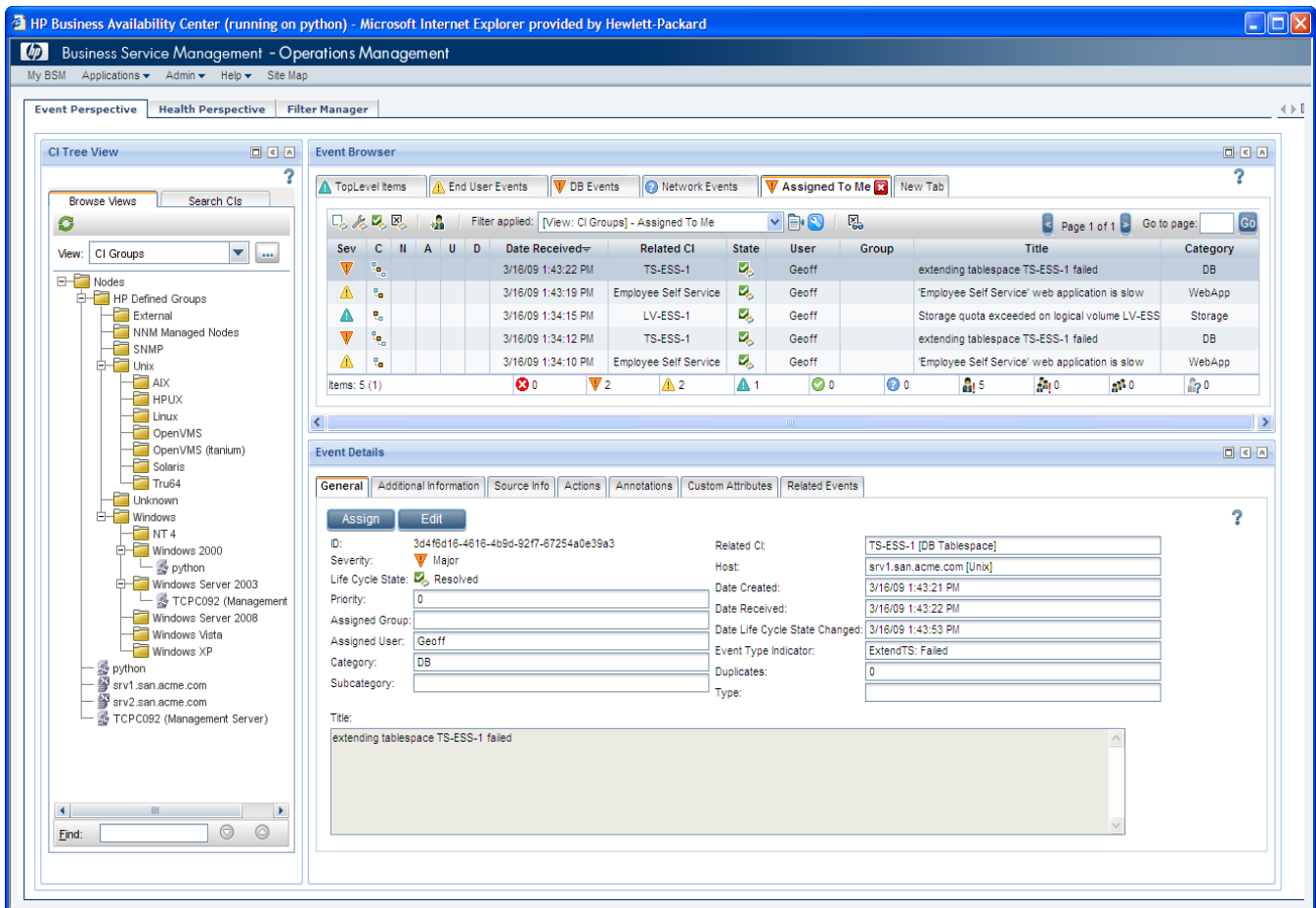
The Event Perspective

In HP OMi, the event perspective displays event-related information in such a way as to enable you to monitor events from a variety of different sources and manage the events' underlying problems from one, consolidated, central location. The event perspective is central to HP OMi's traditional approach to event management. In HP OMi, you can configure many aspects of the event perspective to suit the demands of an individual user's work flow or the work flow assigned to a user group.

Figure 2 on page 19 shows the standard Event Perspective tab, which includes the following panes:

- **CI Tree View:** An overview of the monitored objects (configuration items) in the immediate environment in which the event occurred.
- **Event Browser:** A list of the events currently under investigation, filtered according to the view or configuration-item selected in the CI Tree View.
- **Event Details:** More detailed information about the background to the event organized into technical areas such as: the event source, actions that are available to help solve the underlying problem, and a list of any related events.

Figure 2 The Event Perspective



Although the events that HP OMi displays in the event browser have a consistent form, they can originate from a number of different sources, both internal and external, for example:

- HP Operations Manager for UNIX (HPOM for UNIX)
- HP Operations Manager for Windows (HPOM for Windows)
- HP Network Node Manager i (HP NNMi)
- HP Business Availability Center (BAC)/ End User Management (EUM):
 - Business Process Monitor (BPM)
 - Real User Monitor (RUM)
- HP SiteScope
- HP Systems Insight Manager
- Third-party events, for example: Microsoft® Systems Center Operations Manager, AD, Exchange, BlackBerry Enterprise Server, SAP, and so on.

The “intermediary” that HP OMi uses to gather events from the different sources is the HP Operations Manager running on either UNIX® (HPOM for UNIX) or Microsoft Windows (HPOM for Windows). The HP Operations Manager management server can be configured to forward *all* events to HP OMi using the message-forwarding component included in the HP Operations Manager flexible-management functionality. In other words, HP OMi performs the role of senior manager in the flexible management hierarchy and can be configured to manage *all* your HPOM for UNIX and HPOM for Windows management servers.

In its position at the top of the message-forwarding hierarchy, HP OMi receives a large amount of event notifications. With so many event notifications arriving from so many different sources, it is essential to be able to control not only the number of events in the event browser but also which users see the event notifications that arrive and what actions the users can perform to help solve the event’s underlying problem. HP OMi’s topology-based event-correlation feature enables you to manage the problem of large numbers of similar (related) symptom events in a large network. The correlation feature reduces the overall number of events presented to users without ignoring or losing important data and enables users to drill down through the hierarchy of related events.

HP OMi’s user-assignment feature enables you to use event types and categories to ensure that events are assigned to the user workgroups with the most appropriate knowledge and skills. The various members of the workgroup can collaborate in any investigation into the assigned event’s underlying problem and are collectively responsible for resolving and closing the event.

The events that you manage with HP OMi pass through a so-called “life cycle”, which is a convenient and widely accepted way to display and monitor the status of an event or, more precisely, the status of the investigation into the problem that caused the event. In HP OMi, you assign events to users, who open an investigation and work on finding a solution to the event’s underlying problem. Experts can then assess the proposed solution, check that it solves the problem that caused the selected event, and close the event to end the life cycle.



HP OMi moves resolved problems automatically to the history browser, where they remain available for recall if users need to solve similar problems at a later date.

HP OMi and HP Operations Manager synchronize the state of events and messages. Closing an event in HP OMi automatically acknowledges the corresponding message in HP Operations Manager. Similarly, HP Operations Manager notifies HP OMi about the acknowledgement of messages, and HP OMi automatically updates the life-cycle state of the corresponding events to “closed”.

HP OMi's user functionality enables you to configure and manage groups of users who have skills and knowledge in particular fields. You can define profiles that determine access to objects and events and then apply the profile to the user groups. HP OMi allows a large amount of scope in the configuration of user details.

You can also create and configure tools for users to help them solve the events assigned to them. HP OMi links tools to configuration-item types such as databases or file systems so that the tools are available directly from any event that has an impact on the configuration item. For example, you can provide database diagnostic tools which users can start in the context of any event that is related to database problems.

HP OMi also enables context-sensitive **actions**. Actions are linked to event notifications and come in different forms, for example: automatic or user-initiated. The different types of event-related actions are intended to help solve an event's underlying problems either automatically or, where necessary, with user interaction.

Graphs provide the opportunity to analyze performance-related data in a graphical context, for example, to predict bottlenecks by using the information available in HP OMi relating to configuration items (CI) and topology relations. HP OMi enables all users to launch performance graphs either directly from a CI or from the events that have an impact on the selected configuration item. Users with the appropriate authorizations can also access tools that enable them to create their own, new graph templates and manage the templates by grouping them into categories and families.

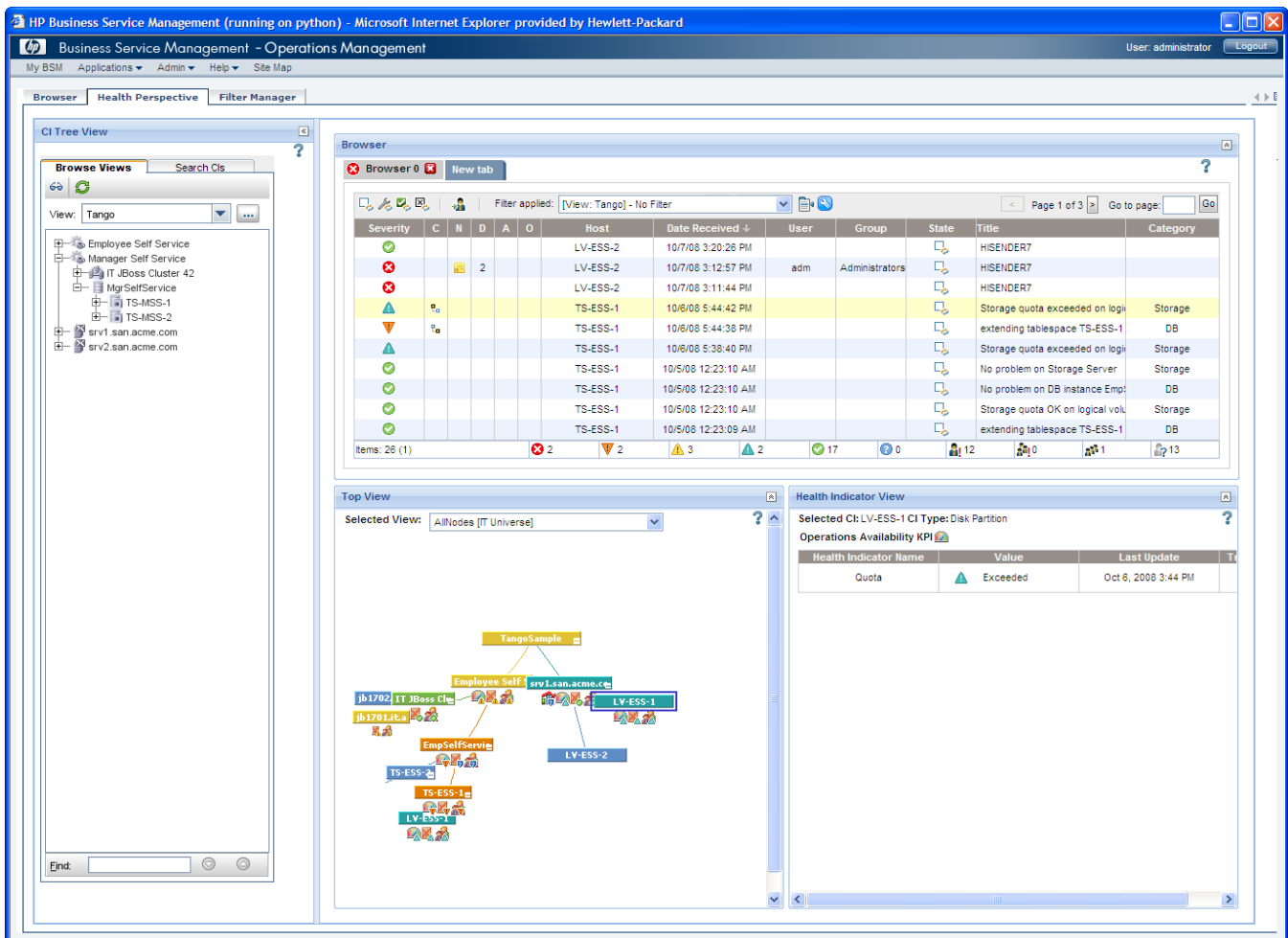
The Health Perspective

HP OMi extends the concept of severity status beyond the event itself to include information about the health of the object impacted *by* the event. The health perspective helps to provide a much broader and more accurate view of both the current and the historical state of the objects in the monitored environment. The additional health-related information enables HP OMi to display a detailed overview of the current health of the configuration items in the monitored environment from a clearer and more relevant perspective.

With event-based data, you can only see if any events are currently affecting the *event*-related status of a particular configuration item. Although this is important, it does not provide the complete picture. Health-based data enables HP OMi to provide additional context to a configuration item's current overall status by showing how the configuration item's health is affected in terms of availability and performance, too. HP OMi defines key performance indicators that use health-related data to calculate the health status of monitored configuration items and indicate the status graphically in the user interface.

By associating traditional colors with the various states of health (red for “critical”, green for “normal”, blue for “unknown”), HP OMi enables the user to visualize more quickly the current state of the monitored environment. Understanding an event's background is essential if you want to decide where and when to invest time and effort in investigating and solving the problem that caused an event and returning the status of the impacted configuration items to normal.

Figure 3 The HP OMi Health Perspective



The combination of the different perspectives in one collated browser page is particularly helpful for users who want a convenient location from which they can perform the tasks that constitute their daily work flow and see how the result of their work impacts the environment.

[Figure 3](#) on page 22 shows the HP OMi health-perspective tab, which provides the following information:

- **CI Tree View:** An overview of the monitored objects (configuration items) in the immediate environment in which the event occurred.
- **Event Browser:** A list of the events currently under investigation, filtered according to the view or configuration-item selected in the CI Tree View.
- **Top View:** A graphical representation of the configuration item impacted by the currently selected event and the relationship the impacted configuration item has to other configuration items in the immediate neighborhood. Unlike the Dashboard's Top View which shows a complete picture of all the configuration-item types contained in the view, the HP OMi Top View filters the UCMDB view and displays only those configuration items that are directly affected by the event selected in the event browser
- **Health-Indicator View:** A list of the health indicators that contributed to the calculation of the severity status assigned to the configuration item impacted by the selected event.

For more information about setting up the health perspective and managing health-based monitoring in HP OMi, see [Health-Based Monitoring](#) on page 121. The information in the section about health-based monitoring is intended for HP OMi administrators and domain experts who need to set up health perspectives for the domain operators.

For more information about the health perspective in the context of event management, see [The Health Perspective](#) on page 60.

Topology-Based Event Correlation

If you are using HP OMi to manage a large environment, one of your biggest concerns will be how to manage the large number of events (of different types) reported by the many different sources. One of the main sources of events for HP OMi is HP Operations Manager, which can be configured to automatically forward to HP OMi all the event notifications it receives from the many different sources it manages. However, HP Operations Manager is not the only source of events for HP OMi; HP OMi can receive and manage events from other integrated sources, too.

To avoid the problem of message duplication and overload, which can hinder the problem-investigation process, you can use the event-correlation functionality provided by HP OMi. Correlating events greatly reduces the number of events displayed in the browser, and the reduced number of events in the browser enables the user to locate and fix the cause of the underlying problems more quickly and efficiently.

HP OMi's correlation process uses rules to make associations between known root-cause events and related symptom events. Symptom events are those events that are usually caused by the occurrence of the root-cause event. When any combination of cause and symptom event occurs in the monitored environment, HP OMi flags the correlated events in the event browser. You can configure HP OMi to display the root-cause event in the event browser and an overview of all the symptom events separately in the event browser's Related Events tab. The overview of the related events enables you to drill down into the correlation process and browse through the hierarchy of correlated events.

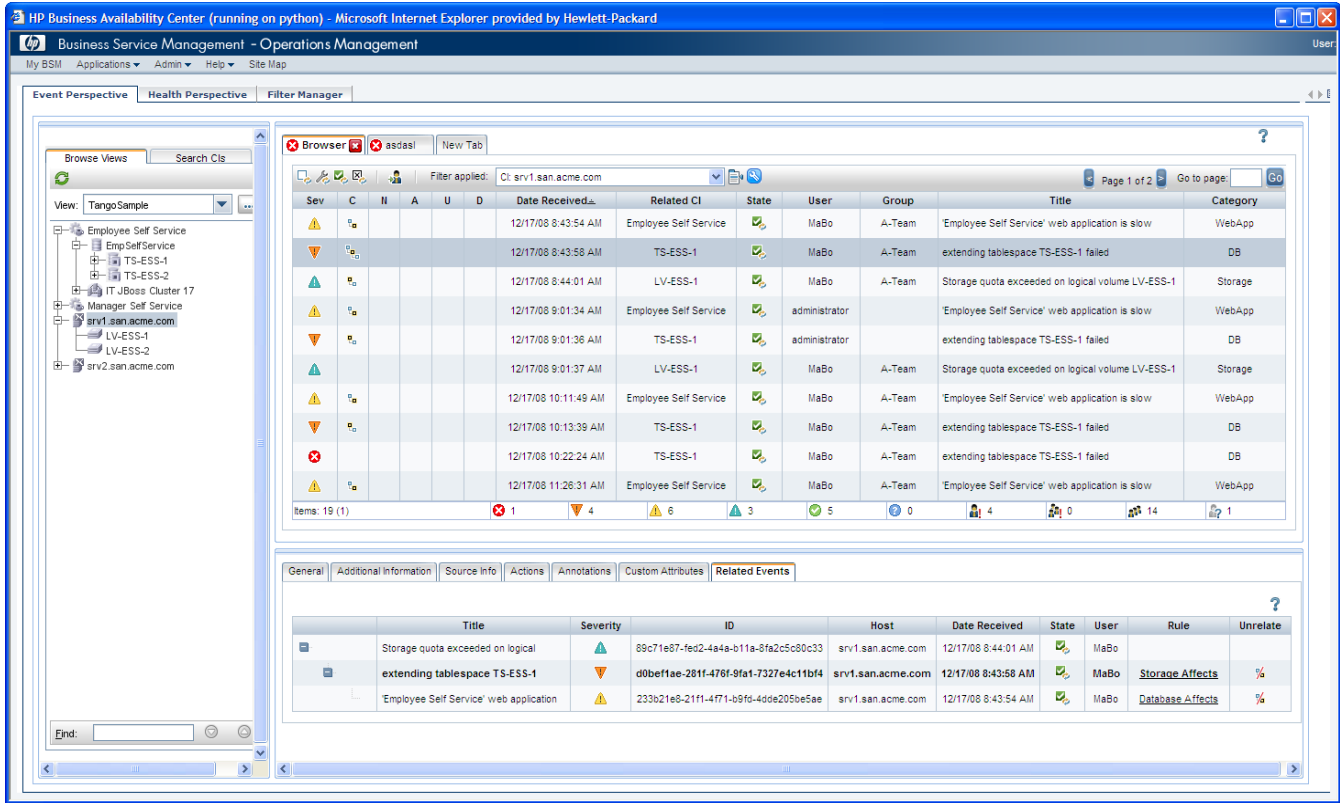
HP OMi uses topology-based data to refine and improve the event-correlation process. Topology-based event correlation requires the existence of a specific topological relationship between the configuration-item types that are affected by the cause and symptom events.

HP OMi also supports the correlation of events that occur in different technical domains, such as: databases, hardware, network, web applications, and so on. This extra scope enables you to correlate events that, at first sight, might not seem to have any connection. The cross-domain functionality also increases productivity by reducing the amount of overlap between operators responsible for the monitoring of different technical areas. For example, by correlating events relating to database problems, network problems, and storage problems, you can avoid the scenario of operators from the different technical areas all separately investigating different events that are the symptoms of one "cause" event.

HP OMi's topology-based event correlation can reuse information stored in the UCMDB by other tools. UCMDB data relating to configuration-item *types* is kept up to date with discovery tools that constantly monitor the IT environment. HP OMi adapts dynamically to the topology updates; modifications to event-correlation rules are not necessary if a change is made to the description of an *instance* of a configuration-item type, for example, if new relationships are discovered or relationships between configuration items change.

For more information about using topology-based event correlation to reduce and refine the number of events to investigate, see [Topology-Based Event Correlation](#) on page 97.

Figure 4 Topology-Based Event Correlation



HP OMi and the UCMDB

Based on the version three of the IT Infrastructure Library (ITIL), the HP Configuration Management System (CMS) enables you to provide quick access to configuration-related information from anywhere in the enterprise. The CMS solution includes the HP Universal Configuration Management Database (UCMDB) and web-services-based adaptors that enable connections to common third-party repositories. The consolidated approach enables you to access the same configuration-management data from multiple sources, view the data in different contexts, and improve information flow across technology functions.

Although HP OMi stores specific configuration data in its own database, it also has access to the contents of the Universal Configuration Management Database (UCMDB), which is the central repository for the configuration-item *types* that represent the objects that HP OMi monitors.

Configuration-item types are the central point of reference for many features in HP OMi. All the rules, tools, and indicators that HP OMi provides to help users monitor and manage the IT environment are associated with a particular *type* of configuration item. For example, you can configure database-related tools and assign them to configuration-item types that describe the database, such as: “database”, “Oracle”, “logical volume”, “table space”, and so on. When HP OMi receives notification of an event relating to a database problem, the tools, rules, and indicators assigned to the CI type are automatically available.

HP OMi uses the concept of inheritance to pass assignments down the configuration-item hierarchy. For example, rules, tools, and indicators assigned to the database configuration-item type are automatically available to any of its children, too, such as: “logical

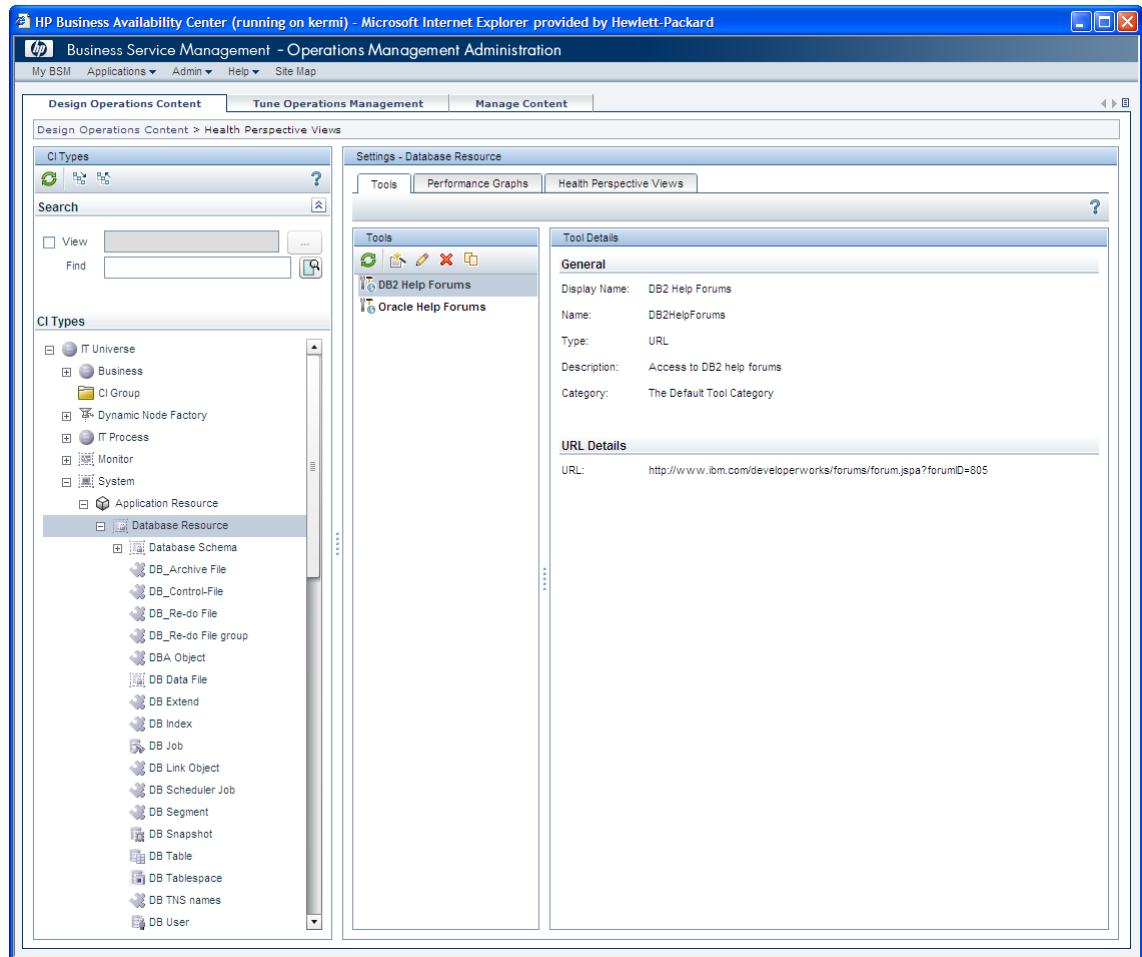
volume”, “table space”, and so on. This feature enables you to restrict the application and availability of rules and tools to individual configuration-item types or make them much more widely available by assigning them to a configuration-item type at the top of the hierarchy.

Figure 5 on page 26 shows how, by assigning tools to a particular configuration-item type, you can make sure that the assigned tools are always available in the context of any event that has an impact on any *instance* of the selected configuration-item type. For example, if you assign a tool to the database configuration-item type, the tool will be available in the context menu of any event concerning problems relating to an instance of a database and, in addition, any event relating to any CI type below the database CI type in the configuration-item type hierarchy.

In the same way, you can associate performance graphs with a specific configuration-item type so that graphs and charts of a particular type are always available in the context of any event that has an impact on the selected configuration-item type.

HP OMi’s integration in the BSM platform provides access to all of the features and functionality of the UCMDB. With access to the UCMDB, you can create and configure new views, create and modify configuration-item types, create and update configuration items (instances of configuration-item types), and so on.

Figure 5 Assign DB Tools to DB Configuration Items



HP OMi enables you to automate the synchronization of topology data between HP Operations Manager and HP OMi. The topology-synchronization feature enables you to transfer the complete managed-services hierarchy from either HPOM for UNIX or HPOM for

Windows to HP OMi, convert it into a format that HP OMi understands, and upload it to the UCMDB. You can use the same feature to update the service tree in the UCMDB periodically, too.



The topology-synchronization feature enables you to add the infrastructure-based service-management data that exists in HP Operations Manager to (and merge it with) the data that the BSM platform has already discovered and instantiated in the UCMDB.

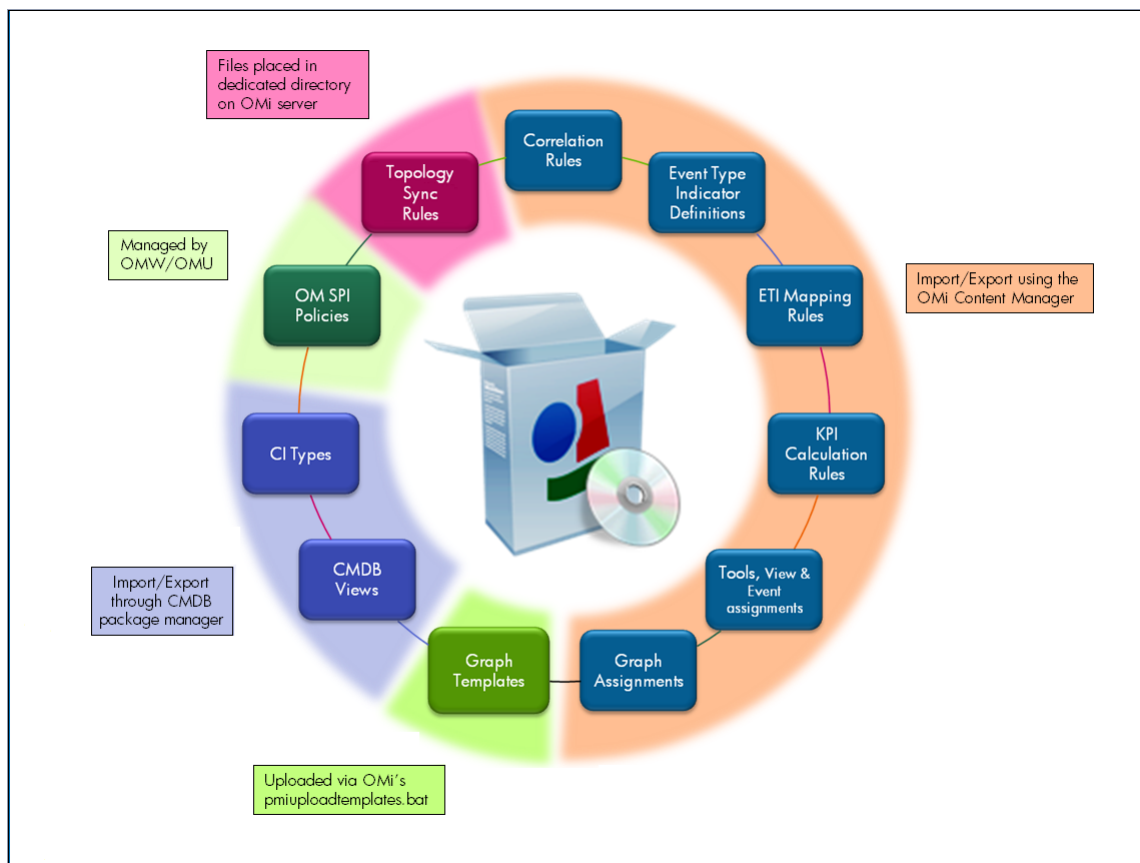
Extendable Management Configuration

HP OMi-specific configuration data is managed in so-called **content packs**, which provide pre-configured rules, tools, and other items for specific managed applications and systems. Content packs typically include items such as the health indicators (HI) and key performance indicators (KPI) used in health-based monitoring, the mapping rules and event-correlation rules used in event-based monitoring, as well as templates for views and graphs. Content that is not specific to HP OMi (such as additional configuration-item types) is placed in other packs and managed separately with special tools.

Content packs come in different forms: those that HP Software makes available separately to compliment data collected by HP Operations Manager Smart Plug-ins (SPI), and those that you define and create yourself to meet the requirements of your own custom applications and monitoring policies.

The content packs that compliment the HP Operations Manager SPIs enable you to set up HP OMi to take advantage of the information contained in the events forwarded from HP Operations Manager. If you install the content pack for the Oracle database, you make HP OMi aware in advance of the form and content of the events sent by the HP Operations Manager Smart Plug-in for Oracle Databases and provide the rules, tools, and graph definitions HP OMi needs to make use of the event data, for example, to determine the health status of Oracle-related configuration items, or correlate Oracle-related events. HP OMi enables you to use the same approach to integrate event-related information from applications that you have developed in house, too.

Figure 6 Overview of HP OMi Content



HP OMi provides a set of tools to help manage HP OMi-specific content. Whether the content-management tools are available to individual users depends on the responsibilities assigned to the group the user belongs to, the demands of the user's work flow, and the context in which the user performs tasks.

Users with the appropriate access can use the Content Manager to exchange content between instances of the HP OMi, too. For example, you can prepare HP OMi content in a test environment and then transfer the tested content to a production environment when the tests confirm that the content is working as expected.

The export and import tools also enable you to exchange content between instances of HP OMi so that you can keep snapshots or backup images of the content you have developed and, in addition, make sure that different instances of HP OMi remain synchronized and up to date.

For more information about the managing content, see [Introduction to Content Management](#) on page 168.

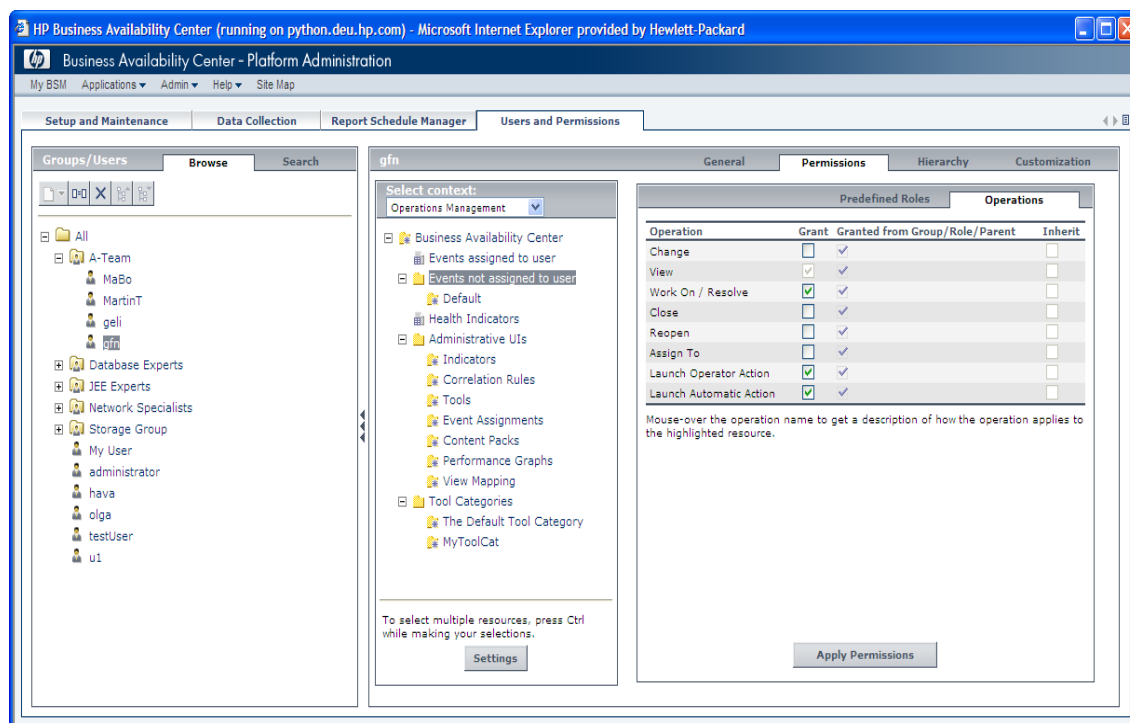
User Roles and Responsibilities

HP OMi enables you to configure an individual user from the bottom up or the top down so that you can define users whose role and area of responsibility meet the demands of your IT environment. To configure a user from the bottom up, you specify rights and permissions for individual users or user types. To configure a user from the top down, you add the new user to an existing group, from which the user inherits all defined roles and responsibilities.

Within these two extremes, you can use the configuration tools that HP OMi provides to configure users in very fine detail. **Figure 7** on page 30 shows how HP OMi enables you to enable access to individual events or event categories according to whether the event is assigned or not - the access permissions change according to the user or user group to whom the event is assigned. For example, you can enable users to view events that are not assigned to them but deny them the right to make any changes. You can grant the same users full access to any *assigned* event so that they are not hindered in their investigation into the event's underlying problem.

The same fine degree of granularity is available if you want to grant users access to the tools that they need to investigate and solve the events that are assigned to them.

Figure 7 User Configuration



HP OMi enables you to define users and user groups with a defined work flow and a specific area of responsibility. Configuring the individual users or the groups to which the users belong involves granting authorization to work groups so that its members can see the events they are best qualified to investigate and start any necessary event-related tools. For example, it is essential for the various domain administrators to be able to see events relating to the domains that they are responsible for configuring and maintaining. If they cannot see the appropriate events, they cannot test the tools they configure for the domain operators.

3 User Management

The information in this section explains who HP Operations Manager i (HP OMi) users are and how user management works from the perspective of an individual user's work flow, that is: the daily tasks the user performs and the order in which the tasks typically occur. This chapter also provides information about the concepts underlying the user-management tools that are available and, where appropriate, explains why the tools work the way they do. Reading this section helps you understand why you need the user-management tools that HP OMi provides and how they can use the tools to help solve the problems that occur in your monitored environment.



The user types described in this section are examples only. HP OMi enables you to configure the user types that best meet the needs of your environment.

Table 2 on page 31 provides an overview of the contents of this chapter and indicates the intended audience, that is: the type of user who needs to read and understand the topic to help perform the tasks in their daily work flow.

Table 2 User-Management Overview

Page	Concept	HP OMi Admin	Domain Expert	Domain Operator
32	User-Management Work Flow	✓	✓	-
34	Introduction to HP OMi User Management	✓	✓	-
35	Users and User Groups	✓	✓	✓
37	User Assignments	-	✓	✓
39	User Authorizations	✓	✓	-
41	User Authentication	✓	✓	-

User-Management Work Flow

HP OMi provides a set of tools that are intended to help set up the users who manage and monitor the operational environment. The tools that are available to individual users depend on the responsibilities assigned to the group the user belongs to, the demands of a user's work flow, and the context in which the users perform their tasks. In HP OMi, users belong to one of more user groups. Members of user groups are granted access to management or administrative tools based on the scope of the tasks the group is expected to perform in their everyday work flow. For example, domain experts need access to administrative tools such as the Indicator Manager to perform some of the tasks in their work flow. Domain operators, on the other hand, need access to event-management tools.

To perform the event-management tasks required by their respective work flow, HP OMi users need to have a good understanding of the topics discussed and explained in this section. The information provided in this section attempts to address the needs of all users whose work-flow requirements mean they have a role to play in user management, for example:

- [The HP OMi Administrator](#)
- [The Domain Expert](#)

The HP OMi Administrator

HP OMi administrators need to have a good understanding of user management as well as the underlying user-related concepts such as user roles, user groups, user authorization, user authentication, and so on. A high-level summary of the HP OMi administrator's work flow in the context of user management includes the following tasks:

- **Configure user groups:**
Define and configure user groups so that events can be assigned to the users with the knowledge and resources to resolve them most efficiently.
- **Grant access to administrative tools:**
Ensure the groups have access to the tools available in the HP OMi administrative interface where appropriate. For example, domain experts need access to the Indicator Manager and the Correlation Manager so that they can create and configure health indicators and topology-based correlation rules.
- **Configure and manage user authentication:**
Design, implement, and manage the user-login authentication strategy based on the tools available to HP OMi.

The Domain Expert

In HP OMi, domain experts need to have a comprehensive understanding of user management including the relationship between users, tools, and the various stages of the event life cycle. Domain experts also need to understand the underlying user-related concepts such as user roles, user groups, user rights and permissions, user authorization, and so on. A high-level summary of the domain expert's work flow in the context of user management includes the following tasks for the specific technical domain:

- **Configure user groups for specific technical domains:**

Configure settings for both the users and the user groups responsible for investigating and resolving events in a particular technical domain, for example: AD, SAP, databases, BlackBerry servers, or Microsoft Exchange.

- Grant access to features and functionality in the context of a technical domain:
Ensure that domain-specific user groups can see and work on the appropriate events and, if necessary, reset health indicators for specific configuration items to their default value.
- Grant authorization to required tools:
Ensure the groups have access to the administrative tools if appropriate.

Introduction to HP OMi User Management

HP OMi enables you to configure individual users from the bottom up or the top down so that you can define users whose role and area of responsibility meet the demands of your IT environment. To configure a user from the bottom up, you specify rights and permissions for individual users or user types. To configure a user from the top down, you create user groups with defined roles and responsibilities which are automatically assigned to any new user who joins the group. Within these two extremes, you can use the configuration tools that HP OMi provides to configure users in very fine detail.

You can define work flows for users and user groups and allocate a specific area of responsibility. When configuring the individual users or the groups to which the users belong, you grant authorization to the individual users or all members of a user group so that they can see the events they are best qualified to investigate and start any necessary event-related tools. For example, it is essential for the various domain administrators to be able to see events relating to the domains that they are responsible for configuring and maintaining. If they cannot see the appropriate events, they cannot test the tools they configure for the domain operators.

One of the most important steps you take when defining users or user groups is to decide which users are best qualified to investigate and fix the problems that cause the events that HP OMi detects. HP OMi enables the definition of users and user groups with very specific levels of authorization. For example, domain operators need to have the knowledge, authorization, and tools to work on the investigation and resolution of events that occur in their own, particular field, such as: AD, SAP, databases, BlackBerry servers, or Exchange servers.

To configure a new user or user group you also have to grant the appropriate level of access to the views, events, and tools the users need to do perform the tasks that make up their daily work flow. For example, you need to make sure that new users can not only see and work on the events that are assigned to them for investigation and resolution but also, if appropriate, see any unassigned events, too. Since events have an impact on particular configuration items, you also need to make sure that users can see and use the UCMDB views that contain the configuration-item types impacted by the events that occur. Finally, users need access to any tools that can help in the event-resolution process. Note that users can start tools in the context of an event or the configuration item impacted by the event.

Users and User Groups

HP OMi enables you to define users and user groups with a preferred work flow and a specific area of responsibility. Although HP OMi enables you to configure users and users groups that meet the demands of your monitored environment, the user models listed in [Table 3](#) on page 35 put some of the explanations in this section (and the rest of the document) into context.

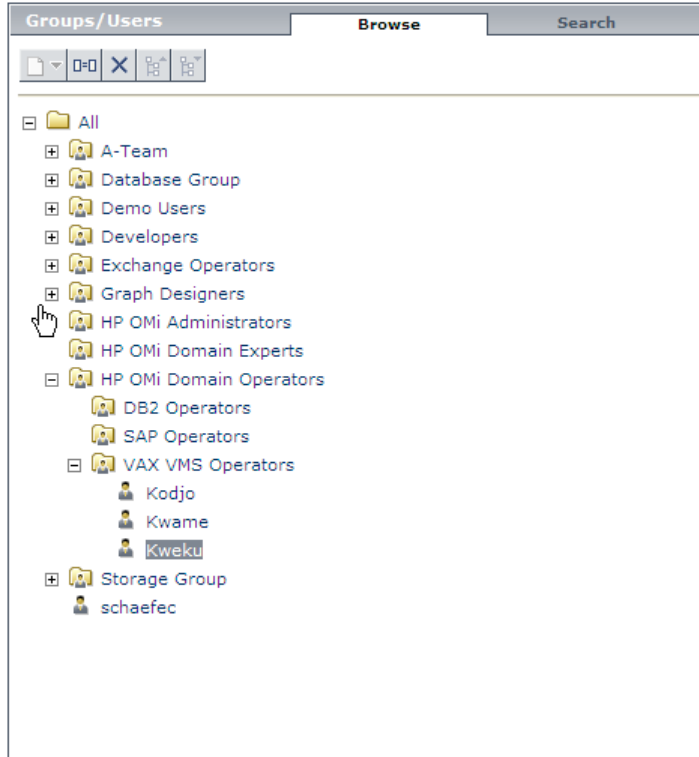
Table 3 Example User Models

User Group	Description
Operators	A group of users with the scope and expertise to work on all sorts of events and whose area of responsibility is not confined to one particular technical domain.
Domain Operators	A group of users with the knowledge, tools, and authorization to work on events that occur in their own, particular technical domain, for example: SAP, databases, BlackBerry servers, or Exchange servers, and so on.
Domain Experts	A group of users with expertise in similarly precise technical areas as the domain <i>operator</i> but whose responsibility includes the configuration of the rules, tools, and mappings that generate events and help domain operators perform tasks in particular technical fields, for example: SAP, databases, BlackBerry servers, or Exchange, and so on.
Administrators	A group of users who are responsible for installing, configuring, and maintaining the HP OMi software, including the design and implementation of user models

The process of creating, defining, and implementing a user model that meets the needs of your particular environment is relatively straightforward. First, you need to define the scope of the roles the users play in your environment, for example: operators, domain experts, and administrators. A user “role” is a high-level definition of a user’s scope and responsibility. Next, you need to organize and name groups that reflect the different roles you define for your users. A user group is a logical container for users with the same scope and responsibility. After you define user groups, you can assign authorization and access rights to the group so that all members of the group have similar rights and responsibilities. Finally, you add individual users to the user groups.

Configuring a new user or user group involves granting the appropriate level of access to the views, events, and tools the users need to do perform the tasks that make up their daily work flow. For example, it is essential for the various domain experts to be able to see events relating to the domains that they are responsible for configuring and maintaining. Domain experts for SAP needs to have access to administrator tools such as the Indicator Manager, the Correlation Manager, and the Content Manager so that they can configure rules and tools for the SAP domain operators. However, to test SAP-related rules and tools, the domain administrator for SAP also needs access to the event browser and must be able to see the SAP-related events, too. The configuration items impacted by the SAP-related events belong to particular SAP-specific or database-specific views, all of which the domain experts must be able to see, too. For more information about setting up user authorizations, see [User Authorizations](#) on page 39.

Figure 8 User-Group Hierarchies



Although the basic user model described in this section probably meets the demands of most environments, there is often a need to modify and customize to suit local requirements. HP OMi meets that need by enabling you to configure all aspects of a user or user group from the bottom up. For example, you can define the sort of access users or user groups should have to individual *types* of events or define access to events according to whether the event is already assigned or not, as described in detail in this section. You can define access to events on the basis of event category, too.

HP OMi also enables you to define the actions that users or user groups can perform when events are in a specific stage of the event work flow, such as: open, work on, resolved, and closed. The assignment of events to user groups is one of the most important acts in the event-management process. It is possible to automate the assignment of events to particular user groups, for example using event categories. Where no event category exists or an event is not assigned to any event category, HP OMi can automatically assign the event to a default category, which is visible to all users or user groups. In this way, events do not remain unnoticed and unassigned for any length of time.

If automation of the event-assignment process consigns too many events to the default event category, you could consider configuring a user who is solely responsible for the assignment of events. This can improve the efficiency of all users' work-flow and help reduce the number of unassigned events. Unassigned events are events that are not being investigated by any user or user group.

The link between events and user assignment is important. In HP OMi, events are assigned to user groups, whose users are automatically given the authorization to investigate and fix the event's underlying problem. The users in a particular user group are expected to manage the event individually or collectively and guide it through a life cycle that starts when the event is assigned and ends when the event is closed. It is important to note that the rights granted to a user or user group change according to whether the event is assigned or not - assignment of an event typically grants a broader range of authorizations to users or user groups.

User Assignments

One of the most important aspects of user management is deciding which people are best qualified to investigate and fix the problems that cause the events that HP OMi detects. HP OMi enables the definition of users and user groups with very specific areas of responsibility and levels of authorization. For example, domain operators need to have the knowledge, authorization, and tools to work on the investigation and resolution of events that occur in their own, particular field, such as: AD, SAP, databases, BlackBerry servers, or Exchange servers.

The configuration of the domain in which the operators work is the responsibility of the domain expert, who configures rules that ensure the correct events are assigned to the appropriate domain-operator groups. Assigning events (or event categories) to a user group rather than an individual user ensures that the users in the group can benefit from a pool of resources that helps solve problems more quickly and efficiently.

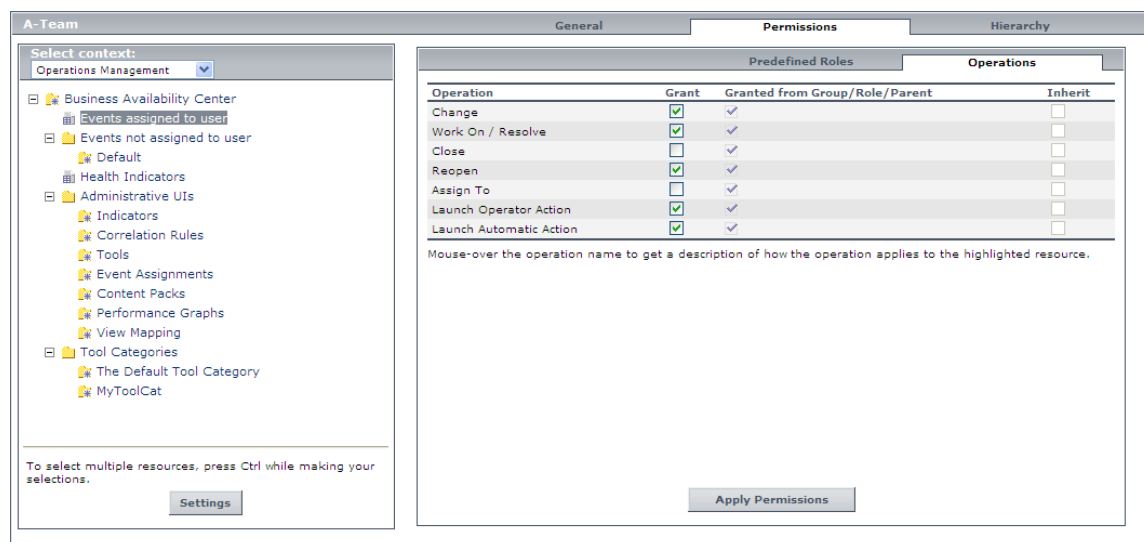
HP OMi enables you to provide different levels of access and authorization according to whether the event is assigned or unassigned. For example, it is possible to configure HP OMi so that all users can *view* unassigned events. However, to change or work on an event, a user must be a member of the user group to which the event is assigned.



You can set up HP OMi to ensure individual users or user groups have the appropriate access to the events in their particular technical domain so that they can perform the tasks required by their daily work flow.

In HP OMi, events are assigned to users (or user groups) who are granted the permissions they require to investigate and fix the event's underlying problem. The users guide the event through a life cycle which shows at what stage the event's investigation has reached. HP Operations Manager i (HP OMi) provides a comprehensive set of tools that are intended to help manage the events that occur in the operational environment. The tools that are available to individual users depend on the responsibilities assigned to the users, the demands of the users' work flow, and the context in which the users perform their tasks.

Figure 9 User Access to Assigned Events



The role that a particular user performs determines the type of access required to objects, events, and tools. Figure 9 on page 37 shows how administrators can very precisely configure the type of access that users have to events based on whether the event is assigned or not. Users to whom an event is assigned typically have more rights and can perform a much wider

range of operations than users to whom the event is not assigned. However, the allocation of rights and permissions based on event assignment must be configured by the person setting up users and event assignments.

Assigning events to users or user groups based on event category is a useful and efficient way of ensuring that the right people are assigned to work on the problems they are best qualified to solve. For example, using an event category such as “SAP”, you can automatically assign SAP-based events to domain operators with a background in SAP. Similarly, events related to database problems could be automatically assigned to users or user groups with expertise in the area of database maintenance.

Note that events that do not belong to any category are automatically assigned to the event category “Default”, which grants all users and user groups “read” access at the very least. You can change the authorization defined for the Default event category to suit the needs of your environment. For more information about event categories and how to use them to automate event assignment, see [Event Categories](#) on page 85.

User Authorizations

HP OMi provides a very fine level of control when granting access to UCMDB views, configuration items, and interface elements. You can choose to configure authorization at the group level so that all members of the group enjoy the same level of authorization or you can implement an authorization strategy that grants authorization to individual users. HP OMi also enables you to reduce or increase authorization for users or user groups on the basis of whether an event is assigned. The same authorization functionality can be used to grant access to management tools such as the Indicator Manager, the Content Manager, or the Correlation Manager and enable users to reset health indicators.

Configuring a new user or user group involves granting the appropriate level of access to the views, events, and tools the users need to do perform the tasks that make up their daily work flow. For example, you need to make sure that new users can not only see and work on the events that are assigned to them for investigation and resolution but also, if appropriate, see any unassigned events, too. Since events have an impact on particular configuration items, you also need to make sure that users can see and use the UCMDB views that contain the configuration-item types impacted by the events that occur. Finally, users need access to any tools that can help in the event-resolution process. Note that users can start tools in the context of an event or the configuration item impacted by the event.

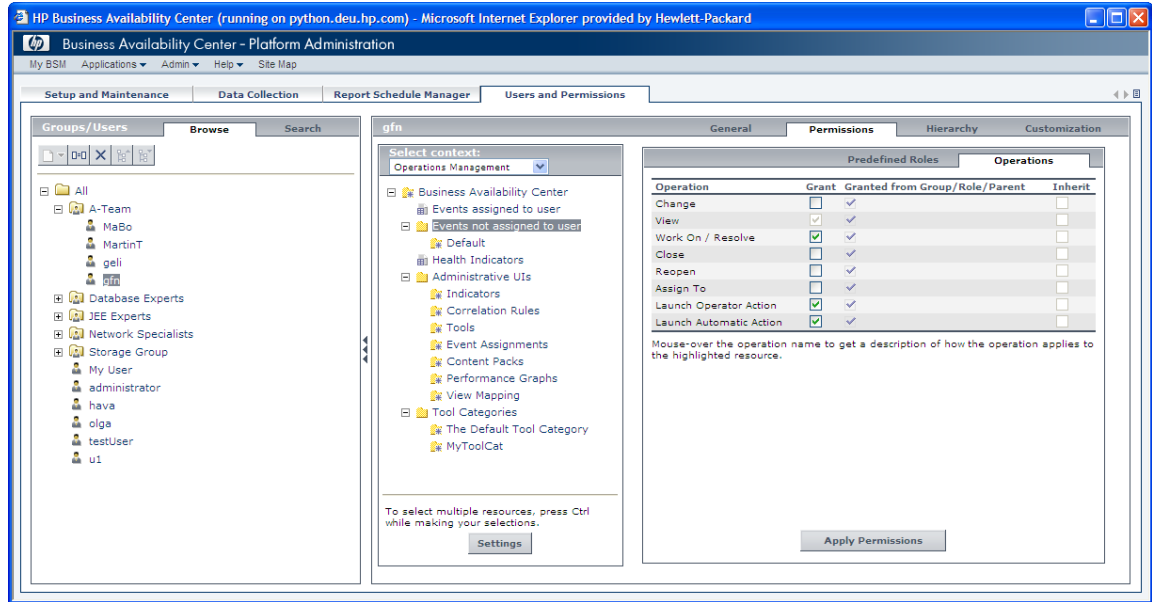
In general terms, it is the responsibility of the HP OMi software administrator to set up groups of domain experts with the authority to set up operators (or groups of operators) who can monitor and manage a particular technical domain. With this authority, domain experts can set up individual user groups whose members have the authorization to access events and use event-management tools. For example, domain operators need authorization to access assigned and unassigned events in the event browser. Domain experts need access to management tools such as the Indicator Manager, the Correlation Manager, the View Mappings Manager in order to set up health-based monitoring and event correlation for the events the domain operators are managing.



Users with access to management tools can start the management tools directly from context-sensitive menus available in the HP OMi graphical user interface.

Figure 10 on page 40 shows how to grant the user “gfn” authorization to use the HP OMi Correlation Manager. The same settings window enables you to assign users or user groups access to unassigned events or assigned events based on a particular event category.

Figure 10 Grant User Authorization in HP OMi



Users who have the permission to start HP OMi event-management tools can take advantage of the shortcuts available in context-sensitive menus, which enable direct access to tools in the context of a particular event. For example, a domain expert could click an event in the event browser and use the context-sensitive menu to start the Indicator Manager in the context of the selected event, that is: with the relevant configuration item pre-selected and the assigned health indicators already displayed. Launching management tools in the context of an event greatly improves work-flow efficiency since it enables instant access to the relevant information for troubleshooting and a quick way of checking changes to configuration.

HP OMi enables you to authorize a user or user group to reset health indicators to their default value. Resetting a health indicator is useful way of manually returning a configuration item's severity status to a defined default value such as "normal" or "running". For example, if a health indicator remains in a critical state because a normal event (which resets the health indicator) is lost as a result of the correlation process during an event storm, a user with the appropriate authorization can reset the health indicator to its default setting. Note that it is not recommended to manually reset health indicators. Health indicators are normally reset as a result of the occurrence of a "normal" event.

You can also authorize access to tools according to the tool category and user or user group. For example, when defining a new tool, you can assign the tool to a tool category, and then assign "execution" rights for all tools in the tool category to a user group. In this way, users in the assigned user group can see and make use of all the tools in the tool category, including the newly added tool.

User Authentication

User authentication concerns the implementation of a log-on strategy for HP OMi users and user groups. By default, HP OMi uses the internal service provided by the HP Business Service Management (BSM) platform to provide login authentication. However, HP OMi also supports the use of authentication services such as Single Sign On (SSO) or the integration of external user-authentication tools such as the Lightweight Directory Access Protocol (LDAP).



HP OMi does not support the implementation of multiple authentication strategies. Only one authentication strategy is permitted at any one time.

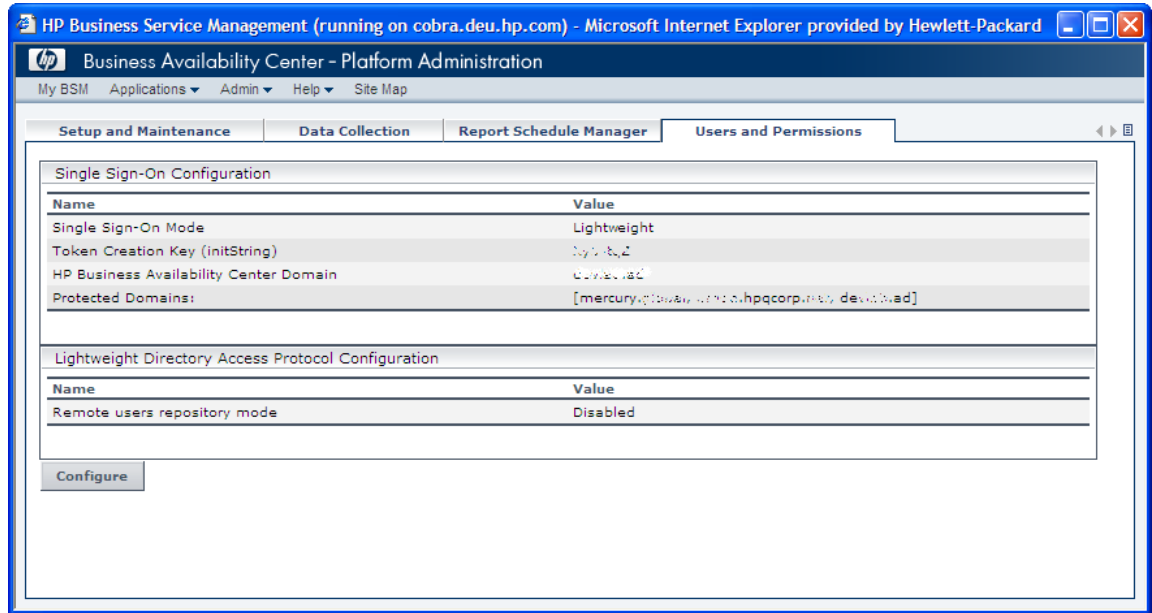
Single sign-on enables you to ensure that users who log in to HP OMi also have access to other applications configured in the BSM platform without having to log in again, for example, each time a new application starts. HP OMi currently supports two approaches to the SSO strategy:

- Lightweight Single Sign On (LW-SSO):
Uses authentication services running on the Business Availability Center server host.
 - ▶ HP OMi can also leverage the authentication performed by another LW-SSO-enabled product from HP Software.
- Identity Management Single Sign On (IDM-SSO):
Uses authentication services running on a remote system that is separate from the Business Availability Center server host.
 - ▶ HP OMi does not currently support IDM-SSO, the identity-management service for the single sign on user-authentication strategy.

Lightweight Directory Access Protocol (LDAP) serves as a user repository. You can use an external LDAP server to store authentication information about HP OMi users (such as user names and passwords) instead of using the internal service provided by BSM. You can also use the LDAP server to map HP OMi user groups to groups configured on the LDAP server. However, if you choose to implement an LDAP user-authentication strategy, note that the LDAP server must be in the same sub net as the Business Availability Center server(s).

Figure 11 on page 42 shows the default configuration settings for an LDAP user-authentication strategy in HP OMi. For more information about user-authentication strategies and configuration, see the user management section of the Business Availability Center *Platform Administration*.

Figure 11 Configure User Authentication



4 Event Management

The information in this section explains what HP Operations Manager i (HP OMi) events are and how HP OMi event management works from the perspective of an individual user's work flow, that is: the daily tasks the user performs and the order in which the tasks typically occur. This chapter also provides information about the concepts underlying the event-management tools that are available to the various types of users and, where appropriate, explains why the tools work the way they do.

- The user types mentioned here are examples only. HP OMi enables you to configure the user types that best meet the needs of your environment.

Table 4 on page 43 provides an overview of the contents of this chapter and indicates the intended audience, that is: the type of user who needs to read and understand the topic to help perform the tasks in their daily work flow.

Table 4 Event-Management Overview

Page	Concept	HP OMi Admin	Domain Expert	Domain Operator
44	Event-Management Work Flows	✓	✓	✓
46	User Groups and Permissions	✓	✓	
47	Event Management Tools		✓	✓
49	Events and Configuration Items	✓	✓	
53	The Event Perspective	✓	✓	✓
60	The Health Perspective		✓	✓
69	Event Filters		✓	✓
72	Severity Status	✓	✓	✓
74	Event Assignment		✓	✓
78	Event Life Cycle		✓	✓
82	Event Types		✓	✓
83	Related Events		✓	✓
85	Event Categories		✓	✓
87	Event Actions		✓	✓
90	Event Sources	✓	✓	
93	Event Attributes		✓	✓

Event-Management Work Flows

HP OMi provides a comprehensive set of tools that are intended to help users manage the events that occur in the operational environment. The tools that are available to individual users depend on the responsibilities assigned to the users, the demands of the users' work flow, and the context in which the users perform their tasks. In HP OMi, events are assigned to user groups, whose members are granted permission to investigate and fix the event's underlying problem. The users assume the responsibility of guiding the event through a life cycle which shows the status an event's investigation has reached.

To perform the event-management tasks required by their respective work flow, HP OMi users need to have a good understanding of all or any combination of the topics discussed and explained in this section. The information provided in this section attempts to address the needs of all users whose work-flow requirements mean they have a role to play in event management, including:

- [The HP OMi Administrator](#)
- [The Domain Expert](#)
- [The Domain Operator](#)

The HP OMi Administrator

HP OMi administrators must have a good understanding of event management and the underlying event-related concepts including event sources, event attributes, event severity and so on. A high-level summary of the HP OMi administrator's work flow in the context of event management includes the following tasks:

- **Configure and consolidate event sources:**

This includes configuring message policies in HPOM for UNIX and HPOM for Windows, configuring other event sources such as HP NNMi, HP SiteScope, and so on to send messages to HP OMi (via the appropriate intermediary if necessary), setting up message forwarding between HPOM for UNIX or HPOM for Windows and HP OMi.
- **Configure user groups:**

Define and configure user groups so that events can be assigned to the users with the knowledge and resources to resolve them most efficiently.

The Domain Expert

In HP OMi, domain experts need to have a comprehensive understanding of event management including the relationship between events and configuration items and the various stages in the event life cycle. They also need to understand the underlying event-related concepts such as event sources, event attributes, event severity, event assignment, and so on. A high-level summary of the HP OMi domain expert's work flow in the context of event management includes the following tasks for the specific technical domain:

- **Configure User Groups for specific technical domains:**

Configure settings for both the users and the user groups responsible for investigating and resolving events in a particular technical domain, for example: AD, SAP, databases, BlackBerry servers, or Microsoft Exchange.
- **Configure and manage UCMDB views:**

Create, configure, and populate domain-specific views with the configuration-item types that represent the monitored objects and events in the operational environment.

- Configure health-based monitoring:

Create health indicators, map health indicators to event attributes, assign HIs to key performance indicators, and so on. This requires a good understanding of event- and health-based severity, event filters, and so on.

- Configure event correlation:

Set up rules to reduce the amount of events in the event browser and display only those messages that cause the event-related problems.

The Domain Operator

In HP OMi, domain operators need to have a comprehensive understanding of event-management concepts such as the event life cycle. They also need to understand the underlying event-related concepts such as event sources, event attributes, event severity, event assignment, and so on. A high-level summary of the domain operator's work flow in the context of event management includes the following tasks:

- View and manage events:

This includes using the event browser, configuring event filters, understanding event severity, making use of event details such as attributes and annotations, and so on.

- Investigate and resolve events:

This includes assigning events, understanding event categories, and making use of health-perspective (health indicators, key performance indicators, and so on), performance graphs, and custom tools.

- Guide assigned events through a life cycle:

This includes understanding the various stages in the event life cycle, understanding the concept of the user group to help pool knowledge for the event investigation.

User Groups and Permissions

One of the most important parts of the event-management process is the assignment of events to the users who are best equipped to investigate and solve the event's underlying problem. HP OMi provides tools that enable you to automate the assignment of events to particular users or user groups, for example using event *categories*. However, a user who is solely responsible for the assignment of events can also improve the work-flow efficiency of *all* operators and help reduce the number of unassigned events. Unassigned events are events whose underlying problem is not under investigation by any user or user group.

The link between event management and user assignment is important. In HP OMi, events are assigned to users or user groups on the basis of the knowledge and expertise available in the user group. The assignment gives the user group the responsibility to investigate and fix the event's underlying problem and, if appropriate, grants permission to access any tools that help in the investigation and resolution process.

In HP OMi, a particular user or user group manages an event and guides the event through a life cycle. The event life cycle shows the stage an event has reached in the overall process of investigation and resolution, for example: “open”, “in progress”, or “closed”. More importantly, the rights and permissions granted to a user or user group change according to whether the event is assigned or not—the assignment of an event automatically grants a different and generally broader range of event-related authorizations to the assigned users or user group.



If users assign an event to themselves, HP OMi assumes the event is assigned to all members of the user group to which the original assigning user belongs. By default, group members all have the same rights and permissions, and all members of the user group can work on the assigned event in the same way. However, you can change the default behavior and grant individual group members wider permissions if necessary.

Although the example user model used in this book (and described in [Users and User Groups](#) on page 35) meets the demands of most environments, there is always a need to modify and customize to suit local requirements. HP OMi meets that need by enabling you to configure all aspects of a user or user group. For example, you can define the sort of access users or user groups should have to assigned or unassigned events. Similarly, you can grant users the permission to see and modify events that are assigned to other users or user groups. For more information about event assignment in general, see [Event Assignment](#) on page 74. For more information about setting up HP OMi to ensure individual users or user groups have access to the objects and events that they need to perform the tasks required by their daily work flow, see [User Assignments](#) on page 37.

HP Operations Manager i (HP OMi) provides a comprehensive set of tools that are intended to help manage the events that occur in the operational environment. The tools that are available to individual users depend on the responsibilities assigned to the users, the demands of the users' work flow, and the context in which the users perform their tasks. For more information about the users and user groups that HP OMi provides by default and how to configure user groups to suit the demands of your environment, see [Users and User Groups](#) on page 35.

Event Management Tools

HP OMi provides users with a selection of specialized tools that are designed to help understand, investigate, and solve the underlying problems associated with the events that occur in the monitored environment. The application area that HP OMi users have access to includes the following tools:

- **Event Perspective:**

The event perspective enables operators to display, monitor, and manage the events that occur in the IT environment. In the Event Perspective tab, the browser is the focal point of the user's work flow. Most tasks start and end here. For more information about events and the event browser, see [The Event Perspective](#) on page 53.

- **Health Perspective:**

The Health Perspective tools display a variety of information about the health of the configuration items that HP OMi is monitoring from different and mutually complementary perspectives. For example, you can see a list of events, the top view, the state of key performance indicators, and a list of health indicators. For more information about what information is available, in what form, why it is important, and how it can help improve an operator's work flow, see [The Health Perspective](#) on page 60.

- **Filter Manager:**

The filter manager enables operators to list, configure, and manage the filters that can help reduce and refine the events displayed in the browser. Reducing the number of events displayed in the browser enables operators to concentrate on those events that are of most interest and importance and helps improve the efficiency of the work flow. For more information, see [Event Filters](#) on page 69.

- **Performance Graphs:**

HP OMi provides a tool that enables you to generate graphs and tables, which you can use to illustrate graphically how the objects in the environment HP OMi is monitoring are performing either over time or at a particular moment in time. For more information, see [Graphing View](#) on page 68.

- **Custom Tools:**

Software administrators and domain experts can configure special tools to add to the standard tools that HP OMi provides. These additional tools can help users perform the basic tasks required by the work-flow in their designated technical areas more efficiently. Custom tools are associated with a particular type of configuration item and are available in pop-up menus either from the configuration-item types to which the tools are assigned or in the context of the events which affect the associated configuration-item type. For more information, see [Event Actions](#) on page 87.

- **Context-sensitive menus:**

HP OMi provides context-sensitive menus in selected parts of the graphical user interface (GUI), for example: the CI tree and the event browser. Context-sensitive menus provide quick and direct access to information about elements in the interface and, in addition, actions that you can perform on the selected element. Context-sensitive menu display when right-clicking an element in the interface. The information available and the actions that are possible from a context-sensitive menu depend on the element you click and the context in which the element exists.

Note that some of the options and tools displayed in context-sensitive menus are only available to those users with the appropriate authorization, for example: the Indicator Manager, the Correlation Manager, and the View Mapping Manager. For more information about granting access to HP OMi administrative tools, see [User Authorizations](#) on page 39.

- Tool Tips:

To help users work more productively, HP OMi provides tool tips for many of the elements in the interface. The tool tips display when a user hovers the mouse over an interface element and describe very briefly what the selected element is or does. If the information provided in a tool tip is not sufficient for your needs, use the contents of the tool tip as search criteria in the this book, or in the HP OMi online help.

Events and Configuration Items

HP OMi uses different types of configuration items to represent the physical and logical objects in the monitored environment. A configuration item (CI) can represent any component in your IT infrastructure, for example: hardware, software, services, or a business process. CIs with similar properties are grouped under a CI type (CIT). Each CIT provides a template for creating an instance of a CI and defining its associated properties.

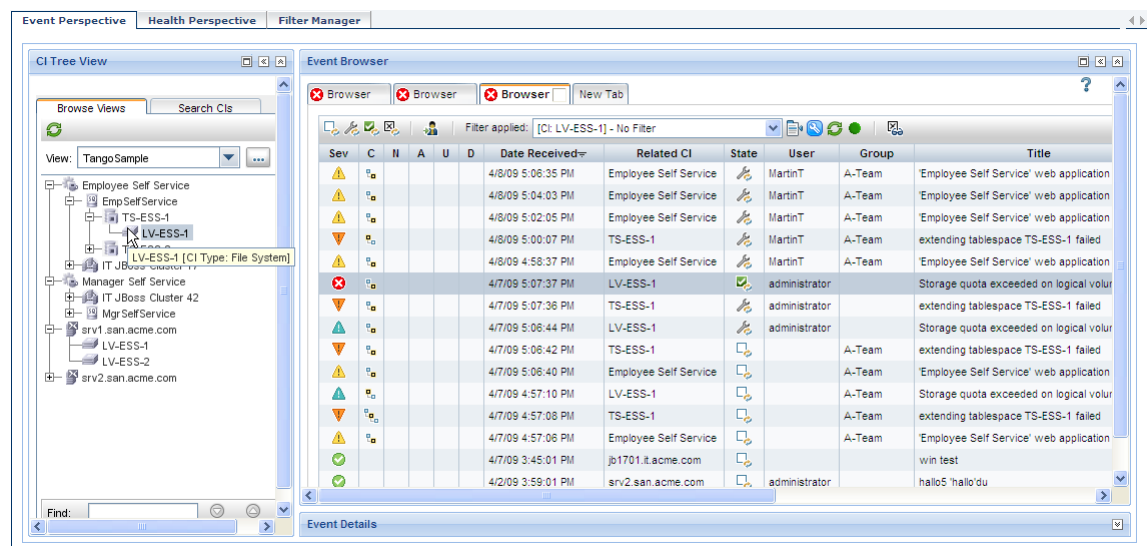
For example, the configuration-item type “Host” can be used to represent “Net Devices” (such as switches, routers, and network printers) and “Processing Systems” such as UNIX servers, Windows personal computers, and so on. The configuration-item type “Logical Volume” could be used to represent the storage space defined for a database instance monitored by HP Operations Manager. HP OMi domain experts can also define new CITs to match the business needs.



The existence of particular CI types is especially important when synchronizing the topologies of HP OMi and HP Operations Manager because the topology-synchronization process cannot create new CI types. In addition, if the topology-synchronization process attempts to modify the details of a CI type that does not exist in the UCMDB, the topology-synchronization process aborts. For more information about topology synchronization, see [Topology Synchronization](#) on page 184.

Figure 12 on page 49 shows how HP OMi displays configuration items hierarchically in the CI Tree View pane. You can browse the CI model by expanding the tree in the CI Tree View pane. HP OMi provides a search function that enables you to locate specific types of configuration items or any instance of a configuration-item type, too. The search function can also locate specific CI instances by name.

Figure 12 Browse CI Types

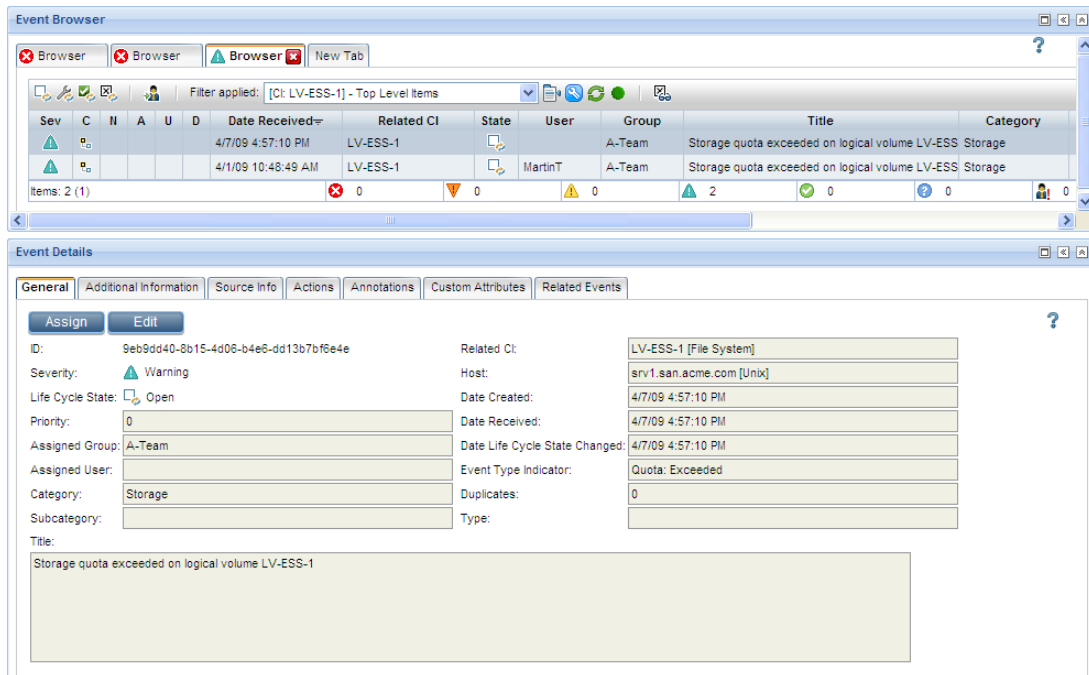


HP OMi associates the events that occur in the monitored environment with a configuration item. For example, a problem might occur with a physical device such as a router or a printer. HP OMi reports the problem by generating an event that refers to the configuration item. Alternatively, a logical volume created for a database that HP OMi is monitoring might be near its capacity, which could cause problems for the database. HP OMi considers the severity of the reported event when calculating the severity status of the configuration item the event relates to.

HP OMi filters the contents of the event browser according to the CI selected in the CI Tree View pane. This means that a user can choose to view only those events that are associated with a view, specific CIs *in* a view such as an instance of a database or, if more detail is required, a specific logical volume defined for a database instance. For more information about event filters, see [Event Filters](#) on page 69.

[Figure 13](#) on page 50 shows how the event-filter function works in the HP OMi browser. The events displayed in the browser occurred on the logical volume “LV-ESS-1”, defined for the database “EmpSelfService”. The browser displays these events as a result of the selection in the CI Tree View shown in [Figure 12](#) on page 49.

Figure 13 Events and Configuration Items



HP OMi provides information in the form of tool tips, which a user can display by moving the cursor over an element in the interface. For example, if you move the mouse over a CI in the CI Tree View pane, HP OMi displays a string (in brackets) that indicates the *type* of configuration item that the selected configuration item *instance* belongs to, for example:

LV-ESS-1 (CI type: File system)

In [Figure 12](#) on page 49, LV-ESS-1 is the name of a configuration item that belongs to the configuration-item *type* “File system”. HP OMi uses event- and health-related information about the logical volume LV-ESS-1 to calculate and set the severity of the LV-ESS-1 configuration item.

CI Resolution

When HP OMi receives notification of an event, it needs to understand not only what type of event occurred but also *where* it occurred so that an investigation into the event’s underlying problem can start without delay. CI resolution is the process by which HP OMi determines the configuration item impacted by an event and the name of the host on which the event occurred.

During the CI-resolution process, HP OMi tries to associate the incoming event with a specific configuration item using CI-related information that is often defined in custom attributes included in the event notification, for example, from events reported by HP OMi-ready Smart Plug-ins. If the event notification does not contain any CI-related information in custom attributes, the CI-resolution process looks for known identifying markers, such as: an object or application name, a UCMDB ID, an HP SiteScope ID, an HP Operations Manager service ID, and so on. If no ID is available to help map the event to a specific configuration-item type, HP OMi uses special algorithms to find a best match between the reported event and the affected CI.

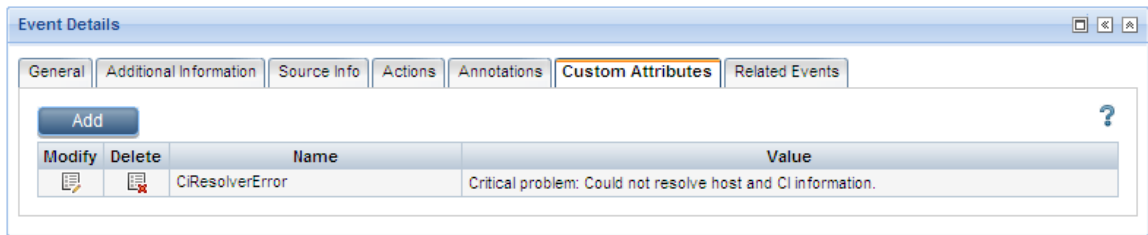


If the CI-resolution process identifies more than one matching configuration item and is unable to decide which to use, the resolution process uses the generic host information as a fall-back solution.

If the process of matching an event to a configuration item does not produce one clear CI candidate, HP OMi does not try to decide between the potential candidates. Instead, HP OMi lists all matching configuration items as custom attributes (CA) and attaches them to the corresponding event. Domain operators and experts can track failed or inconclusive resolutions by configuring a filter that displays only events with custom attributes relating to CI resolution problems.

If the CI-resolution process is unable to find any suitable configuration item to match to an incoming event, the CI resolver generates an error message, which it posts in the custom-attribute tab of the event's details, as illustrated in [Figure 14](#) on page 51.

Figure 14 Configuration-Item Resolution Failure



After mapping the incoming event to a CI, HP OMi needs to determine the physical location of the impacted CI, that is: the name of the machine hosting the impacted CI. Resolving the CI impacted by an event is straight forward if the CI has a host name, for example, a server or a personal computer. However, if the impacted CI is a hard disk or a database instance that does not have a host name or address, HP OMi must determine the name of the host to which the CI impacted by the reported event belongs.

To determine the location of the CI impacted by an event, HP OMi performs the following steps in the specified order:

- 1 If the impacted CI has a host name (Host CI), HP OMi uses the host CI to indicate the location of the event. Note that the host information is sometimes included as an attribute of the original event notification forwarded from HP Operations Manager, for example as part of a service ID or as the “CI info” itself.



The Event Browser uses the CI Resolution section in the event detail's Source Info tab to display the attribute information that is available in the form of hints for the CI-resolution process.

- 2 If the impacted CI does not have a host name, HP OMi determines the name of the host to which the impacted CI belongs (hosted on) by looking at the relationships between CIs and following the relationship paths until a CI is found that *does* have a host CI, for example:

- Table-space CI (hosted on) > Database CI (hosted on) > Oracle (hosted on) > Host CI
- Disk C and Disk D (both hosted on) > Host CI



Not all events are linked to a host with a resolvable name or address. For example, external services such as a remotely hosted e-mail service cannot necessarily be reached at an individual host name. However, it is still possible to test the availability and performance of these remote services and assign the service a status by sending an e-mail and confirming whether the e-mail arrives.

There are many reasons why HP OMi needs to resolve the CI impacted by an event, for example:

- Show the health-status of the impacted CI (set health indicators, calculate KPIs, propagate KPI status).
- Determine the context for an event-related action (automatic or operator initiated).
- Determine the relationships between (and context of) CIs in topology-based event correlation.
- Set the context when launching an event-related tool.
- Refine the data context when generating event-related performance graphs.

One important reason why HP OMi must resolve the CI impacted by an event is so that it can use details of the event to calculate and set (or modify) the health status of the impacted CI and propagate the status up the CI hierarchy. CI resolution is essential for HP OMi in other areas, too. For example, HP OMi needs to know where to start automatic or operator-initiated actions that are attached to an event notification. If any custom tools are available, then HP OMi often needs to start them in the context of the impacted CI. Similarly, performance graphs need to determine the context of the impacted CI to refine the data required to populate the selected graph template. For more information about configuring actions and tools for a specific type of configuration item or a particular category of event, see [Event Actions](#) on page 87.

HP OMi enables you to configure settings for the CI-resolution process. For more information about what settings you can modify and how, see the *HP Operations Manager i Online Help*.

The Event Perspective

The event perspective is the central point of operations and control in the HP OMi console. The event perspective enables operators to display an overview of the events that occur in the operating environment that HP OMi is monitoring. Typically, users make use of the following important features in the event perspective to help them perform the daily tasks required to monitor and manage the events assigned to them:

- **CI Tree View:**

The CI Tree View displays a hierarchical list of all the configuration items that are mapped to objects in your monitored environment. Note that HP OMi filters the contents of the Event Browser according to the configuration item selected in the CI tree. For more information, see [CI Tree View](#) on page 61.

- **Event Browser:**

A list of the events for which the currently logged-in user (or the group to which the user belongs) has view permissions. The event browser provides a central point of focus for users in the performance of their daily tasks. To understand what information is available and why, see [Event Browser](#) on page 53.

- **Event Filters:**

Apply filters to the contents of the browser and reduce the amount (and type) of events on display. To understand how to apply filters, see [Event Filters](#) on page 55.

- **Browser Options:**

Different users require different information to perform the tasks required by their work flow. To understand how to change the type of information displayed in the browser about the listed events, see [Event Browser Options](#) on page 56.

- **Event Details:**

A comprehensive overview of the details of the selected event. For more information, see [Event Details](#) on page 57.

Event Browser

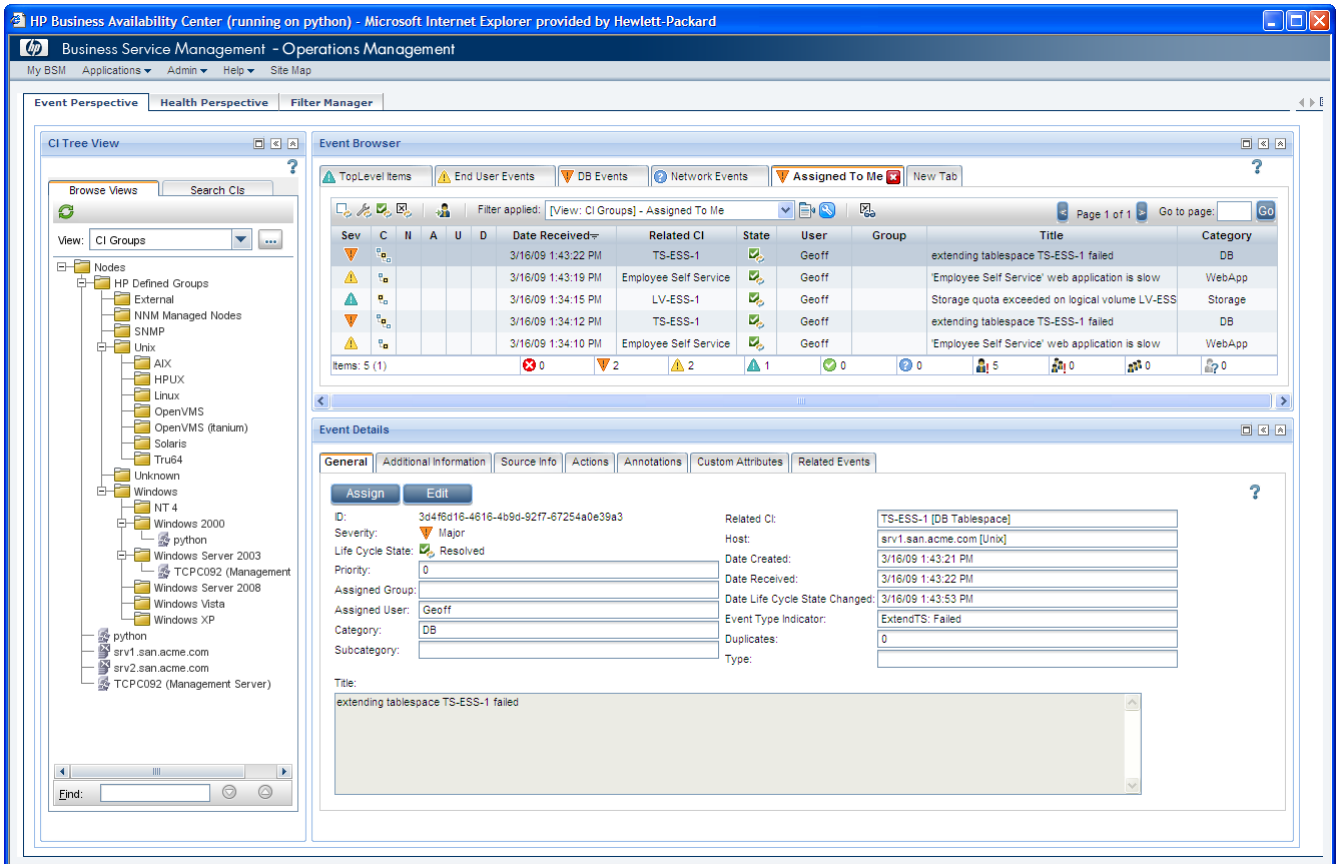
The information displayed by default in the list of events in the browser covers a wide area that includes, but is not limited to, the following details:

- The date and time that the event occurred.
- The severity of the event, for example: critical, warning, minor, and so on.
- The configuration item (CI) to which the event is related, that is: the configuration item affected by the event.
- Indications if any additional information is available either in the form of data supplied by the application that discovered the event or custom annotations added by a user.
- The name of the host system where the event occurred.
- The name of the application that caused the event.
- The name of the user (or user group) responsible for solving the problem that caused the event, if assigned.

HP OMi uses the State column in the event browser to display information about a selected event's life cycle. The event life cycle defines a series of predefined states that summarize the current status of the investigation into the problem that caused an event, for example: "open", "in progress", or "resolved". For more information about the event life cycle, see [Event Life Cycle](#) on page 78.

The standard information displayed in the event browser is a small selection of the total information available about an event, and individual operators can change the information on display to better suit the demands of their work flow and the environment they have to monitor. For more information about how to change the information on display, see [Event Browser Options](#) on page 56.

Figure 15 The Event Perspective Page



If the monitored environment is particularly complex, the event browser supports the use of multiple tabs which users can configure to display different information, additional information, or the same information from a different perspective, that is: using different details. For example, operators can create a filtered view of the same messages displayed in the original tab or display all messages according to the message severity or message owner. To help retain an overview of the contents of the different information displayed in the various new tabs, HP OMi enables you to change the name of the tab by clicking the tab name and typing a new name. The Browser Options icon enables you to specify the type of contents displayed in each, individual browser tab. For more information about which browser options are available and how to set or change them, see [Event Browser Options](#) on page 56.

HP OMi uses a number of columns to display icons that carry a specific message, which can help users understand quickly what additional information is available to help solve the underlying problem.

Table 5 Additional Information in the Event Browser

Column Name	Description
A	Indicates if an automatic action is attached to an event. Automatic actions attempt to fix the problems that cause an event and do not require user intervention. For more information about event actions, see Event Actions on page 87.
C	Indicates if the selected message is the result of a topology-based event-correlation process. For more information about the meaning of the icons displayed in the C column, see Related Events on page 83.
D	Indicates if (and how many) duplicate messages exist, for example: 1, 3, or 10. HP OMi hides duplicate messages from view.
N	Indicates by means of an icon if users have added annotations to the selected event. Annotations are comments or observations that help users investigate the selected event's underlying problem more quickly and efficiently.
U	Indicates if a user-initiated action is attached to an event. Operator-initiated actions enable the problems that caused an event to be fixed remotely, but only after user intervention, for example, by starting and using a specific tool. For more information about event actions, see Event Actions on page 87.

If many events occur, the event browser displays the list of events in pages and indicates both the total number of pages available and the page currently on display. Users can browse through the pages by clicking the back (<) or forward (>) buttons located in the top right-hand corner of the event browser or by entering a page number to display a specific page.

HP OMi supplements the event overview displayed in the browser with event *details* — a collection of more detailed information that describes the context of the selected event much more precisely. Event details are an essential (and probably the most frequently used) part of an operator's tool box. Event details provide quick and easy access to crucial information about the background to an event, hints (in the form of annotations) as to how to go about fixing the underlying problems, and links to any related events, too. For more information about event details, see [Event Details](#) on page 57.

HP OMi enables administrators to specify which type of event a particular type of user can see and work on in the event browser. You can also define the level of access the user has, that is: what operations the user can perform at any given time. For more information, see [User Assignments](#) on page 37.

Events that reach the end of the event life cycle are moved from the event browser to the history browser. Events reach the end of the event life cycle when they are “resolved”.

Event Filters

On startup, the HP OMi event browser displays all the events that the logged-in user (or the group the user belongs to) has permission to view. However, HP OMi enables users to filter the events displayed in the event browser so that only the most important or most interesting

events are visible. The idea behind filters is to enable the users to reduce the amount of events on display so that locating and investigating events is faster and solving the event's underlying problem is easier.



Permission to view an event can change according to whether the event is assigned to the logged in user (or user group) or still unassigned.

By default, HP OMi filters events according to the configuration item selected in the CI Tree. Only those events associated with the selected configuration item appear in the event browser. However, users can create their own custom filters, for example: to display events according to severity, the user assigned to investigate the event, the event category, or the event's life-cycle state, and so on. HP OMi also enables users to display the filtered events in separate tabs within one browser. For more information about event filters and how to configure them, see [Event Filters](#) on page 69.

Figure 16 Filter Events by Current User

Severity	C	N	D	A	O	Host	Date Received	User	Group	State	Title	Category
▲						srv1.san.acme.com	10/9/08 5:33:24 PM	administrator		☐	Storage quota exceeded on logical volume	Storage
▼						srv1.san.acme.com	10/9/08 5:33:23 PM	administrator		☐	extending tablespace TS-ESS-1 failed	DB
▲						srv1.san.acme.com	10/9/08 5:33:21 PM	administrator		☐	'Employee Self Service' web application is s	WebApp
▲				2		srv1.san.acme.com	10/8/08 3:54:38 PM	administrator		☑	Storage quota exceeded on logical volume	Storage
▲						srv1.san.acme.com	10/7/08 3:20:26 PM	administrator		🔧	HISENDER7	
✖				2		srv1.san.acme.com	10/7/08 3:12:57 PM	administrator		🔧	HISENDER7	
▼						srv1.san.acme.com	10/2/08 6:00:10 PM	administrator		☐	Scheduled action Update_HierarchicalNode	OpC
▲						srv1.san.acme.com	10/2/08 4:00:09 PM	administrator		🔧	Scheduled action Update_HierarchicalNode	OpC
▲						srv1.san.acme.com	10/2/08 3:00:09 PM	administrator		🔧	Scheduled action Update_HierarchicalNode	OpC

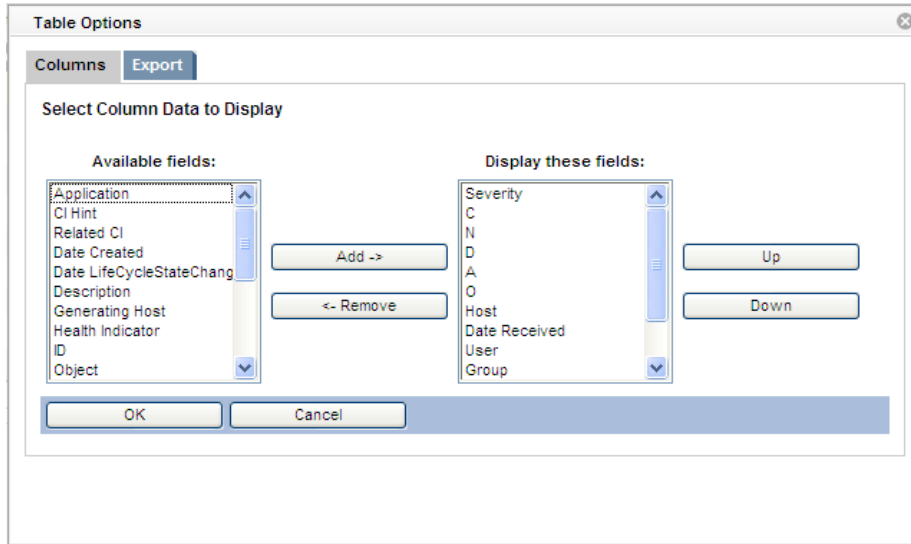
Items: 9 (1) ✖ 1 ▼ 2 ▲ 1 ▲ 2 ☑ 3 ? 0 👤 9 🗑️ 0 📄 0 📁 0

Event Browser Options

The event browser displays information in a table with columns containing specific details about the monitored events. By default, the event table includes columns that contain details of the event's severity, its life-cycle state, the assigned user (or group), the date it was received, a brief description of the event, and so on. However, the Browser Options feature enables users to customize the appearance of the browser and specify not only which columns should appear and in what order but also what information the columns should display. In this way, users can ensure that the information displayed more accurately reflects the needs of their work flow and environment.

[Customize the Contents of the Event Browser](#) on page 57 shows how the Browser Options configuration dialog helps users understand what information is available for display and what information is currently displayed by dividing the information into two separate lists: Available Columns and Displayed Columns. It is important to remember that the order of the Displayed Columns list reflects the order in which the columns appear in the browser (from left to right). Users can change the order in which the columns appear to suit the demands of their own particular work flow. For example, if severity, user assignment, and life-cycle state are important to a user's task-based work flow, it makes sense to ensure they appear at (or near) the top of the Displayed Columns list.

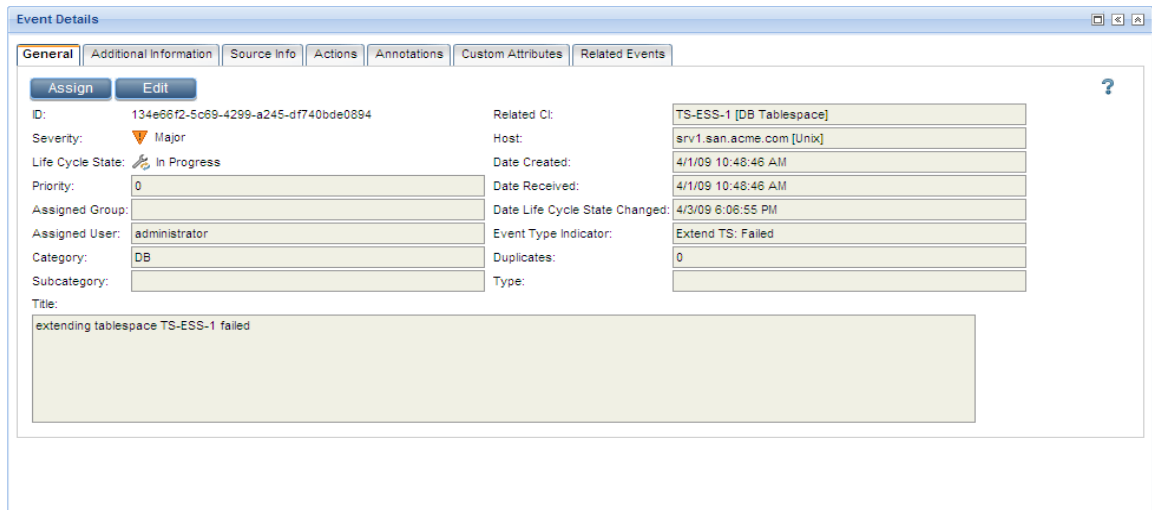
Figure 17 Customize the Contents of the Event Browser



Event Details

HP OMi supplements the information about an event displayed in the browser with event *details* — a collection of much more precise information that describes the context of the selected event. Event details are an essential part of an operator’s tool box and probably the most frequently used in the overall work flow. Event details provide quick access to crucial information about the background to an event, hints (in the form of annotations) as to how to fix the underlying problems, and links to any related events, too.

Figure 18 Display Event Details



Users can choose to display event details either in a pane underneath the event browser or in a separate browser window. Note that if you choose to display event details in a separate browser window, the contents of the new browser window are not refreshed when you click a new event in the original browser window.

HP OMi displays event details in the following tabs, some of which enable users to add and modify information and some of which users tend to need more frequently than others:

- General Tab:

The event detail's General tab provides an overview of the most essential information the user needs to understand the context in which the selected event occurred. For example, the information in the General tab includes the date and time the event occurred, the event's current severity status, the user (and group) the event is assigned to, the affected configuration item, the severity status, and so on.

The General tab is the tab the users most frequently access when investigating the background to an event. The General tab provides a comprehensive overview of an event and, in addition, enables users to perform selected actions on (or relating to) the event.

► Modifying the contents of the General tab requires specific authorization. For more information, see [User Authorizations](#) on page 39.

Users with the appropriate authorization can perform the following tasks in the event browser's General tab:

- **Event Severity:** Users with the appropriate authorization can change the severity of events assigned to them. Administrators can change the severity status of *any* event.
- **Event Priority:** Users with the appropriate authorization can assign a priority between 0 and 9 to the events displayed in the Event Browser. The event priority enables HP OMi users to assign a personal importance to individual events or events from a particular application, for example, because the events relate to an application for which a service agreement defines response times. Note that the concept of event *priority* is additional to (and independent of) the concept of event *severity*.
- **Life-cycle State:** Users with the appropriate authorization can change the life-cycle state of events assigned to them, although there are restrictions concerning which state changes are permitted. Users logged in to HP OMi with the appropriate authorization can change the life-cycle state of any event. The life-cycle operations that other types of users are allowed to perform depend on the authorizations assigned to the user (or the user group to which the user belongs). For more information, see [Event Life Cycle](#) on page 78 and [User Authorizations](#) on page 39.
- **Event Title:** Users with the appropriate permissions can change the text in the event title, which is a short summary of the event. The updates are applied immediately when you save the changes.

- **Additional Information Tab:**

The Additional Information tab displays details of the attributes of the selected event that could not be displayed in other tabs. Additional information tends to be more technical, for example: the application and object associated with the event, the key (ID) assigned to the original message in HP Operations Manager if available, and the string used by HP Operations Manager to automatically acknowledge the original message.

- **Source Info Tab:**

The Source Info tab displays details of the location where the event occurred, as reported in the original event notification. HP OMi uses the information to resolve the CI that was impacted by the event and, in addition, any event-type indicator (ETI) set by the selected event. For more information about CI resolution, see [CI Resolution](#) on page 50. For more information about event-type indicators, see [Event Type Indicators](#) on page 82.

- **Actions Tab:**

The Actions tab displays information about the action to be performed on the remote node. The action is designed to help fix the problem that caused the selected event and can be started automatically, or by a user such as a domain expert or a domain operator. If an

action is configured for an event, it can be started from the event's context-sensitive menu. For more information about event-related actions and tools, see [Event Actions](#) on page 87.

- **Annotations Tab:**

The Annotations tab displays a list of annotations, if available, that users have added to help operators to solve an event's underlying problem should it occur again. Annotations are a useful way of summarizing in one place any issues that a user is likely to encounter when investigating and solving an event's underlying problem.

Note that you can add a new annotation to an event and modify or delete any existing annotations except those created by *System*. Event annotations belong to the user who created or modified them but are visible to all users (or user groups) to whom the event is assigned.

- **Custom Attributes Tab:**

The Custom Attributes tab displays a list of the custom attributes defined for the selected event. Custom attributes are either configured in the original message from HP Operations Manager or added manually to the selected HP OMi event. Note that you can use the Custom Attributes tab to add new custom attributes and modify or delete existing custom attributes. For more information about using custom message attributes to set health or event-type indicators, see [Event Attributes in Health-Based Monitoring](#) on page 150. The Custom Attributes Tab also displays any information relating to the failure of the CI-resolution process. For more information about resolving the CI impacted by an event, see [CI Resolution](#) on page 50.

- **Related Events Tab:**

The Related Events tab displays a hierarchical list of the events that were configured in (and considered by) the event-correlation rule that linked the selected events. You can *unrelate* the event, that is: remove the relationship established by the event-correlation rule, but only for the selected instance. To change the correlation rule that established the relationship in the first place, you have to modify the correlation rule itself. For more information about related events, see [Related Events](#) on page 83.

The Health Perspective

Often, looking at a problem from a different perspective brings to light not just additional problems but also solutions that were not previously obvious. HP OMi enables you to view events from different perspectives at the same time. If specialist users need more health-based information to better understand the background to an event, or need to test rules and filters that they are configuring, they can use HP OMi's Health Perspective page. The Health Perspective page provides a graphical overview of the relationships between the configuration items affected by the events that HP OMi is monitoring, details of the key performance indicators that HP OMi used to determine the severity status of the various configuration items, and a list of the health indicators used to calculate the key performance indicators. The combination of these different perspectives in one collated browser page is particularly helpful for users who want or need a convenient location from which they can perform the tasks that constitute their daily work flow.

In the HP OMi operator's Health Perspective tab, the following tools help operators investigate the health status of an object, understand how HP OMi calculates health status, and see how the status of one object affects the health of other, related objects:

- **CI Tree View:**

The CI Tree View displays a hierarchical list of all the configuration items that are mapped to objects in your monitored environment. Note that HP OMi filters the contents of the event browser according to the configuration item selected in the CI tree. For more information, see [CI Tree View](#) on page 61.

- **Event Browser:**

The Event Browser displays a list of the active events currently under investigation in the monitored environment. HP OMi automatically filters the events displayed according to the specified filter and the configuration item selected in the CI Tree View. For more information, see [Event Browser](#) on page 61. Event details are available in a separate window.

- **Top View:**

The Top View displays a filtered overview of the relationships between the different objects that make up the part of the monitored environment included in the selected view and indicates the current health of the displayed objects. For more information, see [Top View](#) on page 62.

- **Health Indicator View:**

The Health Indicator View displays a list of the health indicators used to calculate the availability and performance of the selected configuration item. Health indicators contribute to the calculation of the severity status of a health-based KPI. For more information, see [Health-Indicator View](#) on page 66.

HP OMi also provides a graphing tool that enables you to generate and display graphs, charts, and tables for events relating to individual configuration items using metrics gathered by the performance agents running on network nodes. For more information, see [Graphing View](#) on page 68.

CI Tree View

Only some of the large number of configuration items (CIs) that make up the IT universe model in the uCMDB are of interest at any one time. Creating a view enables you to build a subset of the overall IT universe model that displays only those CIs that relate to a specific area of interest.



Views enable you to refine both the type and the amount of information displayed in the CI tree. The CI tree is a navigation aide that you can use to filter the contents of the event browser so that you only see those events that are related to the configuration item selected in the CI tree.

HP OMi provides a number of sample views which show how to group configuration items into sets that help HP OMi users to perform their every-day tasks more efficiently. You can modify existing (or configure new) views to change, increase, or decrease the amount and type of information displayed. The views you configure can be exchanged between instances of HP OMi using the UCMDB Package Manager's import-and-export feature, too. Note that exporting a view does not export the configuration-item types referenced in the view. For the views to work after being imported on the new instance of HP OMi, the configuration-item types referenced in the imported views must already exist in the uCMDB on the new HP OMi instance.

The CI tree view also controls what events are displayed in the event browser. HP OMi filters the contents of the event browser according to the configuration item selected in the CI Tree. the chosen filter determines the events HP OMi displays in the event browser. Note that the default setting is to apply no filter, which makes all events visible.

For more information about the link between configuration items and events, see [Events and Configuration Items](#) on page 49.

Event Browser

The HP OMi event browser displays a list of the active events in your environment. Active events are events that are under investigation or whose underlying problem has not yet been solved. Generally speaking, events are an indication of problems concerning the status and the health of the objects that HP OMi is monitoring.

The amount of events displayed in the browser depends on the filter applied. By default, no filter is applied, but HP OMi automatically filters the events displayed in the event browser according to the configuration item selected in the CI Tree View. However, you can configure a filter to change the type and number of events displayed or further refine the events already displayed.

Figure 19 The Event Browser

Severity	C	I	D	A	O	Host	Date Received ↓	User	Group	State	Title	Category
✓						LV-ESS-2	10/7/08 3:20:26 PM			🔍	HISENDER7	
✗			2			LV-ESS-2	10/7/08 3:12:57 PM	adm	Administrators	🔍	HISENDER7	
✗						LV-ESS-2	10/7/08 3:11:44 PM			🔍	HISENDER7	
⚠						TS-ESS-1	10/6/08 5:44:42 PM			🔍	Storage quota exceeded on logi	Storage
⚠						TS-ESS-1	10/6/08 5:44:38 PM			🔍	extending tablespace TS-ESS-1	DB
⚠						TS-ESS-1	10/6/08 5:38:40 PM			🔍	Storage quota exceeded on logi	Storage
✓						TS-ESS-1	10/5/08 12:23:10 AM			🔍	No problem on Storage Server	Storage
✓						TS-ESS-1	10/5/08 12:23:10 AM			🔍	No problem on DB instance Emp	DB
✓						TS-ESS-1	10/5/08 12:23:10 AM			🔍	Storage quota OK on logical vol	Storage
✓						TS-ESS-1	10/5/08 12:23:09 AM			🔍	extending tablespace TS-ESS-1	DB

Items: 26 (1) ✗ 2 ⚠ 2 ⚠ 3 ⚠ 2 ✓ 17 ? 0 👤 12 👤 0 🗑 1 🗑 13

HP OMi uses icons and colors to indicate the severity of events, for example: red for “critical”, blue for “warning”, and green for “normal”. The severity of an event is an indication of the health of an object at the time the event occurred. Note that you can configure HP OMi to use event attributes to set health indicators for the configuration items associated with the event, and health indicators can contribute to severity status. For more information about the contents of the event browser, as well as the meaning of the various icons, buttons, and labels, see [The Event Perspective](#) on page 53.

Although events can set health indicators, the severity of an event does not necessarily reflect the severity of the health indicator that the event sets. HP OMi distinguishes between the concept of event-based severity (set by the event itself) and health-based severity (set by health indicators related to the event). This means that it is not unusual for the severity of an event to be different to the severity of the configuration item impacted by an event. For more information about health-based severity, see [Health-based KPIs](#) on page 64. For more information about event-based severity, see [Event-based KPIs](#) on page 65.

Top View

The Top View pane displays a graphical perspective of the configuration items affected by the event selected in the event browser. The event is an indication of a problem that has occurred in the operational environment. Top Views show the relationships between the configuration items affected by the selected event and indicate their current health status. Top views are particularly useful when investigating problems that require root-cause analysis.

The Top View provides easy access to important health-related information, too, as illustrated in [Figure 20](#) on page 63. For example, you can see how HP OMi propagates health status between configuration items. By hovering the mouse over a configuration item, you can also display a concise overview of the key performance indicators (KPI) assigned to the selected configuration item. The details displayed show, amongst other things, the current severity status of each KPI and the business rule that HP OMi uses to propagate severity status as illustrated in [Figure 22](#) on page 65.

Figure 20 Top View Health Perspective



You can refine the contents of the Top View pane by applying an alternative view using the Selected View drop-down menu. A *top* view displays topological information about the monitored environment in a particular way. Unlike the Dashboard's Top View which shows a complete picture of *all* the configuration-items contained in the view, the HP OMi Top View filters the UCMDB view and displays only those configuration items that are *directly affected* by the event selected in the event browser.

If no event is selected in the event browser, the Top View pane remains empty. If you select an event that is associated with a configuration-item type that is *not* mapped to a uCMDB view using the HP OMi View Mappings manager, HP OMi replaces the top view with a table containing information about the KPIs assigned to the configuration-item type affected by the event, as illustrated in [Figure 21](#) on page 64.



Top views are not to be confused with topology views. Top view have one parent and the same element can appear more than once if relationships require. Topology views are a flat representation of the uCMDB elements where elements appear only once.

Users with the appropriate authorization can use the HP OMi View Mappings Manager to map uCMDB views to individual types of configuration items. Only those views that are mapped to the configuration-item type related to the selected event are available for display in the Selected Views drop-down list in the Top View pane.

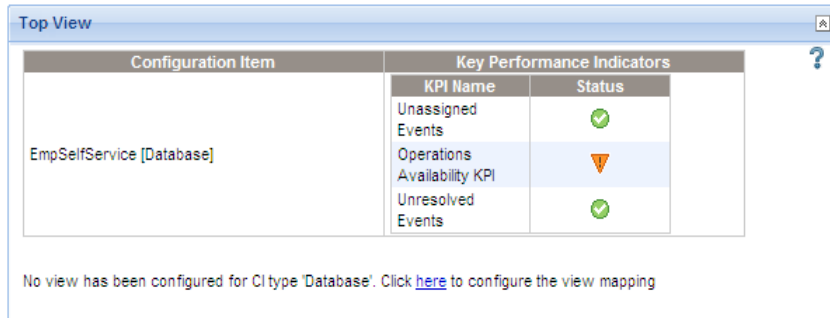
The contents of the Selected Views drop-down list are determined by the configuration-item type associated with the event selected in the browser. The user selects an event in the browser. The selected event is associated with a configuration item. If the configuration-item type is mapped to a view *and* the view contains the configuration item impacted by the event selected in the Event Browser, the view appears in the list of views in the Selected Views drop-down menu.

For example, a user investigating a storage-related problem selects a storage event in the browser. The storage event selected in the browser is assigned to a storage-related configuration-item type such as, "Disk Partition" or "File System". The configuration-item types "Disk Partition" and "File System" are mapped to a UCMDB view called "Cluster Server". In this case, HP OMi would display in the Top View's Selected View drop-down list

only those views that are mapped to the configuration-item types “Disk Partition” or “File System” *and* contain the configuration item related to the event selected in the Event Browser.

HP OMi enables you to further restrict the views displayed in the Selected Views drop-down list according to event category, for example: Database, Storage, Network, and so on. For more information about event categories, see [Event Categories](#) on page 85. All of the features described here are designed to reduce overall “noise” and help the users concentrate on those things that are necessary to complete the tasks in their work flow as quickly and easily as possible.

Figure 21 Configuration Item Not Mapped to a uCMDB View



The Top View pane also displays important information about the key performance indicators (KPI) that HP OMi uses to calculate the health and the severity of the events that occur in the monitored environment. HP OMi displays the information in the context of the individual configuration item that the mouse cursor hovers over. The HP OMi KPIs are divided into the following categories:

- [Health-based KPIs](#) on page 64
- [Event-based KPIs](#) on page 65

HP OMi displays KPI-related information in the tool-tip pop-up pane only if a KPI is assigned to the currently selected configuration-item type. HP OMi’s event-based KPIs are assigned to all configuration-item types by default. HP OMi’s health-based KPIs are assigned to a configuration-item type the first time an event is detected that sets a health indicator for a particular configuration-item type.

Health-based KPIs

HP OMi provides health-based KPIs for "Operations Availability" and "Operations Performance". Availability-related data from health indicators include server run states (up, down, starting, stopping) or process activity (refusing, accepting connections, not responding, and so on). Performance-related data include values for the hit ratio in the database cache, server-connection speeds, queue lengths, or database query-processing times. HP OMi calculates the severity of health-based KPIs by collating the status of health indicators that are set by the events that HP OMi detects and applying one of the following calculation rules:

- **Most critical:** set the severity status of the health-based KPI to the status of the health indicator with the highest severity currently assigned to the related configuration item.

- **Average:** set the severity status of the health-based KPI to the average status of all the health indicators currently assigned to the related configuration item.





HP OMi displays KPI-related information in the tool-tip pop-up pane only if a KPI is assigned to the currently selected configuration-item type. HP OMi's health-based KPIs are assigned to a configuration-item type the first time an event is detected that sets a health indicator for a particular configuration-item type.

Note that HP OMi makes a distinction between health-based and event-based severity. HP OMi does not take into account the severity status of the original event when calculating the severity status of *health*-based key performance indicators. The severity of health-based key performance indicators is calculated using the health indicators set by the incoming events. Consequently, the severity status of both the operations-availability and the operations-performance KPIs is only calculated if the reported event sets a health indicator and references a CI. Note, too, that the severity status of a health-based KPI does not depend on the life-cycle status of the associated event. If the life cycle of an event changes, it does not necessarily affect the status of the health-based KPI.

HP OMi displays essential KPI-related information in a tool-tip pop-up pane. [Figure 22](#) on page 65 shows the information available for health-based key performance indicators such as the Operations Performance and Operations Availability KPIs.

Figure 22 Health-based KPI Perspective

 Operations Performance KPI	
CI Name:	srv1.san.acme.com
Status:	Info
Calculation Rule:	Operations KPI Group Rule
Held status since:	10/8/08 10:59:56 AM
 Operations Availability KPI	
CI Name:	srv1.san.acme.com
Status:	OK
Calculation Rule:	Operations KPI Group Rule
Held status since:	10/8/08 11:06:03 AM

HP OMi Administrators and domain experts can change the rules used to calculate KPI severity status. For more information about the rules that HP OMi uses to calculate and propagate the status of health-based KPIs, see [Health-based KPI Calculation](#) on page 146 and [Health-based KPI Propagation](#) on page 149

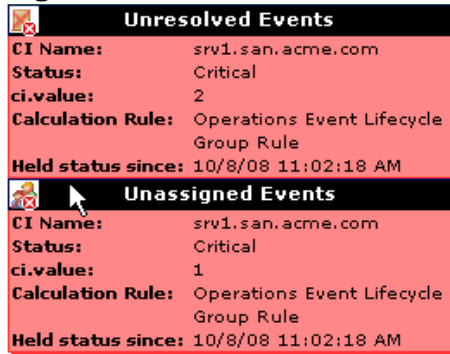
Event-based KPIs

HP OMi assigns event-based KPIs to configuration items by default. Event-based KPIs are related to events that are either *unassigned* or *unresolved*. Unassigned events concern problems that have not yet been allocated to (or addressed by) a user or work group. Unresolved events concern problems that are still under investigation and are not yet solved.

HP OMi calculates the severity status of event-based KPIs by considering the current severity of any events associated with the CI to which the KPI is assigned. One natural consequence of this behavior is that the severity status of an event-based KPI is linked to the status of the event life cycle. If the life-cycle status of an event changes, this can trigger a change to the severity status of the event-related KPI, too.

HP OMi displays essential KPI-related information in a tool-tip pop-up pane. [Figure 23](#) on page 66 shows the information available for event-based key performance indicators such as the Unresolved Events and Unassigned Events KPIs.

Figure 23 Event-based KPI Perspective



If a KPI for either an unassigned event or an event that is not resolved references data from more than one event, the status (and color) of the KPI reflects the severity of the most critical event. For example, if a KPI for an unassigned event refers to one critical and four normal events, HP OMi colors the KPI red to reflect the one, critical event.

Health-Indicator View

The Health Indicator View provides information about the current status of a configuration item from the perspective of the assigned health indicators. The configuration item concerned is the one associated with the event that is currently selected in the event browser. The list of health indicators displayed is divided according to the key performance indicator (KPI) to which the individual health indicators are assigned, namely:

- Operations Availability
- Operations Performance
- Other (not used in any health-based KPI calculation):

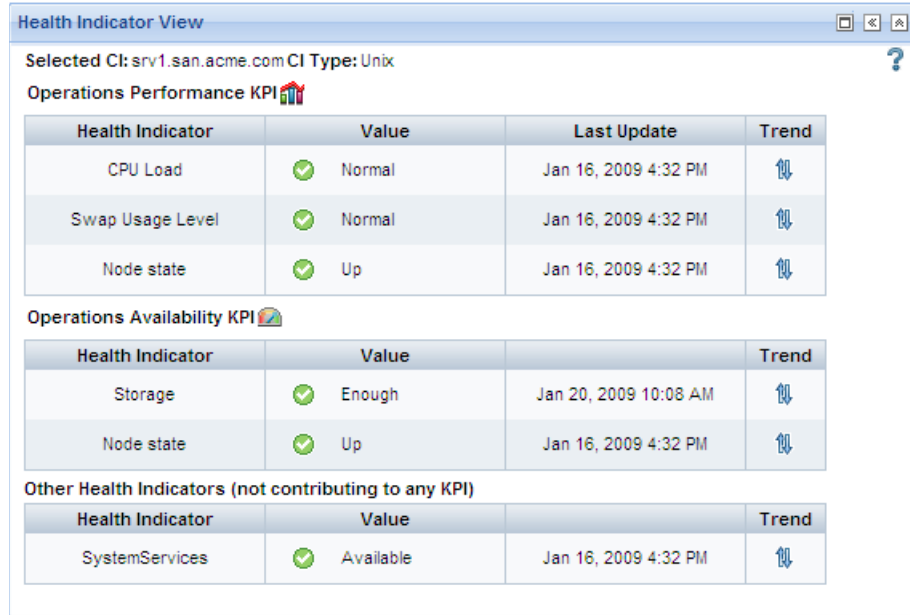
HP OMi uses the special category “other” to show health indicators that are assigned to the configuration item affected by the currently selected event but *not* assigned to any health-based KPI and, as a result, not considered for the calculation of the KPI’s severity status.

Health indicators contribute to the calculation of a configuration item’s health-based severity status. Health indicators are assigned to health-based KPIs and map a defined state to a corresponding severity. For example, if you define health indicators for a database, you could associate the state “running” with the severity “normal”, database “stopped” with the severity “major”, and a failed attempt to extend the table space (when load is high) with the severity “critical”.

When HP OMi detects an event concerning table-space problems for an Oracle database instance, it automatically sets the health indicator for the Oracle configuration item to “critical”. HP OMi then considers the new status when calculating the key performance indicator for the configuration item and, if necessary, changes the color of the appropriate icons in the Top View and Health Indicator view to reflect the new health status.




Note that one KPI rule can include multiple health indicators reporting from different “domains”. For example, a KPI for the database configuration-item type could include a combination of health indicators monitoring the run state (up, down), the cache-hit ratio (0, 50, 100%), the length of query queues (empty, full), and response times (#ms) to determine overall health. By assigning importance to each of the values and combining the results, you can provide a much more accurate picture of the health of a configuration item.

Figure 24 Health-Indicator Perspective



The Health Indicator View also provides information that enables you to visualize trends, which can help track how the health of a particular configuration item changes over time. The combination of trend information and a time stamp for each report enables you to see how long the selected configuration item has remained in the current state and how fast its health is improving or declining. Table 6 on page 67 lists the icons HP OMi uses to visualize how the health of a configuration item changes over time.

Table 6 Health Indicator Trends

Trend	Description
	Up: the health of the configuration item associated with the currently selected event has improved compared to the last known report.
	No change: the health of the configuration item associated with the currently selected event has not changed compared to the last known report.
	Down: the health of the configuration item associated with the currently selected event has declined compared to the last known report.

HP OMi provides authorized users with context-sensitive access to the tools required to configure and manually reset health indicators for the selected configuration-item directly from the Top View pane. Context-sensitive menus are available by right clicking a configuration item.



Resetting a health indicator manually is not recommended but might be useful if a normal (reset) event is lost in an event storm and HP OMi continues to display the configuration item in a critical state, even though the related event's underlying problem has been solved and the event has been closed.

HP OMi uses a tool-tip pane to display a summary of the last event that was used to calculate the current health-indicator status. To display a health-based summary of the event, hover the cursor over a health indicator in the Health Indicator View pane.

HP OMi also enables users to display in a separate browser a list of all the events that contributed to the calculation of the health-based severity status of the currently selected event. The summary is a convenient way to display an overview of the event's immediate health-based history.

Authorized users can start the Indicator Manager and modify the configuration of any of the health indicators listed in the health-indicator view. The Indicator Manager loads the details of the selected health indicator and displays them on start up. Context-sensitive access to configuration tools improves the efficiency of the user work flow.

Graphing View

HP OMi provides a feature that enables you to generate graphs and tables, which you can use to illustrate graphically how the objects in the environment HP OMi is monitoring are performing. For example, the graphs you generate show an overview of important performance metrics such as CPU and swap space utilization over time and memory page use and availability.

You can generate graphs, charts, and tables in the context of individual events and their associated configuration-items. For context-sensitive access to the performance graphs available for an individual event, right-click the event for which you want to display graphs and use the graphing option displayed in the menu that pops up.

HP OMi users can choose from a variety of graph families and categories so that the information available and the format used to display it meets the requirements of a particular user's work flow. Users can also configure which details should appear in the graph, the time period for the data to be displayed, and the display format, for example: graph, chart, or table. The graphing view also enables the simultaneous display of the same data in different forms using multiple tabs.

For more information about assigning graph families to specific configuration-item types, see [Performance Graphs](#) on page 152. Assigning graphing families to a specific type of configuration item enables administrators and domain experts to define which types of graphs are available to other users such as domain operators in the context of a particular type of event.

Event Filters

On startup, HP OMi displays all known *active* (open and still unresolved) events in the event browser. However, HP OMi enables users to filter the events displayed in the event browser so that only the most important events are visible. For example, users can create filters that display events according to severity, the user assigned to investigate the event, the event category, or the event's life-cycle state, and so on. HP OMi can also display the filtered events in separate tabs within one browser.

Filters are an essential part of the HP OMi user's tool box since they enable users to reduce and refine both the *type* and the *amount* of events displayed in the event browser. Reducing the amount of unnecessary events displayed in the browser and restricting the events that do appear to those that are the most relevant helps to improve the efficiency and effectiveness of the user's work flow.

By default, HP OMi filters the contents of the event browser according to the configuration item selected in the CI tree or, if no individual CI is selected, the view containing the configuration items displayed in the CI Tree View. For example, when a user selects a configuration item in the CI tree, HP OMi automatically applies a filter that displays in the event browser only those events that are in some way related to the selected configuration item. HP OMi provides the following types of event filters:

- Standard filters:
 - **No Filter:** show all known *active* events in the Event Browser
 - **Top Level Items:** show all events that are *not symptoms* in an event-correlation rule, that is: events that are either a cause in an event-correlation rule or not configured in an event-correlation rule at all.
 - **Assigned To Me:** show all events assigned to the user who started the current browser session

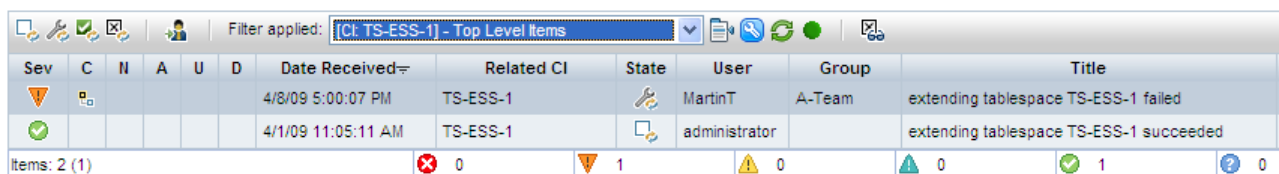
- Temporary filters:

HP OMi applies a *temporary* filter when a user selects a configuration item in the CI Tree. The temporary filter has a name that takes the form of a colon-separated list and reflects the name of the selected configuration item, for example, **CI:<Host_Instance>**.

- Custom filters:

A *custom* filter is either a default filter which a user has modified or, alternatively, a new filter created by an HP OMi user to suit the demands of the local environment.

Figure 25 Filter Selection in the Event Browser



The screenshot shows the HP OMi Event Browser interface. At the top, there is a 'Filter applied:' dropdown menu with the text '[CI: TS-ESS-1] - Top Level Items'. Below this is a table with columns: Sev, C, N, A, U, D, Date Received, Related CI, State, User, Group, and Title. The table contains two rows of event data. At the bottom of the table, there is a summary bar showing 'Items: 2 (1)' and various status icons with counts: 0 red, 1 orange, 0 yellow, 0 green, 1 blue, and 0 purple.

Sev	C	N	A	U	D	Date Received	Related CI	State	User	Group	Title
▼	□					4/8/09 5:00:07 PM	TS-ESS-1	⚙️	MartinT	A-Team	extending tablespace TS-ESS-1 failed
✓						4/1/09 11:05:11 AM	TS-ESS-1	🔒	administrator		extending tablespace TS-ESS-1 succeeded

Items: 2 (1) 0 1 0 0 1 0

Figure 25 on page 69 shows how HP OMi uses the Applied Filter box in the Event Browser to indicate the current combination of standard and temporary filters using the following syntax:

```
[CI: TS-ESS-1: Top Level Filter]
```

- TS-ESS-1:

The *temporary* filter set by the selection in the CI Tree View. The filter name reflects the name of the currently selected configuration item (CI).

- Top Level Filter:

The *standard* filter set by selecting an item from the Applied Filter list in the Event Browser.

Note that the *standard* filter you select is “persistent”, that is: the filter remains in effect until you either select a different standard filter or remove the standard filter selection from the browser by selecting the No Filter option. The behavior of the *standard* filter is independent of the *temporary* filter selected in the CI Tree View. The temporary filter is so named because a temporary filter applies only if (and as long as) an item is selected in the CI Tree or a view is selected in the View box. If you select a new view or change the item selected in the CI Tree, the temporary filter changes to reflect the new view or CI selection, and HP OMi updates the contents of the Event Browser accordingly.

HP OMi provides a tool that enables users to create, modify, and manage filters from a central location. For more information about the filter manager, see [The Filter Manager](#) on page 70.

The Filter Manager

The Filter Manager enables you to set up and manage the filters that reduce the number of events displayed in the event browser. The filters you define are displayed in the Filter Applied drop-down list in the event browser's title bar. The Filter Applied drop-down list also indicates which (if any) filter is currently active.



Event filters are not the same as browser *options*. Event filters determine which events to display in the event browser; browser options determine what *type* of information to display in the event browser about the filtered events, and how. For more information about browser options, see [Event Browser Options](#) on page 56.

For example, users can define a *filter* that displays all events that occurred between 10:00 and 12:00 on Monday and, using *browser options*, refine the type of information displayed in the browser to three columns including: the application that produced the event, the affected configuration item, and the date the event occurred.

Note that the event attributes available for selection and use in an event filter depend on the context in which the event filter is to be used, for example: the Event Browser, the History Browser, the Indicator Manager, or automatic event assignment. HP OMi displays for selection and use in a filter only those attributes that make sense in the chosen context. [Figure 26](#) on page 71 shows the Edit Filter dialog when launched in the context of the Event Browser, which is the tool HP OMi provides to help manage the events that occur in the monitored environment. For more information about event filters in the context of event assignment, see [The Event-Assignment Manager](#) on page 75; for more information about event filters in the context of health indicators, see [Event Attributes in Health-Based Monitoring](#) on page 150.

Figure 26 Define an Event Filter

Filter Configuration

Loaded Filter: gfn

General Dates Resolution Custom Attributes Advanced

Severity:

- Critical
- Major
- Minor
- Warning
- Normal
- Unknown

Assignment:

- Assigned to Me
- Assigned to My Workgroups
- Assigned to Others
- Not Assigned

Life Cycle State:

- Open
- In Progress
- Resolved

Correlation:

All events
 Only top level events

Priority: = 0

Category: equals Exchange

Subcategory: equals

Type: equals

Title: equals

Description: equals

Preview OK Cancel

Reducing and refining the events displayed helps you to locate the events you are interested in. For example, you can create filters for use in the following areas:

- Event Browser:

Define filters to reduce and refine the number and type of events that appear in the event browser and in the Health Perspective tab.

- Mapping rules:

Define filters that select the events to be considered when mapping events to health indicators or event-type indicators in the Indicator Manager and, as a result, speed up the mapping process. Note that access to administration tools such as the Indicator Manager requires special authorization.

- Event Assignment:

Define filters that select the events to be considered when configuring HP OMi to assign events automatically to individual users or more generic user groups. For more information about filters in event assignment, see [The Event-Assignment Manager](#) on page 75.









Filters created in the filter manager are not necessarily available for use in other contexts where filters are used. For example, event filters created in the Filter Manager are not available for use in event-assignment rules. Similarly, filters created in the assignment manager are not available to other HP OMi management tools such as the Indicator Manager.

Severity Status

HP OMi uses the same standards for severity status defined in HP Operations Manager for UNIX and HP Operations Manager for Windows to indicate the health of the objects affected by the events that occur in the monitored environment. Table 7 on page 72 lists the event- and health-related severities that users are likely to encounter during the course of their every-day work flow, and describes briefly what each severity means.

Table 7 Understand Severity Status

Icon	Severity	Description
	Critical	An event has occurred that requires immediate corrective action.
	Major	An event has occurred whose impact is high enough to prevent the normal use of the affected object.
	Minor	An event has occurred whose impact is relatively low and should not impede the normal use of the affected object.
	Warning	A potential or impending service-affecting event has occurred, Action is required to diagnose and correct the problem.
	Normal	An event has occurred as expected. For example, a process is starting or completing, or displaying status information.
	Unknown	A severity level was not defined in the policy that detected the event that generated the message.

HP OMi distinguishes between two types of severity: *event* severity and *health* severity. Event severity is determined by the original event source, for example, HP SiteScope or HP NNMi. The severity assigned to an event notification received from HP NNMi or HP SiteScope is passed on unchanged to HP OMi. For *health* severity, the situation is a little more complex and, as a result, a more accurate reflection of the real status of the monitored object. Health severity is calculated by HP OMi after receipt of the event notification and indicates the status HP OMi assigns to the object affected by the reported event based on assumptions HP OMi makes using information concerning performance and availability.

To determine and display the *health* severity of a monitored object, HP OMi uses one or more health indicators, which are assigned to key performance indicators (KPI) for availability and performance. Health indicators contribute to the calculation of health-based severity status in key performance indicators (KPI).

When HP OMi detects a new event, it uses pre-defined rules to calculate the severity status of the KPIs assigned to the configuration item with which the reported event is associated. The rules consider the severity status of the various health indicators assigned to the KPI and set the health severity, which HP OMi displays in the Health Perspective's Top View pane.



KPIs play a central role in the work flow of all HP OMi users. HP OMi operators use KPIs to understand at a glance how event severity affects the health of a monitored object. HP OMi administrators and domain experts configure KPIs to provide other users with a much more accurate reflection of the severity of events.

Health indicators can have one or more values, each of which is aligned with a severity status. For example, a health indicator for the database state could have two values: “unavailable” (critical) and “available” (normal). If HP OMi detects that a database is not available, it generates an event notification that automatically sets the health severity of the monitored

object to “critical”. For more information about health indicators and their values as well as details of how to use event attributes to set health indicator values automatically in HP OMi, see [Indicator Mapping Rules](#) on page 137.

If more than one health indicator is available, HP OMi uses calculation rules to determine the health severity of the KPI for a monitored object. The calculation rule that HP OMi uses by default is: “most critical”. However, you can also choose to use the “average” calculation rule, too. The “most critical” calculation rule, sets the health severity of a KPI to the severity of the most critical health indicator assigned to the KPI. The “average” calculation rule sets the health severity of the KPI to the average severity of *all* the health indicators assigned to the KPI. For more information about calculation rules, see [KPI Calculation Rules](#) on page 146.

KPI business rules determine how HP OMi uses health-related data to calculate and set the severity status of a KPI. Business rules also determine if, how, and when to propagate the status of one or more related "child" objects in order to set or change the status of dependent "parent" objects. For more information, see [KPI Business Rules](#) on page 148.

In the context of most users’ work flow, event severity determines the order in which events need to be investigated. Most users choose to investigate critical events before events with the severity status “major” or “minor”. HP OMi enables users to filter the events displayed in the browser according to severity. Users can also display the events according to ascending or descending severity, as illustrated in [Figure 27](#) on page 73. If necessary, a user can change the severity of an event directly in the browser, using the Edit button in the General tab of the Event Details pane.

Figure 27 Events Displayed by Severity

Severity ↓	C	N	D	A	O	Host	Date Received	User	Group	State	Title
✖			2			LV-ESS-2	10/7/08 3:12:57 PM	administrator		🔧	HISENDER7
✖						LV-ESS-2	10/7/08 3:11:44 PM	OM User		🔧	HISENDER7
⚠	🔍					srv1.san.acme.com	10/9/08 5:33:23 PM	administrator		🔧	extending tablespace TS-ESS-1 failed
⚠	🔍					srv1.san.acme.com	10/8/08 4:52:27 PM			🔧	extending tablespace TS-ESS-1 failed
⚠	🔍		1			srv1.san.acme.com	10/8/08 4:22:06 PM			🔧	extending tablespace TS-ESS-1 failed
⚠	🔍					srv1.san.acme.com	10/9/08 5:33:21 PM	administrator		🔧	'Employee Self Service' web application is slow
⚠	🔍					srv1.san.acme.com	10/8/08 4:18:34 PM			🔧	'Employee Self Service' web application is slow
⚠	🔍					srv1.san.acme.com	10/1/08 4:46:52 PM			🔧	'Employee Self Service' web application is slow
⚠	🔍					srv1.san.acme.com	10/8/08 4:22:08 PM			🔧	'Employee Self Service' web application is slow
⚠	🔍					srv1.san.acme.com	10/8/08 4:52:25 PM			🔧	'Employee Self Service' web application is slow

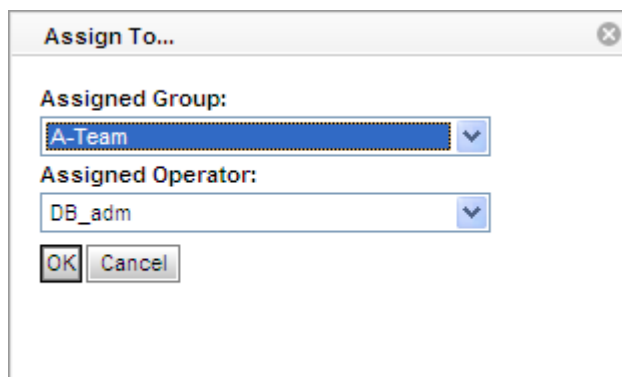
Event Assignment

HP OMi uses the concept of *assignment* to ensure that the people working on solving an event's underlying problem are those who know most about the event, its cause, and its background. HP OMi enables administrators to *assign* events to individual users or more generic user groups. The idea is to ensure that only those people with sufficient knowledge and authorization are permitted to work on a particular event and ensure that the event's underlying problem is solved more quickly and efficiently. By assigning an event to a group rather than an individual, the HP OMi administrator can ensure that individual users have access to a pool of knowledge to help them overcome issues that occur during the course of the investigation.

For example, users with a background in hardware (disks, disk controllers) and file systems are best qualified to investigate storage-related events. Users with a detailed knowledge of database software and configuration are more able to investigate problems that cause database-related events.

Figure 28 on page 74 shows how you can manually assign an event to either a user or a user group. Because of the way user groups work, if you assign an event to an individual, you effectively assign the event to the group to which the individual user belongs. This is because HP OMi enables all members of the chosen user group to work on the assigned event. The Assign To... dialog is available in the context of the event—either as an option in the Operations context-sensitive menu or from the Assign To... icon in the event browser tool bar or the Event Details pane. If you want to assign more than one event to a user or user group, hold down the Ctrl key while selecting the events to assign.

Figure 28 Assign Events to Users



To benefit from the event-assignment feature, HP OMi administrators need to decide in advance the type of user required to monitor and manage the events that occur in the local IT environment and create the user groups that reflect the user types needed. After configuring the desired user groups, the HP OMi administrators must add users to the newly created user groups and then assign event categories to the user groups with the appropriate knowledge and expertise.

Before configuring rules to assign events either manually or automatically, HP OMi administrators and domain experts need to decide how to handle *unassigned* events—events not yet assigned to a user or a user group. HP OMi can be configured to display or hide unassigned events. For example, you can configure HP OMi to enable particular users to hide all unassigned events or only see unassigned events that belong to a specified event category such as: Database, Network, or Storage. Alternatively, you can create a special user such as an “event-assignment manager”, who is responsible for assigning events manually to a particular user or user group.

Event assignment is related to the event life-cycle state and, in addition, to authorizations granted to HP OMi users. Whether an event is assigned to a user or user group determines what permissions the user (or user group) has to perform actions on the event. The rights and permissions granted to a user or user group change according to whether the event is assigned or not



If an event is assigned to a user group, then all members of the user group can work on the event. If users assign an event to themselves, all members of the user group to which they belong can work on the event.

For example, in a typical setup, the user to whom an event is assigned can change the assigned event's life-cycle state from "open" to either "in progress" or "resolved" but *not* to "closed". This is because assignment and closure of an event require special authorization. Only those users with the appropriate authorization are permitted to "assign" events to other users or change the event life-cycle state from "resolved" to "closed". For more information about event life cycles, see [Event Life Cycle](#) on page 78.

Figure 29 Display Events by User Assignment

Severity	C	N	D	A	O	Host	Date Received	User ↓	Group	State	Title
✖		2				LV-ESS-2	10/7/08 3:12:57 PM	administrator		🔧	HISENDER7
⚠		2				srv1.san.acme.com	10/8/08 3:54:38 PM	administrator		🔧	Storage quota exceeded on logical volume LV-ESS-1
⚠						srv1.san.acme.com	10/9/08 5:33:21 PM	administrator		🔧	'Employee Self Service' web application is slow
⚠						srv1.san.acme.com	10/9/08 5:33:24 PM	administrator		🔧	Storage quota exceeded on logical volume LV-ESS-1
⚠						srv1.san.acme.com	10/9/08 5:33:23 PM	administrator		🔧	extending tablespace TS-ESS-1 failed
✔						LV-ESS-2	10/7/08 3:20:26 PM	administrator		🔧	HISENDER7
✖						LV-ESS-2	10/7/08 3:11:44 PM	OM User		🔧	HISENDER7
✔						TS-ESS-1	10/5/08 12:23:10 AM			🔧	No problem on Storage Server
⚠						srv1.san.acme.com	10/8/08 4:18:34 PM			🔧	'Employee Self Service' web application is slow
⚠						srv1.san.acme.com	10/1/08 4:46:52 PM			🔧	'Employee Self Service' web application is slow

If an event is assigned to a user group, *any* member of the group can work on the event in the same way as an event assigned to an individual user. Multiple users from the same group can even work on the same problem concurrently. However, the same restrictions apply to events assigned to user groups as apply to individual users regarding changes to the assigned event's life-cycle status.

If an HP OMi administrator or a Domain Expert needs to check which events have been assigned to which users or user groups, the event browser includes a feature that enables the sorting of displayed events according to user or user group. Clicking the Users column header displays the list of events by user or user group.

HP OMi also enables you to assign events to users or user groups automatically, for example, by using an event filter, which specifies an event attribute such as the event category. For more information about event filters, see [Event Filters](#) on page 69. For more information about event categories, see [Event Categories](#) on page 85. For more information about automatic event assignment, see [The Event-Assignment Manager](#) on page 75.

The Event-Assignment Manager

HP OMi provides a tool that helps automate the process of assigning events of a particular type to users (or user groups) as soon as the events arrive in the event browser. Using attributes such as the event category or event severity, you can filter incoming events and assign matched events automatically to the user group with the knowledge and expertise required to fix the event's underlying problem.

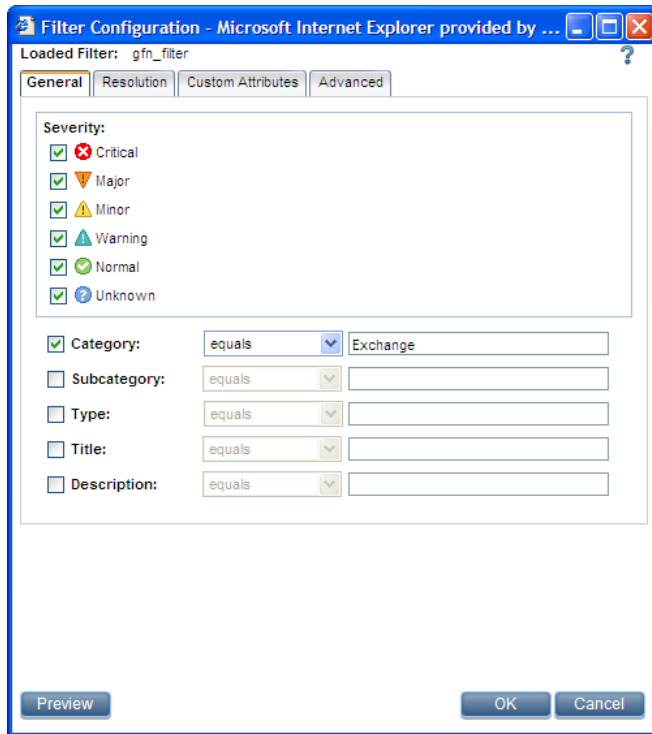
The event-assignment tool relies on the existence of the user or user groups to which you want to assign events and the event categories that you want to as the basis of the automatic event assignment. You need to create the user groups and the event categories *before* you start the process of configuring event assignment. When you create the new user groups, using the BSM platform's user manager, you must also ensure that you grant the appropriate rights and permissions relating to the actions that the group members can perform on the assigned events. For example, you must ensure that the assigned user group can view, work on, and resolve the assigned events before you start the process of automating event assignment to the configured user group. For more information about configuring user authorizations, see [User Authorizations](#) on page 39.



By default, HP OMi grants all users permission to view any events assigned to them. It is not possible to remove or change this authorization setting.

Unlike user groups, which must already exist, you can create a new filter while setting up automatic event assignment, if no suitable filter exists. HP OMi uses the filter to reduce the number of events to be considered for assignment to the specified user group and speed up the overall assignment process. After assignment, any user belonging to the specified group can contribute to the work involved in finding a solution to the event's underlying problem.

Figure 30 Event Filters in User Assignment



Event filters created *outside* the context of the Event Assignments Manager are not available for use in event-assignment rules. Similarly, filters created in the assignment manager are not available to other HP OMi management tools. Filters created for use in the Indicator Manager, for example as part of a mapping rule for an event-type indicator, are not available for use in the assignment manager as part of an event-assignment rule. Similarly, filters created in the assignment manager are not available for use in Indicator Manager or the event browser.

In addition, the attributes available for selection and use in an event filter depend on the context in which the event filter is to be used, for example: automatic event assignment, the Indicator Manager, the Event Browser, or the History Browser. HP OMi displays for selection

and use in a filter only those event attributes that make sense in the chosen context. [Figure 30](#) on page 76 shows the Edit Filter dialog when launched in the context of event assignment, which is the process of automating the assignment of events to users. For more information about event filters in the context of event management, see [Event Filters](#) on page 69; for more information about event filters in the context of health indicators, see [Event Attributes in Health-Based Monitoring](#) on page 150.





The filters configured for use with automatic event assignment are available to all users who have access to the assignment manager. For example, filters created by an SAP domain expert are visible to (and available for use by) any other domain expert, who has access to the assignment manager, too.

Event Life Cycle

HP OMi uses the event browser to display the position of an event in a defined life cycle. The event life cycle defines a series of predefined states that summarize the current status of the investigation into the problem that caused an event, for example: “open”, “in progress”, “resolved”, and “closed”. You can use the event life cycle to track the progress of the investigation of a selected event. Administrators and domain experts can use the event life cycle to display a broader picture of events, for example: which events are not yet open for investigation, which are still in progress, and which are already resolved. HP OMi enables you to display the contents of the event browser according to life-cycle status, too.

HP OMi uses icons to indicate to the user where an event lies in the overall life cycle. [Table 8](#) on page 78 lists the life-cycle icons and describes the event’s life-cycle states.

Table 8 Event Life-cycle States in the Event Browser

Icon	Life Cycle State	Description
	Open	The event is known about but no user is yet responsible for the investigation of the problems that caused the event.
	In Progress	The event has been assigned to a specified user and the assigned user has started working on the investigation of the event's underlying problems. The name of the assigned user or user group appears in the user column in the browser.
	Resolved	The investigation into the selected event's underlying problem is complete and the problem found and fixed. Note that it is recommended to confirm and approve resolved events before closing them.
	Closed	An event whose resolution has been confirmed, approved, and removed from the list of "active" events displayed in the browser.

Life-cycle states are linked to authorizations granted to HP OMi users. For example, in a typical setup, the user to whom an event is assigned can change the assigned event's life-cycle state from "open" to either "in progress" or "resolved" but not to "closed". In HP OMi, assignment and closure of an event require authorization. HP OMi permits only those users with the appropriate authorization to "assign" events to other users or change the event life-cycle state from "resolved" to "closed".

If an event is assigned to a user group, *any* member of the group can work on the event in the same way as an event assigned to an individual user. However, the same restrictions apply to events assigned to user groups as apply to individual users regarding changes to the assigned event’s life-cycle status.

Although the life-cycle states occur in a logical, consecutive manner (open, in progress, resolved, closed), users can set an event's life cycle state at any time. For example, users with the appropriate authorization can assign an event to an alternative user, or re-open an investigation by changing the event state from "closed" to "in progress".

HP OMi provides command-line tools that enable authorized users to close, archive, or delete a large number of events in batches. The `opr-close-events` command is an administrative tool that sets the life-cycle state of the *active* events that meet the specified criteria (date, time

stamp, severity, and so on) to “closed” and is designed to help maintain the HP OMi database and prevent the problem of performance issues caused by an excessively large number of events in the event browser.



HP OMi displays *open* events in the event browser; open events are events whose underlying problem is still unresolved and under investigation. HP OMi removes *closed* events from the event browser automatically and displays them in the history browser.

The `opr-close-events` command respects relationships established during the event-correlation process. If a cause event is closed by the `opr-close-events` command, then any related symptom events are automatically closed at the same time, too. To maintain database consistency, the `opr-close-events` command also looks for and closes any symptom events whose cause event is for some reason lost or no longer available.

The `opr-archive-events` command is an administrative tool that removes events that meet the specified criteria from the *history* browser and either deletes the events or stores them in a designated file. For more information about how to use these command line tools and which options are available, run the command in a command shell with either the `-h` or the `--help` option.

Life-Cycle State Synchronization

The life-cycle state of an event remains synchronized between HP OMi and HP Operations Manager. Events that are acknowledged in HP Operations Manager are set to “closed” in HP OMi; “open” events in HP OMi are automatically set to “unacknowledged” in HP Operations Manager.

If an HP Operations Manager user acknowledges an event, HP Operations Manager immediately notifies HP OMi of the change, and HP OMi updates the life-cycle state of the acknowledged event to “closed”. If the same event is later unacknowledged in HP Operations Manager, for example, so that an operator can restart work on it, HP OMi is once again notified of the change in state and sets the event’s life-cycle state to “open”.

The synchronization of the life-cycle state works in both directions, that is: from HP OMi to HP Operations Manager and from HP Operations Manager to HP OMi. When an HP OMi user re-opens a “closed” event that it originally received from (or has synchronized with) HP Operations Manager, HP OMi notifies HP Operations Manager of the change in life-cycle state, and HP Operations Manager automatically changes the event state to “unacknowledged”.



The event-synchronization feature requires both message forwarding from HP Operations Manager to HP OMi and event forwarding from HP OMi to HP Operations Manager to be set up and working correctly. For more information about setting up message and event forwarding, see the *HP Operations Manager i Installation Guide*.

The automatic synchronization of the life-cycle state of events between HP OMi and HP Operations Manager is especially important in the context of topology-based event correlation, where a cause events can be linked to one or more symptom events. For example, if an operator unacknowledges a message in HP Operations Manager that is configured as a *cause* event in HP OMi topology-based event-correlation, HP OMi automatically re-opens the cause event and changes the event’s life-cycle state in HP OMi to “open”. Since cause events are linked to one or more symptom events, HP OMi also re-opens any related symptom events and changes the life-cycle state of each re-opened symptom event to “open”.

If a user closes an event defined as a cause in HP OMi event-correlation, all related symptom events are automatically closed in HP OMi, too. If the events originated from HP Operations Manager (or were synchronized at any time), HP OMi sends notification of the change in life-cycle state to HP Operations Manager, which automatically acknowledges the corresponding messages.

The combination of event correlation and the bi-directional synchronization of an event's life-cycle state can lead to a situation where a change in the state of a single message in HP Operations Manager can produce a change in state to numerous other HP Operations Manager messages that do not at first appear to be related, at least in the context of HP Operations Manager.

Figure 31 Automatic Event Synchronization

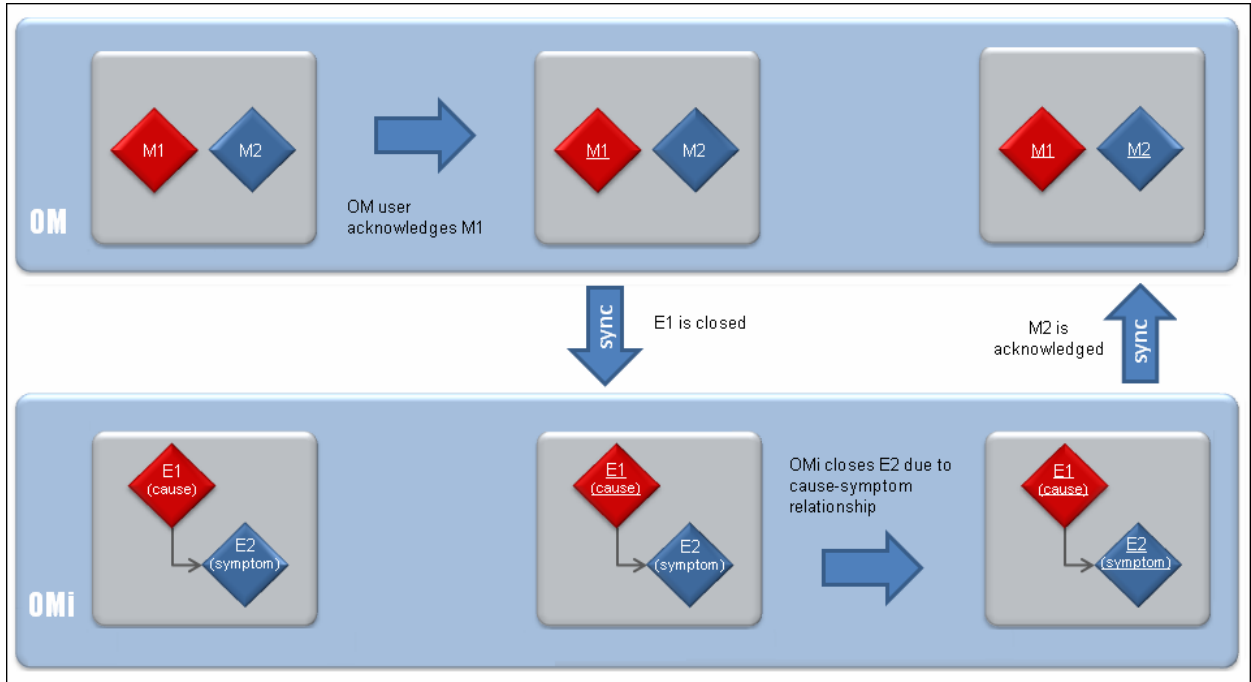


Figure 31 on page 80 illustrates how the state of HP OMi messages remains synchronized with the life-cycle state of the related HP OMi events. Figure 31 also shows how the acknowledgement of *one* HP Operations Manager message can lead to the automatic acknowledgement of *multiple* other HP Operations Manager messages because the messages are related to cause and symptom events in HP OMi event correlation. The synchronization proceeds as follows:

- 1 A user acknowledges a message (M1) in HP Operations Manager, which notifies HP OMi of the change to the message state because the acknowledged message is related to an HP OMi event. The event is defined as a *cause* event in HP OMi event correlation.
- 2 HP OMi updates the life-cycle state of the corresponding *cause* event (E1) to “closed”.
- 3 Since the cause event (E1) is related to a *symptom* event (E2) in event correlation, HP OMi automatically changes the life-cycle state of the related *symptom* event (E2) to “closed”, too, and notifies HP Operations Manager of the change.

- 4 HP Operations Manager changes the state of the corresponding “individual” message (M2) to “acknowledged” to reflect the closed state of the symptom events in HP OMi. Acknowledged messages are moved automatically to the History Browser and are no longer visible in the Active Message Browser



Unacknowledging an event in HP Operations Manager that is defined as a *symptom* in an HP OMi event-correlation rule and also has the life-cycle state “closed” results in a special-case scenario, which is described below.

HP OMi’s topology-base event correlation creates a relationship between events that are defined as a cause in a correlation rule and events that are defined as a symptom. If an operator *unacknowledges* an event in HP Operations Manager and the unacknowledged event is related as a *symptom* to an HP OMi cause event, HP OMi changes the life-cycle state of the single (unacknowledged) symptom event from “closed” to “open”. HP OMi does not, however, re-open the related *cause* event, too. Instead, HP OMi removes the correlation relationship between the re-opened symptom event and the cause event (in this instance only) and removes any reference to event correlation from the re-opened “symptom” event. HP OMi displays the re-opened symptom event as a top-level event in the Event Browser with no relations to any other events.

For more information about changes to the event life-cycle state in the context of event correlation, see [Automatic Life-Cycle State Synchronization](#) on page 105 and [The Correlation Time Window](#) on page 116.

Event Types

HP OMi categorizes the wide variety of events that it monitors in the operational environment according to type, for example: hardware related, software related, service related, and so on. Domain experts can create so-called “*indicators*” for the various event types. The event-type indicators can be further refined with one or more indicator “*values*”.

Event Type Indicators

Event-type indicators (ETI) represent the various types of event that occur in the monitored environment, for example: “host state”, “memory usage”, or “print-queue length”. Event-type indicator *values* represent the likely *states* for the defined event types, for example: “up” and “down” (for node state), “high” and “low” (for memory usage), or “empty” and “full” (for print-queue length). Changes of state can often indicate the existence of a problem.

Event-type indicators exist in the context of a particular configuration-item *type*, and the UCMDB model definition for configuration-item types includes information about the specific indicator assignments. Typically, domain experts assign event-type indicators to a specific type of configuration item if they want to ensure that the different *instances* of the selected configuration-item type can take advantage of the benefits of event-based monitoring provided by HP OMi.



Event-type indicators are mainly intended for use in topology-based event correlation. For more information, see [Event Correlation](#) on page 82.

Authorized users can use the Indicator Manager to create event-type indicators manually or let HP OMi create them automatically using custom attributes defined for and included in incoming events. For more information about creating and managing event-type indicators, see [Indicator Management](#) on page 140.

Event Correlation

One of the central aims of HP OMi event types and event-type indicators is to enable and facilitate the process of configuring event-correlation. Event-type indicators (ETI) and, more specifically, their respective values (ETIV) are the building blocks of HP OMi’s topology-based event correlation feature. In HP OMi, administrators and domain experts can define and enable rules that correlate the event-type indicator values that HP OMi uses to monitor events occurring in the managed IT environment.

For more information about event correlation, see [Related Events](#) on page 83. For more information about using event-type indicators in topology-based event-correlation rules, see [Indicator Values in Correlation Rules](#) on page 109.

Event Mapping Rules

Messages from HP OMi-ready Smart Plug-ins (SPI) can contain pre-defined custom attributes (CA) that HP OMi uses to set values for event-type indicators automatically. For those events reported by a Smart Plug-in that is *not* HP OMi-ready, domain experts can define rules that map events either to a specific severity status or, alternatively, to an event-type indicator value. The aim of mapping rules is to automate the setting of an event’s severity status. For more information about mapping events to indicator values, see [Indicator Mapping Rules](#) on page 137.




Related Events

To avoid the problem of duplication and overload when managing information from multiple sources, HP OMi enables you to set up topology-based rules that correlate events by distinguishing between symptom and cause events. The event correlation results in a much clearer picture of the state of the operational environment that HP OMi is monitoring.

Topology-based event correlation reduces the number of events displayed in the event browser. The less events to browse, the easier it is for a user to investigate and solve the event's underlying problem, especially when the correlation process groups *related* events together in the event browser. For more information about setting up topology-based event correlation, see [About Topology-Based Event Correlation](#) on page 100.

Topology-based event correlation uses a combination of specified symptoms and a probable cause to determine the cause of an event, which it then flags in the event browser. An icon in the event browser's C column indicates that the selected event is the result of a correlation process. HP OMi uses the following icons to indicate what part in the correlation process the selected event played.

Table 9 Event Correlation Icons in the Event Browser

Icon	Description
	Event is a <i>cause</i> in an event correlation rule. The cause in an event-correlation rule is the event that is the main reason for a problem and "causes" other (symptom) events to occur. In an event-correlation rule, the "cause" event is mapped to an indicator value, for example, network "unreachable".
	Event is a <i>cause</i> in one event correlation rule and a <i>symptom</i> in another. 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. A chain of rules that correlates events occurring in different domains requires at least one common configuration-item type and one common indicator value. The common configuration-item type and indicator value is the link between the rules defined for the different domains.
	Event is a <i>symptom</i> in an event correlation rule. Symptoms in an event-correlation rule are events that occur as a result of another event. "Symptom" events are mapped to individual indicator values, for example: database "unavailable", application response "slow", and so on.

HP OMi displays an overview of all the events considered by the correlation process in the Event Browser's Related Events tab, which is where the users can find out what events either contributed to or were discarded by the correlation process. The overview presented in the Related Events tab enables operators to drill down through the correlation history and browse the correlated events.

Figure 32 Browse Related Events

The screenshot shows a web browser window with a table of events. Below the main table, there is a 'Details' section with a 'Related Events' tab selected, displaying a list of related events with columns for Title, Severity, ID, Related CI, Date Received, State, User, Rule, and Unrelate.

Sev	C	II	A	U	D	Date Received	Related CI	Host	State	User	Group	Title	Category
▼						1/16/09 5:14:40 PM	TS-ESS-1	srv1.san.acme.com	🔍			extending tablespace TS-ESS-1 failed	DB
🟢						1/16/09 5:13:00 PM	TS-ESS-1	srv1.san.acme.com	🔍	MartinT	A-Team	extending tablespace TS-ESS-1	DB
▼						1/16/09 3:09:04 PM	TS-ESS-1	srv1.san.acme.com	🔍	MartinT	A-Team	extending tablespace TS-ESS-1 failed	DB
▼						1/16/09 3:41:38 PM	TS-ESS-1	srv1.san.acme.com	🔍	gfn	A-Team	extending tablespace TS-ESS-1 failed	DB
🟢						1/16/09 5:13:04 PM	TS-ESS-1	srv1.san.acme.com	🔍	MartinT	A-Team	extending tablespace TS-ESS-1	DB
▼						1/16/09 5:13:06 PM	TS-ESS-1	srv1.san.acme.com	🔍	MartinT	A-Team	extending tablespace TS-ESS-1 failed	DB

	Title	Severity	ID	Related CI	Date Received	State	User	Rule	Unrelate
🔍	Storage quota exceeded on logical	🟢	500fc513-06b5-4a64-be14-b8d42deaae48	LV-ESS-1	1/16/09 5:13:02 PM	🔍	MartinT		
🔍	extending tablespace TS-ESS-1 failed	▼	587e7d9e-5069-499a-b79d-a42858fe04e9	TS-ESS-1	1/16/09 5:13:06 PM	🔍	MartinT	Storage Affects	%
🔍	extending tablespace TS-ESS-1	▼	b108e60b-6405-4b77-8aba-f573d3cb6a67	TS-ESS-1	1/16/09 5:14:40 PM	🔍		Database Affects	%
🔍	Employee Self Service' web application	⚠️	37b91df0-852a-4f8b-b0d7-0132648cbafa	Employee Self Service	1/16/09 5:15:04 PM	🔍	MartinT	Database Affects	%
🔍	Employee Self Service' web application	⚠️	3c34105a-2968-4ae3-b0ce-10bef1b7579a	Employee Self Service	1/16/09 5:13:05 PM	🔍	MartinT	Database Affects	%
🔍	Storage quota exceeded on logical	🟢	dde67021-d5c8-410d-b50b-af9801e1bab7	LV-ESS-1	1/16/09 5:14:42 PM	🔍	MartinT	Storage Affects	%

The Unrelate option in the Related Events tab removes the relationship that a correlation rule has established between symptom and cause events. The Unrelate feature is useful if you think that HP OMi correlated the selected event by mistake.



The "unrelate" action has no effect on the correlation rule that initially established the relation between events. To prevent HP OMi relating the events in future, a user with access to the HP OMi Correlation Manager must modify the associated event-correlation rule.

The rules column in the related-events tab displays the name of the rule HP OMi used in the correlation process for a selected event. The rule name is a link to the rule used in the correlation process, and users with the authorization to access HP OMi administrator tools can click the link to display a graphical representation of the rule. Note that operators do not usually have access to administrator tools, which are available only to administrators and domain experts. For more information about user authorization, see [User Authorizations](#) on page 39.

Event Categories

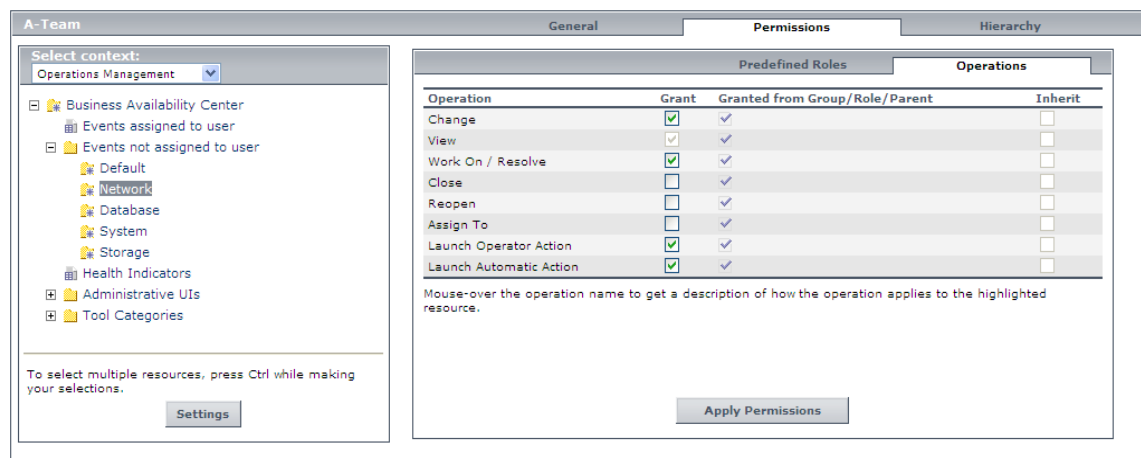
Event categories are logical groups of similar events that belong to a specific technical area, for example: databases, storage, network, Web applications, hardware, and so on. Event categories typically reflect a particular technical area in which events are likely to occur. HP OMi provides a Default event category for events that do not belong to any other category.

However, HP OMi enables users with the appropriate authorization to create their own, additional event categories, for example:

- **Network:** events relating to network problems
- **Database:** events relating to database instances
- **System:** events relating to the underlying operating system

Event categories are similar in concept to the HPOM for UNIX message group. By setting the message group in the HP Operations Manager message policy, you can make sure that messages generated by the policy are automatically assigned to a particular HP Operations Manager message group. The individual HP Operations Manager message groups are then mapped to a particular HP OMi event category automatically. If the event categories are also assigned to a user group in HP OMi, then HP OMi automatically assigns messages forwarded from HP Operations Manager to the HP OMi user group most qualified to solve the event's underlying problems.

Figure 33 Assign Event Categories to Users



Event categories are closely connected to event assignment. HP OMi administrators and domain experts can use event categories to help simplify the process of deciding the user or user group to which particular types of event should be assigned for investigation. It is also possible to configure what exactly the specified user or user group can do with events belonging to the assigned event category, for example: view, modify, resolve, or close the event.

Figure 33 on page 85 shows how HP OMi administrators can restrict access to unassigned events on the basis of event categories. For example, users responsible for database-related problems only see and work on unassigned events belonging to the event category "database". Users responsible for problems relating to the underlying operating system have access only to unassigned events that belong to the category "Operating System".



If an event is assigned to a user or user group, HP OMi applies the permissions defined in "Events assigned to user", which are not affected by event category.

The event browser displays the category to which an event belongs, for example: "Storage", "Database (DB)", "System", or "WebApp" (Web Application) and enables users to filter events in the browser according to category. To display the contents of the event browser according to event category, click the Event Browser's Category column title.

Event categories provide a quick and convenient way to filter the events displayed in the event browser or help automate the assignment of events to users and user groups. HP OMi creates event categories automatically, for example, to reflect the message groups to which messages forwarded from HP Operations Manager belong. Domain experts can use event categories in the context of user authorizations, for example: to refine the number and type of actions that individual users or complete user groups can perform on particular types of events. For more information about user authorizations, see [User Authorizations](#) on page 39.

Event categories are also important in the context of view mapping. View-mapping rules specify a link between a configuration item and a particular uCMDB view, and event categories provide a means to reduce and restrict the views displayed. Note that if the event category you specify in a View Mapping context does not already exist, HP OMi creates a new event category with the name you specify. The mapped views appear in a drop-down list in the Health Perspective's Top View pane. [Figure 34](#) on page 86 shows how HP OMi enables users to restrict the view available in the Top View pane based on the event category. For more information about Top Views, see [Top View](#) on page 62.

Figure 34 Event Categories in View Mapping

The screenshot shows a dialog box titled "Systems_Infrastructure - Edit View Mapping". It contains the following fields and controls:

- ID:** df5204ea-aaa8-4258-b8ce-18f180014793
- View:** * Systems_Infrastructure (marked as required)
- Mapping Description:** View for System Infrastructure
- Event Category Pattern:** File System
- Precedence:** 10 (with up/down arrows)

Below the Event Category Pattern field, there is explanatory text: "For the Health Perspective top view that is launched in the context of the event browser you can restrict the available views based on the event category. Enter a regular expression that matches the event category for which this view shall be available."

Below the Precedence field, there is explanatory text: "The precedence controls, which view is shown in the Health Perspective top view of the event browser. The view mapping with the highest precedence value is always shown as default. Note that the precedence of inherited view mappings is also evaluated."

A legend at the bottom left indicates that the asterisk (*) denotes a required field. At the bottom of the dialog are three buttons: OK, Cancel, and Help.

Event Actions

HP OMi enables you to attach an action to an event. The action provides a convenient way to start the process of solving the event’s underlying problem. There are two types of action:

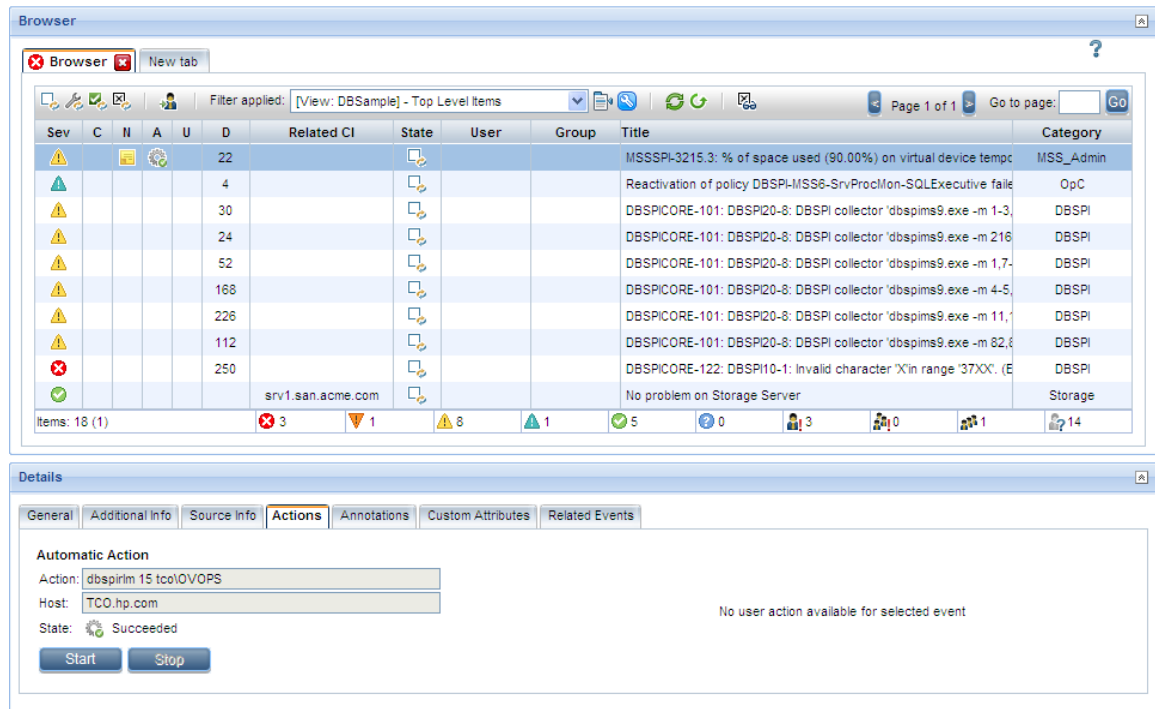
- Event-related actions are defined as part of a HP Operations Manager message-source policy, for example:
 - Automatic action: tool or command started automatically by a message policy
 - User action: tool or command started by user input
- Tool-related actions are defined in HP OMi, for example, to start a tool in the context of an event or the configuration item *impacted* by an event. Defined in HP OMi with the Tools Manager, custom tools are available in the context-sensitive menu displayed by right-clicking an event or the impacted configuration item.

Note that both types of action require the HP Operations Manager agent to be available. If the HP Operations Manager agent is not running at the time the action starts, the action fails.

Event-Related Actions

HP OMi provides detailed information about the event-related actions that are available for a selected event in the event browser’s Actions tab, as illustrated in [Figure 35](#) on page 87. Event-related actions are command-line tools that are defined as part of an HP Operations Manager message-source policy and cannot be modified in HP OMi. Event-related actions can only be started in the context of an event—they are not available in the context of the configuration item impacted by the event.

Figure 35 Check for Event-Related Actions



Typically, the detailed description of an action includes the command to be executed, the name of the remote host where the command is to run, and the state of the command after the last run, for example: “running”, “completed”, or “failed”. Note that HP OMi uses the HP

Operations Manager agent processes to start commands on the managed node where the event occurred or the HP Operations Manager management server that is responsible for the managed node.

An event-related action can start either automatically or as a result of user input. An automatic action starts by itself as soon as the policy monitoring the event detects that the event has occurred. A user action is started by the user viewing the event in the event browser. Events can have either automatic or user-related actions (or both). HP OMi uses the Actions tab to indicate if one or both type of action is not available, as illustrated in [Figure 35](#) on page 87. The Event Browser also indicates if an *automatic* or a *user-initiated* action is available for an event by displaying an icon in the A or U column respectively.



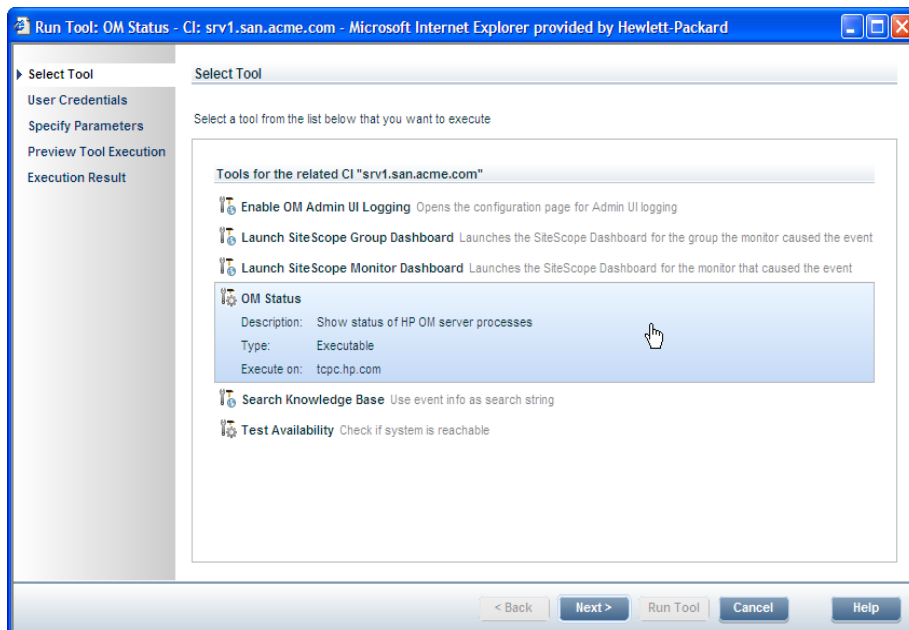
HP OMi enables you to grant or restrict authorization to launch any automatic or user-initiated actions attached to an event on the basis of the event category to which the event belongs. This security measure enables domain experts to ensure that the actions associated with an event can only be started by the users to whom the event is assigned.

Automatic actions are commonly associated with event annotations—the automatic action adds an annotation to the event to indicate to other users what command the action started (and when) and another annotation to show what the result of the action was, for example: “successful” or “failed”. For more information about event annotations, see [The Event Perspective](#) on page 53.

Tool-Related Actions

HP OMi enables software administrators or domain experts to configure actions that start custom tools, which are assigned to a particular type of configuration item. If an event occurs on an instance of a configuration-item type for which custom tools are available, the tools are displayed in the tool-runner dialog which pops up when you right click an event in the Event Browser or the impacted configuration item (in the CI Tree, the Top View, or the Dashboard) and select the Launch Tool... option. Domain operators or experts can start the tool-related action manually by selecting the relevant tool from the context-sensitive list as illustrated in [Figure 36](#) on page 88.

Figure 36 Start Tool-Related Actions



The tools started by tool-related actions are defined in HP OMi and run in the context of the configuration-item impacted by the event from which the tool is run. Tool-related actions can start a command, run a script, or launch a URL in a browser. For more information about configuring custom tools, see [The Tools Manager](#) on page 194.

To ensure that custom tools are available from a particular event or the configuration item impacted by the event, users with access to the Tools Manager, must first configure the tools they want to provide for the various operators. Part of the tool-configuration process involves assigning the new tool to the configuration-item type impacted by the events you want to monitor. For example, to provide a tool that helps investigate events related to an Oracle database, you assign the Oracle tool you create to the Oracle database configuration-item type.



Assigning a tool to a configuration-item type *high* up the CI hierarchy enables you to make sure that the same tool assignment is passed on automatically by inheritance to all related configuration-item types lower down the hierarchy.

A global tool-assignment strategy works well for high-level tools that are useful in many different scenarios—assigning a custom tool to a single configuration-item type high up the CI tree makes the same custom tool available to a large number of tools further down the tree. However, tools that are intended to help solve problems in more specific technical areas where command names differ or the environment is unique (such as an Oracle database, BlackBerry servers, or a Microsoft Exchange server) are best assigned directly to the individual configuration-item type impacted by the events you want to monitor. Typically, these configuration-item types tend to be lower down the CI-type hierarchy.

Tool-related actions use the HP Operations Manager agent running on either the management server or the managed node. If the agent is not available at the time the tool starts, the tool-related action fails.

Event Sources

One of the most important features of HP OMi is the Event Perspective tab, which is a single, central location for event management that users can configure to suit the demands of their individual work flow. The Event Perspective tab includes an event browser, which gathers in one place all the events detected in the monitored environment regardless of the event's origin or the monitoring source.

The events that HP OMi displays in the event browser have a specific form and a minimum required content. Before HP OMi can display an event in the browser, it has to know the source of the event (the application) and understand the contents of the event notification. If the event is reported by an external application, an application that cannot talk directly to HP OMi, then the contents of the event have to be converted into a form that HP OMi can understand, use, and display. Configuring HP OMi to perform the conversion process is part of the work flow assigned to the HP OMi administrator and the domain expert who is responsible for the application that is generating the events, for example: AD, SAP, Oracle, BlackBerry enterprise server, or Microsoft Exchange.

Although the events that HP OMi displays in the event browser have a consistent form, they can originate from a number of different sources, both internal and external, for example:

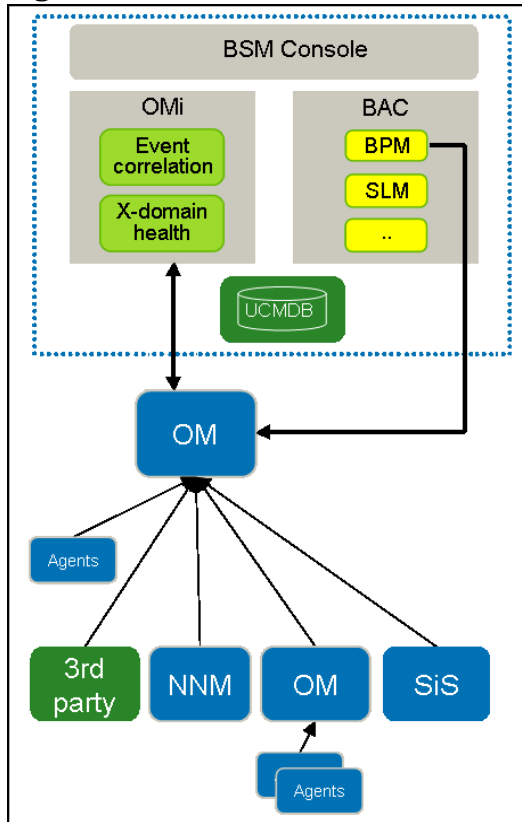
- HP Operations Manager for UNIX (HPOM for UNIX)
- HP Operations Manager for Windows (HPOM for Windows)
- HP Network Node Manager i (HP NNMi)
- HP Business Availability Center (BAC)/End User Management (EUM):
 - Business Process Monitor (BPM)
 - Real User Monitor (RUM)
- HP SiteScope
- HP Systems Insight Manager
- Third-party events, for example, MS MOM, Exchange, BlackBerry enterprise servers.

Currently, the “intermediary” that HP OMi uses to gather *all* events (both internal and external) is HPOM for Windows or HPOM for UNIX. *All* events in the HP OMi event browser are forwarded to HP OMi from either HPOM for UNIX or HPOM for Windows. HPOM for UNIX and HPOM for Windows receive notification of events from their own agents and, in addition, any Smart Plug-ins configured to monitor external application areas such as SAP, Microsoft Exchange, BlackBerry Enterprise Server, or Oracle databases.

If you want HP OMi to manage events from sources that are *not* monitored by Smart Plug-ins, for example: HP NNMi, HP SiteScope, or HP Storage Essentials, you have to configure the event source to use the appropriate interfaces available in either HPOM for UNIX or HPOM for Windows and then configure either HPOM for UNIX or HPOM for Windows to forward to HP OMi the events they receive from the external source. For more information about how the translation and forwarding process works, see [Table 10](#) on page 91.

If you have already configured external applications to forward events to an existing installation of HPOM for Windows or HPOM for UNIX, then little or no extra configuration is necessary to see the same events in HP OMi. Part of the installation and initial configuration of the HP OMi software includes setting up the automatic forwarding (and synchronization) of events between the instances of HP OMi and either HP Operations Manager for Windows or HP Operations Manager for UNIX.

Figure 37 : Event Sources in HP OMi



However, if you want to monitor and manage events originating from other applications such as HP SiteScope or HP NNM*i*, you need to look into configuring and using the appropriate interface as described in [Table 10](#) on page 91.

Table 10 Integrate External Event Sources

Event Source	Interface/Adapter
HPOM for UNIX	HP Operations Manager event forwarding or directly from the agent
HPOM for Windows	
HP NNM <i>i</i>	Incident Web Service / SNMP
HP BAC/EUM (BPM/RUM)	Incident Web Service
HP SiteScope	HPOM for UNIX/HPOM for Windows agent integration, agent adapter
HP Systems Insight Manager	HPOM for Windows
Third-party (e.g. MS MOM)	Smart Plug-in HPOM for UNIX/HPOM for Windows

With so many event notifications arriving from so many different sources, it is crucial to be able to control not only the number of events in the event browser but also who sees the events and what actions they can perform. HP OMi enables you to set up rules to correlate the events from the different sources. For more information about event correlation, see [Related Events](#) on page 83.

It is also essential to ensure that the event notifications from the various different sources adhere to a consistent policy regarding severity status when displayed in the browser. The potential for confusion is high, if multiple sources assign different severities to the same type of event. For more information about event severity, see [Severity Status](#) on page 72.

The source of an event determines what information is available in the event and the level of detail supplied, too. For example, events from HPOM for UNIX or HPOM for Windows can arrive with or without custom attributes. How much information an event contains is crucial in determining the sort of mapping rules administrators and domain experts can create to set event-type indicators and health-indicators using event attributes. And the availability of event attributes has an impact on the detail you can use for the filters you define to select events.

Event Attributes

Event attributes are one of the most important elements of the HP OMi solution. For domain operators, event attributes are an invaluable source of detailed information about the event's underlying problem. For domain experts, event attributes are the essential building blocks for use in configuring many of the tools and rules that make the domain operator's job simpler.

Event attributes have an important role to play in the following contexts:

- [Event Management](#) on page 93
Display an overview of the event's details, which include all defined attributes.
- [Event Filters](#) on page 94
Set up complex rules that filter events according to any combination of the available event attributes. Event filters are useful in many different contexts.
- [Indicator Mapping Rules](#) on page 95:
Configure HP OMi to set indicators for health and event type using the attributes of events that occur on the objects HP OMi is monitoring.
- [Top-View Mapping Rules](#) on page 96
Restrict the views available for a particular event in the Event Browser's Top View pane according to event category.
- [Automatic Event Assignment](#) on page 95
Filter incoming events according to event attributes and assign the filtered events to users or user groups automatically.
- [Custom Tool Definitions](#) on page 96:
Use event attributes as parameters in a tool definition to more accurately define the context in which a custom tool runs.

Event Management

In the domain operator's event-management work flow, event attributes are especially important as they provide not only a complete overview of the selected event but also important details that can help solve the event's underlying problem. HP OMi displays the attributes of the selected event in the Event Details pane beneath the event browser. The Event Details pane collates the most important event attributes and displays them in a selection of tabs according to the technical context, for example: information relating to the event source, any actions attached to the event, any custom attributes defined for the event, and any related events. [Figure 38](#) on page 94 shows an overview of the attributes available for an HP OMi event.

Figure 38 Details of Event Attributes

The screenshot shows a window titled "Event Details" with several tabs: "General", "Additional Information", "Source Info", "Actions", "Annotations", "Custom Attributes", and "Related Events". The "General" tab is active. At the top left of the main area are "Assign" and "Edit" buttons. A help icon (?) is in the top right. The attributes are organized as follows:

ID:	134e66f2-5c69-4299-a245-df740bde0894	Related Cl:	TS-ESS-1 [DB Tablespace]
Severity:	Major	Host:	srv1.san.acme.com [Unix]
Life Cycle State:	In Progress	Date Created:	4/1/09 10:48:46 AM
Priority:	0	Date Received:	4/1/09 10:48:46 AM
Assigned Group:		Date Life Cycle State Changed:	4/3/09 6:06:55 PM
Assigned User:	administrator	Event Type Indicator:	Extend TS: Failed
Category:	DB	Duplicates:	0
Subcategory:		Type:	

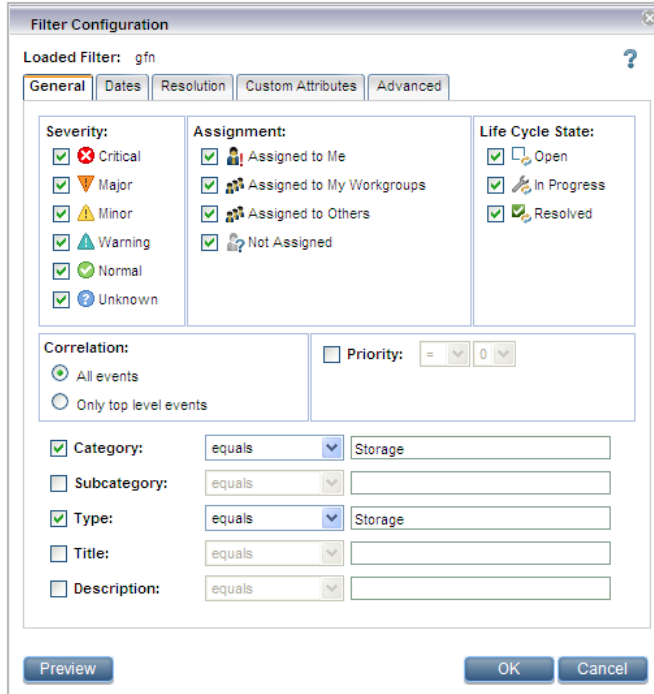
Title:
extending tablespace TS-ESS-1 failed

Event Filters

Event filters enable you to display in the browser only those events that match the selection of attributes defined. For example, you can display events based on severity, assignment, or life-cycle state. Using the Filter Manager, you can set up complex rules that filter events according to any combination of the available event attributes. The event filter is a tool that can be used in many different contexts, too. For more information about event filters, see [Event Filters](#) on page 69.

Figure 39 on page 95 shows a filter that displays Storage-related events regardless of the event severity state, regardless of whom they are assigned to, but if the life-cycle state is anything other than “closed”.

Figure 39 Event Attributes in Filters



Indicator Mapping Rules

HP OMi administrators and domain experts can configure HP OMi to set indicators for health and event type using the attributes of events that occur on the objects HP OMi is monitoring in the operational environment.



Manual configuration of indicator mapping rules is only necessary where HP Operations Manager message-source policies do not set indicators automatically.

Messages generated by policies from HP OMi-ready SPIs contain pre-defined custom attributes (CA) that HP OMi recognizes and can use to set indicator values automatically. For those events reported by non HP OMi-ready SPIs, domain experts can define their own mapping rules that filter events according to event attributes and use attribute values to set either health indicators or event-type indicators.

Figure 39 on page 95 shows some of the basic event attributes you can use to set up a filter for use in a mapping rule for either a health indicator or an event-type indicator. For example, you could set up a filter that searches for events of category “Storage” produced by the application “Oracle” with the severity critical and use the matched events to set an event indicator for instances of the configuration-item type “Oracle Database”.

For more information about how to use event attributes when configuring rules that map event attributes to indicator values, see [Indicator Mapping Rules](#) on page 137.

Automatic Event Assignment

HP OMi administrators and domain experts can automate the process of assigning events of a particular type to users or user groups as soon as the events arrive in the event browser. Using attributes such as the event *category* or event *severity* (amongst others), HP OMi can filter incoming events and assign matched events automatically to the user group with the

knowledge and expertise required to fix the underlying problem. For more information about using event attributes to assign events to user groups automatically, see [The Event-Assignment Manager](#) on page 75.

Top-View Mapping Rules

Event attributes are also useful when mapping views to a particular type of configuration item. For example, the event *category* can be used to refine a view mapping rule. Event categories are logical groups of similar events that typically reflect a particular technical area in which events are likely to occur, for example: databases, storage, network, Web applications, hardware, and so on. HP OMi can use the event category to restrict the views available for a particular event (or event category) in the Top View pane. The views available in the HP OMi Top View pane are the views that are mapped to a specific type of configuration item and concern events belonging to the specified event category. Domain experts can use this feature to ensure that only views mapped to the configuration-item type impacted by an event are available in the context of a selected event.

Custom Tool Definitions

HP OMi enables you to use an event attribute as a parameter in a command, a script, or a URL, which you can run from within a custom tool. HP OMi uses the contents of the resolved parameter (the event attribute) to restrict the scope of the command in such a way as to return a result more quickly and efficiently or target the result of a URL search request more precisely.

For example, you could use the event attribute “*evt_title*” as all (or part of) the string in a URL sent to a search engine. The event attribute “*evt_title*” is the description of an event displayed in the Title column of the Event Browser. The event title contains references to error messages or numbers. You could also extract some of the text from the event title, such as an error message number (SAP note 12345, or ORA_12345), and use this in a search query on the respective support forum. Making use of event attributes in this way enables domain experts to configure custom tools that automatically provide access to information that is targeted at solving specific known problems.



Product-specific forums often require login credentials that cannot be automated by using cookies and security certificates.

For more information about tool-related actions, see [Tool-Related Actions](#) on page 88. For more information about custom tools, see [Introduction to Custom Tools](#) on page 192.

5 Topology-Based Event Correlation

The information in this section explains what HP OMi's topology-based event correlation (TBEC) is and how managing TBEC works from the perspective of an individual user's work flow, that is: the daily tasks the user performs and the order in which the tasks typically occur. This section also provides information about the concepts underlying the event-correlation tools that are available and, where appropriate, explains why the tools work the way they do. Reading this section helps users understand why they need the event-correlation tools that HP OMi provides and how they can use the tools to help investigate and solve the problems that occur in the monitored environment.



The user types described here are examples only. HP OMi enables you to configure the user types that best meet the needs of your environment.

Table 11 on page 97 provides an overview of the contents of this chapter and indicates the intended audience, that is: the type of user who needs to read and understand the topic to help perform the tasks in their daily work flow.

Table 11 Event-Correlation Overview

Page	Concept	HP OMi Admin	Domain Expert	Domain Operator
98	Event-Correlation Work Flows	✓	✓	✓
100	About Topology-Based Event Correlation	✓	✓	✓
102	The Correlation Manager	✓	✓	-
104	Symptoms and Causes	-	✓	✓
107	Rule Topology	-	✓	-
109	Indicator Values in Correlation Rules	-	✓	-
111	Cross-Domain Event-Correlation Rules	-	✓	-
114	UCMDB Views and Configuration Items	✓	✓	-
116	The Correlation Time Window	-	✓	-
118	Rule Validation	-	✓	-
120	Related Events	-	✓	✓

Event-Correlation Work Flows

HP Operations Manager i (HP OMi) provides a set of tools that are intended to help define and manage event-correlation rules for the monitored operational environment. The tools that are available to individual users depend on the responsibilities assigned to the groups the user belongs to, the demands of a user's work flow, and the context in which the users perform their tasks.

In HP OMi, users belong to one or more user groups, whose members are granted access to management or administrative tools based on the scope of the tasks the group is expected to perform in its every-day work flow. For example, domain experts need access to administrative tools such as the Correlation Manager to perform some of the tasks in their work flow. Domain operators, on the other hand, need access only to event-management tools that display the *results* of the configuration work completed in the Correlation Manager.

To perform the event-management tasks required by their respective work flow, HP OMi users need to have a good understanding of all (or any combination of) the topics discussed and explained in this section. The information provided in this section attempts to address the needs of all users whose work-flow requirements mean they have a role to play in topology-based event correlation, for example:

- [The HP OMi Administrator](#)
- [The Domain Expert](#)
- [The Domain Operator](#)

The HP OMi Administrator

HP OMi administrators need to have a good understanding of event correlation itself and, in addition, the underlying user-related concepts such as user roles, user groups, user authorization, user authentication, and so on. A high-level summary of the HP OMi administrator's work flow in the context of event correlation includes the following tasks:

- **Configure user groups:**
Define and configure user groups so that correlated events can be assigned to the users with the knowledge and resources to resolve them most efficiently.
- **Grant access to administrative tools:**
Ensure the groups have access to the tools available in the HP OMi administrative interface where appropriate. For example, domain experts need access to the Indicator Manager and the Correlation Manager so that they can create and configure event-type indicators (ETI) and topology-based correlation rules.
- **Configure and manage user authentication:**
Design, implement, and manage the user-login authentication strategy based on the tools available to HP OMi.

The Domain Expert

In HP OMi, domain experts need to have a comprehensive understanding of topology-based event correlation including which type of events are likely to occur in a particular technical domain, the relationship between events, and how the correlation process can affect the various stages of the event life cycle. Domain experts also need to understand the underlying

correlation-related concepts such as event symptoms, event causes, event-type indicators, health-indicators, and so on. This knowledge needs to be applied in the context of a particular domain, for example: SAP, or Oracle, so that important events remain visible and the less important events are hidden by the correlation process.

A high-level summary of the domain expert's work flow in the context of event-correlation management includes the following tasks for the specific technical domain:

- **Create CMDB views:**
Create views in the UCMDB for the configuration-item types that are to be used in the topology-based correlation rules. The topological information is used in the rule definition.
- **Manage UCMDB State:**
Ensure that discovery tools (such as topology synchronization and DDM) populate the UCMDB regularly with the most current information concerning configuration items.
- **Configure event-correlation rules for specific technical domains:**
Configure rules that correlate events in a particular technical domain, for example: AD, SAP, databases, BlackBerry Enterprise Server, or Microsoft Exchange. The correlation rules need to be tested to ensure that the correct events appear in the browser.
- **Grant access to features and functionality in the context of a technical domain:**
Ensure that domain-specific user groups can see and work on the appropriate events and, if necessary, add or change event details such as event-type indicators (and their values).
- **Grant authorization to required tools:**
Ensure the groups have access to the administrative tools if appropriate.

The Domain Operator

In HP OMi, domain operators need to have a good understanding of event-correlation concepts such as event symptoms, event causes, and related events. Domain operators also need to understand the underlying event-related concepts such as event sources, event attributes, event severity, event assignment, and so on. A high-level summary of the domain operator's work flow in the context of topology-based event correlation includes the following tasks:

- **View and manage events:**
This includes using the event browser, configuring event filters, and understanding how event severity can change in the context of the event-correlation process.
- **Investigate and resolve events:**
This includes assigning events (for example, to oneself), making use of event details such as related events, and understanding links in chains of event-correlation rules across multiple domains. For more information about related events and how they help investigate correlated events, see [Related Events](#) on page 83.
- **Guide assigned events through a life cycle:**
This includes understanding how the correlation process hides some events and using this information to help guide visible events through the various stages in the event life cycle.

About Topology-Based Event Correlation

In HP OMi, administrators and domain experts can define and enable rules that correlate events. HP OMi uses event-type indicator values to monitor events occurring in the different domains which make up the managed IT environment. Correlating events that are either generated by the same (or a related) object greatly reduces the number of events displayed in the browser. The reduced number of events in the browser enables the user to locate and fix the cause of the problems more quickly and efficiently.

Event-type indicators (ETI) are not only a primary source of information for calculating HP OMi severity status, they and their respective values are the building blocks of HP OMi's topology-based event-correlation feature, too. HP OMi enables you to use the attributes of an event to set or modify individual event-type indicators automatically. HP OMi administrators and domain experts need to understand the relationship between event attributes and event-type indicators so that they can use the information available in events to automate the process of calculating, setting, and displaying the event-based severity status of configuration items. For more information about defining event-type indicators and using them in topology-based event-correlation rules, see [Indicator Values in Correlation Rules](#) on page 109.

The correlation process determines the cause of an event, which is displayed in the event browser. An overview of all the symptom events affected by the correlation process is available separately in the browser's Related Events tab. The overview enables you to browse through the set of correlated events.

HP OMi's event-correlation process uses the topology stored in the uCMDB to specify which configuration-item types can be considered for inclusion in an event-correlation rule. The topology-based approach improves the correlation process by adding path-related constraints to the event-correlation rule. Since topology-based event correlation requires that a relationship exist between the configuration items specified in the correlation rule, you have to make sure that at least one relationship is selected. If no relationship exists, HP OMi does not permit you to save the correlation rule.

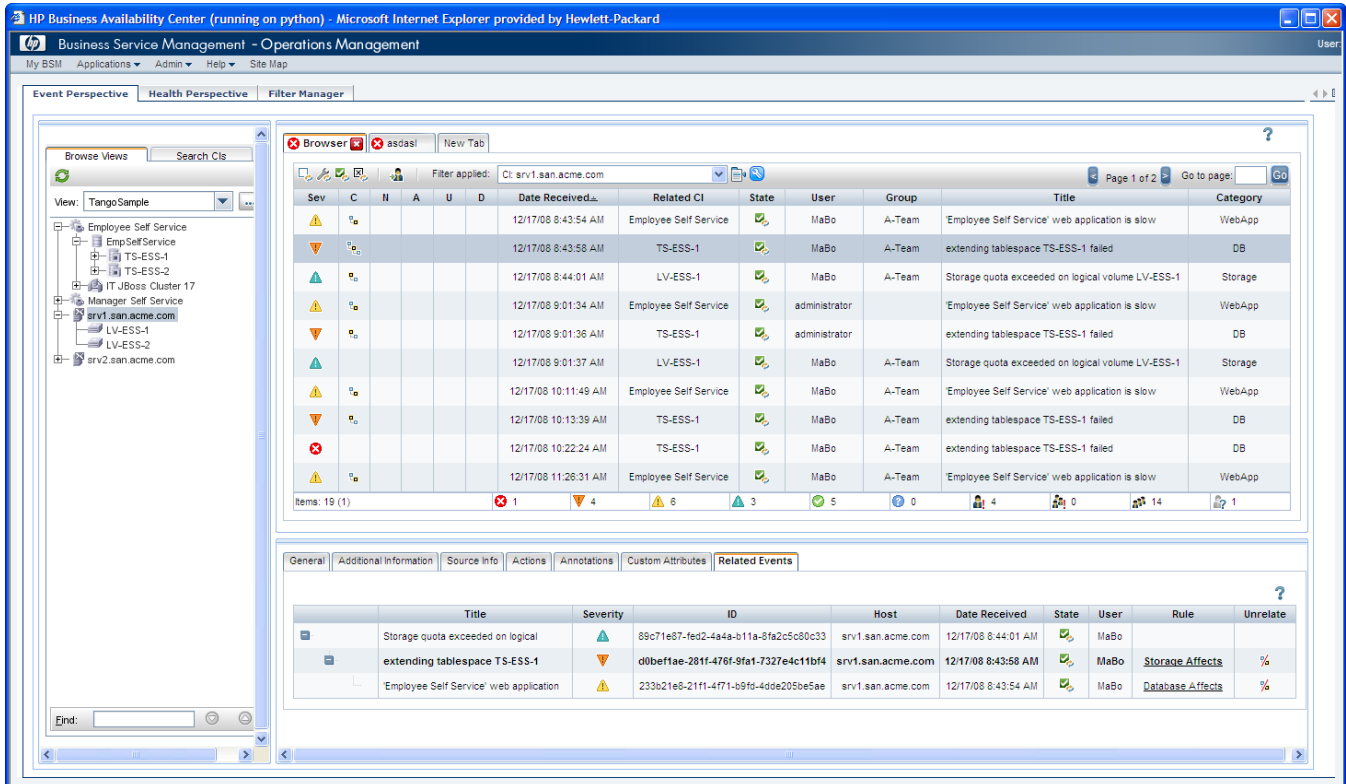
▶ The view used to define the configuration items referenced in a topology-based event-correlation rule must also demonstrate that a relationship exists between the configuration items specified in the rule.

A time limit exists for the processing of the event-correlation rules you define with the Correlation Manager. If the cause event and any combination of the events specified as symptoms in a correlation rule occur within a defined period of time, HP OMi flags the correlated events in the event browser. If, at the end of the time limit, at least one pair of the symptom and cause events specified in the rule has *not* occurred, HP OMi displays all the cached events as individual, uncorrelated events in the event browser. HP OMi provides filters to enable users to hide or reveal correlated events in the event browser. For information about browser filters, see [Event Filters](#) on page 69. For more information about time restrictions in event-correlation rules, see [The Correlation Time Window](#) on page 116.

▶ HP OMi displays *all* events in the event browser as soon as it receives notification of the events, regardless of whether the events are correlated by a rule or not. After a correlation rule matches, the event-correlation process modifies the contents of the browser to indicate which events are specified in a correlation rule as a symptom or cause.

[Figure 40](#) on page 101 shows the end result of the topology-based event correlation process. Although the cause event is displayed in the event browser, users can drill down through the correlated symptom events that HP OMi assembles and displays in the Related Event tab.

Figure 40 Browse Correlated Events



The correlation process establishes a relationship between the events that are specified as symptoms in an event-correlation rule and those that are specified as a cause. The relationship includes details of the hierarchy and sequence of the correlated events, which HP OMi displays in the Related Events tab, as illustrated in Figure 40 on page 101. The *unrelate* feature enables you to break the relationship that the correlation process establishes between events. Note that the unrelate feature only breaks the relationships established during the correlation process of the selected event. If you want to remove the relationship permanently, so that the relationship between the events is never again established by the correlation process, use the Correlation Manager to modify the event-correlation rule that established the relationship in the first place.



HP OMi identifies the matching rule in the Rule column in the event browser's Related Events tab, as illustrated in Figure 40 on page 101. Users with the appropriate permission can click the rule to display it in the Correlation Manager.

For more information about the Correlation Manager, see [The Correlation Manager](#) on page 102. Note that only authorized users can access administrative tools such as the Correlation Manager. For more information about access to administrative tools, see [User Authorizations](#) on page 39.

The Correlation Manager

The correlation manager provides HP OMi administrators and domain experts with the tools they need to define and enable rules that use the values of event-type indicators to correlate the events occurring in the different domains which make up the managed IT environment. You can use the correlation manager to perform the following management-related tasks:

- Define, test, deploy, and manage topology-based event-correlation rules.
- Visualize the topology of correlation rules.
- Manage event-type indicators and their values, for example: creating, modifying, and deleting event-type indicators.
- Browse the hierarchy of cross-domain event-correlation rules.
- Create event-type indicators.
- Navigate links in a chain of event-correlation rules.

Figure 41 on page 103 shows the HP OMi Correlation Manager and the relationship between a simple correlation rule, the event-type indicators used in the rule, and the events specified as either a symptom or a cause in the selected rule.

The Correlation Manager enables you to display the topology of an event-correlation rule in different ways. You can restrict the configuration-item types on display to only those specified in the event-correlation rule. Restricting the rule topology allows you to concentrate on only those configuration-item types that have an impact on the selected rule. Alternatively, you can expand the display to include *all* the items in the UCMDB view that contains the configuration-items types specified in the selected rule. Setting the rule topology in the context of a complete UCMDB view enables you to better understand the event background and more easily visualize the wider impact of symptom and cause events.

The Correlation Manager displays an overview of the correlation rule in terms of the symptom events and cause events. The list indicates which event-type indicators to monitor and the configuration-item type to which the listed event-type indicator is assigned.

In the rule topology pane, different icons distinguish between configuration items that are configured as a *cause* in an event-correlation rule and events that are configured as a *symptom*. If the same configuration item is also configured in another event-correlation rule, links enable you to jump directly from one rule to the other so that you can follow chains of event-correlation rules. The Correlation Manager enables you to keep track of where you are in the list of rules by highlighting the currently displayed rule in the complete list of correlation rules.

The Correlation Manager also enables users to see which event-type indicators are assigned to the configuration-item types specified in an event-correlation rule. If a user selects any individual configuration-item type in the displayed correlation rule, the Correlation Manager displays a list of *all* the event-type indicators assigned to the selected configuration-item type.

Figure 41 Event Correlation Overview

The screenshot displays the HP Business Availability Center interface. The main window shows a correlation rule titled "Exchange: Windows.CPU Load >> Edge Transport Queue Length - View Correlation Rule".

Rule Topology: A hierarchical diagram showing the flow of events. It starts with "Windows" at the top, connected to "Microsoft Exchange Server" via a "Container link", which is then connected to "Exchange Edge Server" via another "Container link".

Exchange Edge Server - Indicators: A list of indicators for the Exchange Edge Server, including:

- Active Mailbox Delivery Queue Length (Exchange Transport Server)
- ADAM Service Status
- Aggregate Delivery Queue Length (Exchange Transport Server)
- Delayed DSN Count (Exchange Transport Server)
- Edge Credential Service Status
- Exchange Service Host Status (Exchange role)
- Failed DSN Count (Exchange Transport Server)
- File Distribution Service Status (Exchange role)
- Largest Delivery Queue Length (Exchange Transport Server)
- Poison Queue Length (Exchange Transport Server)
- Remote Delivery Queue Length (Exchange Transport Server)
- Retry Non Smtpt Delivery Queue Length (Exchange Transport Server)
- Submission Queue Length (Exchange Transport Server)
- Transport Service Status (Exchange Transport Server)
- Unreachable Queue Length (Exchange Transport Server)

Symptoms and Causes: A table summarizing the correlation rule's symptoms and causes.

Type	CI Type	Indicator	Indicator Value
Cause	Windows	CPU Load	Bottlenecked
Symptom	Exchange Edge Server	Active Mailbox Delivery Queue Length	Very High
Symptom	Exchange Edge Server	Aggregate Delivery Queue Length	Very High
Symptom	Exchange Edge Server	Submission Queue Length	Very High

Symptoms and Causes

Every rule that HP OMi uses to correlate events must include at least one symptom and one cause. In the context of event-correlation rules, HP OMi defines symptoms and causes as follows:

- **Symptom:**
Symptoms in an event-correlation rule are events that occur as a result of another event. HP OMi maps "symptom" events to the individual event-type indicator *values* used to monitor the objects in your IT environment, for example: database "unavailable", application response "slow", and so on.
- **Cause:**
The cause in an event-correlation rule is the event that is the main reason for an indicated problem. The cause event leads to the occurrence of other (symptom) events. In an event-correlation rule, the "cause" event is mapped to an event-type indicator value, for example, network "unreachable".



If multiple rules correlate the same symptoms at the same time but specify a different event as the potential cause, HP OMi gives precedence to the event specified as the cause in the first rule triggered and ignores any subsequent rules.

Correlation rules require a combination of symptoms and cause, which you specify by selecting values associated with the event-type indicators that are assigned to the configuration-item types specified in the correlation rule. HP OMi uses event-type indicator values to represent the events that have an impact on the configuration-item types specified in the topology-based event-correlation rule.

Each configuration-item type (for example, a Microsoft Exchange server) that you specify as a potential symptom requires one or more event-type indicators (run state, availability) to be defined for it, and each defined event-type indicator must have a value (for example, down or offline). The configuration item you choose as the cause also requires an event-type indicator and a value.

Figure 42 on page 104 shows a list of the event-type indicators included either as a symptom or a cause in a rule that correlates events concerning usage, availability, and CPU load on a machine hosting a Microsoft Exchange server.

Figure 42 List Symptoms and Causes in Correlation Rules

Type	CI Type	ETI	Value
Cause	Computer	CPU Load	Bottlenecked
Symptom	Exchange Edge Server	TransportQueueLength	High
Symptom	Exchange Hub Server	TransportQueueLength	High
Symptom	Exchange Mail Server	AverageMailDeliveryTime	High
Symptom	Exchange Mail Server	AverageTimeforPFDelivery	High
Symptom	Exchange Mail Server	MailflowLatency	High
Symptom	Exchange Mail Server	MailLatency	High
Symptom	Exchange Mail Server	MessageQueueLength	Critical

In HP OMi, an event-correlation rule defines a number of events as either symptoms or cause. If the cause event and any combination of the events specified as symptoms in a correlation rule occur within a defined period of time, HP OMi flags the correlated events in the event browser. By default, no filter is applied to the events displayed in the event browser. HP OMi displays *all* events, whether symptom or cause, correlated or uncorrelated. If you want to hide correlated events, that is: hide all events defined as a symptom in a correlation rule, you can select and apply the Top Level browser filter provided by HP OMi. Applying the Top Level filter does not delete the correlated “symptom” events. [Figure 40](#) on page 101 shows how HP OMi hides the symptom events from view in the event browser but displays them as “related events” in the event details.

In the Correlation Manager, HP OMi uses icons to distinguish between configuration items that are configured as a cause in an event-correlation rule and events that are configured as a symptom. If the configuration item is also configured as a cause or symptom in another event-correlation rule, HP OMi provides links that enable you to jump directly from one rule to another to follow chains of event-correlation rules. HP OMi keeps track of where you are in the list of rules, by highlighting the currently active rule in the Correlation Rules list.

HP OMi enables you to correlate events across multiple domains by configuring rules that establish a link between a particular chain of events, even if the different events occur in different domains. In cross-domain event correlation, an event configured as a cause in one rule is also configured as a symptom in a rule for another domain. Similarly, an event configured as a symptom in one correlation rule can be configured as a cause in another rule. Rules that correlate events occurring in different domains require at least one common configuration-item type and one identical event-type indicator value. The common configuration-item type and event-type indicator value are the link between the rules and the different domains. For more information about cross-domain correlation rules, see [Cross-Domain Event-Correlation Rules](#) on page 111.



You can specify multiple *potential* causes for the same set of symptoms.

If the configuration of your monitored environment leads to situations where the same set of *symptom* events are the result of more than one *cause* event, you can, for the sake of convenience and efficiency, combine the different cause events and the same symptom events within one correlation rule. Note that, for correlation purposes, HP OMi considers the two rules not as one rule but as two rules in one. However, for configuration purposes, HP OMi sees only one rule, which means that the same topology must apply to the configuration-item types impacted by the correlated events.

If any combination of cause event and symptom event occurs, the rule matches and the correlation process stops. HP OMi then flags the matched cause event and symptom event in the event browser. Note that if you define different potential cause events for the same set of symptom events in a single rule, the topology of the configuration-item types included in the correlation rule must be the same. You can work around this restriction on topology by using multiple rules to specify *different* potential causes for the same symptoms

Automatic Life-Cycle State Synchronization

The automatic synchronization of an event’s life-cycle state between HP OMi and HP Operations Manager is especially important in the context of topology-based event correlation, where a cause event can be linked to one or more symptom events.

Event correlation creates a relationship between an event that is defined in HP OMi as a cause and events that are defined as a symptom. If a user closes an HP OMi cause event, all related symptom events are automatically closed, too. If the event originated from (or was

synchronized at any time with) HP Operations Manager, HP OMi sends notification of the change in life-cycle state to HP Operations Manager, which automatically acknowledges the corresponding individual events.

If an HP Operations Manager operator unacknowledges an event that is configured as a *cause* event in HP OMi topology-based event correlation, HP OMi automatically changes the event's life-cycle state to "open". Since cause events are linked to one or more symptom events, HP OMi also re-opens any events defined as a symptom in the same event-correlation rule and changes the life-cycle state of each re-opened symptom event to "open".

If an HP Operations Manager operator *unacknowledges* an event and the unacknowledged event is also related as a *symptom* to an HP OMi cause event, HP OMi changes the life-cycle state of the single (unacknowledged) symptom event from "closed" to "open". HP OMi does not, however, re-open the related cause event, too. Instead, HP OMi removes the relationship established by the correlation process between the re-opened symptom event and the corresponding cause event (in this instance only) and removes any reference to event correlation from the re-opened "symptom" event. Henceforth, the re-opened symptom event appears as a top-level event in the Event Browser.

For more information about the effects of automatic changes to the life-cycle state in the context of event correlation, see [Life-Cycle State Synchronization](#) on page 79.

For more information about how changes to a correlated event's life-cycle state can influence the calculation of the correlation time window, see [The Correlation Time Window](#) on page 116.

Rule Topology

The Correlation Manager uses the Rule Topology pane to represent graphically the topology of the correlation rule you are creating or modifying. The rule topology shows the configuration-item types included in the rule and, if requested, the context in which an event-correlation rule exists. A topological link must exist between the configuration-item types specified in an HP OMi event-correlation rule. If several links exist, HP OMi shows the shortest by default.

HP OMi uses different labels to indicate not only the type of configuration items in the correlation rule but also the relationship between the various items. For example, labels such as Contains, Depends on, or Member indicate just some of the many relationships that are possible. Note that although the relationships are defined in the UCMDB view, the Correlation Manager enables you to specify whether HP OMi should respect the defined relationship or ignore it in the context of the selected correlation rule.



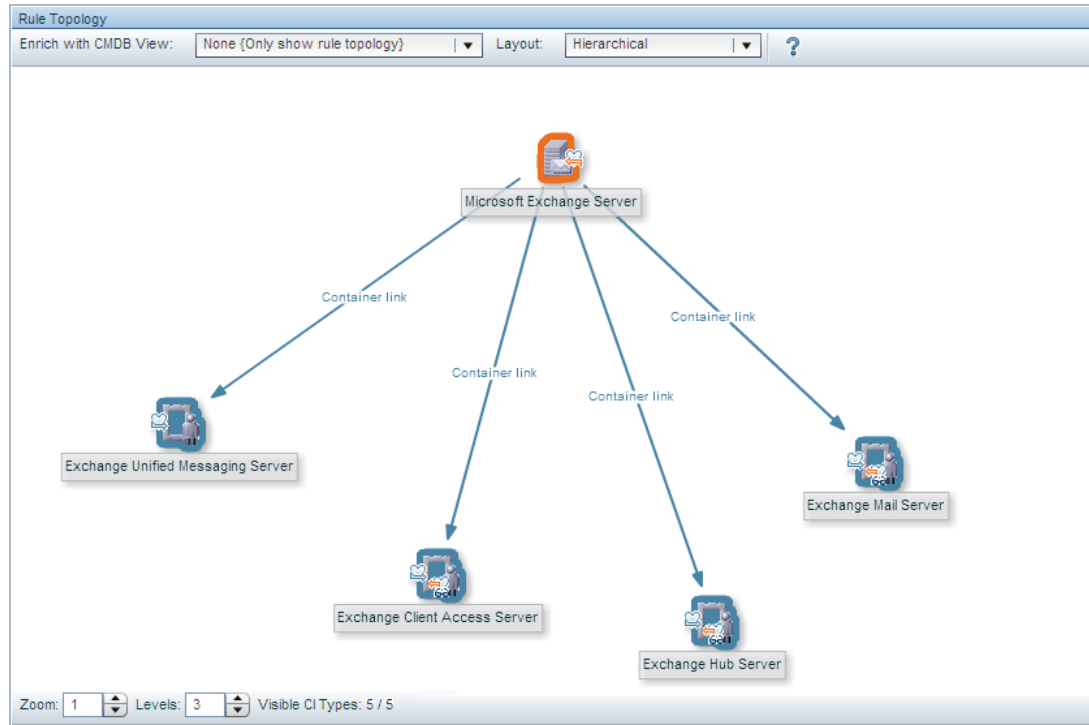
The Correlation Manager does not change or modify in any permanent way the *type* of relationship between configuration-item types. The relationship between configuration-item types is defined in the UCMDB model. Use the UCMDB's IT Universe Manager to set up new configuration-item types and define new relationships.

The Correlation Manager requires you to specify which parts of the view topology HP OMi must consider for the event-correlation rule you are configuring, that is: which configuration-item types to include in the rule and whether to ignore the existing relationships between the configuration-item types. The configuration-item types to choose are the ones impacted by the events you want the rule to correlate. The Correlation Manager validates a rule before saving it, and the validation process checks that the new or modified rule indicates both the configuration-item types to consider in the event-correlation process and, in addition, their relationship. If the correlation rule is not valid, the Correlation Manager cannot save it.

The Correlation Manager enables you to display the topology of an event-correlation rule in different ways. [Figure 43](#) on page 108 shows how you can restrict the configuration-item types on display to only those specified in the selected event-correlation rule. Restricting the rule topology allows you to concentrate on only those configuration-item types that have a role to play in the selected rule. Alternatively, you can expand the display to include *all* the items in the UCMDB view that contains the configuration-items types specified in the selected rule. Setting the rule topology in the context of a complete UCMDB view enables you to better understand the event background and more easily visualize the wider impact of symptom and cause events on configuration-item types.

When configuring a new event-correlation rule, domain experts first have to specify the view containing the configuration-item types they want to include in the new rule. The configuration-item types in an event-correlation rule are the ones impacted by the events that you want to correlate with the new rule. Initially, HP OMi displays a list of the *all* available UCMDB views. However, after the newly configured rule is saved for the first time, HP OMi filters the contents of the view list and displays only those views which contain (or reference) any of the configuration-item types in the selected correlation rule. This view-filtering mechanism helps improve the work flow by displaying only those configuration-item types that are applicable in the context of the current correlation rule.

Figure 43 Correlation Rule Topology



HP OMi expects the instantiation of a topology-based event-correlation rule to match the conditions described in the rule, itself. In other words, the correlation rule triggers only if the combination of physical events and configuration items in the real world match the logical events and configuration-item *types* specified in the event-correlation rule. HP OMi checks the topological relationships between *all* the configuration-item types specified in an event-correlation rule even if only some of the events occur on some of the instances of the configuration-item types specified in the rule. If any piece of the topology specified in the rule is missing in the instantiation of the rule in the real world, the rule does not trigger.

For example, if you set up a simple topology-based correlation rule monitoring events on a host configuration-item type (CIT) that contains two other CITs, for example, a hard-disk and a DVD drive, the correlation rule will only work for hosts that have both a hard disk *and* a DVD. If the same event specified in the correlation rule occurs on the hard disk of a host that does not have a DVD drive, the event appears in the Event Browser but is ignored by the correlation rule.



HP OMi tests the topology of an event-correlation rule whenever you use the Send Test Event tool to see if the rule you are configuring correlates the specified events as expected. For more information about testing event-correlation rules, see [Rule Validation](#) on page 118.

Indicator Values in Correlation Rules

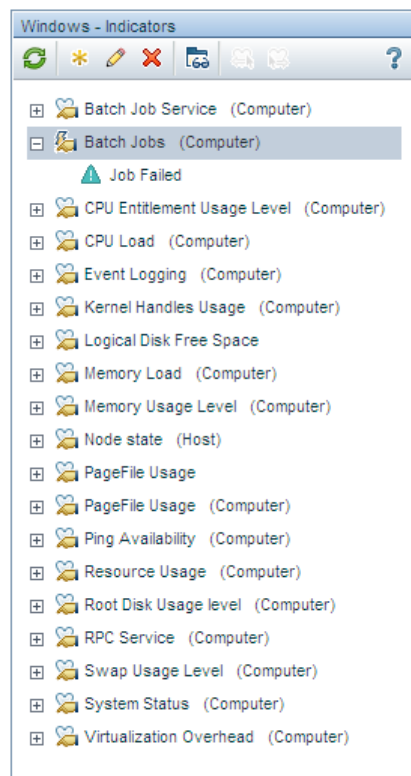
HP OMi uses the concept of event types to categorize the wide variety of events that occur in the operational environment according to type, for example: hardware related, software related, service related, and so on. To help in the process of configuring event correlation, HP OMi enables you to assign indicators to event types and refine the indicators with one or more indicator values.



Event-type indicators can have one or more values; health indicators must have a default value and at least one other value, too.

Event-type indicators reflect the various types of event that occur, for example: “node state”, “memory usage”, or “Print queue length”. Event-type indicator values represent event states such as “up” and “down”, “high” and “low”, or “long” and “short”, and changes of state can often indicate the existence of a problem. Event-type indicators and their values are the building blocks of topology-based event correlation rules. When events of a particular type occur relating to known states defined in event-type indicator values, correlation rules can use the information to correlate the events.

Figure 44 Select Indicators in Correlation Rules



The Correlation Manager displays a list of all the event-type indicators configured for the configuration-item type selected in the Topology Rule pane including those event-type indicators created together with a health indicator. [Figure 44](#) on page 109 illustrates how the Correlation Manager uses icons to distinguish between event-type indicators that *are* associated with a health indicator and those that are *not*. Domain experts can browse through the list of event-type indicators and select the value that best represents the event status that they want to correlate with other events either on the same (or on another) configuration-item type.

The Correlation Manager enables you to associate an indicator value with a symptom or cause event. For example, you could define the event-type indicator value “Disk Space Usage; High” as a *cause* event that leads to *symptom* events concerning file-system performance. For more information about defining event-type indicator values as symptoms and causes in correlation rules, see [Symptoms and Causes](#) on page 104.

Health indicators do not play any role in the event-correlation process. Health indicators are assigned to KPIs contribute to the calculation of severity status. Health indicator values (HIVs) are used to set the health status of the configuration item to which their parent health indicator is assigned. For more information about KPI assignment, see [HI-based Key Performance Indicators](#) on page 143.

Cross-Domain Event-Correlation Rules

The Correlation Manager enables you to configure rules that correlate events for configuration items in different (and technically distinct) domains, for example: database, storage, and web applications. Cross-domain correlation connects a chain of events that rules are already correlating independently in different domains. The correlation process uses events defined as a symptom in one rule as the cause event in another rule, or vice versa.

The link between different correlation rules in different domains is one, single event-type indicator value assigned to a shared configuration-item type that appears in both correlation rules. Domain experts can define an existing event-type indicator value for a specific configuration-item type as a *symptom* event in one rule. In another rule for a different domain, the domain expert can define the same event-type indicator value for the same configuration-item type as a *cause* event. If all the events specified in the various correlation rules occur in the different domains as expected and trigger the various rules, the correlation process highlights the cause event from the last rule in the event-correlation chain in the event browser.



Cross-domain correlation rules must share at least one identical combination of configuration-item type and event-type indicator value.

For example, if all the necessary correlation rules are defined for (and deployed) in the database, storage, and web-application domains and, in addition, the necessary indicator values for the various event types are being monitored for a shared configuration item, the correlation manager can determine that a problem with physical-disk utilization in the storage domain is the root cause of problems with server availability in the web-application domain.

Figure 45 Cross-Domain Correlation Rules

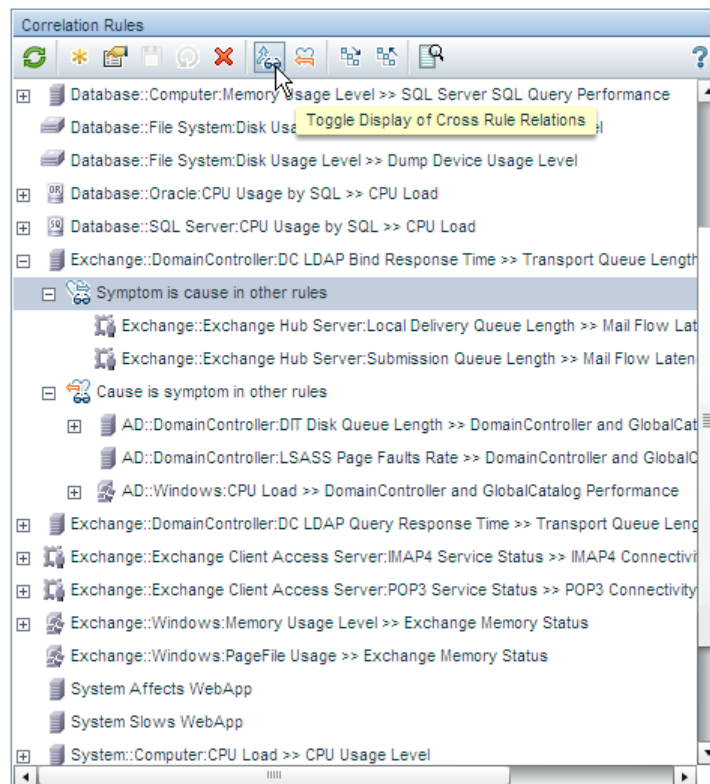


Figure 45 on page 111 shows how the Correlation Manager indicates which of the event-correlation rules contains symptoms or causes that also feature in other rules—perhaps even those defined for a different domain. In cross-domain rules, event-type indicator values configured as a symptom in one rule are also configured as a cause in another rule defined for 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 that correlates events across different domains.

- Symptoms are causes in other rules:

Indicates that the selected correlation rule includes symptom events that are defined as a cause event in another rule. Note the following important points:

- A single correlation rule can have several symptom events.
- Each symptom event is represented in the correlation rule by an event-type indicator value.
- If two correlation rules specify the same symptom event but a different cause, the first rule triggered takes precedence and the second rule is ignored.

- Cause is symptom in other rules:

Indicates that the selected correlation rule includes a cause event that is defined as a symptom event in another rule (or rules). Note the following important points:

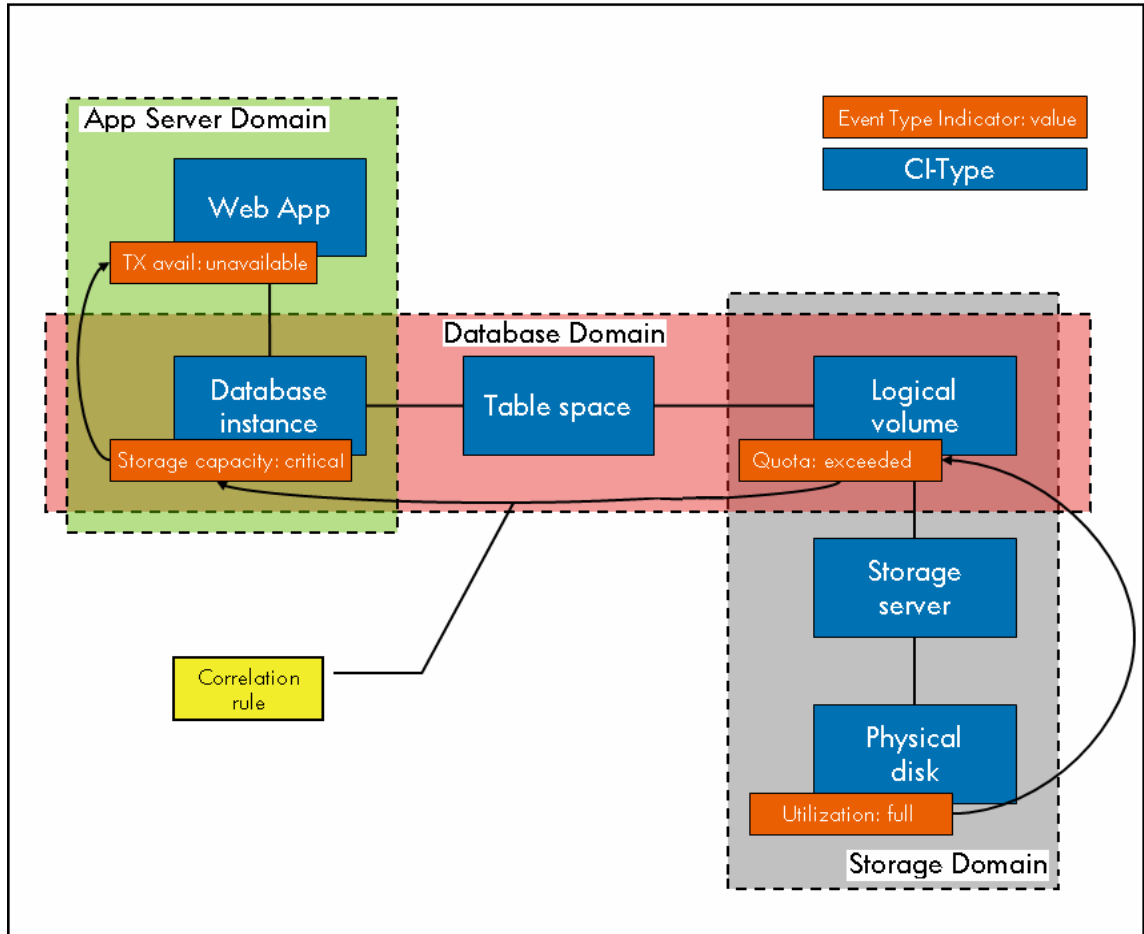
- HP OMi currently supports the specification of more than one cause event in an event-correlation rule.
- If two rules specify a different cause for the same symptoms, the first rule that matches takes precedence and the second rule is ignored.

The HP OMi Correlation Manager uses icons and colors to distinguish between configuration-item types that are configured as a *cause* in an event-correlation rule and configuration-item types that are configured as a *symptom*. If a configuration-item type is configured as a cause in one rule and a symptom in another rule, HP OMi provides links that you can use to jump from one rule to another and, in this way, navigate chains of rules and display each rule’s details, as illustrated in Figure 45 on page 111.

Figure 46 on page 113 illustrates an example of a chain of rules that correlate events across three domains: a Web-application server, a database host, and storage (physical disk capacity). Although each domain has a separate correlation rule, the correlation rule for one domain shares a CI type and event-type indicator value (ETIV) with the correlation rule for another domain. The shared configuration-item types and event-type indicator values form the link in a chain of event-correlation rules that enable *apparently* unrelated symptom events to contribute to a more accurate assessment of the real cause event.

In the example of cross-domain event correlation illustrated in Figure 46 on page 113, the correlation rules for the Web-application and database domains share the configuration-item type “Database Instance” and the event-type indicator value “Storage Capacity: critical”. The correlation rules for the database and storage domains share the configuration-item type “Logical Volume” and the event-type indicator value “Quota: exceeded”. HP OMi uses the shared configuration items and event-type indicator values to provide a link between the different rules and form a chain across the domains. The crucial difference is that the shared ETIV is defined as a cause in one rule and as a symptom in another rule.

Figure 46 Multi-Domain Correlation Rule



It is important to understand that a correlation rule exists first and foremost in the domain for which it is defined. The rule is not aware of any role it plays in a chain of correlation rules across different domains. The link between two correlation rules is created automatically when a domain expert defines a rule that shares a specific combination of configuration-item type and event-type indicator with another correlation rule.

The link between correlation rules can be either deliberate and planned (the domain expert uses a known combination of configuration-item type and event-type indicator value in two different rules) or accidental (the domain expert happens to include in one rule a combination of configuration-item type and event-type indicator value that is already in use in another rule). The advantage of this approach is that the various domain experts do not have to know about or keep track of all the correlation rules defined in all the various domains.

If experts in different domains agree on naming conventions for event-type indicators and their values and adhere to these conventions when defining event-type indicators and event-correlation rules, they can ensure that HP OMi establishes cross-domain links between rules automatically whenever the named configuration item and event-type indicator value is used in multiple rules.

UCMDB Views and Configuration Items

The configuration-item *type* is the central point of reference for topology-based event correlation. HP OMi correlates the events that *affect* the configuration items specified in the event-correlation rules. In addition, the event-type indicators that are the basis of event-correlation rules are assigned to correlation-item *types* and inherited by the configuration items themselves.



The Correlation Manager displays configuration-item types in the context of the view to which they belong. The configuration items displayed in the event-correlation rule topology are only a small part of a larger topological picture.

If you are configuring a topology-based correlation rule for the first time, HP OMi makes all views available for selection and use. After you save the new event-correlation rule, HP OMi filters the available views and displays for selection and use only those views that contain a reference to any of the CI types included in the selected rule, as illustrated in [Figure 47](#) on page 114.

The configuration items that HP OMi displays in the Rule Topology pane is determined firstly by the selection you make in the Enrich with UCMDB View drop-down list. The list contains all the views that are mapped to any of the configuration items specified in the selected correlation rule.

Figure 47 Set the Context of the Correlation Rule

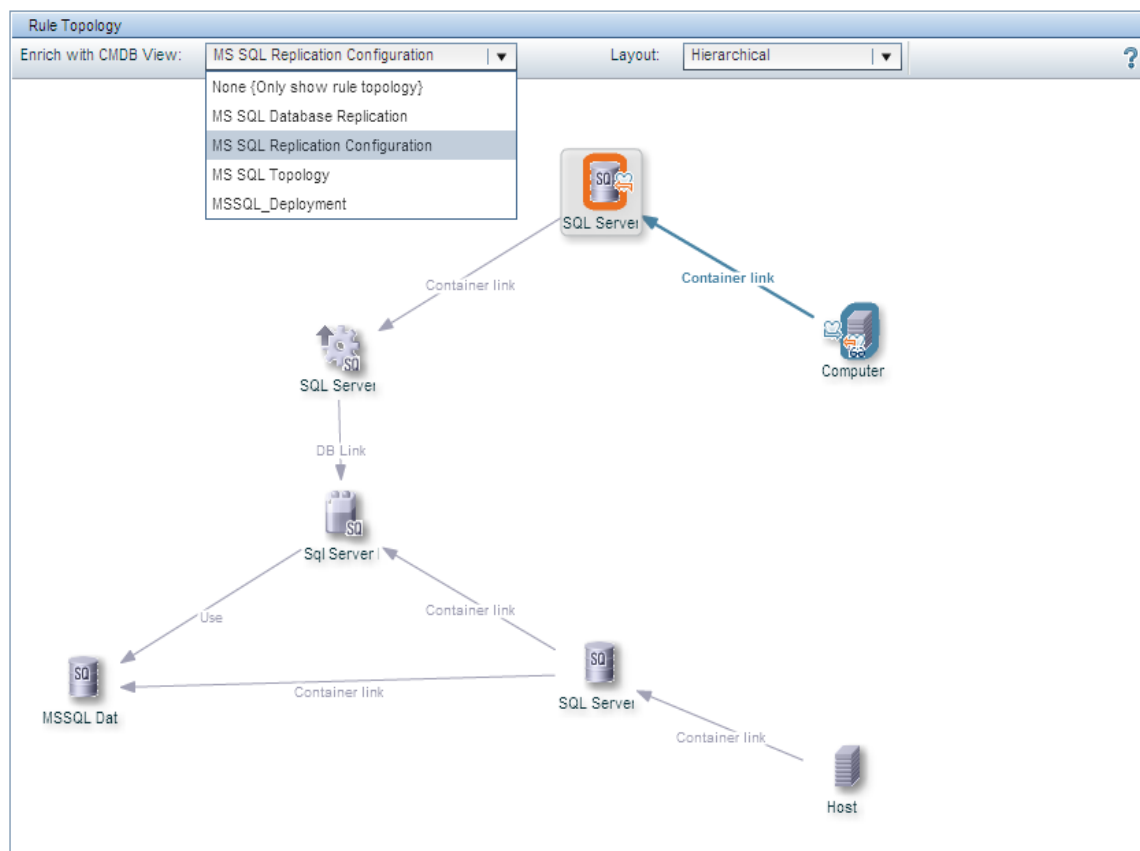


Figure 47 on page 114 shows how to enrich the context of the event-correlation rule by selecting from a list of available UCMDB views, that is: display the configuration-item types included in the correlation rule in the context of one of the views to which they belong.



Configuration items do not, by default, belong to a view. CIs have to be added to a view explicitly. If the configuration items in the selected correlation rule do not belong to any view, the list of views available for enrichment purposes remains empty.

The view-enrichment feature enables you to see wider context of the configuration-item types included in the correlation rule. The wider context can often help you understand if it makes sense to adjust the scope of the correlation rule, for example by refining a rule's contents or broadening a rule's reach to include other combinations of configuration items and event indicators.

Although the Correlation Manager shows the configuration-item types configured in the event-correlation rule, HP OMi does not correlate the configuration-item types themselves. Rather, HP OMi monitors and correlates the events that *affect* the configuration-item types specified in a correlation rule. Which events HP OMi monitors is determined by the event-type indicators defined for (and assigned to) a given configuration-item type. Selecting a configuration-item type in the Rule Topology view displays the list of event-type indicators currently available for the selected configuration-item type.

The creation and management of event-type indicators is performed for the most part in the Indicator Manager. However, you can also use the Indicator Manager embedded in the Correlation Manager to edit existing event-type indicators and add new ones, too. Note that any changes you make to event-type indicators in the embedded Indicator Manager are available globally and not just in the context of the currently selected correlation rule.

The Correlation Time Window

A time window exists in which the processing of the event-correlation rules you define with the Correlation Manager must complete. The event-correlation time window is the amount of time that HP OMi waits for notification of the next event specified as either a symptom or cause in a correlation rule. HP OMi starts a time window for each correlation rule after receiving notification of any event that is specified in the event-correlation rule.

If the cause event and any combination of the symptom events specified in a rule occur within the defined time window and the option to automatically extend the time window is set to “true”, the correlation process continues until either the time window expires, the next event in the correlation rule occurs, or the correlation process completes successfully. If the time window expires before notification arrives of the next event specified in the correlation rule, then the correlation process for the rule stops.

If all the events specified in the correlation rule occur within the defined time window for a correlation rule, HP OMi flags the correlated events in the browser as either symptom or cause. If, at the end of the time window, at least one pair of the symptom and cause events specified in the rule has *not* occurred, HP OMi displays all the cached events as individual, uncorrelated events in the event browser.

By default, the time window for HP OMi’s topology-based event correlation is set to sixteen (16) minutes. However, users with access to the platform settings area can change the default setting to suit the requirements of their environment. Note that changes to the default setting apply globally, that is: for *all* topology-based correlation rules.

Figure 48 Specify the Correlation-Rule Time Window

Operations Management - Topology-Based Event Correlation Settings		
Name	Description	Value
Auto-Extend Time Window Mode	Automatically extends a correlation time window whenever an additional symptom is correlated to the same cause.	true
Correlate Closed Cause Events	Correlate symptoms with already closed cause events. This includes automatically closing these symptoms.	true
Correlation Time Window	Cause and symptom events must arrive at the correlation engine within the specified time frame to be considered for correlation. A time window starts when the first cause or symptom event arrives that cannot be correlated with any other event (seconds).	960

Figure 48 on page 116 shows where to modify the *default* setting for the event-correlation time window. The platform-settings manager also enables you to configure the HP OMi correlation engine to extend the correlation time window for a correlation rule automatically each time additional events occur that are specified in the correlation rule. The Auto-Extend Time Window Mode starts the time-window clock when HP OMi receives notification of an event specified in a correlation rule. HP OMi then waits for the amount of time specified in Correlation Time Window for notification of another event in the same correlation rule. If another event specified in the correlation rule occurs, HP OMi restarts the time-window clock. By default, HP OMi is configured to *enable* the auto-extension of the time window for event-correlation rules.



HP OMi enables you to override the default setting for the correlation time window for individual event-correlation rules.

Figure 49 on page 117 shows how to override the default settings for the event-correlation time window for an individual correlation rule. Domain experts can set the time window for the event-correlation process in an individual correlation rule either when creating a new rule or editing an existing rule. Note that the rule-specific time window takes precedence over the global setting for the event-correlation time window.

Figure 49 Set the Time Window for a Correlation Rule

Database Affects WebApp - Edit Correlation Rule

ID: 232d8026-5605-4d28-b565-2439c7fa0456

Display Name: * Database Affects WebApp

Name: * DB2WebAppFail

Description: TS causes WebApp problem

Active:

Time Window: Override default time window in this rule

Seconds: 760

(* Required field)

OK Cancel Help

To help improve the accuracy of event-correlation results, you need to align the event-correlation time window with the monitoring interval defined in the HP Operations Manager message-source policy that monitors and reports the original events. For example, if the HP Operations Manager message-source policy checks once for the occurrence of an event every 30 minutes, then the default setting of 16 minutes for the event-correlation time window is too short.



Changes to the life-cycle state of a correlated *cause* event can have an impact on the event-correlation time window and, as result, the event-correlation process.

If the life-cycle state of a correlated *cause* event changes to “closed” during the correlation process, HP OMi does not immediately restart the correlation process—HP OMi continues to correlate symptom events until the currently active time window for the related correlation rule expires. After the correlation rule’s time window expires, HP OMi restarts the correlation process. This behavior might lead to a situation in which new symptom events are correlated with an old (and closed) cause event. If you want to force HP OMi to restart the correlation process as soon as the life-cycle state of a correlated cause event is set to “closed”, you can change the default event-correlation configuration in the Infrastructure Settings Manager under the section Operations Management - Topology-Based Event Correlation Settings.

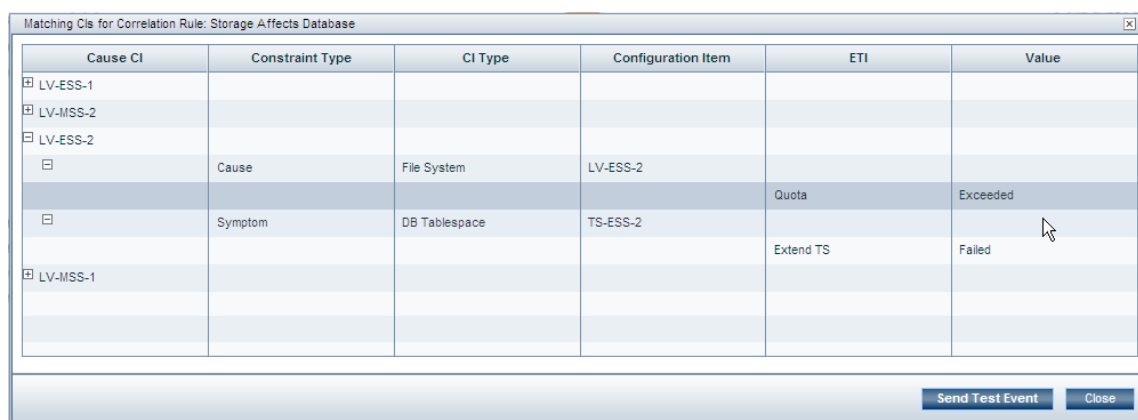
Since HP OMi and HP Operations Manager synchronize events and the event’s state, the life-cycle state of HP OMi event can change automatically as a result of a change to the corresponding event in HP Operations Manager. For example, if an HP Operations Manager user acknowledges (or unacknowledges) an event, HP OMi automatically sets the life-cycle state of the corresponding event to “closed” (or “open”). For more information about the impact that event synchronization has on event life-cycle status and, by extension, on event correlation, see [Life-Cycle State Synchronization](#) on page 79.

Rule Validation

HP OMi enables you to test an event-correlation rule by using the Correlation Manager to send a test event using one of the combinations of configuration-item type and event-type indicator value specified in the rule. The test simulates the occurrence of an event of the type and value specified in the selected event-correlation rule and sends notification of the event to the Event Browser. If HP OMi displays the test event in the Event Browser as a correlated event, the rule does what is expected and is ready for deployment in a production environment.

The rule-validation test first looks for any available *instances* of the configuration-item *types* specified in the selected event-correlation rule and lists the instances it finds in a separate window, as illustrated in [Figure 50](#) on page 118. Domain experts can browse through the list of configuration items and expand each item to see which types of events are specified for correlation. After locating and selecting the type of event they want to simulate, the domain experts can instruct the Correlation Manager to send an event of the selected type and value to the Event Browser. In the example displayed in [Figure 50](#) on page 118, HP OMi enables you to simulate an event relating to quotas for the File System configuration-item type. The Correlation Manager sends notification of the simulated event to the Event Browser when you click the Send Test Event button.

Figure 50 List Matching Configuration Items



Cause CI	Constraint Type	CI Type	Configuration Item	ETI	Value
<input type="checkbox"/> LV-ESS-1					
<input type="checkbox"/> LV-MSS-2					
<input type="checkbox"/> LV-ESS-2					
<input type="checkbox"/>	Cause	File System	LV-ESS-2	Quota	Exceeded
<input type="checkbox"/>	Symptom	DB Tablespace	TS-ESS-2	Extend TS	Failed
<input type="checkbox"/> LV-MSS-1					

Part of the rule-validation test involves a complete check of the topological relationships specified in the rule. The topological check that the simulation test performs is exactly the same as the check that occurs during the actual event-correlation process. HP OMi always checks the topological relationships between *all* the configuration-item types specified in an event-correlation rule even if only *some* of the events occur on some of the instances of the configuration-item types specified in the rule. The test does not succeed unless the complete topology specified in the rule matches the instantiated version of the topology.



The topological relationships considered during the test are those that are indicated with a thick blue line when you display the rule in the Correlation Manager's Rule Topology pane. For more information about rule topology in topology-based event-correlation and the restrictions that apply, see [Rule Topology](#) on page 107

If you use self-configured views as the basis for topology-based event-correlation rules, you need to make sure that the instantiation of the relationships defined in the custom view are actually possible. For example, if the view specifies that host A has a relationship with server B *and* server C (rather than server A *or* server B), then the rule cannot work in a

high-availability cluster environment, where server B *and* server C are never available at the same time. The rule-validation test would fail since the instantiation of host A with server B *and* server C cannot occur.

Often, the quickest and easiest way to solve problems relating to topology instantiation is either to make use of “OR” relationships (rather than “AND”) in the views containing the configuration-item types specified in the correlation rule or, where AND is required, to define shorter rules that avoid the problematic relationship and target more specifically the event and configuration items you want to monitor.

Related Events

An overview of all the events considered during the correlation process is available in the event browser's Related Events tab. The Related Events tab shows you the events that either contributed to or were discarded by the correlation process. The overview presented in the Related Events tab enables operators to drill down through the correlation process and browse the correlated events.

The Unrelate option in the Related Events tab removes the relationship that a correlation rule established between symptom and cause events. The Unrelate feature is useful if you think that HP OMi correlated the selected event by mistake.



The "unrelate" action has no effect on the correlation rule that initially established the relation between events. To prevent HP OMi relating the events in future, a user with access to the HP OMi Correlation Manager must modify the associated event-correlation rule.

The rules column in the related-events tab displays the name of the rule HP OMi used in the correlation process for a selected event. The rule name is a link to the rule used in the correlation process, and users with the authorization to access the Correlation Manager can click the link to display a graphical representation of the rule. Note that operators do not usually have access to administrator tools such as the Correlation Manager. Administrator tools are typically available only to administrators and domain experts. For more information about user authorization, see [User Authorizations](#) on page 39.

For more information about the information that HP OMi displays in the event browser's Related Events tab, see [Related Events](#) on page 83.

6 Health-Based Monitoring

The information in this section explains what health monitors are and how the configuration of health-based monitoring in HP OMi works from the perspective of an individual user's work flow, that is: the daily tasks the user performs and the order in which the tasks typically occur. This chapter also provides information about the concepts underlying the tools that are available to help configure health-based monitoring and, where appropriate, explains what the tools do and why the tools work the way they do. Reading this section helps you understand why you need to configure health-based monitoring and how you can use health-based monitoring to help manage the problems that occur in the monitored environment.



The user types mentioned here are examples only. HP OMi enables you to configure the user types that best meet the needs of your environment.

Table 12 on page 121 provides an overview of the contents of this chapter and indicates the intended audience, that is: the types of user who needs to read and understand the topic to help perform the tasks in their daily work flow.

Table 12 Health-Perspectives Overview

Page	Concept	HP OMi Admin	Domain Expert	Domain Operator
122	Health-Monitoring Work Flows	✓	✓	-
125	Introduction to Health-based Monitoring	✓	✓	-
127	The Health Perspective	✓	✓	-
133	Health Indicators	-	✓	-
143	HI-based Key Performance Indicators	-	✓	-
150	Event Attributes in Health-Based Monitoring	✓	✓	-
152	Performance Graphs	-	✓	-
157	Top Views	-	✓	-
161	Health Management Tools	-	✓	-

Health-Monitoring Work Flows

HP Operations Manager i (HP OMi) provides a set of tools that are intended to help set up health-based monitoring, which is a new and more flexible way to manage problems in the operational environment. The selection of health-based monitoring tools that are available to individual users depends on the responsibilities assigned to the group the user belongs to, the demands of a user's work flow, and the context in which the users perform their tasks.

In HP OMi, users belong to one or more user groups, whose members are granted access to management or administrative tools based on the scope of the tasks the group is expected to perform in their every-day work flow. For example, in the context of health-based monitoring, domain experts need access to administrative tools such as the Indicator Manager, the KPI manager or the View Mapping manager to perform some of the tasks in their work flow.

To perform the management tasks required by their respective work flow in the context of health-based monitoring, HP OMi users need to have a good understanding of all (or any combination of) the topics discussed and explained in this section. The information provided in this section attempts to address the needs of all users whose work-flow requirements mean they have a role to play in the management of health-based monitoring, for example:

- [The HP OMi Administrator](#)
- [The Domain Expert](#)
- [The Domain Operator](#)

The HP OMi Administrator

HP OMi administrators need to have a good understanding of the basics of health-based monitoring and, in addition, the underlying health-related concepts such as event-type indicators, health indicators, key performance indicators, calculation and business rules, severity status and propagation, and so on. A high-level summary of the HP OMi administrator's work flow in the context of health-based monitoring includes the following tasks:

- **Configure user groups:**

Define and configure user groups so that users with the appropriate knowledge and resources (domain experts) can configure health-based monitoring quickly and efficiently for their respective technical areas.
- **Grant access to administrative tools:**

Ensure the domain experts and operators have access to the tools available in the HP OMi administrative interface where appropriate. For example, domain experts need access to the Indicator Manager and the Correlation Manager so that they can create and configure health indicators and topology-based correlation rules, respectively.
- **Configure event sources:**

Ensure that, where possible, the attributes of events from all sources can be used by the domain experts to set the health indicators that HP OMi needs for health-based monitoring. Event source include: HP Operations Manager, HP Network Node Manager i, Business Availability Center, Business Process Monitor, HP SiteScope, or events from integrated third-party sources.

The Domain Expert

In HP OMi, domain experts need to have a comprehensive understanding of health-based event management including the underlying health-related monitoring concepts such as: health indicators, key performance indicators, calculation rules, severity status, propagation, and so on. Domain experts also need to understand how to use this knowledge of health-based monitoring to implement a monitoring strategy in the technical domain for which they are responsible.

For example, experts in the Microsoft Exchange domain need to have a good understanding of the various Exchange server roles (client access, edge and hub transport, mailbox, and unified messaging) as well as the relationship between the different Exchange-related servers. The domain experts also need to know what events are most likely to occur on each type of Exchange server (and why) and understand which of the events that do occur are important enough to require monitoring on a more regular basis. Good candidates for monitoring are the length of the transport queue on the Exchange Edge and Hub servers and the length of the message queue on the Exchange Mail server which can, either individually or collectively, have a direct impact on the general availability and performance of the Exchange service.

Domain experts who want to map graph families (or categories) to configuration-item types need to have advanced knowledge of the configuration and workings of the HP Performance Manager or the graphing component, too, including but not limited to performance agents and performance-related data sources.

A high-level summary of the domain expert's work flow in the context of health-based monitoring includes the following tasks for each specific technical domain:

- Set up configuration-item types:
 - Create and configure new (or modify existing) CI types for the domain-specific objects in the monitored environment, for example: SAP, Exchange, BlackBerry enterprise servers, or databases.
- Set up health indicators (and values):
 - Create and configure new (or modify existing) health indicators (and values) for each of the configuration-item types available for the domain-specific objects in the monitored environment.
 - Assign the health indicators to the appropriate configuration-item type.
 - Assign the health indicators to the appropriate key-performance indicator.
- Map health indicators to event attributes:
 - Map health indicator values to event attributes so that incoming events can set and change health indicators automatically
- Set up calculation rules for HP OMi key performance indicators:
 - Configure HP OMi performance and availability KPIs for the domain-specific configuration-item types by assigning the appropriate domain-specific health indicators and, if necessary, setting calculation and business rules.
- Define and map graph families or categories to CI types:
 - If custom performance data sources are available, map graphs to configuration-item types so that graphs are available from events that occur on instances of the mapped configuration-item type.

- Manage UCMDB Views:

Create and modify views in the UCMDB and manage the assignment of configuration-item types to views so that graphing functionality is available in the context of particular events and configuration-item types.

The Domain Operator

In HP OMi, domain operators do not typically have access to health-management tools and do not need to understand how health management works to perform the tasks that comprise their daily work flow. However, domain operators *do* need to know about and understand health-related concepts in the context of event management. For more information about health perspectives in event management, see [The Health Perspective](#) on page 60.

Introduction to Health-based Monitoring

By extending the concept of event severity to include health status, HP OMi provides a much broader and more accurate view of the state of the monitored objects in the operational environment. The additional health-related information enables HP OMi to display a detailed overview of the *current* health of configuration items in the monitored environment from different perspectives. The information about the current health status is an important addition to information such as the life-cycle status and the severity status of events.

The combination of different health-based views in one collated browser page is particularly helpful for users who want or need a convenient location from which they can perform the tasks that constitute their daily work flow. The information in this section is intended for HP OMi administrators and domain experts who need to set up health perspectives for the domain operators or configure health-based monitoring in general. These users must understand what the basic elements of health-based monitoring are and how they work together. For example, event notifications contain information in the form of attributes that HP OMi can use to set health indicators (HI). Health indicators define the possible health-based statuses of a configuration-item type and are an essential part of the calculation of key performance indicators (KPI). Key performance indicators contribute either individually or collectively to the current health status of configuration items (CI), which are instances of configuration-item types (CIT).

Figure 51 HP OMi Health Perspective

The screenshot displays the HP Business Service Management interface. The main window is titled "Business Service Management - Operations Management" and shows a "Health Perspective" view. On the left, there is a "CI Tree View" showing a hierarchy of configuration items under the view "Tango". The central "Browser" table lists configuration items with the following columns: Severity, C, N, D, A, O, Host, Date Received, User, Group, State, Title, and Category. The table shows several items, including LV-ESS-2 and TS-ESS-1, with various health indicators (green checkmarks, red X's, yellow triangles) and titles such as "Storage quota exceeded on logical volume" and "No problem on Storage Server". At the bottom, the "Top View" section shows a hierarchical diagram of configuration items, including "Employee Self Service", "Manager Self Service", "IT JBoss Cluster 42", and various servers and services like "srv1.san.acme.com" and "TS-ESS-1".

The first part of setting up and implementing HP OMi health perspectives involves the creation and configuration of health indicators and the assignment of the new health indicators to HP OMi's health-based key performance indicators. The information in this section describes the concepts underlying health indicators, explains what they are for and how they work, and provides examples of their application and use. HP OMi administrators and domain experts need to understand how to create and assign health indicators and, more importantly, why.

Health indicators provide essential information that HP OMi requires in the calculation and display of health-based key performance indicators. The information in the HI-based KPI section describes the concepts underlying HP OMi's key performance indicators, explains what they are for and how they work, and provides examples of their use. HP OMi administrators and domain experts need to understand how to configure and assign key performance indicators if they want to monitor health-based severity status accurately.

In HP OMi, there is a close relationship between event attributes and health indicators. Part of the process of setting up health-based monitoring involves establishing a link between the attribute of an event and the value of a health-indicator—the link enables the attributes of an event to be used to set or modify individual health indicators automatically. This is important, since health indicators are the primary source of information that HP OMi uses when calculating the severity status of health-based KPIs. The information in the section describing event attributes in the context of HI-based monitoring explains the link between event attributes and health-indicator values and shows how to use the link when monitoring external data sources such as messages from HP Operations Manager or alerts from SiteScope. HP OMi administrators and domain experts need to understand the relationship between event attributes and health indicators so that they can use the information available in events to automate the process of calculating, setting, and displaying the health-based severity status of configuration items.

If the appropriate data sources are configured and available on the objects HP OMi is monitoring, HP OMi can generate and display graphs, charts, and tables with information about the performance history, current configuration, and future trends of individual configuration-items. The information in the graphing section is intended to help HP OMi administrators and domain experts to set up graphing and includes details of how to assign graph families (or categories) to configuration-item types, configure graphs and graph families, and enable users to display the generated graphs in the context of a particular type of configuration item or event. The events in question are those that have an impact on instances of the configuration-item type to which the graphs are assigned.



Although not strictly related to health-based monitoring, HP OMi provides a variety of other tools that can help in the analysis and investigation of an event's underlying problems, for example: custom tools, agent-based tools, and event-related actions.

HP OMi uses a number of different but inter-related tools to display a detailed overview of the health of configuration items from different perspectives. The aim of this approach is to provide a variety of useful information that helps users to investigate an event's underlying problems from one, central location. HP OMi users with the appropriate authorization, such as administrators or domain experts, can use tools such as the Indicator Manager and the Mapping Manager to collate the information from the various sources and ensure that particular users or user groups see the most useful information in the most convenient form in the most helpful context. For more information about the Indicator Manager and the Mapping Manager, see [Health Management Tools](#) on page 161.

The Health Perspective

In the Health Perspective tab, HP OMi uses a number of different but inter-related tools to display a detailed overview of the health of configuration items from different points of view. The aim is to present a variety of health-related information that helps users to investigate an event's underlying problems from one, central location. The information that HP OMi displays and the way it displays it is the responsibility of the HP OMi administrator and the experts from the domains which are the source of the events, such as SAP, databases, BlackBerry enterprise servers, Exchange servers, and so on. HP OMi users with the appropriate authorization, such as administrators or domain experts, can use the tools provided to configure the underlying platform and ensure that particular users or user groups see the most useful information in the most helpful form.

In the HP OMi Health Perspective tab, administrative users need to configure the contents of the following panes:

- **The CI Tree View:**

A hierarchical list of the configuration items included in the selected UCMDB view.

- **The Event Browser View:**

A list of the events currently affecting the configuration items in the selected view.

- **The Top View:**

The configuration item impacted by the currently selected event and displayed in the context of the UCMDB view to which it is mapped. The information includes related CIs and any assigned key performance indicators (KPI).

- **The Health-Indicator View:**

A list of the health indicators set for the configuration item impacted by the currently selected event. The listed health indicators show details of the current health of the CI affected by the event selected in the Event Browser.

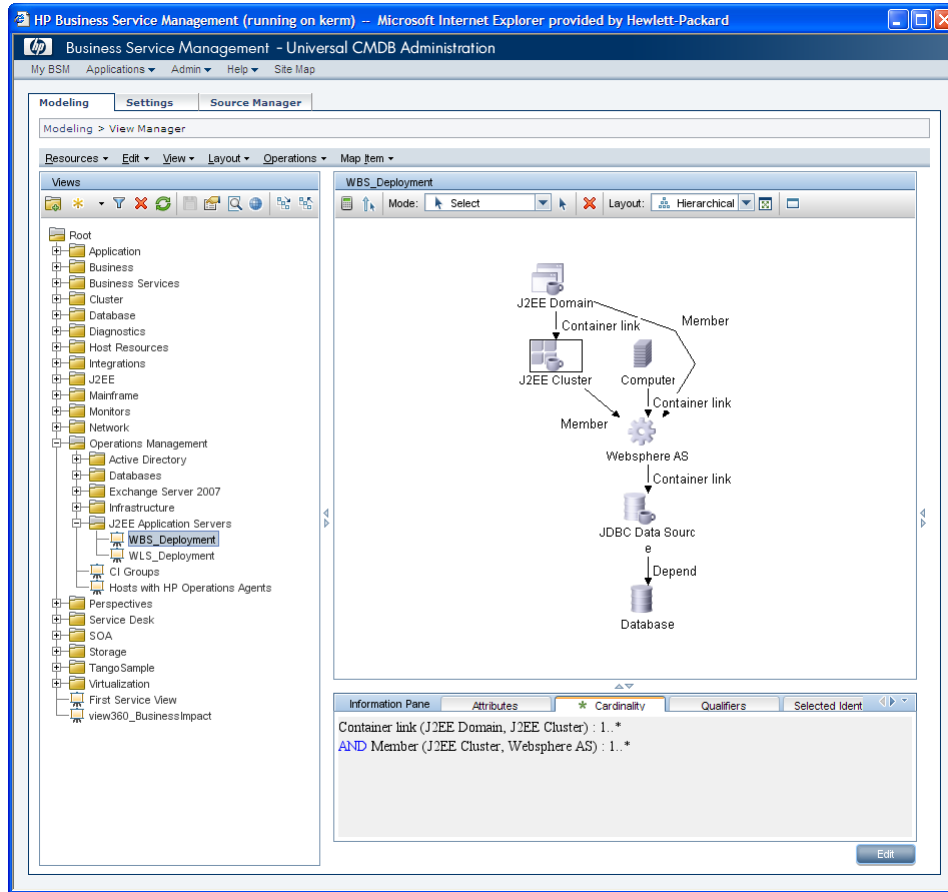
The CI Tree View

The CI Tree View pane in the HP OMi Health Perspective tab enables users to browse the views stored in the UCMDB or search for and locate individual configuration items. After users have found and selected a particular view, they can use the configuration items contained in the view to filter the contents of the event browser, for example, to display only those events that have an impact on the selected configuration-item. Users with authorization to access the UCMDB can add views and configuration-item types that help HP OMi user groups perform the tasks in their respective work flows.

Normally, the domain experts create domain-specific views that they then assign to the user groups whose members are responsible for investigating the events that have an impact on the configuration items in the assigned view. The users with access to the assigned view can see the relevant events in the Event Browser.

For example, to add a view to the list of views displayed in the CI Tree view, HP OMi administrators or domain experts can use the UCMDB's dedicated View Manager, as illustrated in [Figure 52](#) on page 128. Note that not all users have access to the UCMDB View Manager. Users with the appropriate authorization can modify existing configuration-item types and add new configuration-item types to an existing view, too.

Figure 52 List Views in the UCMDB View Manager



The Event Browser View

To configure the HP OMi event browser to display events and indicate event severity, HP OMi domain experts or administrators must ensure that messages sources in the various domains are correctly configured, especially if events originate from third-party sources that forward events through HP Operations Manager. After configuring event sources and setting up the event-forwarding mechanism, administrators and domain experts must also make sure that event attributes are mapped to event-type indicators and health indicators (if available) so that incoming events can set and modify values for the specified indicators automatically. If the mapping does not occur automatically as a result of custom message attributes set in the original message-source policy of HP OMi-ready Smart Plug-ins (SPI), the HP OMi enables users with the appropriate authorizations to set up the required rules manually. For more information about the Mapping Manager, see [Indicator Mapping Rules](#) on page 137.

The Top View

HP OMi uses the Top View pane to display the neighborhood defined for the configuration item that is directly impacted by the currently selected event. The view highlights the configuration item impacted by the selected event and displays the configuration item along with any related CIs in the context of the currently active UCMDB view. The currently active

view is the view selected from the list of views available in the Selected View drop-down menu. Note that the HP OMi Top View filters the contents of the view hierarchy to show only those configuration items impacted by the event selected in the Event Browser.

Not all the views stored in the UCMDB are available for selection in the Top View. HP OMi filters the list of views and displays in the Selected View drop-down menu only those views that are manually mapped to the configuration-item type affected by the currently selected event. If the configuration-item type is not mapped to any view, HP OMi does not display a Top View. Instead, HP OMi displays a table containing information about any key performance indicators assigned to the configuration-item type. For more information about mapping views to configuration items, see [View Mapping](#) on page 129.

Domain experts can configure views that are most helpful in (and appropriate for) the analysis of a particular type of event's underlying problem, that is: views that contain only those configuration items most likely to be impacted by events that take place in a particular domain or technical field (SAP, BlackBerry enterprise servers, Exchange, and so on). Unlike the Dashboard view, the HP OMi Top View filters the contents of the view hierarchy to show only those configuration items impacted by the event selected in the Event Browser.

To configure the Top View to display the appropriate information in the most helpful form, domain experts need to make sure not only that the appropriate views are available to the domain operators but also that the necessary health-based information exists. For example, the domain experts need to configure the relevant health indicators and assign them to the appropriate configuration-item types and HP OMi key performance indicators, too. The KPI calculation rule has to be set to ensure that HP OMi considers the severity of any health indicators assigned to the KPI when setting a configuration item's severity status. For more information about KPI calculation rules, see [Health-based KPI Calculation](#) on page 146



HP OMi provides authorized users with context-sensitive access to the tools required to configure health indicators for (and map views to) the selected configuration-item directly from the Top View pane. Context-sensitive menus are available by right clicking a configuration item.

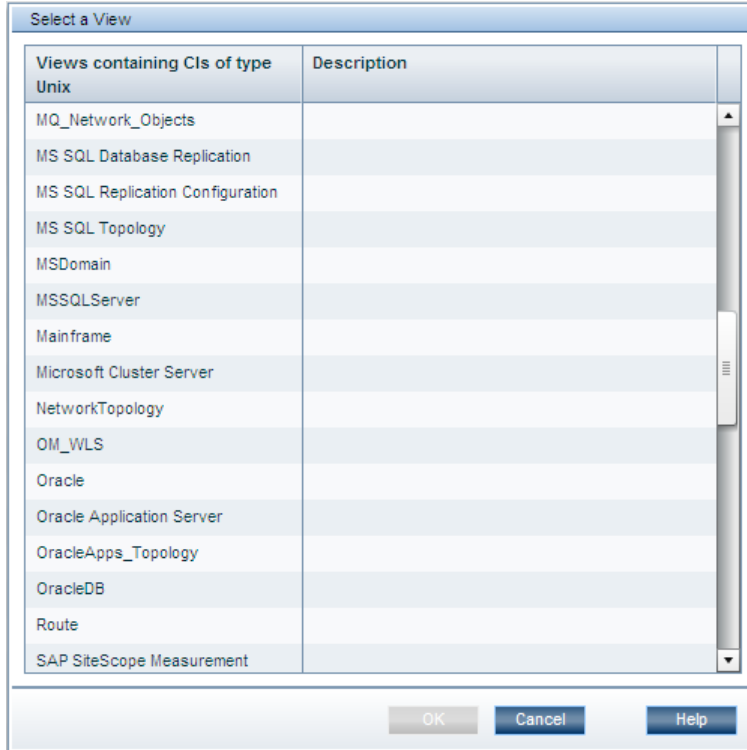
View Mapping

To ensure that views are available for selection and use in the HP OMi Top View pane, the configuration item impacted by the event selected in the event browser must be explicitly mapped to at least one view. Note that the view-mapping process can only make use of existing views. The Dashboard's View Manager enables users to create new views in the UCMDB.

Domain experts can use the View Manager to configure new views that help domain operators analyze the problems that are most likely to cause a particular type of event, that is: views that contain only those configuration items most likely to be impacted by events that take place in a particular domain or technical field (SAP, BlackBerry enterprise server, Exchange, and so on). Unlike the Dashboard view, the HP OMi Top View filters the contents of the view hierarchy to show only those configuration items impacted by the event selected in the Event Browser.

Users with access to the View Mapping manager, such as domain experts or the HP OMi administrator, can use associate configuration-item types with one or more views. [Figure 53](#) on page 130 shows the window you use to select a view to map to the configuration-item type "Unix".

Figure 53 Map Views to CI Types



If the HP OMi administrator or domain experts maps the configuration-item type “Unix” to a view such as “Oracle DB”, HP OMi includes the view “Oracle DB” in the list of views displayed in the Selected Views drop-down menu in the Top View pane each time the user selects an event that has an impact on any instance of the configuration-item type “Unix”.

KPI Assignment

HP OMi uses tool tips to display information about KPI assignment and status. Tool tips appear if you hover the mouse cursor over a configuration item in the Top View pane. HP OMi uses two distinct types of key performance indicators, namely: those that show *event* status and those that show *health* status.

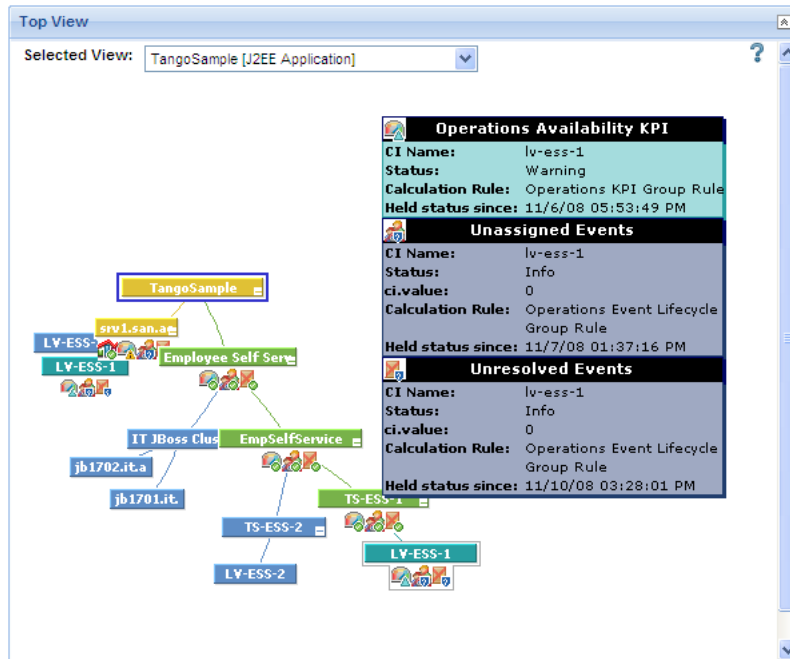
HP OMi assigns event-based KPIs (*unassigned* and *unresolved* events) automatically to all configuration-item types impacted by the reported event. Status information for *event*-based KPIs is available by default.

HP OMi assigns *health*-based KPIs to a configuration item automatically when an event occurs that sets an availability- or performance-based health indicator associated with the impacted configuration item. Domain experts can configure HP OMi to set health indicators automatically by mapping indicator values to the attributes of incoming events. For more information about mapping event attributes to indicator values, see [Indicator Mapping Rules](#) on page 137.

If the health-based KPIs are assigned to the CI affected by the event selected in the event browser, HP OMi populates the KPI tool-tip pop up with the available health-related information.

The tool-tip information for health-based KPIs such as “Operations Availability” and “Operations Performance” includes the name of the impacted configuration item, the current status, and the business rule used to propagate the KPI status. HP OMi administrators or domain experts can use the Indicator Manager to create new health indicators for a configuration-item type and assign the health indicators to a health-based KPI, too.

Figure 54 KPI Tool-tip Information



In Figure 54 on page 131, the tool-tip pop up does not display any information about the Operations Performance KPI for the selected configuration item, LV-ESS-1, a logical volume configured for a monitored database. The lack of information about the KPI is an indication that the health-based KPI “Operations Performance” has not yet been assigned to the selected CI. As soon as an event occurs that sets a performance-related health indicator assigned to the affected CI, HP OMi automatically assigns the Operations Performance KPI to the affected CI and displays the additional details in the tool-tip panel along with the current severity status.

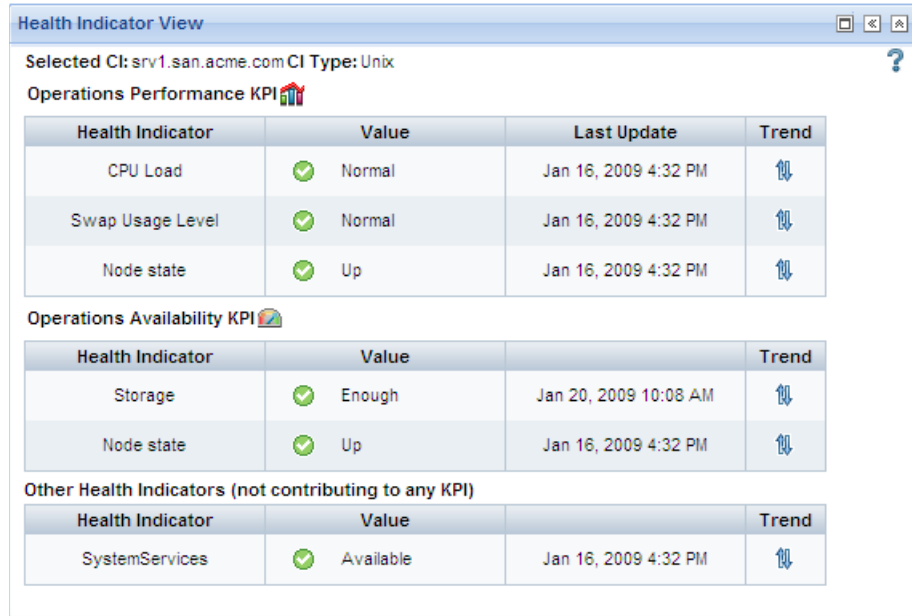
The Health-Indicator View

HP OMi uses the Health Indicator View to display a list of all the health-indicators that are assigned to the configuration-item *type* associated with the configuration item selected in the CI tree. The list groups the HI values according to whether they are used in the KPI calculation process and which KPI severity they contribute to. HP OMi uses KPIs to set the health-based severity status of a configuration item. The information displayed in the Health Indicator View is a detailed break down of the health-based severity status shown in the Top View pane and enables users to see where they need to invest resources in the investigation of a configuration item’s underlying problem. The configuration item in question is the one impacted by the event currently selected in the event browser.

The information displayed in the Health Indicator View includes the health-indicator value used to set the health indicator that contributes to the selected CI’s current health status and the key performance indicator to which the health indicator is assigned, for example: Operations Performance, or Operations Availability. HP OMi uses a time stamp to indicate when the current status was set, and the Trend column shows whether the current status is

declining, improving, or unchanged compared to the previously recorded status. The consolidated information provides the domain operators investigating the underlying problem with a comprehensive overview of the data used to calculate the current health status of the configuration item affected by the reported event.

Figure 55 Health Indicator Perspective



It is important to understand that if a health indicator exists for a configuration item but is not assigned to a KPI, the unassigned health indicator cannot be considered during calculation of the KPI's health-based severity status. The unassigned health indicators that do not contribute to the calculation of health-based KPI appear in the Health Indicator View pane in a section named "Other".



HP OMi provides authorized users with context-sensitive access to the tools required to configure and reset health indicators for the selected configuration-item directly from the Health Indicator View. Context-sensitive menus are available by right clicking an element in the user interface.

HP OMi uses health indicators and key performance indicators to determine and display the health of the objects in the monitored environment. Domain experts define values for the health indicators that HP OMi then uses in combination with any additional data available about dependent objects. The combined data is passed to calculation rules which evaluate and set the severity of key performance indicators (KPI) that HP OMi uses to indicate the overall health of an object. HP OMi also uses business rules to determine how HP OMi propagates the severity status of a KPI up and down the dependency chain.

Health Indicators

A health indicator (HI) 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". HP OMi uses health indicators to show if a hardware resource is available and responding or, alternatively, if the performance of a software application changes according to whether the load is normal, high, or exceeding specification.

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" as well as any instances of the Oracle and DB2 database configuration-items.

Authorized users can use the Indicator Manager to create health indicators and define rules that enable HP OMi to set health indicators automatically using custom attributes attached to incoming events detected by HP OMi-ready SPIs. For more information, see [Indicator Mapping Rules](#) on page 137 and [Indicator Management](#) on page 140.



A health indicator cannot exist in “isolation”; when you create a health indicator HP OMi automatically associates a corresponding event-type indicator with the new health indicator, too.

Health indicators provide the data that key performance indicators (KPI) use to calculate the health-based severity status for the availability and performance of monitored resources. HP OMi administrators and domain experts assign health indicators to key performance indicators (KPI), which HP OMi uses 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.

Figure 56 Edit Indicators

Icon	Display Name	Severity
✓	Normal [Default]	✓ NORMAL
⚠	Higher Than Normal	⚠ MAJOR
⚠	Lower Than Normal	⚠ MAJOR
✗	Much Higher Than Normal	✗ CRITICAL
✗	Much Lower Than Normal	✗ CRITICAL

(*) Required field

OK Cancel Help

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 calculate the health-based severity status accordingly. The type of health-based data source determines the importance that HP OMi attaches to the information provided.

HP OMi's health perspective displays detailed information about the health indicators considered during the calculation of the health status of the currently selected configuration item. The information displayed includes trends, which indicate how the value of the listed health indicators changes over time, for example: whether the health is improving, declining, or stable.

You can manually reset a health indicator to its default value. Resetting a health indicator is a useful way of returning a configuration item's health-based severity status to a defined default value such as "OK", "normal", or "running". For example, when a health indicator remains in a critical state because a normal event (which resets the health indicator) is lost as a result of the correlation process during an event storm, you can reset the health indicator manually.

HP OMi provides command-line tools that enable authorized users to close, archive, or delete a large number of events in batches even when the HP OMi is not running. The `opr-close-events` command is an administrative tool that sets the life-cycle state of the *active* events that meet the specified criteria (date, time stamp, severity, and so on) to "closed" and is designed to help maintain the HP OMi database and prevent the problem of performance issues caused by an excessively large number of events in the event browser.

To help maintain database consistency, you can instruct the `opr-close-events` command to reset health indicators where appropriate. Resetting the health indicator in this way prevents the problem of HP OMi continuing to recognize the "old" health status of an event (for example, for health-severity calculation) after the event has been closed.

For more information about how to use command-line tools and which options are available, run the command-line tool in a command shell with either the `-h` or the `--help` option.

Health-Indicator Values

HP OMi uses health-indicator *values* to represent the different states associated with a configuration item such as: "starting", "running", or "stopped". A health-indicator must have at least two values but can have many more if required. For example, a health indicator for a hardware resource can use multiple values to show if a hardware resource is "available" or "unavailable", "responding" or "not responding". A different health indicator can use multiple values to indicate if a software resource is "offline" or "running" and performing to its maximum potential.

Health indicator values show a configuration item's availability status such as "available", "unavailable", "starting" or "stopped". Health indicator values can also show how the performance of a software application changes according to whether the load is "normal", "high", or even "exceeded".

Figure 57 Add Indicator Values

The screenshot shows a dialog box titled "Higher Than Normal - Edit Indicator Value". It contains the following fields and values:

- ID: 385323fc-d5d6-4d32-b0b3-6ccb3fc90b94
- Display Name: * Higher Than Normal
- Name: * HigherThanNormal
- ETI Resolution Hint: VirtualizationOverhead:HigherThanNormal
- Default: (use this value for initial state and reset)
- Health Severity: MAJOR
- Icon: <default>

At the bottom left, there is a note: "(*) Required field". At the bottom right, there are three buttons: OK, Cancel, and Help.

Users with access to the appropriate tools can configure rules that map the attributes of an event to individual health-indicator values. The mapping rules enable HP OMi to set health-indicator values automatically using event attributes or the custom attributes of messages received from HP Operations Manager. Note that you can use the value displayed in the ETI Resolution Hint field to set a custom attribute manually in the original HP OMi message-source policy.

For example, a mapping rule could ensure that the attribute of a critical event concerning the unavailability of a database server automatically sets the health-indicator value “stopped” for the health indicator “database”. If the health indicator is assigned to the Operations Availability KPI, HP OMi sets the health-based severity status of the Operations Availability KPI to “critical” for the corresponding (database) configuration item.



Where multiple values exist for a health indicator, the first value defined is the default unless otherwise specified during creation or modification of the health indicator. HP OMi requires the default value when resetting (clearing) a health indicator either manually or automatically, and the default value must be “Normal (OK)”.

Health indicators provide the data that key performance indicators (KPI) need 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, warning, or normal. For example, a KPI for a database could include multiple health indicators concerning the run state (up, down), the cache-hit ratio (0, 50, 100%), the length of query queues (empty, full), and response times (#ms) to determine overall health. For more information about health-indicator values in calculation rules, see [KPI Calculation Rules](#) on page 146.

To enable user to clear a health indicator, that is: reset the health indicator to its default status, a default health-indicator value must exist for the health indicator that the user wants to reset. HP OMi sets the first value defined for a health indicator as the default. However, you can change this setting at any time.

Assignment to Configuration-Item Types

Health indicators exist in the context of a configuration-item type and represent the potentially problematic areas of the configuration-item type to which they are assigned. For example, a “Computer” CI has health indicators for CPU load and utilization, memory and swap usage, virtualization overheads, and so on. The UCMDB model definition for configuration-item types includes information, if available, about the specific

health-indicators assignments. What this means is that you have to assign health indicators to a specific type of configuration item if you want the configuration-item *instances* to be able to take advantage of the benefits of health-based monitoring provided by HP OMi. For more information about managing health indicators with the Indicator Manager, see [Indicator Management](#) on page 140.

Health-indicator assignments are passed down the configuration-item-type hierarchy from parent to child. Health indicators assigned to one configuration item are assigned, by inheritance, to the configuration item's children, too. The idea behind this feature is that the assignment of one health indicator to a single, high-level configuration-item type such as "database" ensures that standard database-related health indicators "run state", "cache hit ratio", and "response time" are assigned to *all* database configuration-item types (Oracle, DB2, and so on) and, as a result, any instances of the database types, too.

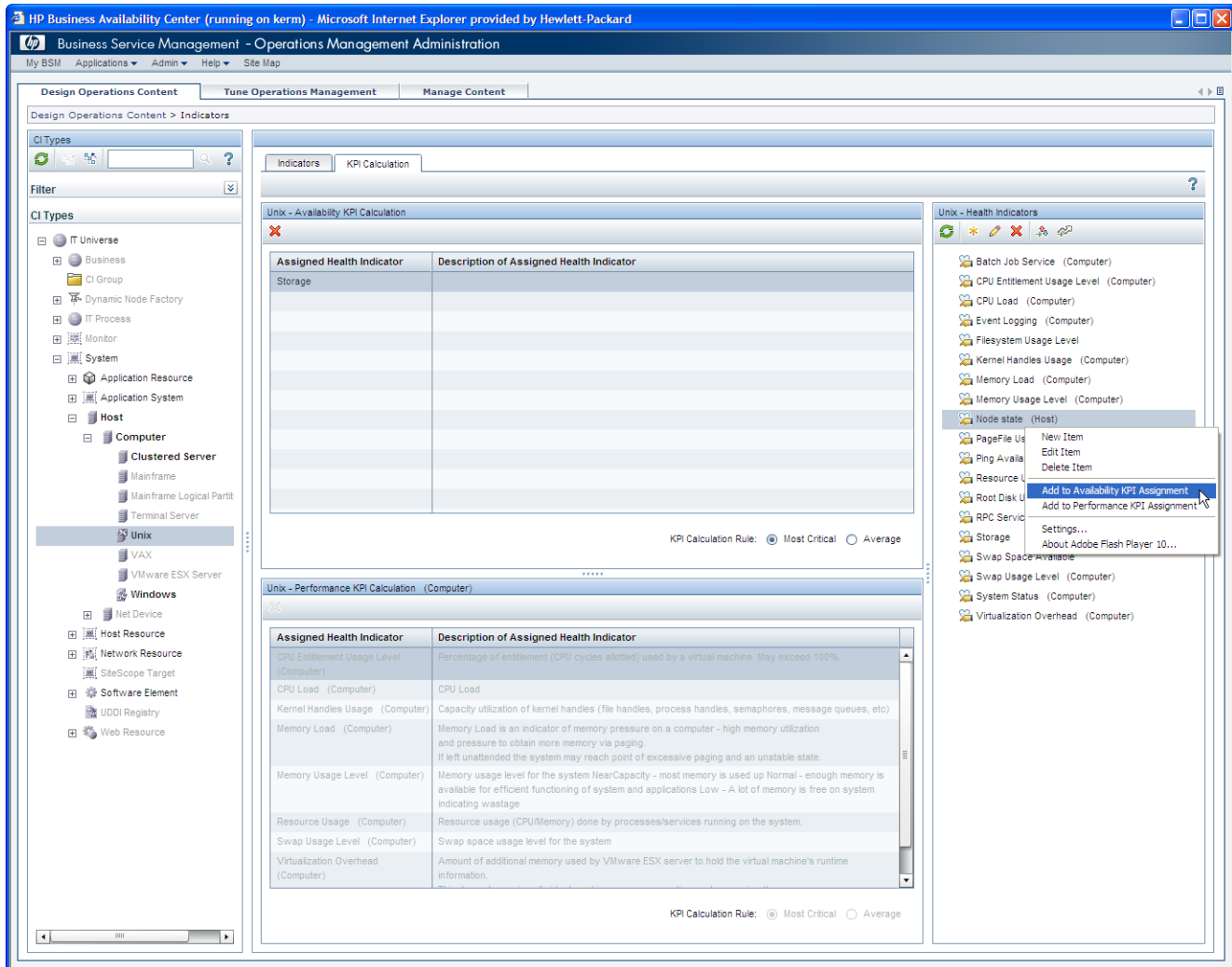
One obvious advantage of the inheritance feature is that it allows domain experts to choose the level in the CI-type hierarchy at which to assign a health indicator and, as a result, target more precisely the CI types that are associated with a specific health indicator. Assigning a health indicator to a CI type at the top of the hierarchy ensures that one assignment covers a wide range of CI types. Assigning a health indicator to a CI type at the bottom of the hierarchy enables domain experts to target individual CI types more precisely with a specific, customized health indicator.

Assignment to Key Performance Indicators

Health indicators (HI) provide the data that key performance indicators (KPI) need to calculate the availability and performance of monitored resources represented by configuration-item types. HP OMi assigns health indicators to configuration-item types (CIT) by default. HP OMi does not, however, assign health indicators to health-based KPIs, by default. HP OMi users must assign individual HIs to health-based availability and performance KPIs manually. KPIs use the information provided by assigned health indicators to help calculate and set the health status of the configuration items to which the KPIs are assigned.

[Figure 58](#) on page 137 shows how to use the Indicator Manager to assign the health indicator "Node state" to the HP OMi availability KPI for the configuration-item type "Unix". HP OMi's default inheritance rules mean that the Unix configuration-item *type* passes on the new health-indicator assignment to all existing (and any new) instances of the Unix configuration-item type (or subtype). If the appropriate event occurs, HP OMi sets the configured health indicator to the specified value for the affected CI.

Figure 58 Assign Health Indicators to Key Performance Indicators



Indicator Mapping Rules

Messages from HP OMi-ready Smart Plug-ins (SPI) contain pre-defined custom attributes (CA) that HP OMi recognizes and can use to set values automatically for health indicators and event-type indicators. HP OMi uses health indicators in the calculation of health-related severity status. For those events reported by a Smart Plug-in that is *not* HP OMi-ready, domain experts can define their own, custom mapping rules for health indicators and event-type indicators. Indicator mapping rules are intended to help in the following situations:

- Domain experts want HP OMi to monitor events that are not (at least by default) integrated in either HP OMi or forwarded from HP Operations Manager.
- Domain experts want to integrate events from a custom Smart Plug-in or a Smart Plug-in that is not HP OMi-ready.

Users with access to the appropriate tools can configure rules that map the attributes of an event to individual health-indicator values. The mapping rules enable HP OMi to set indicator values automatically using event attributes or the custom attributes of messages received from HP Operations Manager. Note that when you are creating an indicator value,

HP OMi supplies a so-called “ETI Resolution Hint” which you can use to set a custom attribute manually in the original HP OMi message-source policy. The resolution hint takes the form of the indicator name and the indicator value separated by a colon, for example, `BatchJobs:JobFailed`.

The mapping of indicator values to event attributes occurs either during the installation and setup of an HP OMi content pack or as a result of an indicator mapping rule. Domain experts define indicator mapping rules either for a particular event or in an HP Operations Manager message-source policy.



One event cannot set multiple values for an event indicator. Each event can set only one value for a health or event-type indicator. However, domain experts can configure multiple message policies to report on different aspects of the same event and use the different messages to set different health (and event) indicators.

Domain experts can define mapping rules that search filtered events for strings and values which HP OMi then uses to set an indicator value. Alternatively, the rules can use the custom attributes of messages from sources such as HP Operations Manager to set (and change) indicator values automatically. If the mapped event sets a health indicator, the corresponding values for the health indicator are set at the same time, too.

Figure 59 List Available Indicator Mapping Rules

The screenshot shows a dialog box titled "Memory Usage Level - Edit Indicator" with three tabs: "General", "Values", and "Mapping". The "Mapping" tab is active. At the top, there is an information icon and a text box stating: "You can set the event type indicator in events either using custom message attribute (CMA) 'EventTypeIndicator' defined in the original OM message policy or setting up mapping rules. By default, the mapping rules is ignored if the event contains an 'ETI Resolution Hint'. They are ordered on CI type level." Below this is a section titled "Mapping Rules" with icons for adding, deleting, and editing rules. The main part of the dialog is a table with the following data:

Display Name	Event Filter	Map to Indicator Value	Active
SIS_map_MemMon_normal	SIS_fit_MemMon_normal	Normal	true
SIS_map_MemMon_error	SIS_fit_MemMon_error	Near Capacity	true
MemoryUsage	MemoryUsage_for_Windows	[Based on severity]	true
MemoryUtilization	MemoryUtilization_for_Windows	[Based on severity]	true
UNIX OS SPI Memory Usage alert	MemoryUtilization_For_Unix	Near Capacity	true
Win OS SPI Memory Usage Normal	WinosspiMemoryUsageNormal	Normal	true
HP SiteScope Memory Monitor Alert	SIS_Host_MemMon	Near Capacity	true
Win OS SPI Memory Usage Alert	Win_OS_SPI_Memory_Usage	Near Capacity	true
UNIX OS SPI Memory Usage Normal	Unix_OS_SPI_Memory_Usage_Normal_Alert	Normal	true
HP SiteScope Memory Monitor Normal Alert	Sis_Host_MemMon_Normal	Normal	true

At the bottom of the dialog are "OK", "Cancel", and "Help" buttons.

Figure 59 on page 138 lists the mapping rules configured for an indicator named “Memory Usage Level” and shows how some mapping rules set an indicator value based on the severity of a particular event attribute (based on severity) while other mapping rules set a *particular* indicator value, for example: Normal or Near Capacity, as specified by the user configuring the rule. If a mapping rule uses the based-on-severity option, HP OMi attempts to find a best match between the severity of the event specified in the mapping-rule filter and the values

that exist for the particular indicator. If a mapping rule specifies a *particular* indicator value such as “Near Capacity”, HP OMi sets the indicator value to the specified value (Near Capacity) whenever the combination of event and event attribute defined in the mapping-rule filter occurs—regardless of the severity status associated with the original event or event attribute.

The Indicator Manager enables you to define filters that target more precisely the events to be considered in a mapping rule. The filter can use any of the available event attributes. For example, you can define a mapping rule that considers only those messages that have a critical or major severity status and are assigned to a particular user or user group. You can create and test new filters while defining the mapping rule, or modify existing filters, too.



A mapping-rule filter is for use exclusively with the mapping rule it belongs to. The mapping-rule filter cannot be used in any other context and is not visible in the list of filters displayed in the Filter Manager.

Since it is essential that mapping rules work consistently by always focussing on particular events, HP OMi does not permit users to modify an event filter outside the context of the mapping rule for which it was defined. This feature helps prevent unauthorized and unexpected changes in the behavior of an event-based mapping rule.

If multiple mapping rules attempt to define different values for the same event indicator, you can choose whether to permit rules to overwrite existing values or leave them unchanged. For example, if a message generated by an HP Operations Manager Smart Plug-in uses custom attributes (CA) to set an event-type indicator value automatically, you can specify that a rule overrides the automatic setting and sets the indicator value to a different state.

Mapping rules for event indicators follow a specified order. If one mapping rule matches, the mapping process stops and ignores all subsequent rules further down the specified order. Mapping rules are passed down the hierarchy of configuration-item types. A configuration-item type inherits indicator mapping rules from its parent and passes them on to its own children. To see which configuration-item types the mapping rules are assigned to, use the CI Type column in the Indicator Mapping Rules pane. To see which indicator values are specified in the mapping rule for a particular configuration-item type, you can expand the name of the configuration-item type in the CI Type column.

Figure 60 on page 140 shows how mapping rules exist in the context of a specific type of configuration item, for example: computer, host, or router. The mapping rules defined for a specific configuration-item type can use only the health-based information defined in the event-type indicators assigned to the specified configuration-item type. Since mapping rules for indicators are passed by inheritance down the CI hierarchy from parent to child, a mapping rule defined for the “Host” configuration-item type is passed on to all configuration items of type “Host”, for example: Unix, VAX, Mainframe, Windows, and so on, as well as any instances of the configuration-item type Host that HP OMi is monitoring.

Figure 60 Inherited Indicator-Mapping Rules

CI Type	Order	Display Name	Filter	Indicator	Map to Indicator Value	Active
VAX						
Computer						
	1	Win OS SPI CPU Bottleneck Normal	Winosspi_CpuBottleneckNormal	CPU Load	Normal	true
	2	UNIX OS SPI CPU Bottleneck Alert	CPUUtilization_for_Unix	CPU Load	Bottlenecked	true
	3	Win OS SPI Memory Load Normal	WinosspiMemoryUtilNormal	Memory Load	Normal	true
	4	UNIX OS SPI CPU Bottleneck Normal	CPUUtilizationNormal_forUnix	CPU Load	Normal	true
	5	UNIX OS SPI Memory Usage alert	MemoryUtilization_For_Unix	Memory Usage Level	NearCapacity	true
	6	Win OS SPI Memory Usage Normal	WinosspiMemoryUsagNormal	Memory Usage Level	Normal	true
	7	Win OS SPI Event Log Alert	WinOSSPEventLog	Event Logging	Unavailable	true
	8	Win OS SPI Event Log Normal	WinOSSPEventLogNormal	Event Logging	Available	true
	9	Win OS SPI Memory Load Alert	MemoryUtilization_for_Windows	Memory Load	Paging	true
	10	SIS_HostPing_HI	SIS_Host_PingAV	Ping Availability	Unavailable	true
	11	SiteScope Memory Monitor Alert	Sis_Host_MemMon	Memory Usage Level	NearCapacity	true
	12	SiteScope alert for Host CPU utilization level	Sis_Host_CPUUtil	CPU Load	Busy	true
	13	Win OS SPI Memory Usage Alert	Win_OS_SPI_Memory_Usage	Memory Usage Level	NearCapacity	true
	14	Win OS SPI CPU Bottleneck Alert	WinOSSPICPUBottleneckAlert	CPU Load	Bottlenecked	true
	15	UNIX OS SPI Memory Usage Normal	Unix_OS_SPI_Memory_Usage_Normal_Alert	Memory Usage Level	Normal	true
	16	SiteScope Memory Monitor Normal Alert	Sis_Host_MemMon_Normal	Memory Usage Level	Normal	true
	17	UNIX OS SPI Root Disk Usage Level Alert	Root_disk_Usage_level	Root Disk Usage level	High	true

Figure 60 on page 140 shows how indicator mapping rules defined for the configuration-item type “Host” are passed on by inheritance to the configuration-item type VAX. Domain experts can control which configuration items inherit defined mapping rules by choosing the level in the configuration-item hierarchy at which to define them. The higher in the CI hierarchy the mapping rule is inserted, the greater the number of configuration items that inherit it.

Indicator Management

The Indicator Manager is a tool that HP OMi provides for administrators and domain experts who want to configure how HP OMi uses health indicators, event-type indicators, and key performance indicators to monitor the events that affect the health and status of resources in the operational environment. Figure 61 on page 142 shows the Indicator Manager, which enables you to perform the following health-related management tasks:

- Create, modify, or delete a *health* indicator (HI), or any of its values. Note that creating a health indicator also creates an associated event-type indicator. However, when deleting a health indicator, you can choose to leave the associated event-type indicator in place and untouched.
- Create, modify, or delete an *event-type* indicator (ETI), or any of its values.
- Create a health indicator from an existing event-type indicator.

Note that a health indicator requires at least two associated values, for example: “up” (normal) and “down” (critical). An event-type indicator can have one or more associated values.

- Define mapping rules that use event attributes to set (or modify) indicator values.

- Assign health indicators to (or unassign them from) key performance indicators. Health indicators contribute to the calculation of the severity status of health-based key performance indicators.
- Apply rules that HP OMi uses to calculate the severity of a key performance indicator.

Health indicators and event-type indicators enable you to approach the challenge of monitoring the operational environment from two different but complimentary perspectives. However, if you choose to adopt one approach, HP OMi does not confine you to that perspective in the event that your operations-management plans change or modifications to the monitored environment require a management rethink.

For example, if you decide that you want to observe events from the perspective of categories and types, you can create the appropriate event-type indicator. If you later realize that you need to add health-related information to the equation so that you can use the data to contribute to the calculation of performance and availability KPIs, the Indicator Manager enables you to create health indicators from an existing event-type indicators. If, on the other hand, it is clear from the outset that both event-based and health-based data are important, you can use the Indicator Manager to create a health indicator and a corresponding event-type indicator at the same time.

HP OMi user roles can help restrict access to the Indicator Manager to those users who really need it and have the knowledge to use it effectively, for example, administrators and domain experts with expertise in a particular field. HP OMi enables you to further restrict access to the Indicator Manager by implementing more general password-authenticated login procedures. For more information about user authorization, see [User Authentication](#) on page 41. For more information about the health-management tools that HP OMi provides, see [Health Management Tools](#) on page 161.

Figure 61 List Indicators in the Indicator Manager

The screenshot shows the HP Business Availability Center interface. The main content area is titled 'Computer - Indicators' and lists various indicators such as Batch Job Service, Batch Jobs, CPU Entitlement Usage Level, CPU Load (selected), Event Logging, Kernel Handles Usage, Memory Load, Memory Usage Level, Node state (Host), PageFile Usage, Ping Availability, Resource Usage, Root Disk Usage level, RPC Service, Swap Usage Level, System Status, and Virtualization Overhead.

The 'Details' pane for 'CPU Load' shows the following information:

- General:**
 - Display Name: CPU Load
 - Name: CPU Load
 - Type: Health Indicator with associated Event Type Indicator
 - Description: CPU Load
- Values:**

Icon	Display Name	Severity
✓	Normal [Default]	NORMAL
⚠	Constrained	WARNING
⚠	Busy	MINOR
⚠	Overloaded	MAJOR
✗	Bottlenecked	CRITICAL
- Mapping Rules:**

Display Name	Filter	Map to Indicator Value	Active
Win OS SPI CPU Bottleneck Normal	Winosp_CpuBottleneckNormal	✓ Normal [Default]	true
UNIX OS SPI CPU Bottleneck Alert	CPUUtilization_for_Unix	✗ Bottlenecked	true
UNIX OS SPI CPU Bottleneck Normal	CPUUtilizationNormal_forUnix	✓ Normal [Default]	true
SiteScope alert for Host CPU utilization level	SIS_Host_CPUUtil	⚠ Busy	true
Win OS SPI CPU Bottleneck Alert	Win OSSPI CPU Bottleneck Alert	✗ Bottlenecked	true
SiteScope alert for Host CPU Utilization level normal	SIS_CPUUtilNormal	✓ Normal [Default]	true
CPUUtilization	CPUUtilization_for_Unix	[Based on severity]	true
CPUUsage	CPUUtilization_for_Unix	[Based on severity]	true
CPUBottleneck	CPUUtilization_for_Unix	[Based on severity]	true

HI-based Key Performance Indicators

KPIs use calculation rules to determine the availability and performance of the configuration item to which they are assigned. The calculation rules use the data provided by any health indicators assigned to the KPI. The value that results from the calculation is used to set a health-based severity status for the KPI, for example: normal, minor, major, or critical.

Different KPI calculation rules determine how HP OMi sets the health-based severity status of a KPI, for example: "Most critical" or "Average". For more information about what KPI calculation rules are available and how the rules work, see [KPI Calculation Rules](#) on page 146.



A KPI *calculation* rule determines how HP OMi uses the data from health indicators assigned to a KPI to set the KPI's severity status: a KPI *business* rule determines how the resulting status is propagated up the dependency chain.

The business rule that HP OMi uses to propagate severity status among KPIs is determined by the type of KPI assigned to the monitored configuration item. Users with access to the HP OMi platform-administration settings can change the default business rule assigned to a KPI at any time. For more information about business rules and how HP OMi uses them to determine status-propagation behavior for the affected configuration items, see [KPI Business Rules](#) on page 148.

HP OMi displays key performance indicators (KPI) in top views (such as the Health Perspective page or the Dashboard) as a series of small box icons attached to a configuration item. Each KPI has a distinct color that reflects the current severity. The KPIs appear under the monitored object to which they belong.

HP OMi introduces new key performance indicators which monitor the health-based severity of the events that occur in the monitored environment. HP OMi divides the new KPIs into the following categories:

- Health-based KPIs:
 - Operations Availability
 - Operations Performance
- Event-based KPIs:
 - Unresolved events
 - Unassigned events

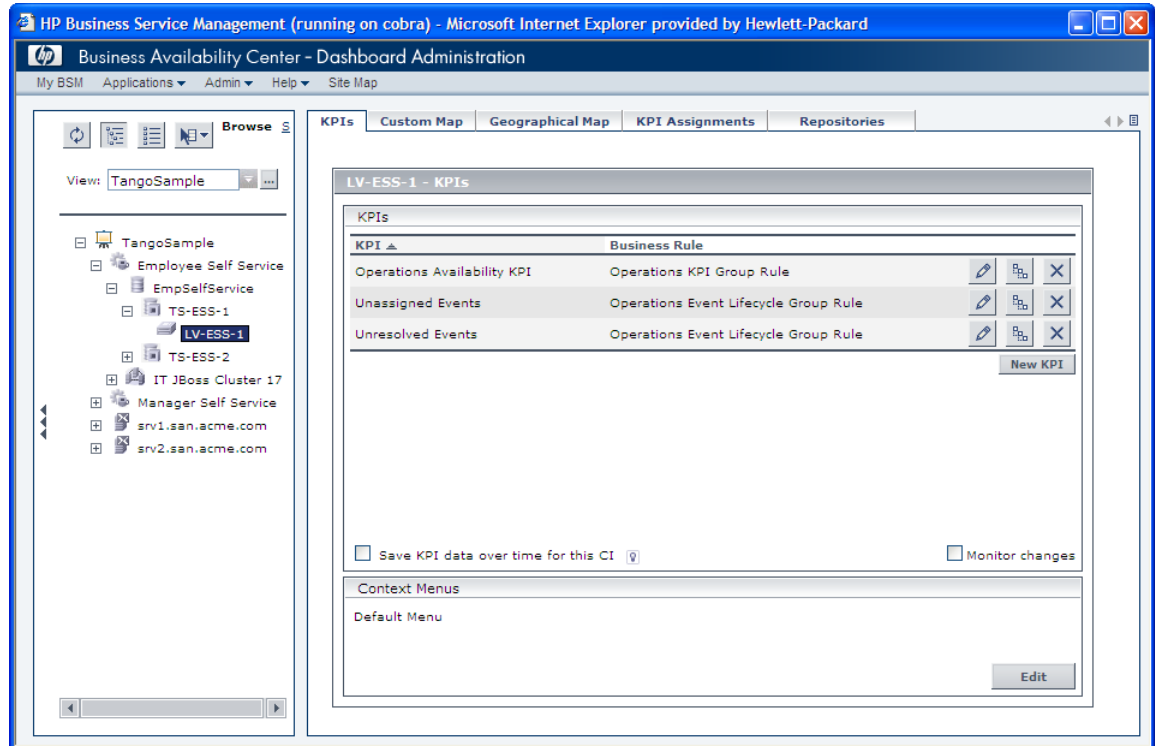
For more information about health-based KPIs, see [Health-based KPIs](#) on page 144. For more information about event-based KPIs, see [Event-based KPIs](#) on page 145.



You cannot assign health indicators to KPIs for unassigned-events and unresolved-events.

HP OMi stores the key performance indicators it uses in the Dashboard KPI repository along with other KPIs. To modify the default settings for a KPI, use the tools provided in the Dashboard as illustrated in [Figure 62](#) on page 144. Configuration tools are not always available to all users and might require special authorization to access.

Figure 62 Assign HP OMi KPIs to Configuration Items



Health-based KPIs

HP OMi provides health-based KPIs for "Operations Availability" and "Operations Performance". The Operations Availability and Operations Performance KPIs use data supplied by availability- and performance-based health indicators assigned to the KPIs. Performance-related data from health indicators could include values for the hit ratio in the database cache, server-connection speeds, queue lengths, or database query-processing times. Availability-related data might include server run states (up, down, starting, stopping) or process activity (refusing, accepting connections, not responding, and so on).

Figure 63 Health-based KPI Perspective

Operations Performance KPI	
CI Name:	srv1.san.acme.com
Status:	Info
Calculation Rule:	Operations KPI Group Rule
Held status since:	10/8/08 10:59:56 AM
Operations Availability KPI	
CI Name:	srv1.san.acme.com
Status:	OK
Calculation Rule:	Operations KPI Group Rule
Held status since:	10/8/08 11:06:03 AM

HP OMi does not take into account the severity status of the event itself when calculating the severity status of *health*-based key performance indicators. The severity of health-based KPIs is calculated by using the status of the health indicators assigned to the KPI.

More specifically, HP OMi calculates the severity of *health*-based key performance indicators according to the value of the health indicators that the incoming event sets. Consequently, HP OMi only sets a severity status for both the operations-availability and the operations-performance KPIs if the reported event sets a health indicator that is assigned to the KPI and, in addition, has an impact on the CI to which the KPI is assigned.



The severity status of a health-based KPI does not depend on the life-cycle status of the associated event. If the life-cycle status of an event changes, it does not necessarily affect the status of the *health*-based KPI.

For more information about how HP OMi calculates the severity status of a health-based KPI, see [Health-based KPI Calculation](#) on page 146. HP OMi's health-based KPIs have their own special business rules which determine the propagation of severity status. For more information, see [Health-based KPI Propagation](#) on page 149.

Event-based KPIs

HP OMi assigns *event*-based KPI to configuration items by default. The event-based KPIs represent the status of events that are either unassigned or unresolved. *Unassigned* events concern problems that have not yet been assigned to (or addressed by) a user. *Unresolved* events concern problems that might or might not be under investigation but, in any case, are not yet solved.

HP OMi restricts the events that can contribute to the calculation of an event-based KPI's severity status according to the contributing event's life-cycle state (open, closed). When HP OMi calculates the severity status of an event-based KPI, it considers all events except those whose life-cycle state is either "resolved" or "closed".

One obvious consequence of this behavior is that a change in an event's life cycle state can have an impact on the severity status of an event-based KPI. If the life-cycle state of an event changes from a state that *is* considered during event-based KPI calculation (open) to one that is *not* (resolved), the change in life-cycle state can trigger a change in the severity status of an event-based KPI. For example, if a domain operator fixes a critical event that contributes to the severity status of an event-based KPI and the life-cycle state of the critical event changes to "resolved", the critical event is no longer considered in the calculation of the event-based KPI's severity status, which can trigger a change in severity status, too.

Figure 64 Event-based KPI Perspective



If a KPI for either an unassigned event or an event that is not resolved references data from more than one related event, the status (and color) of the KPI reflects the severity of the most critical related event. For example, if a KPI for an unassigned event refers to one critical and four normal events, HP OMi changes the color of the KPI for the unassigned event to red so

that the new color reflects the one, critical event. The value displayed reflects the number of events with the indicated severity that have occurred and have an impact on the selected configuration item.

HP OMi applies strict rules to the calculation and propagation of the severity status of event-based KPIs. For more information about the rules used to calculate the severity status of an event-based KPI, see [Event-based KPI Calculation](#) on page 147. For more information about the rules used to propagate the severity status of an event-based KPI, see [Event-based KPI Propagation](#) on page 149.

KPI Calculation Rules

When HP OMi receives notification of a new event, it uses pre-defined rules to calculate the severity status of the KPIs assigned to the configuration item impacted by the reported event. The rules consider the severity status of the various health indicators assigned to the KPI in the following ways:

- **Most Critical:**
Set the severity status of the health-based KPI to the severity of the most critical health indicator assigned to the KPI.
- **Average:**
Set the severity status of the health-based KPI to the average severity of all the health indicators assigned to the KPI.

The way in which HP OMi calculates the severity status of a KPI depends on whether the type of KPI is health based or event based. For more information about KPI calculation methods, see [Health-based KPI Calculation](#) on page 146 and [Event-based KPI Calculation](#) on page 147.

Health-based KPI Calculation

HP OMi uses KPIs to set the health-based severity status of the configuration item (or items) impacted by an event. The calculation process that HP OMi uses to calculate and set the severity status of a health-based KPI involves a number of steps.

First of all, HP OMi uses CI-resolution algorithms to determine which configuration item is impacted by the reported event. If a configuration item is impacted by the reported event, HP OMi starts the process of gathering all the information it needs to calculate the severity status of the health-based KPI that is assigned to the affected configuration item. For more information about CI resolution, see [CI Resolution](#) on page 50.

HP OMi uses information defined in the configuration-item type itself to determine which KPI calculation rule to use to calculate the health-based severity of any instances of the configuration item. If the information is not set in the CI type, HP OMi consults the nearest parent CI-type in the CI-type hierarchy.

The next stage in the KPI calculation process involves determining the status of any health indicators assigned to the KPI that is associated with the configuration-item type impacted by the currently selected event. HP OMi has to determine the current value of all health-indicators assigned to the configuration item for which it wants to set a health-based KPI.

HP OMi has a number of different ways to calculate the severity of a health-based KPI. For example, HP OMi currently enables you to choose between the calculation rules “Most Critical” or “Average”. For more information about KPI calculation rules, see [KPI Calculation Rules](#) on page 146.

After completing the KPI calculation process, HP OMi sends out notification and, if necessary, changes the color of the corresponding icons for the impacted configuration items in the Top View and Dashboard.

Figure 65 on page 147 shows the calculation settings for HP OMi's health-based performance KPI for the CI type Computer and indicates which calculation rule is applied and which health indicators are considered during the calculation process.

Figure 65 Set the KPI Calculation Rule

Assigned Health Indicator	Description of Assigned Health Indicator
CPU Entitlement Usage Level	Percentage of entitlement (CPU cycles allotted) used by a virtual machine. May exceed 100%.
CPU Load	CPU Load
Kernel Handles Usage	Capacity utilization of kernel handles (file handles, process handles, semaphores, message queues, etc)
Memory Load	Memory Load is an indicator of 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.
Memory Usage Level	Memory usage level for the system NearCapacity - most memory is used up Normal - enough memory is available for efficient functioning of system and applications Low - A lot of memory is free on system indicating wastage
Resource Usage	Resource usage (CPU/Memory) done by processes/services running on the system.
Swap Usage Level	Swap space usage level for the system
Virtualization Overhead	Amount of additional memory used by VMware ESX server to hold the virtual machine's runtime information. This depends on size of virtual machine memory, operating system running thereon. This value is usually constant and does not vary highly.

KPI Calculation Rule: Most Critical Average

For more information about health-based key performance indicators, see [Health-based KPIs](#) on page 144.

Event-based KPI Calculation

The following rules apply to the calculation of the severity status of HP OMi's event-based KPIs:

- Unresolved KPI:**

Consider the severity status of all related events except those whose current life-cycle state is either "Resolved" or "Closed". Set the severity of the KPI to the highest (most critical) severity of all considered events.
- Unassigned KPI:**

Consider the severity status of all related events except those whose current life-cycle state is either "Resolved" or "Closed" and, in addition, do not belong to a Workgroup or have an owner. Set the severity of the KPI to the highest (most critical) severity of all considered events.

For more information about event-based key performance indicators, see [Event-based KPIs](#) on page 145.

KPI Business Rules

KPI business rules determine how HP OMi uses health-related data to calculate and set the severity status of a KPI. Business rules also determine if, how, and when to propagate the status of one or more related “child” objects in order to set (or change) the status of dependent “parent” objects. HP OMi uses the following types of KPI business rules:

- Monitor Rules:

Monitor rules use live data from monitor configuration items, that is: using sample data from real sources reported by monitors running on the monitored objects.

- Group Rules:

Group rules aggregate the current status of any child KPIs and use the aggregated value to set the status of the parent KPI. The KPI status determines the status of the configuration item to which it is assigned. Note that a group rule considers only the status of its *immediate* KPI children; the group rule does not consider the status of any KPIs further down the hierarchy, for example: *grand* children or *great grand* children.

Table 13 Business Severity-Propagation Rules

Rule Name	Type	Description
Operations Event Lifecycle Group Rule	Group	Calculates the severity status of HP OMi’s event-based KPI using the severity of the KPI on the monitor CI that is related to the CI affected by the unresolved event. Note that this rule does not take into account the severity status of child CIs.
Operations Event Lifecycle Unassigned Event Rule	Monitor	Calculates the severity status of HP OMi’s event-based KPI using sample data from any related events that are not yet assigned to any user or user group for investigation and resolution.
Operations Event Lifecycle Unresolved Event Rule	Monitor	Calculates the severity status of HP OMi’s event-based KPI using sample data from any related events that are not yet resolved, that is: events with the life-cycle state “open” or “in progress”.
Operations KPI Group Rule	Group	Calculates the severity status of HP OMi’s health-based KPIs using data from its own monitor, if available, and if not, the worst-child principle. Of all the dependent objects in the group, the “worst child” is the one object with the highest severity status, for example, “critical”.
Operations KPI Rule	Monitor	Calculates the severity status of HP OMi’s health-based KPIs using sample data from local monitors.

The default business rule that HP OMi uses to propagate severity status between KPIs is determined by the *type* of KPI assigned to the monitored configuration item, that is: whether the KPI is *health* based or *event* based. You can change the default business rule assigned to a KPI at any time either for individual configuration items or for all configuration items to which the standard HP OMi KPIs are not yet assigned.



Changing the default business rule assigned to a KPI does not affect those configuration items to which the modified KPI is already assigned. These configuration items retain the original business-rule assignment.

If you feel that the business rule assigned to a KPI by default does not meet the requirements of your operational environment, you can change the business-rule assignment at any time. To change the default business rule assigned to a health based KPI, you need access to administrator tools in the Dashboard, as illustrated in [Figure 62](#) on page 144.

Health-based KPI Propagation

HP OMi's health-based KPIs have their own, dedicated, business rules, which determine how health-based KPIs propagate severity status. HP OMi considers the severity status reported by local health indicators assigned directly to a configuration item as more important in the calculation of health-based KPI severity than the combined severity status of health-based KPIs assigned to any child configuration items.

HP OMi propagates the severity status of a health-based KPI as follows:

- If a specified configuration item has a KPI severity that is based on a value calculated from data supplied by health indicators assigned directly to the configuration item itself, HP OMi uses this value to set the severity status of the selected health-based KPI. This is the KPI status that HP OMi propagates.
- Otherwise, HP OMi considers the severity of the KPIs associated with all the children of the specified configuration item and uses the most critical severity to set the severity status of the health-based KPI for the specified CI. This is the KPI status that HP OMi propagates.

Event-based KPI Propagation

Although a business rule exists for HP OMi's event-based KPIs, the rule does not propagate the severity status of event-based key performance indicators.

Event Attributes in Health-Based Monitoring

Event attributes are a collection of data that describe an event in detail and include amongst other things: the event source, the event type, the date and time the event occurred, the severity status, and so on. Taken together, the collated data uniquely identifies the event. Individually, event attributes provide a vital source of information wherever and whenever rules or filters are used to reduce and refine the data available to help solve an event's underlying problem. Event attributes, rules, and filters are of particular importance in the context of health-based monitoring. However, you can also use event attributes when configuring custom tools, for example, as a parameter in the command that the tool calls.

HP Operations Manager uses policies to monitor and report events. If a particular event occurs, the policy generates a message. Messages from HP OMi-ready SPIs can contain pre-defined custom attributes (CA) that HP OMi uses to set health indicators automatically. If the health indicator is assigned to a health-based KPI for a particular configuration item, the reported event contributes automatically to the calculation of the severity status for the impacted configuration item.

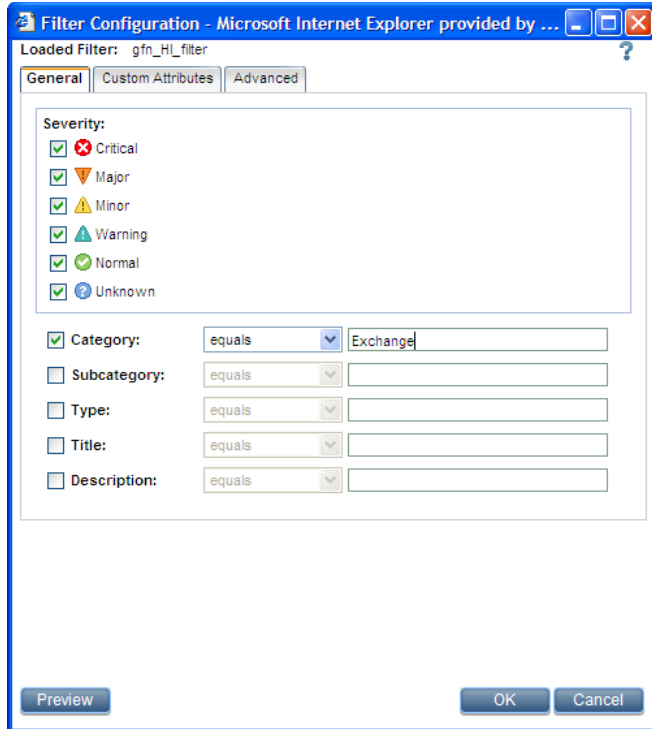
For those events reported by *non* HP OMi-ready SPIs, domain experts can select the most useful attributes and use them to set and update health indicators values each time a particular type of event occurs. HP OMi maps message (or event) attributes to health-indicator values in the following ways:

- An HP OMi administrator installs an HP OMi content pack which contains pre-defined mapping rules.
- A domain expert defines a custom mapping rule for a particular type of event.
- A domain expert uses a custom attribute (CA) in an HP Operations Manager message policy to set a health indicator.

Users with access to the appropriate tools can configure rules that map the attributes of an event to individual health-indicator values. The mapping rules enable HP OMi to set health-indicator values automatically using event attributes or the custom attributes of messages received from HP Operations Manager. Note that HP OMi provides a so-called ETI resolution hint which domain experts can use to set a custom attribute manually in the original HP OMi message-source policy. For more information about using event attributes to configure health-indicator mapping rules, see [Indicator Mapping Rules](#) on page 137.

Event filters can use all (or any combination of) the attributes of an event to refine and reduce the number of events that a mapping rule considers. Filters reduce operational overhead by targeting the events that contain the most useful information. Note that the attributes available for selection and use in an event filter depend on the context in which the event filter is to be used, for example: the Indicator Manager, automatic event assignment, the Event Browser, or the History Browser. HP OMi displays for selection and use in a filter only those event attributes that make sense in the chosen context. [Figure 66](#) on page 151 shows the Edit Filter dialog when launched in the context of the Indicator Manager, which is the tool HP OMi provides to create and assign indicators to configuration-item types and key performance indicators. For more information about event filters in the context of event management, see [Event Filters](#) on page 69; for more information about event filters in the context of automatic event assignment, see [The Event-Assignment Manager](#) on page 75.

Figure 66 Event Filters in Indicator Management



Event attributes have a role to play in a wider context, too, for example: when mapping Top Views to configuration-item types, or as variables in custom tools. For more information about event attributes outside the context of health-based monitoring, see [Event Attributes](#) on page 93.

Performance Graphs

If the appropriate performance-related data sources are available on the systems HP Operations Manager is monitoring, you can use the HP OMi graphing tool to generate performance graphs. The graphs use data collected by HP Performance agents running on systems that host instances of the monitored configuration-item types. Performance graphs, charts, and tables provide a health-related overview of individual configuration items that includes data showing the performance history, current configuration, and general trends.

The information in this section is intended to help HP OMi administrators and domain experts to manage the high-level aspects of graphing. The information includes details of how to assign a graph family (or category) to a configuration-item type, configure categories of graphs and graph families, and display the generated graphs.



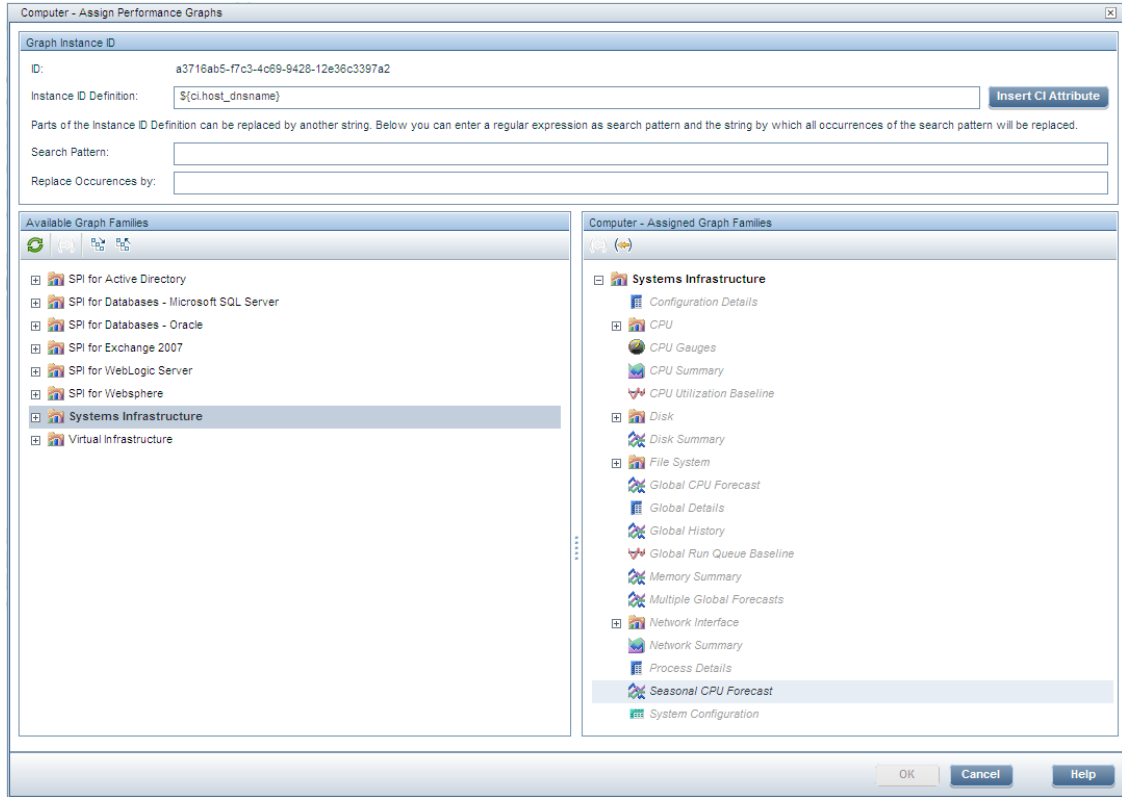
The graphing manager is a high-level interface that enables you to make associations between types of configuration items in the UCMDB and graph families and graph categories. To configure the graphs, graph categories, or graphs families themselves, use the graph designer.

To configure graph-related details such as which metrics to source, you must use the graphing component, which is available from within the graphing manager. For more information about the graphing component and how to use it to design and display performance-related graphs, see the HP OMi online help.

The graphing manager splits graphs into the following distinctive groups:

- **Graph Family:** a high-level group that reflects the domain for which the graphs are intended, for example: Oracle, BlackBerry, Exchange, System Infrastructure, and so on.
- **Graph Category:** a subgroup of the graph family that reflects the various areas of interest in a domain. For example, the System Infrastructure graph family includes the following graph categories: CPU, Disk, File System, and so on.
- **Graph Template:** the template that defines the performance data to use and display in the graph including the data source and, if appropriate, the instance ID of the performance-data database.

Figure 67 Assign Graph Families to a Configuration-Item Type



Graphs and View Mappings

HP OMi provides graphing families for various “standard” domains such as Active Directory, Oracle databases, Exchange servers, or system infrastructure. Graphing families are uploaded to the HP OMi database during installation and setup of the HP OMi content packs for the particular domain. For example, if you install a content pack for a domain such as Oracle databases, BlackBerry Enterprise Server, or Microsoft Exchange, HP OMi displays any uploaded graphing families in the graphing manager. The content packs also upload the necessary modifications to views, view mappings, and so on.

The main aim of the graphing manager is to enable users to manually map graph families or graph categories to a particular *type* of configuration item. Mapped graph families ensure that graphs of a particular family or category can be displayed directly from the configuration-item type to which they are assigned, any instance of the configuration-item type, or any event in the event browser that has an impact on an instance of the mapped configuration-item type.

By default, the mapping between graph families or categories and configuration-item types is defined inside an HP OMi content pack. Domain experts only need to map a graphing family to a configuration-item type manually if they want to integrate a custom application that has access to performance-related data or if they want to create their own graphing families, categories, and templates for use in HP OMi. For more information about the contents of HP OMi content packs, see [HP OMi Content Packs](#) on page 172.

The configuration-item types selected as the target for graph-family mappings must already be mapped to a UCMDB view. If the view mapping is not already configured as part of an installed content pack, domain experts can use HP OMi’s view-mapping feature to map views to configuration-item types manually. HP OMi requires the *view*-mapping information to

determine which graphs are available for display from a particular event or configuration item. For more information about mapping views to configuration-item types, see [View Mapping Rules](#) on page 158.



If you assign a graph family to a configuration-item type and then assign the configuration-item type to a view, HP OMi displays the assigned graph family for all *instances* of the configuration-item type as well as any CIs that are related in the assigned view.

As part of the manual graph-mapping process, the domain expert has to specify an instance identifier (ID) for the source of the performance-related data. The source provides the performance data that HP OMi uses to populate the graphs in the mapped graph family. The instance ID refers to the database instance that the HP Operations Manager performance component or the HP Performance agent use to store performance-related data. For more information about where to find the ID and what requirements exist for format and syntax, see the product documentation for the HP Performance Manager and the modelling information for the CI types that represent the performance-related objects.



HP OMi usually resolves the performance-database instance ID automatically. Manual insertion of an instance ID is only necessary if you configure custom applications to store performance metrics in HP Performance Manager.

[Figure 68](#) on page 154 shows how you can select and use CI type attributes to form the instance identifier, if you need to define a mapping rule to integrate sources for your own performance data.

Figure 68 Graph Categories and Configuration-Item Attributes

CI Type	Name	Type	Description
▶ Object			
▶ IT Universe			
▶ System			
▶ Application Resource			
Database Resource			
▼ DB Tablespace			
	Minimum Number of Extents	STRING	Default minimum number of extents .
	Maximum Number of Extents	STRING	Default maximum number of extents .
	Extent management	STRING	Tablespace extent management
	Segment space management	STRING	Tablespace segment space management
	Status	STRING	Tablespace status: ONLINE, OFFLINE, or READ ONLY.
	Default Extent Size	STRING	Default initial extent size.
	Contents	STRING	Tablespace contents value
	Extent Size	STRING	Default incremental extent size.
	Minimum Extent	STRING	Minimum extent size for the tablespace..

Figure 68 on page 154 shows how you can use CI attributes to apply the ID to a more specific level, for example, so that multiple instances of different types of database can be covered with one string. The CI attributes are resolved at run time.



HP OMi does not check the string you specify as an instance ID when you save it. Any errors in the saved string only become apparent when a domain operator or expert tries to display a graph from a family mapped using the saved string.

The general rules for inheritance in HP OMi configuration-item types apply to graph-family mapping, too. If a domain expert maps a graph family or category to the configuration-item type "Host", the mapping is passed on down the configuration-item-type hierarchy. Graphs in the mapped family or category are available from events that relate to "Unix", "VAX", or "Windows" hosts, too.

Exporting Graph-Family Mappings

Users with the appropriate authorization can use management tools such as the Content Manager to exchange graph-related mappings (including all customization and additions) between HP OMi management servers. For more information about using the Content Manager to export graph-family mappings, see [Exchanging Content](#) on page 181.

Displaying and Using Graphs

Mapping graph families or categories to a type of configuration item enables domain experts to control the performance graphs that are available in the context-sensitive menus for particular events. Events have an impact on (and are related to) specific configuration items, which are instances of configuration-item types. Mapping graphing families to the configuration-item type means that *any* of the graphs in the mapped family is available in the HP OMi context-sensitive menu from *any* event that is related to a configuration item that is an instance of a mapped configuration-item type.

For example, the System Infrastructure graph family includes graph categories that display data concerning the performance of a CPU, a disk, a file system, and so on. If a domain expert maps the System Infrastructure graph family to the CPU configuration-item type, all graphs in the system-infrastructure graph family are available from any CPU-related event, assuming that a data source is configured, running, and collecting data on the machine hosting the affected instance of the CPU.



Domain experts can also map an individual graph category (such as "Disk") to the Disk configuration-item type, so that only disk-related graphs are available from events concerning disk problems rather than *all* the graphs in the system-infrastructure graph family.

A user who has authorization to access the graph-designer tool provided by the graphing component can modify a displayed graph directly, that is: without closing the graph and opening it again in the graph designer. The effects of the changes can be viewed immediately and saved for future use.

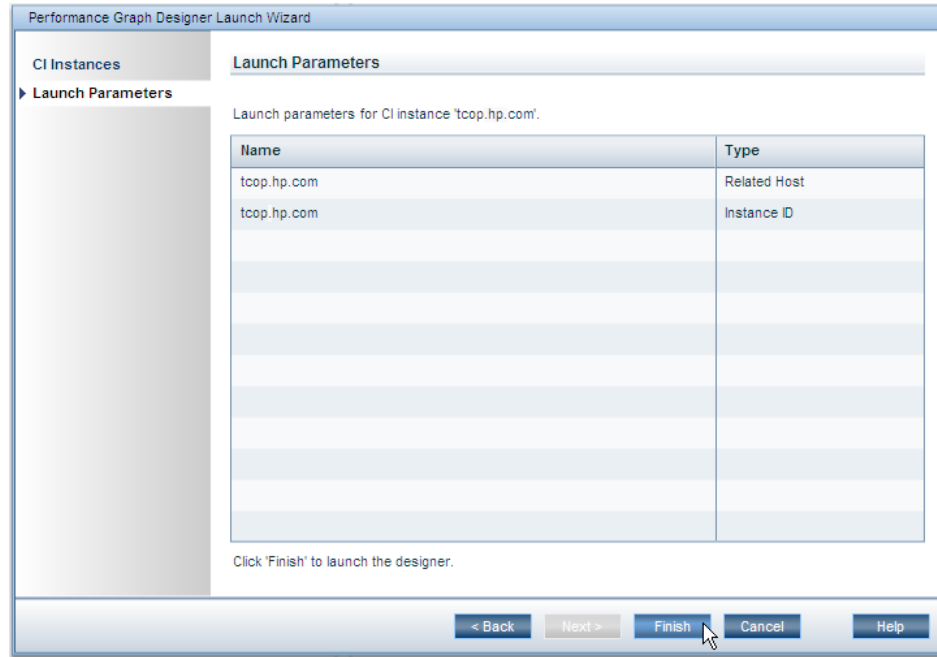
The Graph Design Wizard

Users with the appropriate authorization can launch the graph-design wizard from within the HP OMi graphing manager. The graphing design wizard enables users to create new graph templates, edit existing graph templates, and delete any graphs that they themselves created or modified.

The graph designer runs in the context of a specific configuration item, that is: an instance of a configuration-item type. The context is necessary to provide the graph designer with metrics data, which it obtains from data sources that only exist on a host configuration item with the installed performance agent. However, the metric data are not included in the graph template. The data are used to help design the template. The graph template you create or modify is saved independently of the metric data used in the design itself and can be used to generate graphs for other instances of configuration items, too.

Figure 69 on page 156 shows the last step in the process of starting the graph designer wizard, namely, the selection of the configuration-item instance that supplies the performance data that populates the graphs generated by the finished graph template.

Figure 69 Launch the Graph Designer



Top Views

Top views are the universal-CMDB (UCMDB) views that HP OMi uses to display configuration-items in the Top View pane of the Health Perspective tab and, in addition, in the Dashboard's Top View tab. A view displays a defined subset of the UCMDB's overall IT model, for example, only those configuration-items that relate to a specific area of interest, such as: "storage" or "databases". A *top* view refines the topological information it presents and displays it in a particular way.



Top views are not to be confused with topology views. A top view has one parent and the same element can appear more than once if relationships require. A topology view is a flat representation of the database elements where elements appear only once.

Generally speaking, UCMDB views enable you to refine both the type and the amount of information displayed. For example, selecting a view in the event browser's CI Tree reduces the number and type of configuration-item types loaded from the UCMDB and displayed in the list of available configuration-item types.

Similarly, you can restrict the amount and type of information presented in the Top View pane by selecting a view from Selected View drop-down list. The contents of the selected view drop-down list depend on the configuration items in the Top View and the views mapped to them with the View Mappings manager. The configuration items are related to the event selected in the event browser.



The HP OMi Top View displayed in the Top View pane of the Health Perspectives tab is a more refined and accurate reflection of the configuration items affected by the event selected in the event browser than the Top View displayed in the Dashboard.

Unlike the Dashboard's Top View which shows a complete picture of *all* the configuration-item types contained in the view, the HP OMi Top View filters the UCMDB view and displays only those configuration items that are directly affected by the event selected in the event browser.

Domain experts can use the View Mappings Manager to add entries to (and modify the contents of) the Selected View drop-down list in the Top View pane. In this way, domain experts can control the top views available to (and speed up the work flow of) domain operators by reducing the amount of information that is presented. The views available for mapping are those that either contain or reference a particular configuration item or configuration-item type.

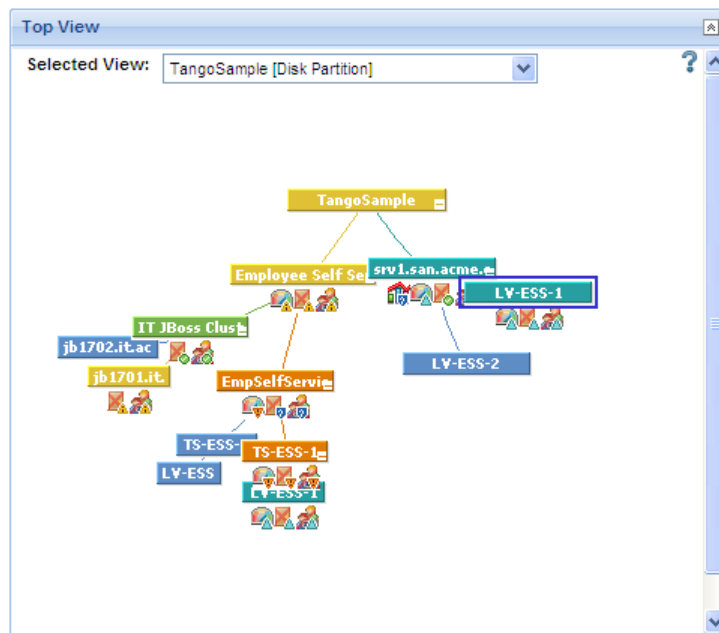
mapped configuration-item type. The list of views available in the Top View pane contains all the views that are mapped to the configuration-item type affected by the event selected in the event browser.



The views you map to configuration-item types must already exist in the UCMDB when you are creating a view-mapping rule. HP OMi makes only existing views available for selection and mapping in the Edit View Mapping dialog.

You can use the View Mappings Manager to add entries to (and modify the contents of) the Selected View drop-down list in the Top View pane. In this way, you can control the top views available to operators and speed up their work flow by reducing the amount of information that is presented and at the same time broadening the scope of the information presented by the different views and perspectives.

Figure 71 Top View Selection



Note that the rules defined in the View Mappings Manager are available in the context of graph-family mappings, too. HP OMi enables users with the appropriate authorization to map graph families (or categories) to configuration-item types. The mapping enables users to display mapped graphs either from an instance of the mapped configuration-item type (in the CI Tree) or from any event (in the event browser) that has an impact on any instance of the mapped CI type.

When a configuration-item type is mapped to a view, users can display from one event not just graphs linked to the single configuration item impacted by the selected event, but also the graphs mapped to any instances of the configuration-item types referenced in the mapped view. If any of the configuration-item types in the first mapped view are already mapped to additional views, too, then the graphs families mapped to the additional views are displayed as well. For more information, see [Graphs and View Mappings](#) on page 153.

HP OMi enables you to assign a *precedence* to a view-mapping rule. In the context of view-mapping, precedence defines the level of importance you want a rule to have in the event that more than one rule is available for (and applies to) the currently selected event. The higher the precedence assigned to a view-mapping rule, the more important HP OMi assumes the rule to be. For example, the default precedence of zero (0) indicates a rule that is less important than a rule with a precedence of 10. The highest precedence you can assign to a view-mapping rule is one thousand (1000). HP OMi uses the precedence to sort the list of

views displayed in the Selected View drop-down list in the Top View pane—view-mapping rules with a high precedence are displayed before view-mapping rules with a low precedence. [Figure 72](#) on page 160 shows a view-mapping rule with a precedence of one hundred (100).

Figure 72 Precedence in View-Mapping Rules

Create New View Mapping

View: * Systems_Infrastructure

Mapping Description: Hardware Monitoring

Event Category Pattern: Hardware

For the Health Perspective top view that is launched in the context of the event browser you can restrict the available views based on the event category. Enter a regular expression that matches the event category for which this view shall be available.

Precedence: 100

The precedence controls, which view is shown in the Health Perspective top view of the event browser. The view mapping with the highest precedence value is always shown as default. Note that the precedence of inherited view mappings is also evaluated.

(* Required field)

OK Cancel Help

Health Management Tools

HP OMi provides a number of tools to help set up and manage the building blocks of health-based monitoring. Expert users with the appropriate authorization can use the following tools to configure the various elements of health-based monitoring, which HP OMi uses to manage the operational health of the network and services:

- [The Indicator Manager](#) on page 161:
Create, configure, and manage the event and health indicators that HP OMi uses to monitor the status and health of objects in the operational environment.
- [The Key Performance Indicator Manager](#) on page 162:
Configure how HP OMi's key performance indicators use health-based data to calculate and set the health status of monitored objects in the operational environment.
- [The Indicator Mapping-Rules Manager](#) on page 162:
Configure rules that map event attributes to indicator values (for health and event types) so that HP OMi automatically sets (and updates) event-related and health-related status according to the events that occur in the operational environment.
- [The Graphing Manager](#) on page 162:
Configure the graph, graphs families, graph categories, and graph templates that provide CI-based performance and availability reports for users of all types.
- [The View Mappings Manager](#) on page 163:
Map configuration-item types to UCMDB views so that HP OMi can filter views available in the Health Perspective Top View and, in addition, determine which performance graphs to make available from particular events.

User roles can restrict access to administrator tools to those users who really need it and have the knowledge to use it effectively. For example, user roles can restrict access to health-management tools so that only administrators or domain experts users with expertise in a particular field can use the them. HP OMi enables you to further restrict access by implementing password-authentication procedures. For more information about user authorization, see [User Authentication](#) on page 41.

The Indicator Manager

The Indicator Manager is a tool for administrators and domain experts who want to configure how HP OMi uses event-type indicators, health indicators, and key performance indicators to monitor and manage the events that affect the health and status of objects in the operational environment. The Indicator Manager enables you to perform the following management-related tasks:

- Create, modify, or delete *event-type* indicators (ETI), or any of their values.
- Create, modify, or delete *health* indicators (HI), or any of their values..
- Specify if a health indicator should also create and set a corresponding event-type indicator.
- Create a health indicator from an existing event-type indicator.
- Define mapping rules that use event (or message) attributes to set (or modify) values for health indicators and event-type indicators.

- Assign health indicators to (or unassign them from) key performance indicators. Health indicators contribute to the calculation of the severity status of health-based key performance indicators.
- Apply rules that HP OMi uses to calculate the severity of a key performance indicator.

For more information about managing indicators, see [Indicator Management](#) on page 140.

The Key Performance Indicator Manager

HP OMi provides a tool for administrators and domain experts who want to configure how HP OMi uses key performance indicators to calculate and set the health and status of the configuration items that represent the monitored objects in the operational environment. With the KPI Manager, you can perform the following management-related tasks:

- Create, modify, or delete health indicators, or any of their values.
- Assign health indicators to (or unassign them from) key performance indicators; health indicators contribute to the calculation of KPI severity status.
- Apply rules that HP OMi uses to calculate the health (severity status) of a key performance indicator.

For more information about setting and calculating KPIs, see [HI-based Key Performance Indicators](#) on page 143.

The Indicator Mapping-Rules Manager

HP OMi provides a tool for administrators and domain experts who want to configure HP OMi to set health indicators (or event-type indicators) automatically using the attributes of events that occur on the objects HP OMi is monitoring in the operational environment. The Indicator Manager enables users to perform the following tasks relating to mapping rules:

- Define mapping rules that use event attributes (or the attributes of HP Operations Manager messages) to set values for health indicators or event-type indicators.
- Configure filters that refine the events to be considered by the mapping rules during the mapping process.
- Specify the order and priority for the mapping rules, if more than one rule exists.

For more information about configuring rules that use event attributes to set indicator values, see [Indicator Mapping Rules](#) on page 137.

The Graphing Manager

HP OMi provides a tool for administrators and domain experts who want to configure the relationship between graph families and configuration-item types. Assigning graph families to a configuration-item type enables users such as domain operators to generate graphs that display performance and availability reports for the specific CI type affected by the event selected in the browser. With the graphing manager you can perform the following management-related tasks:

- Define rules that map a graphing family such as “Performance History” to a particular type of configuration item (Host, Computer, and so on).
- Launch the graph designer and edit graph families or templates.

Mapping graphing families to a particular type of configuration item enables users to display graphs in the context of events that are related to instances of the mapped configuration-item type. For example, mapping a graphing family such as “Performance History” to the configuration-item type “Host” enables operators to generate any of the graphs included in the Performance History graph family directly from an event concerning any host such as Unix, VAX, Windows, and so on. Domain experts can use this feature to ensure that the relevant graphs are available for events concerning the configuration items they are monitoring in their specific technical domain.

For more information about providing performance graphs in the context of an event, see [Performance Graphs](#) on page 152.

The View Mappings Manager

HP OMi’s View Mappings manager enables users with the appropriate authorization to map configuration-item types to UCMDB views. Mapping configuration-item types to UCMDB views enables you to configure the following behavior:

- Filter the views available for selection and use in the Health Perspective Top View, for example, according to event category. For more information about mapping-rules, see [View Mapping Rules](#) on page 158.
- Assign a *precedence* to view-mapping rules. Precedence defines the relative importance of a view-mapping rule where more than one rule is available or applies. HP OMi uses precedence to determine the order in which to display the views in any drop-down list. The higher a rule’s precedence, the higher up a list the rule appears. For more information about mapping-rules, see [View Mapping Rules](#) on page 158.
- Filter the performance graphs that are available from particular events. For more information, see [Graphs and View Mappings](#) on page 153.

7 HP OMi Content

The information in this section explains what HP OMi content is and how content management works from the perspective of an individual user's work flow, that is: the daily tasks the user performs and the order in which the tasks typically occur. This section also provides information about the concepts underlying the tools that are available to help configure content management and, where appropriate, explains why the tools work the way they do. Reading this section helps users understand why they need to configure content management and how they can use content management to help manage the problems that occur in the monitored environment.



The user types mentioned here are examples only. HP OMi enables you to configure the user types that best meet the needs of your environment.

Table 14 on page 165 provides an overview of the contents of this chapter and indicates the intended audience, that is: the type of user who needs to read and understand the topic to help perform the tasks in their daily work flow.

Table 14 Content Management Overview

Page	Concept	HP OMi Admin	Domain Expert	Domain Operator
166	Content-management Work Flows	✓	✓	-
168	Introduction to Content Management	✓	✓	-
169	Installation Packages	✓	✓	-
170	Universal CMDB Packages on page 170	✓	✓	-
172	HP OMi Content Packs	✓	✓	-
178	Content-Management Tools	✓	✓	-
181	Exchanging Content	✓	✓	-
184	Topology Synchronization	✓	✓	-

Content-management Work Flows

HP Operations Manager i (HP OMi) provides a set of tools that are intended to help set up content management, which is the management of the data that HP OMi uses to describe the objects to monitor and how to monitor them. The content-management tools that are available to individual users depend on the responsibilities assigned to the group the user belongs to, the demands of a user's work flow, and the context in which the users perform their tasks.

In HP OMi, users belong to one or more user groups, whose members are granted access to management or administrative tools based on the scope of the tasks the group is expected to perform in their every-day work flow. For example, domain experts need access to administrative tools such as the Content Manager to perform some of the tasks in their work flow. Domain operators, on the other hand, only need access to event-management tools.

To perform the management tasks required by their respective work flow in the context of content management, HP OMi users need a good understanding of all (or any combination of) the topics discussed and explained in this section. The information provided in this section attempts to address the needs of all users whose work-flow requirements mean they have a role to play in the configuration and use of content management, for example:

- [The HP OMi Administrator](#)
- [The Domain Expert](#)
- [The Domain Operator](#)

The HP OMi Administrator

HP OMi administrators need to have a good understanding of the basics of content management and, in addition, the underlying data-related concepts such as installation packages, UCMDB packages and HP OMi content packs. A high-level summary of the HP OMi administrator's work flow in the context of health-based monitoring includes the following tasks:

- **Configure user groups:**
Define and configure user groups so that users with the appropriate knowledge and resources (domain experts) can configure content management quickly and efficiently for their respective technical areas.
- **Grant access to administrative tools:**
Ensure the domain experts and operators have access to the tools available in the HP OMi administrative interface where appropriate. For example, domain experts need access to the Content Manager and the Package Manager so that they can create and configure content packs and UCMDB packages, respectively.

The Domain Expert

In HP OMi, domain experts need to have a comprehensive understanding of content management and, in addition, the underlying data included in the various packages and packs, for example: UCMDB views, configuration items, health indicators, key performance indicators, calculation rules, event-correlation rules, graphing families, categories, templates, and so on. Domain experts also need to understand how to use this knowledge of content management to implement a content-management strategy in the technical domain for which they are responsible. For example SAP domain experts need to know which content-related

data is appropriate or required for the SAP instances in the monitored SAP landscape, which databases or application servers require more or less attention, and which processes (Work, Dialog, Enqueue, and so on) are most important to track for availability and performance.

A high-level summary of the domain expert's work flow in the context of content-management includes the following tasks for each specific technical domain:

- Set up and manage content:
Build and maintain an overview of domain-specific content in the monitored environment, for example: Oracle, Active Directory (AD), Exchange, and so on.
- Create and maintain UCMDB packages:
Define, configure, and maintain UCMDB views and configuration-item types using tools such as the CI Type Manager, the View Manager, and the Package Manager.
- Create and maintain HP OMi content packs:
Define, configure, and maintain packages containing HP OMi data such as KPI calculation rules, HIs, rules, tools, and graphing elements. Maintaining content-pack data may require the use of tools such as the Content Manager to import and export data as part of the process of exchanging data between instances of HP OMi and, in addition, other management tools to check that data was successfully exported and imported.
- Maintain and implement installation packages:
Install, configure, and manage the installation packages for specific technical domains. Installation packages can contain both UCMDB packages and content packs, as well as additional file-system data. Installation packages enable you to move content between machines, for example: from development systems to test systems, and from test systems to the production environment.

The Domain Operator

In HP OMi, domain operators do not typically have access to content-management tools. Nor do they usually need to know about the workings of content management to perform the tasks that comprise their daily work flow.

Introduction to Content Management

In HP OMi, “content” is the data that HP OMi uses to describe the objects in the monitored environment and, in addition, any HP OMi extensions that provide access to configuration data, such as rules, filter, menus, and graphs. Content can include all (or any combination of) configuration-item types, mapping rules for topology synchronization, discovery sources, correlation rules, rules for HI-based key performance indicators, health indicators, graphing families categories or templates, and so on. You can upload different types of content to (and download from) the various databases, Universal Configuration-Management Database (UCMDB) and HP OMi, and exchange the same data (by exporting and importing) between instances of databases, too.

Outside of the database, "content" is stored in files or archives whose format depends on the contents of the package, the package's intended use, and the tool you use to prepare it, for example, XML files or ZIP archives.

You can use UCMDB packages to install new or update existing content in the UCMDB. You can use "content packs" to install or update items in the HP OMi database. The same "packages" can be used to exchange data between instances of either the UCMDB or the HP OMi database, too. For more information about the different types of packages and their content, see UCMDB Packages and Content Packs.

The type of package you are working with determines the tool you need to use, for example: the HP OMi Content Manager, the UCMDB package manager, or standard Microsoft installation tools. For more information about which tools you need to use to work with the different type of content and content packs, see [Content-Management Tools](#) on page 178.

Installation Packages

HP OMi installation packages are Microsoft installation (MSI) files that are intended for first-time installation. The installation and setup process copies files to the local file system on the HP OMi processing server and, depending on the content of the package, automatically uploads the appropriate content to the Universal CMDB (UCMDB) or the HP OMi database, respectively.



If the HP OMi deployment installs the processing and gateway servers on different machines, content-management configuration rules and scripts are located on the processing server.

Installation packages are available for a variety of different application areas and can be installed either automatically during HP OMi setup or manually at a later date. The installation packages include content that extends the functionality of HP OMi, for example, additional event-correlation rules to manage events that occur on an Exchange server or a BlackBerry enterprise server.

Installation-package Contents

Table 15 on page 169 provides an overview of the contents of a standard installation package:

Table 15 Installation Package Contents

Contents	Description
UCMDB package	Descriptions of CI types, their relationships and dependencies, and details of the underlying architectural model. The contents of the package are uploaded to the UCMDB.
HP OMi content pack	KPI calculation rules, event-type indicators, health indicators, view mappings, tool definitions, event-correlation rules, graphing-family definitions, and menu extensions. The contents of content pack are uploaded to the HP OMi database.
Topology synchronization	Rules that define how HP OMi configuration-item types are mapped to the service objects monitored by HP Operations Manager for Windows and how to manage changes to this information. Installation setup copies topology-synchronization rules to the local file system on the installed machine.
Graph Templates	Information about the graph templates, categories, and families installed with HP OMi. The installation process writes graph-template-related data to the local file system on the target machine. Note: The installation package contains only the names of the graph templates; it does not contain any graph data.

HP OMi provides a collection of pre-configured rules, tools, and definitions to help you monitor the events reported to the HP Operations Manager for Windows management server by HP Smart Plug-ins (SPI) such as the SPI for operating systems or the SPI for BlackBerry Enterprise Server (BES). If the SPI for BES is installed on an HP Operations Manager for Windows management server and this server is configured to forward messages to HP OMi, you can make use of the tools, rules, and definitions installed by the appropriate installation package.

Universal CMDB Packages

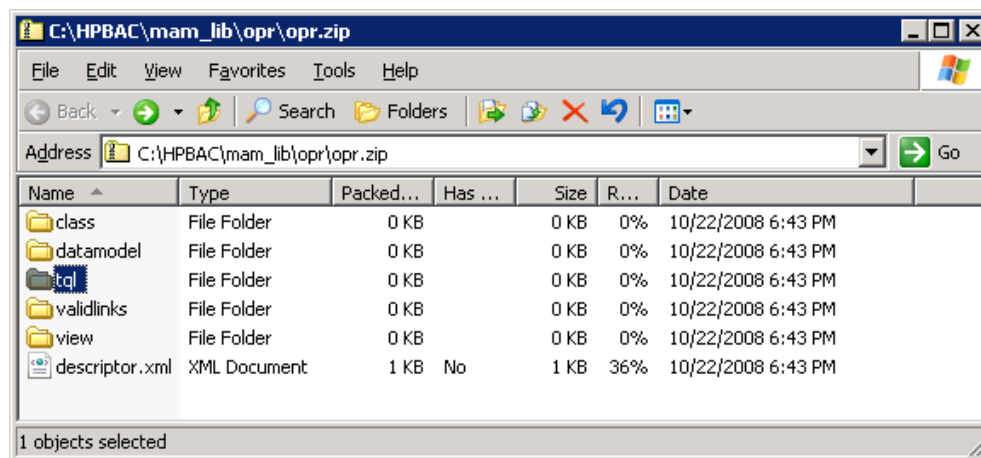
UCMDB packages are essential part of HP OMi content. You can use UCMDB packages to manage view models and configuration-item types for example: exporting, importing, and updating content either on the same server or between different instances of an HP OMi management server. This section introduces some of the basic types of UCMDB package, describes the package contents, explains some of the basic concepts of UCMDB package management, and helps you understand how you can use the packages to improve the work flow of administrators and domain experts.

UCMDB Package Contents

A package is a subset of resources grouped together by certain defined criteria. Resources can be a variety of things, for example: rules, definitions of configuration-item types, CI enrichment rules, TQL queries, view definitions, and so on.

A UCMDB package takes the form of a zip file containing resources and a directory structure. Most of the files are in XML format. Each XML file describes the attributes, parameters, and values of the resources contained in the package. For example, [Figure 73](#) on page 170 shows the top-level contents of a typical UCMDB package used during the installation of HP OMi. The package contains resources such as CI views, a description of the data model, TQL queries, and so on.

Figure 73 HP OMi UCMDB Package



Creating and managing UCMDB packages enables you to make snapshots of data, which you can then use to perform specific management tasks. For example, UCMDB packages can contain data relating to the discovery of specific IT infrastructure assets or the modeling of the operational infrastructure that you are monitoring with HP OMi. You can also use UCMDB packages to transfer groups of resources from one system to another.

HP OMi works with two types of UCMDB packages:

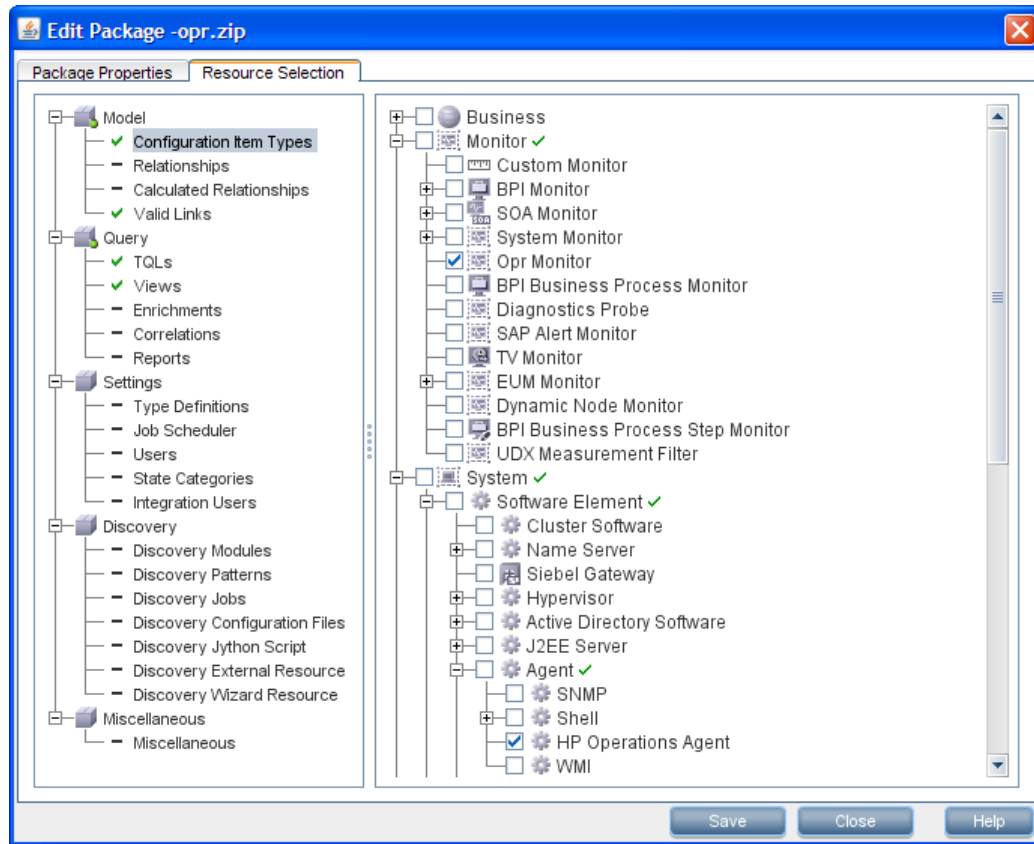
- **Factory package:** Factory packages contain resources that are deployed during product installation and used to initialize HP OMi.
- **Custom package:** Custom packages are packages that a user creates to fulfill a specific purpose, for example: create a snapshot of data, or exchange configuration (or CI model) data between installed systems.

The default location for UCMDB packages on the HP OMi management server is:
%TopazHome%\mam_lib\opr\content.

The UCMDB Package Manager

The tool you use to perform a content-management task depends on the type of package you want to work with and the contents of the package. Some tools are only available to users who are logged in with the appropriate authorization. Users logged into HP OMi without administrative authorization might be denied access to packaging tools or required to login using the name and password of a user with administrative authorization to start package-management tools.

Figure 74 UCMDB Package Management



Those users who do have the authorization to start and use package-management tools, can use the UCMDB package manager to perform the following tasks:

- Export content from the UCMDB, for example, where the content includes configuration-item types.
- Import content into the UCMDB, for example, where the content includes configuration-item types.

For more information about the UCMDB Package Manager, see the HP Business Services Management *Model Management Guide*.

HP OMi Content Packs

HP OMi uses content packs to exchange customized, HP OMi-related data between instances of the HP OMi management server. A content pack can contain a complete snapshot of all (or any part of) the HP OMi rules, tools, mappings, assignments, and menu options that you define and configure to help users manage your IT environment with HP OMi.

You exchange content packs between instances of HP OMi by exporting a content pack to a file and importing the content pack file into the another HP OMi management server.

HP OMi uses a content pack definition to specify the contents of a content pack. For more information about content pack definitions, see [Content-pack Definitions](#) on page 175



Creating a content pack is a two-step process. First you define the contents of the content pack, then you tell the Content Manager to use the content-pack definition to create the content pack itself. For more information about content-pack definitions, see [Content-pack Definitions](#) on page 175.

Content-pack Contents

A content pack can contain a complete snapshot of all (or any part of) the HP OMi rules, tools, mappings, assignments, and menu options that you define and configure to help users manage your IT environment with HP OMi. HP OMi content packs can contain any combination of the elements listed in [Table 16](#) on page 172.

Table 16 Content Pack Contents

Content Type	Description
Event Type Indicators	A list of the definitions that are used to configure and calculate HP OMi <i>event-type</i> indicators (ETI) plus information about the configuration-item type the ETI is assigned to.
Health Indicators	A list of the definitions that are used to configure and calculate HP OMi <i>health</i> indicators (HI) plus information about the configuration-item type the HI is assigned to.
Indicator Values	A list of the <i>values</i> defined for HP OMi health indicators and event-type indicators including information about the indicator to which the value is assigned.
Mapping Rules	A list of the rules that define how HP OMi automatically sets event-type indicators (and health indicators) by mapping the attributes of HP Operations Manager for Windows messages or HP OMi events to indicator values.
KPI Rules Definitions	A list of the rules used to configure and calculate HP OMi key performance indicators (KPI).
HI to KPI Rule Assignments	A list of the health indicators assigned to the HP OMi key performance indicators, namely: Operations Availability or Operations Performance.
Correlation Rules	A list of the rules that users such as domain experts have configured to correlate similar or related events.

Table 16 Content Pack Contents

Content Type	Description
Tools Definitions	A list of the custom tools that the HP OMi software administrator or domain experts have configured for HP OMi users.
View Mappings	A list of the rules that map configuration items to a particular UCMDB view. HP OMi filters the complete list of views in the UCMDB and displays only mapped views in the Selected View drop-down list in the Top View pane in the HP OMi Health Perspective tab.
Graph Family Mappings	A list of the configuration-item types to which domain experts have mapped graph families. HP OMi maps graph families to a particular configuration-item type so that graphs can be displayed from an instance of the mapped CI type.
Graph Families	A list of graph definitions grouped into similar types (or families) along with an indication of the configuration-item type to which the graph family is mapped. For example, a group of graphs showing different aspects of the performance of the Microsoft Exchange server can be linked to the Exchange Server configuration-item type. Note: The content pack only refers to the <i>names</i> of the graph families; it does not contain any graph templates or graph data.
Graph Categories	A list of the graph categories defined in HP OMi. Graph categories are logical groups of graphs that belong to a similar technical area, for example, different aspects of the performance of the Exchange server's Information Store. Note that you can map a graph category to a configuration-item type in the same way as you can map graph families. Note: The content pack only refers to the <i>names</i> of the graph categories; it does not contain any graph templates or graph data.

The Content Manager

HP OMi's Content Manager enables you to create a content pack that contains a snapshot of the rules and tools that you have defined with HP OMi and save the snapshot information in a file. The snapshot file you create includes all (or any selection of) the health indicators, event-type indicators, key performance indicators, mapping and correlation rules, calculation rules for KPIs, tools definitions, view mappings, graphing assignments, or menu options that you have defined specifically for HP OMi.

You can use the Content Manager to perform the following tasks:

- Define the contents of a content pack and save the definition in the HP OMi database. For more information about content-pack definitions, see [Content-pack Definitions](#) on page 175.
- Export a content pack definition (and the data it references) to a file called a "content pack". For more information about what data is included in a content pack, see [Content-pack Contents](#) on page 172.
- Import a content pack definition and the data it references. For more information about what data is included in a content pack, see [Content-pack Contents](#) on page 172.
- Exchange content packs between installed instances of HP OMi.

The content-management feature is particularly useful if you want to exchange HP OMi-specific configuration data between instances of HP OMi. You can export the package you create and deploy it on another instance of HP OMi for example, if you want to test the package on a development system before deploying it on a production system.



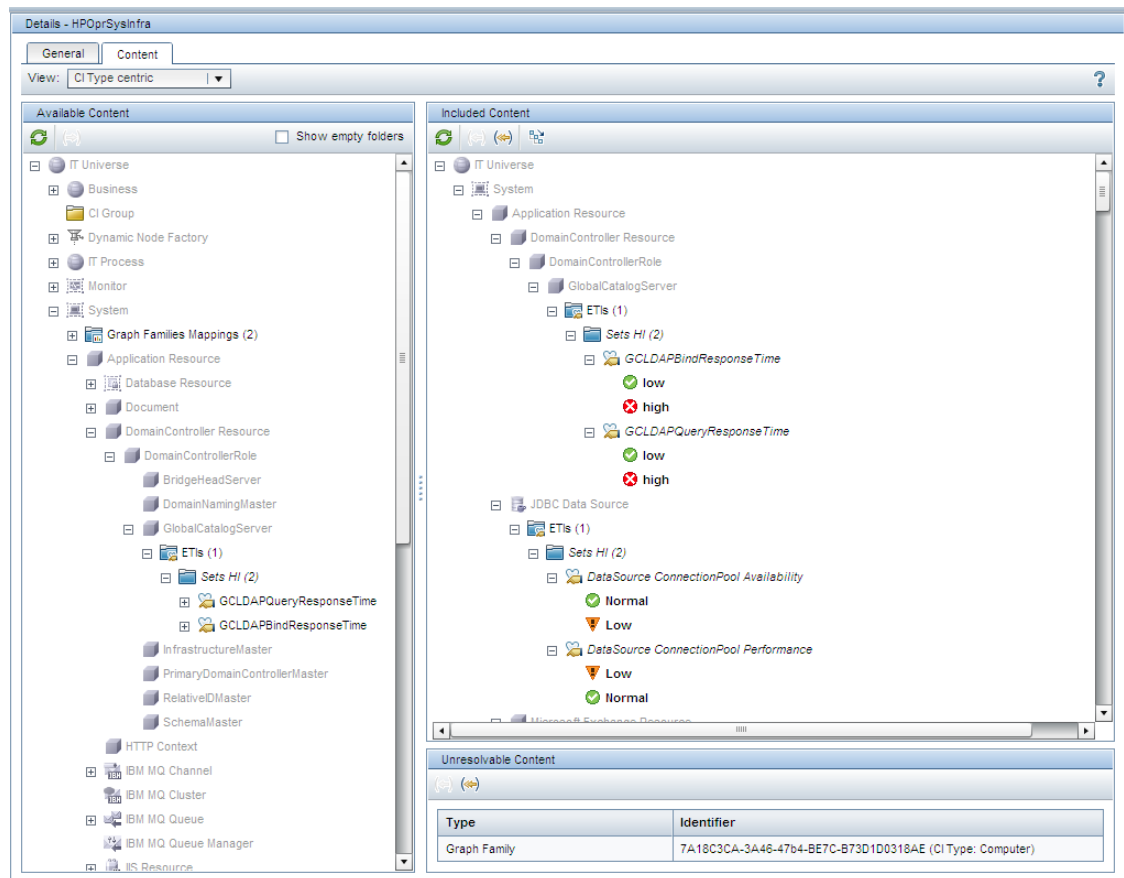
You can use the user-roles feature to restrict access to the Content Manager to those users who really need it such as HP OMi administrators and domain experts. For more information about user authorization, see [User Authorizations](#) on page 39.

For more information about content pack definitions, see [Content-pack Definitions](#) on page 175. For more information about content packs, see [HP OMi Content Packs](#) on page 181.

HP OMi provides two interfaces to the content-management feature: the graphical user interface (GUI) described in this section and illustrated in [Figure 75](#) on page 174 and, in addition, the command-line interface (CLI), which is described in [The ContentManager CLI](#) on page 179.

[Figure 75](#) on page 174 shows part of the graphical version of the Content Manager, which enables you to choose between displaying a general overview of the contents of an HP OMi content pack or a more detailed list of the included contents.

Figure 75 HP OMi Content-Pack Details



To help you understand more quickly what the contents of the content pack are, the Content Manager uses different font types to distinguish between items that are included directly in the package definition and the items that are included by association. When you are creating a content pack, HP OMi uses the **bold** font type to indicate the items you select for inclusion in the content pack and the *italic* font type to indicate the items that are included automatically as a result of the selection you make. For example, if you select a health indicator, then any health indicator values that belong to the selected health indicator are

included automatically, too. In this way, you can see at a glance exactly which health-indicators, KPIs, graphing rules, and so on are included in a content pack and which configuration-item types they belong to.

Figure 75 on page 174 shows the behavior is a little different when HP OMi displays the contents of an *imported* Content Pack. In an imported Content Pack, HP OMi used the **bold** font type to indicate the items that were actually imported, and *italic* font type indicates the items that also had to be imported along with the originally selected items so that the original structure can be replicated on the target system



HP OMi displays resolved and unresolved items in separate lists as explained below.

HP OMi configuration data such as health indicators, view mappings, or custom tools are assigned to a particular configuration-item type. When you display a content pack in the Content Manager, HP OMi attempts to resolve references to configuration-item types.

If HP OMi encounters any problems resolving the content selected for inclusion in a content pack, the Content Manager either displays the unresolved items in a separate list or, in the worst-case scenario, stops the import action prematurely. In the event of a failed import operation, the Content Manager rolls back to the state that existed before the import operation started.

For example, if you want to import a health indicator assigned to a specific configuration-item type, the referenced configuration-item type must exist in the UCMDB on both the source (export) and target (import) hosts used in the content exchange. If, during the import operation, HP OMi discovers that the referenced configuration-item types does not exist on the target host, the import operation fails.

For graph templates, categories, and families, the behavior is a little different. An HP OMi content pack does not include graph templates, families or categories; it includes a reference to the *names* of the templates, categories, and families. If the named graph family, category or template does not exist on the target system, the Content Manager displays the unresolvable graph templates, categories, or families in a separate list. The list of unresolved graph-related items includes the item's internal ID and the name of the configuration-item type to which the graph item is assigned.

Problems with the resolution of content-pack data can also occur if changes are made to the UCMDB and these changes have an impact on an existing content-pack definition. For example, if an administrator removes a configuration-item type from the UCMDB or makes substantial changes to a configuration-item type that is referenced by items you include in a content pack definition, the Content Manager will not be able to resolve any of the included items that refer to the modified or removed CI type.



If content packs make reference to custom graph data or items installed by HP Smart Plug-ins, you must make sure that the custom data is available and the Smart Plug-in is installed on the system into which you want to import the content pack.

Content-pack Definitions

HP OMi uses a content-pack definition to specify the contents of a content pack. A content pack is the means that HP OMi uses to install HP OMi-specific configuration data on (and exchange between) HP OMi systems. Note that a content-pack definition does not, itself, contain any data. The content-pack definition contains a list of the data to include in a content pack when you use the Content Manager's export feature to prepare a package for exchange with another management server.

The content-pack definition respects and retains the original relationships between configuration-item data and configuration-item type as well as any relationships between the included items. For example, if you include an event-correlation rule in a content-pack definition, any health indicators, health-indicator values, mapping rules, and filters referenced in the rule are also included along with any relationships between the various included items



Although objects described in a content-pack definition may contain references to views or configuration-item types, the content-pack definition does not include either the referenced views or configuration-item types themselves. To exchange views or configuration-item types between instances of a management server, use the package-management tools provided by the UCMDB.

HP OMi checks the contents of a content-pack definition before displaying it in the Content Manager's graphical user interface. If the Content Manager cannot resolve references to objects included in a content definition, for example because a user has modified, deleted, or renamed an item after the definition was created, the unresolved item is displayed in a separate pane in the Content Manager user interface along with as much information as possible about the unresolved item. It is important to remember that the unresolved item is not included in any export or import operation even though it is referenced in the content-pack definition. HP OMi does not consider for import or export any objects that it cannot resolve or find.

For more information about exchanging content packs between instances of HP OMi, see [Exchanging Content](#) on page 181.

Dependencies and Inheritance

The rules, tools, and definitions in the content packs that the Content Manager imports and exports belong to particular configuration-item types. The configuration-item types are part of a hierarchy which involves relationships and dependencies, for example: between other configuration-item types, key performance indicators, health indicators, and health-indicator values. Configuration-item types have a fixed position in the context of the hierarchy, and KPI and HI assignments are often inherited from further up and passed on down the hierarchy.



A configuration-item type and any of its data, such as rules, tools, and definitions cannot exist in isolation. A content-exchange operation also imports or exports the context of the exchanged data.

For example, health-indicator mapping rules are passed from parent object to child object by inheritance. A mapping rule defined for the "Host" configuration-item type is passed on to (and used by) all configuration items of type "Host", such as: Unix, VAX, Mainframe, Windows, and so on, as well as any real instances of the configuration-item type Host that HP OMi is monitoring. Content-pack definitions respect and convey the relationships between configuration data that is passed between configuration items by inheritance.

Health indicators, tool definitions, and rules for KPI calculation and event correlation exist in the context of a specific configuration-item type. When domain experts use the Content Manager to add rules, health indicators, tools, and so on to a content-pack definition, the assignment to any configuration-item type is also included in the definition. This means that when you use the content-pack definition to export a content pack, you should note the following important points:

- If you select a configuration-item type for inclusion in a content-pack definition, all KPI assignments and health indicators are also included along with all KPIs and health indicators assigned to any *descendants* of the selected configuration-item type.

- If you include a KPI rule definition in a content-pack definition, any assigned health indicators, health-indicator values, mapping rules, filters, and any relationships between these items are automatically included, too.
- KPI assignments to health indicators are included in the content-pack definition and the content pack itself. These assignments are re-established on import, assuming the appropriate health indicators and configuration-item types are available on the target machine. For more information, see [Exchanging Content](#) on page 181.
- The immediate context of exported configuration-item types are included in the content pack definition. However, the position in the overall IT hierarchy could change between exported and imported systems. For example, the CI type “Host” could belong to “System” on the exported machine but to “IT Universe” on the imported machine.
- If you include an event-correlation rule in a content pack definition, any health indicators, health-indicator values, mapping rules, and filters referenced in the rule are also included as well as any relationships between the various included items.



The content-pack definition respects and retains the original relationships to configuration-item types and any relationships between the included items. The content-pack definition does not include the configuration-item types themselves. To exchange configuration-item types, use the tools provided by the UCMDB.

Content-Management Tools

The tool you use to perform a content-management task depends on the type of package you want to work with and the content the package contains. The following table illustrates the contents of the various types of packages and the tool required to prepare or make use of them.



Some tools are only available to users who are logged in with the appropriate authorization. Some tool options are only available in the command-line version of the tool.

[Table 17](#) on page 178 lists the different types of packages and the tools that are required to install and manage content from the various, supported sources.

Table 17 Select the Content-Management Tool

Package Type	Package Content	File Type	Tool Type
Installation	<ul style="list-style-type: none"> • UCMDB package • Content pack • Topology-synchronization rules • Graph Templates ^a 	MSI	Microsoft installation tool
UCMDB	<ul style="list-style-type: none"> • UCMDB model • View patterns • View instances • TQL queries • Enrichment rules... 	XML (ZIP)	uCMDB package manager For more information, see The UCMDB Package Manager on page 171.
Content Pack	<ul style="list-style-type: none"> • ETIs, ETI values, ETI mapping rules • HIs, HI values, HI mapping rules • KPI rules and assignments • Correlation rules • Tool definitions • Graph-family definitions • Context menu options... 	XML	HP OMi Content Manager For more information, see The Content Manager on page 173.

a. Template names only, not the graph content.

Command-line Interface

HP OMi provides command-line versions of tools that you can use to manage HP OMi data, namely: content data and topology data. HP OMi provides command-line versions of the following data-management tools:

- `ContentManager`: manage configuration data generated by HP OMi including export, import, and exchanging between instances of HP OMi. For more information, see [The ContentManager CLI](#) on page 179.

- `opr-startTopologySync.bat`: synchronize topology data between HP OMi and HP Operations Manager management servers. For more information, see [The opr-startTopologySync CLI](#) on page 180.

The ContentManager CLI

HP OMi provides access to the features and functionality available in the Content Manager's graphical user interface from the command line, too. The `ContentManager` command is available for use directly in a command shell, or remotely in a script.



You cannot use the Content Manager's command-line interface to define a content pack, that is: create a content-pack definition. With the `ContentManager` command, you can only create a content pack from an existing content-pack definition.

The command-line version of the content-management tool is especially useful if you want to access content-management functionality from within a self-written script, for example, to automatically upload content or synchronize data during the installation of a content package.

The command-line version of the content manager also has some extra options that are not available in the graphical user interface. For example, the command-line version of the Content Manager enables you to *clear* content as part of the overwrite option during an import operation. Clearing content removes existing content from the target system before the new content is imported from the content pack and enables you to clean up before performing an import operation, for example, to remove old and unwanted items.



Names for indicators must be unique in the context of the CI-type hierarchy. Duplicate names are not supported for ETIs and HIs.

The `Clear` option can help prevent errors due to the existence on the target system of indicator values that are included in a content pack. However, extreme care is recommended when using the `Clear` option to remove references to items that might be required in another context.

To demonstrate what effect the various options have on existing data during the import operation performed by the `ContentManager` command-line tool, [Table 18](#) on page 179 shows what happens when a health indicator (HI) with values A1, B1 (or A1, B1, and C1) is imported into a system where the same health indicator exists but whose values are either different or modified for example: A0, B0, and C0.

Table 18 CLI Parameters for Importing Content-pack Data

Import Action	Existing Content	Imported Content	Result
Overwrite	HI (A0, B0, C0)	HI (A1, B1)	HI (A1, B1, C0)
Overwrite/Clear	HI (A0, B0, C0)	HI (A1, B1)	HI (A1, B1)
Ignore	HI (A0, B0)	HI (A1, B1, C1)	HI (A0, B0, C1)

The `ContentManager` command enables you to instruct HP OMi to keep a record of the import operations performed with either the graphical or command-line version of the Content Manager (or both). The information stored in the import history includes a time stamp, any options used, and details of all the items referenced in the import operation. Since this level of detail can quickly lead to large files, the `-history` option also enables you to set a limit to the number of operations to track, for example ten (10). Once the limit is reached, HP

OMi deletes the oldest entry in the list and adds a record of the latest import operation to the list. The default setting is minus one (-1) which is “unlimited”. Zero (0) disables the history option and tells HP OMi not to maintain any records of any import operations.



Changes to settings do not take effect immediately. Changes only take effect during the next import operation. In addition, if you use the history option and then, at some later point in time, disable it, HP OMi removes all existing records of import operations.

The ContentManager command also enables you to export the current contents of the HP OMi database to a file using the `-snapshot` option.

The `opr-startTopologySync` CLI

For more information about the tool provided to manage topology synchronization, see [Topology Synchronization](#) on page 184.

Exchanging Content

HP OMi enables you to exchange content between instances of HP OMi by defining and creating packages using content-management tools. The package you create can be exported to a file which you can then use to deploy the same content on another instance of HP OMi. The tool you use to perform a content-management task depends on the type of package you want to work with and the content the package contains. For more information about content-management tools, see [Content-Management Tools](#) on page 178.

UCMDB Packages

To export a UCMDB package you need to have access to the UCMDB package manager and detailed knowledge of the items and resources included in the package you want to export. The export operation writes the package to an XML file and places the file in the location you choose. Note that the export operation does not (and cannot) create a new UCMDB package. The export operation takes an existing UCMDB package and creates an exportable form that you can use to re-import, if necessary, at a later stage.

When importing, the default location for UCMDB packages on the HP OMi management server is:

```
%TopazHome%\mam_lib\opr\content
```

HP OMi Content Packs

To export a package containing HP OMi configuration data such as rules and tools for configuration items, you need to have access to the HP OMi Content Manager. To ensure that the export package you create contains the correct data, you need detailed knowledge of the configuration items related to the definitions you want to export. You also need to understand which health indicators, key performance indicators, correlation rules, tool, and graphing elements are assigned to the configuration items that are selected for export.



By default, HP OMi saves the content pack to the file system on the machine where you start the browser in which the Content Manager is running. If you want to save the file in an alternative location, for example on the HP OMi management server, make sure the remote file system is visible known to (and visible from) the machine where you started the instance of the Content Manager that is performing the import operation.

To import an HP OMi content pack, you need to have access to the HP OMi administrator tools such as the Content Manager. You also need detailed knowledge of the configuration items whose rules, tools, and definitions you want to import. You also need to understand which health indicators and key performance indicators are assigned to which configuration items. An export and import operation completes successfully only if the same configuration items are available on both the source and target systems.

Perhaps more important is the way in which HP OMi imports the data enclosed in a content pack and the options available to manage the import operation. Before importing an HP OMi content pack, it is essential that domain experts consider the meaning of the various import options, understand the consequences of their use, and evaluate the risk concerning the potential loss of data, for example, by overwriting modifications to objects on the target system with older (duplicate) objects from an imported package. HP OMi provides the following options to control how the content-pack data is imported:

- **Overwrite:** enable HP OMi to update or replace configuration data that exist on the target machine with configuration data imported from a content pack. The type of configuration data determines what remains and what is overwritten during the import process, as illustrated in [Table 19](#) on page 183.

If you have modified the name of a health-indicator or health-indicator value on the target machine, then the overwrite option replaces the locally modified version with the data included in the imported content pack. As a result, any local modifications are lost during the import process. However, *new* HIs or HI values on the target machine remain untouched by the import operation.

For correlation rules, the overwrite behavior is a little different since symptoms and causes do not exist outside the context of a correlation rule. The import operation replaces the correlation rule on the target machine with the correlation rule of the same name included in the content pack and, in the process, removes any changes or additions to correlation rules on the target machine.

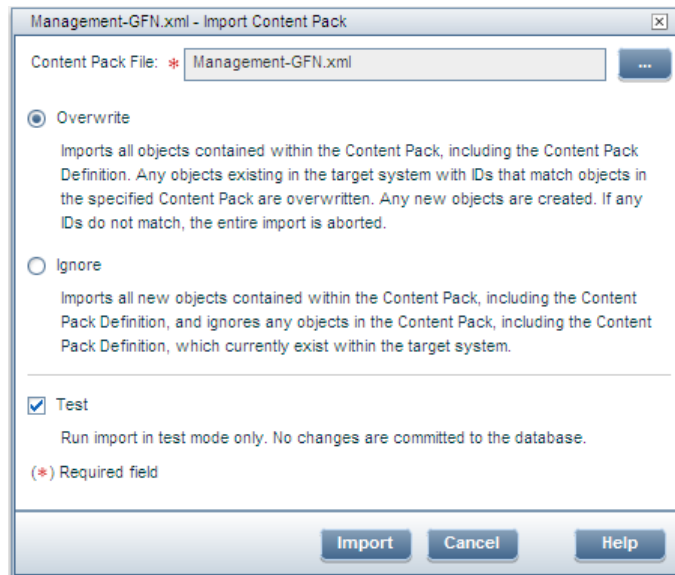
▶ The overwrite option available with the command-line version of the Content Manager has some additional parameters. For more information, see [The ContentManager CLI](#) on page 179.

- **Ignore:** Ignore any existing objects on the target machine if they also exist in the imported content pack and import only new objects. This effectively updates the data on the target system with any new objects in the imported content pack.

▶ Check the Test box to start a simulated run of the selected import operation and display the results. Note that no changes are made in test mode and nothing is actually imported. Test mode is a useful way to test for errors *before* starting the import operation.

[Import a Content Pack](#) on page 182 shows the options to select if you want to test the import of a content pack using the overwrite option.

Figure 76 Import a Content Pack



To demonstrate what effect the various options have on existing data during the import operation using the Content Manager's graphical user interface, [Table 19](#) on page 183 shows what happens when a health indicator (HI) with values A1, B1, and C1 is imported into a system where the same health indicator exists but whose values are either different or modified from the original values A0, B0, and C0.

Table 19 GUI Parameters for Importing Content-pack Data

Import Action	Existing Content	Imported Content	Result
Overwrite	HI (A0, B0, C0)	HI (A1, B1)	HI (A1, B1, C0)
Ignore	HI (A0, B0)	HI (A1, B1, C1)	HI (A0, B0, C1)

Note that the command-line version of the Content Manager includes an extra *clear* option, which enables you to remove all content on the target machine before starting the import operation. For more information about the `ContentManager` command-line tool and the *clear* option, see [The ContentManager CLI](#) on page 179.

Topology Synchronization

HP OMi provides a feature that enables you to synchronize topology data between HP Operations Manager and the UCMDB using the tool `opr-startTopologySync.bat`. The synchronized data includes: services, managed nodes, and node groups. The topology-synchronization process ensures that the state of the UCMDB reflects the state of the HP Operations Manager database at the time the synchronization runs. You can run the topology-synchronization tool, `opr-startTopologySync.bat`, manually from the command line or automatically according to a defined schedule, for example, with the Windows task scheduler.

On startup, `opr-startTopologySync.bat` looks for information defined and stored in the settings manager, for example: the name of the HP Operations Manager server with which HP OMi is to synchronize data, and details of the database instances between which data is to be exchanged. The topology-synchronization process requires a connection between the HP OMi and the HP Operations Manager management servers whose data you want to synchronize. In addition, you need to ensure access to both the HP OMi database and the UCMDB.

The `opr-startTopologySync.bat` command writes details of the topology-synchronization progress to a log file, `opr-topologysync.log`. The log file resides in the default directory for all HP OMi log files, `%TOPAZ_HOME%\log\opr-topologysync`. By default, the topology-synchronization process logs errors, warnings, and general information only, which includes, amongst other things, details of the number and type of objects that are modified during the synchronization process. If you need more detailed information of what happens during the topology-synchronization process, you can change the *loglevel* setting in the `opr-topologysync.properties` file, which resides in the following directory:

```
%TOPAZ_HOME%\conf\Core\tools\log4j\opr-topologysync\
```

The `opr-topologysync.properties` file explains what options are available for logging information. For more detailed information about the settings for the topology-synchronization tool, see [Topology-Synchronization Settings](#) on page 184. For more information about the `opr-startTopologySync.bat` command, see the HP OMi online help.

Topology-Synchronization Settings

The successful completion of the topology-synchronization process depends on the availability of information that the synchronization tool needs concerning the connection between the management servers whose topology must be synchronized and access to the databases that store the topology data. Note that topology synchronization works with the installed default settings, assuming that the HP OMi administrator provided answers to all the questions about topology synchronization during installation and setup of HP OMi. Before you use the topology-synchronization tool for the first time, it is important to check and, if necessary, adjust the topology-synchronization settings to suit the requirements of your local environment.



HP OMi displays the synchronization settings that you need to check and change in the Infrastructure Settings Manager under Operations Management - OM Topology Synchronization.

To ensure the successful synchronization of HP OMi and HP Operations Manager topologies, you need not only to configure settings for the synchronization itself, you also need to check and, if necessary, adjust the settings defined for the following areas:

- **Database Settings:** the topology-synchronization process writes the ID mapping into the HP OMi database for the resolution of configuration items. The information you need to check and, if necessary, change to suit your environment, includes the log-in details that the topology-synchronization process uses to access the database.
- **OM connection settings:** the topology-synchronization process needs to read the topology data from the HP Operations Manager web service (WS) during synchronization.
- **UCMDB Connection Settings:** the topology-synchronization process needs to write information about new and changed configuration items to the UCMDB during the synchronization. This operation requires log-in credentials that the topology-synchronization process uses to access the UCMDB.

If you want to set up a topology-synchronization task in the Windows scheduler, use the file: `%TOPAZ_HOME%\bin\opr-startTopologySync.bat`. For more information about the `opr-startTopologySync.bat` command, open a command shell and run the command with the `-help` option.

Table 20 on page 185 lists the attributes you also need to take into account when configuring the settings for topology synchronization.

Table 20 HP Operations Manager Topology-Synchronization Settings

Parameter	Description
Dump data	Saves all data gathered during the topology-synchronization process and dumps it to file. This is not recommended for production systems, as it can have a serious impact on system performance. Possible values are: “true” or “false”. False is the default setting. True is intended for use with troubleshooting or debugging activities.
Enable usage of Groovy scripts	Enables an interface for users who want to make use of Groovy scripts to manipulate the synchronization data during the synchronization process. The default setting is “false”. To make use of this feature, change the setting to “true” and make sure that the script names use the naming conventions described in Interface for Groovy Scripts on page 185.
Packages used for Topology Sync	Semicolon separated list of the packages that HP OMi uses for the topology synchronization, for example: <code>default;nodegroups;operations-agent;HPOprOra</code> For more information about configuration and restrictions, see Packages for Topology Sync on page 186.
Resolve IPs during synchronization	Enables IP resolution for nodes in HP Operations Manager that do not have an IP address. Possible values are “true” or “false”. Setting this parameter to true has a negative impact on the synchronization performance.

Interface for Groovy Scripts

HP OMi provides an interface for users who want to make use of Groovy scripts to manipulate the synchronization data during the synchronization process. To enable access to the interface, you must change the setting from the default “false” to “true”. You also have to make sure that the script names use the following naming conventions:

- `preEnrichment.groovy:`

A script that HP OMi runs before starting the topology synchronization's mapping process, for example, to supplement default mapping rules that do not meet local requirements.

- `preUpload.groovy`:

A script that HP OMi runs after the mapping process but before writing any data to the UCMDB, for example, to create additional CIs or add extra details to existing CI instances.

- `postUpload.groovy`:

A script that HP OMi runs after saving the uploaded data in the UCMDB, for example, to modify data saved during the upload process.

The Groovy scripts must reside in the same location as the topology-synchronization mapping rules, namely: `%TOPAZ_HOME%\conf\opr\topology-sync\sync-packages`.

Packages for Topology Sync

HP OMi enables you to specify the content you want to update when synchronizing the topology between HP OMi and HP Operations Manager. In the Topology Synchronization Settings dialog, you can list the packages whose contents HP OMi must update during the topology-synchronization process. The entries in the list must be separated by a semicolon (;) as illustrated in the following example:

```
default;nodegroups;operations-agent;HPOprOra
```

A package contains a collection of configuration files which define the mapping rules to use (for attributes, context, CI type, and so on) during topology synchronization. By default, packages reside in the directory

`%TOPAZ_HOME%\conf\opr\topology-sync\sync-packages`. HP Smart Plug-ins also write topology-synchronization packages to this directory. For example the SPI for Oracle uses the package (and directory) name: `HPOprOra`. This is the name you enter in the list if you want the mapping rules to be considered during topology synchronization.

If you are adding custom packages, note that the package name is the same as the name of the directory in which the package resides.



Removing items from the list of packages to update during synchronization can lead to the removal of items from the UCMDB. For more information, see [Troubleshooting Synchronization Problems](#) on page 186.

Troubleshooting Synchronization Problems

HP OMi topology-synchronization is a one-way process which ensures that data discovered in HP Operations Manager is reflected in the UCMDB and available to HP OMi management tools.



The topology-synchronization operation is not the only process which updates information about CI instances in the UCMDB. If licensed and enabled, the Discovery and Dependency Mapping (DDM) process updates the contents of the UCMDB regularly, too.

If both DDM and the topology-synchronization process update the same objects during their respective runs, care is needed in understanding what the current state of the object is before, during, and after the respective synchronization completes. For example, if DDM writes the *short* host name for the CI type "Host" and the topology-synchronization process writes the *long* host name, then the host-name attribute toggles between long and short each time the respective discovery and synchronization runs.

Table 21 on page 187 shows what happens when a object such as a configuration item (CI-A, or CI-B) with attributes (a, b, c, and so on) is updated by both DDM and the topology-synchronization process.

Table 21 Synchronize Topology Data

UCMDB Content	DDM Update	Topology-Sync Update	Result
CI-A	CI-A (a1, b1)	CI-A (c2, d2)	CI-A (a1, b1, c2, d2)
CI-B	CI-B (a1, b1, c1)	CI -B (a2, b2)	CI-B (a2, b2, c1)

The topology-synchronization process overwrites the existing objects in the UCMDB with the objects discovered in HP Operations Manager even if a newer (or modified) version exists in the UCMDB, for example, because it was created or modified by DDM. Unlike DDM, the topology-synchronization process does not and cannot create new configuration-item *types*. If the topology-synchronization process attempts to write a CI to the UCMDB for which a CI type does not exist, the topology-synchronization process fails, with a corresponding entry in the log file. However, the topology-synchronization process can modify an existing CI or CI type using the attributes defined in the mapping tables included in the topology-synchronization packages.



Caution is necessary when changing topology-synchronization settings, particularly when removing items from the list of packages to consider for update during the synchronization process. The topology-synchronization process not only adds items to the UCMDB but, where necessary, removes them, too.

Before starting the topology-synchronization process, HP OMi compares the current and previous list of packages whose content must be considered for update. The delta detection is designed to monitor changes to the synchronization requirements and use the information to determine what, if any, changes are required during the synchronization process. If you remove a package from a list that was used in a previous synchronization, all the configuration items that were added to the UCMDB in the previous synchronization by the package that is no longer in the list are removed from the UCMDB when the next synchronization starts.

For example, if the topology synchronization runs twice, first *with* and then *without* the `HPOprOra` package, the result of the topology synchronization would be as follows:

- Synchronization 1:** `default;nodegroups;operations-agent;HPOprOra`

HP OMi adds or updates the configuration items referenced by any of the listed packages, including the `HPOprOra` package for the HP Smart Plug-in for Oracle (Database instances, table space, and so on).
- Synchronization 2:** `default;nodegroups;operations-agent;HPOprExc`

Since the `HPOprOra` package is no longer in the list of packages to consider for update, HP OMi *removes* from the UCMDB all configuration items added or updated by the `HPOprOra` package in the previous runs (Oracle database instances, database table space, and so on). During the same topology synchronization, HP OMi *adds* to the UCMDB any configuration items referenced by the new entry in the list of packages, namely: `HPOprExc`, the package for HP Smart Plug-in for Microsoft Exchange (edge, hub, client-access servers, and so on).

For more information about the settings you can configure for topology-synchronization, see [Topology-Synchronization Settings](#) on page 184.

If you intend to make use of the topology-synchronization feature, note that HP OMi and HP Operations Manager handle the problem of duplicate object IDs (for nodes, node groups, service groups, and so on) differently, and the difference can lead to problems when synchronizing data. Although duplicate IDs are not recommended in HP Operations Manager, they can occasionally occur but do not cause problems. In HP OMi, however, duplicate IDs can lead to severe problems and cause the topology-synchronization process to fail. Duplicate IDs occur when the same ID is assigned inadvertently to two different objects in HP Operations Manager, for example: a node and a node group, or a node group and a service group.

Note that the problem of duplicate IDs is rare; duplicate IDs cannot occur if you use the standard GUI in HP Operations Manager. However, duplicate IDs are possible if you circumvent normal procedures, for example: by entering an ID by hand, or importing into HP Operations Manager a service tree defined in a separate MOF file.

8 Custom Tools

The information in this section introduces the concept of the custom tool in HP OMi and explains how custom tools can help improve an individual user's work flow, that is: the daily tasks the user performs and the order in which the tasks typically occur. This chapter also provides information about the concepts underlying the administrative tools that are available to help authorized users configure and manage custom tools. Reading this section helps you understand why you need to make use of custom tools and how custom tools can help operators solve the problems that occur in your monitored environment.



The user types described in this section are examples only. HP OMi enables you to configure the user types that best meet the needs of your environment.

Table 22 on page 189 provides an overview of the contents of this chapter and indicates the intended audience, that is: the type of user who needs to read and understand the listed topic to help perform the tasks in their daily work flow.

Table 22 User-Management Overview

Page	Concept	HP OMi Admin	Domain Expert	Domain Operator
190	Custom-Tools Work Flow	✓	✓	-
192	Introduction to Custom Tools	✓	✓	-
194	The Tools Manager	✓	✓	-
196	Tool Definitions	✓	✓	-
201	Tool Parameters	✓	✓	-
207	Tool Tests	✓	✓	-
208	The Run-Tool Wizard	✓	✓	✓

Custom-Tools Work Flow

HP OMi provides an administrative feature that aims to help authorized users such as domain experts create, configure, and manage custom tools. Custom tools are intended to help domain operators manage and monitor specific types of events that occur in the operational environment. The custom tools that are available to individual users depend on the responsibilities assigned to the group the user belongs to, the demands of a user's work flow, and the technical context in which the users perform their tasks. For example, domain experts need access to administrative tools such as the Tools Manager to perform some of the tasks in their work flow. Domain operators, on the other hand, need access to event-management tools.

To perform the tool-management tasks required by their respective work flow, HP OMi users need to have a good understanding of the topics discussed and explained in this section. The information provided in this section attempts to address the needs of all users whose work-flow requirements mean they have a role to play in the management of custom tools, for example:

- [The HP OMi Administrator](#)
- [The Domain Expert](#)
- [The Domain Operator](#)

The HP OMi Administrator

HP OMi administrators need to have a good understanding of user management as well as the underlying user-related concepts such as user roles, user groups, user authorization, user authentication, and so on. A high-level summary of the HP OMi administrator's work flow in the context of user management includes the following tasks:

- **Configure user groups:**
Define and configure user groups so that custom tools can be configured for and assigned to the users who need them the most.
- **Grant access to administrative tools:**
Ensure that user groups have access to the tools available in the HP OMi administrative interface where appropriate. For example, domain experts need access to the Tools Manager so that they can create and configure the custom tools that domain operators use to manage events.

The Domain Expert

In HP OMi, domain experts need to have a comprehensive understanding of custom tools and tool management including the relationship between users and tools and events and configuration-item types. Domain experts also need to understand the underlying user-related concepts of custom tools and tool categories as well as how the use and availability of the custom tools depend on the rights and permissions granted to users and user groups. A high-level summary of the domain expert's work flow in the context of custom-tool management includes the following tasks:

- **Configure tools and tool categories for specific technical domains:**
Create, configure and make custom tools available to the users responsible for investigating and resolving events in a particular technical domain, for example: Oracle, Active Directory (AD), BlackBerry Enterprise Server, or Microsoft Exchange.

- Create appropriate CI types for the technical domain:

Make sure that the appropriate types of configuration-item exist for the specific technical domain and, if necessary create new ones, so that the custom tools required for the technical domain can be correctly assigned.

- Grant authorization to required tools:

Ensure the appropriate users and user groups have access to the customs tools that are available.

The Domain Operator

In HP OMi, domain operators sometime need special tools to help resolve the problems that cause (or are a symptom of) a particular type of event. The tools themselves are usually provided by the experts responsible for a particular domain, such as: Microsoft Exchange, Oracle, or Active Directory. A high-level summary of the domain operator's work flow in the context of custom tools includes the following tasks for the specific technical domain:

- List and launch custom tools:

Start and use customized tools configured by domain experts to help solve problems associated with a particular type of configuration item or event. Understand and make use of any feedback returned by the custom tool.

Introduction to Custom Tools

HP OMi enables users with access to the administrative interface to create, configure, and manage custom tools that domain operators can use to help resolve and close specific types of events that occur in the monitored environment. For example, domain experts can create tools that check the status and availability of an Oracle database instance, run commands on a remote system, or look up specific information on a web site run by an application provider.

HP OMi enables you to create the following types of tools:

- **Command:**

A custom tool can run a command including any additional options and parameters. For example, you can configure a command that starts the information-store service on a Microsoft Exchange Mailbox Server. Alternatively, you can configure a command that checks the connection of all the Oracle database instances monitored by the Smart Plug-in for Databases (Oracle).

- **Script:**

A custom tool can run a script in one of the following languages: Perl, Javascript, Visual Basic, or Windows script host (WSH). For example, you can create a script that logs in to a remote system, runs a series of commands to check the status of the HP Operations Manager agent and specific Smart Plug-in processes, writes the returned information to a file or standard out, which can be made available to operators.

- **URL:**

A custom tool can call a uniform resource locator (URL) that points to a web site or page where information is available for a specific application or problem. For example, you can look up information about patches and hot fixes for operating-systems, check for firmware updates for hardware, or display documentation that provides expert background to help solve an event's underlying problems.

Custom tools are typically assigned to a CI type so that they are available whenever an event occurs that has an impact on an instance of the nominated CI type. The custom tools are available in the context of the CI type to which they are assigned, any instance of the CI type (either directly or by inheritance), or any event that has an impact on the nominated CI, for example:

- The CI Tree, which is displayed in the Event Perspective tab or the Health Perspective tab.
- The Top View displayed in the Health Perspective tab.
- The Top View and Console displayed in the Dashboard.
- The Event Browser by selecting the event that has an impact on the configuration item, to which the custom tool is assigned.



Custom tools often make use of the HP Operations Manager's distributed agents to run commands directly on managed systems. If you create a tool that requires the HPOM agent and the HPOM agent is not available when the tool starts, the tool run fails.

If a large number of tools are necessary to help operators investigate and fix the problems that occur in their domains, you can group the tools into categories. Tool categories are logical groups of tools that are intended to help solve problems that occur in a particular technical area, such as: network, database, storage, and so on. If a suitable tool category does not exist, you can add one during the tool-configuration process. Tools categories enable you to assign

groups of tools to particular users or user groups to help solve the event-related problems that they are most likely to encounter in their daily work flow. For more information about tool categories, see [Tool Categories](#) on page 198.

The Tools Manager

HP OMi enables users with the appropriate authorization to create their own custom tools, which they can make available to other users to help them solve the problems that often occur in the technical domain that they are responsible for monitoring. Custom tools are context-related tools that provide users with the means to check and resolve common problems associated with the configuration-item type impacted by particular types of event that occur in particular technical areas. HP OMi enables you to configure different types of custom tools, for example: tools that start a command, tools that run a script, or tools that call a specific URL.

Figure 77 on page 195 shows how the Tools Manager provides an overview of the custom tools that are available. The information displayed is divided into the following, distinct areas:

- **CI Context:**

The Tools Manager indicates the configuration-item type to which the currently selected (or new) tool is assigned in the context of the complete CI-type tree. The overview enables you to see exactly where in the CI-type tree it makes most sense to assign a custom tool. The assignment position is important if you want to make use of the inheritance feature, which passes on the tool assignment down the CI-type hierarchy.



You can use the built-in CI filter to display only those CI types to which a tool is assigned, or restrict the displayed CI types to those contained in a specific view.

- **Tools List:**

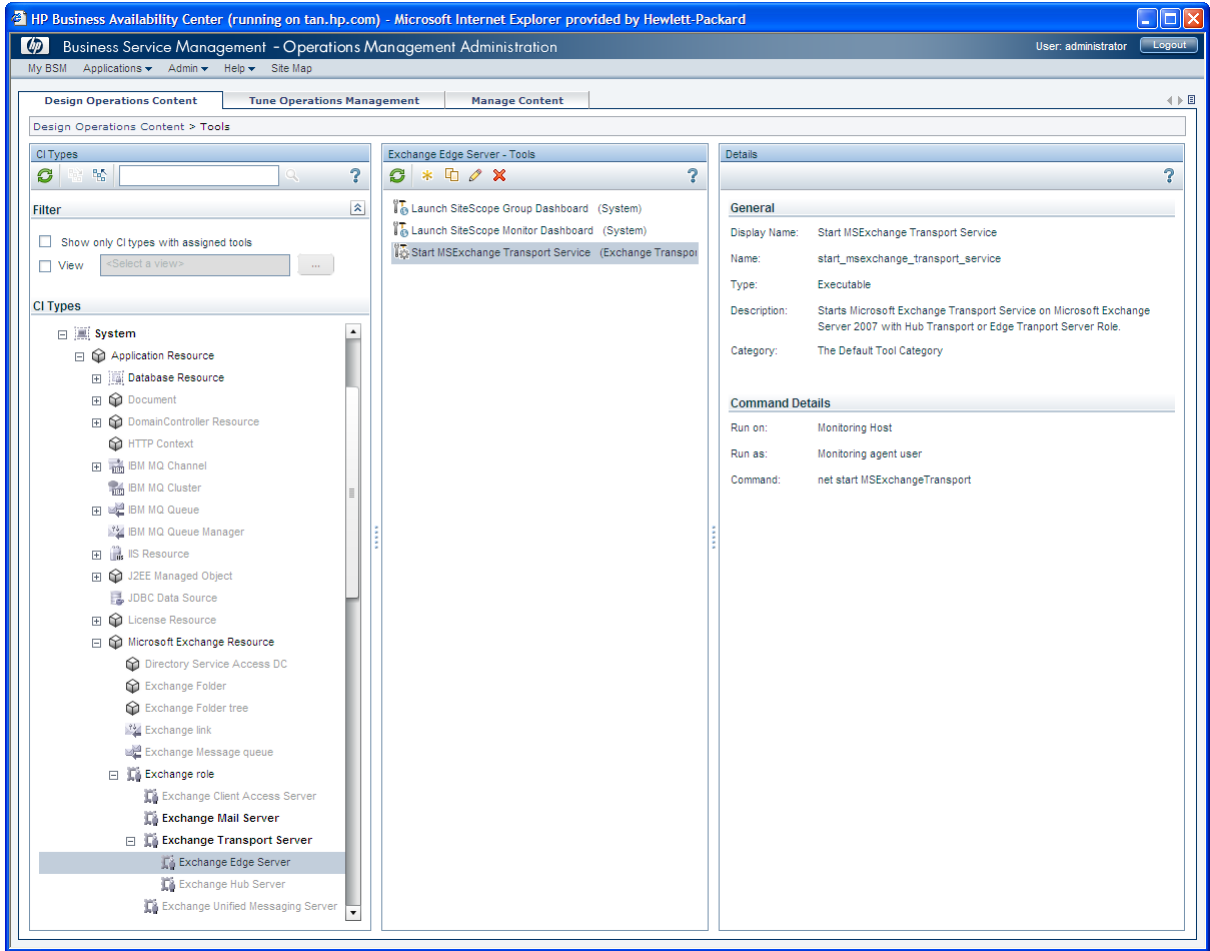
The Tools Manager displays a list of all the tools available for the configuration-item type currently selected in the CI Types pane. The information in the tools list shows if a tool assignment was inherited and, if so, indicates (in brackets) the CI type to which the custom tool was originally assigned. You can use the tools list to modify and manage existing tools or, if necessary, add new tools, too.

- **Tool Details:**

The Tools Manager displays a comprehensive overview of the currently selected custom tool. The details displayed includes the name of the tool, the type (command, script, URL), a short description of the tools purpose, and the tool category the tool belongs to. Note that tools belong to the Default tool category if they are not specifically assigned to another tool category.

The tool details also display a read-only version of the command, script, or URL called by the currently selected tool. If you want to modify the script or command, use the edit feature (available in the tools list) and remember to save the changes you make.

Figure 77 The Tools Manager Interface



Tool Definitions

HP OMi enables users with the appropriate authorization to create custom, context-related tools, which they can make available to other users to help them perform the common tasks that make up their daily, event-management work flow. Custom tools are context-related tools that are associated with the configuration-item type impacted by a particular event—the tools are intended to help fix the problems that cause the events that often occur on a particular type of configuration item. HP OMi enables you to configure custom tools of various types, for example: tools that start a command, tools that run a script, or tools that call a specific URL.

When defining a custom tool, it is important to remember that since custom tools are associated with a particular *type* of configuration item, the tools are also available either from any *instance* of the configuration-item type for which the tools are defined or from any *events* associated with the selected configuration-item type. For example, custom tools are available in the CI Tree View, in the Dashboard, or in the Health Perspective Top View. However, custom tools are also available in the Event Browser in the context of any event occurs that has an impact on an instance of the configuration-item type to which the tool was originally assigned. If you configure a tool that tests the connection to a BlackBerry server and assign the tool to a BlackBerry CI type high up the CI tree, the tool will be available from the BlackBerry CI type to which you assign the tool and, in addition, any configuration items that inherit the tool assignment. The tool will also be available from any event that has an impact on any instance of BlackBerry CI types.

Figure 78 Define a Custom Tool

Start MExchange Information Service - Create New Tool

General

Type

Display Name: * Start MExchange Information Service

Name: * Start_MExchange_Information_Service

Description: This tool starts Microsoft Exchange Information Store Service on an Microsoft Exchange Server 2007 with Mailbox Server Role.

Category: * Default category Other category

(* Required field)

< Back Next > Finish Cancel Help

The second step in the tool-configuration process is to choose the type of tool you want to create, for example: a tool that starts a command, runs a script, or calls a specific URL. The type of tool you choose to create determines which (and how many) other steps are necessary

to complete the tool-configuration process. For example, if you add a tool that runs a script, you need to select a script language. The choice of language is important since it tells HP OMi how to interpret the contents of the script at run time.



For custom tools running on HPOM for UNIX nodes, HP OMi only supports scripts written in Perl.

HP OMi provides a text box for the input of the command, script, or URL that you want to run with a custom tool. The text box can only be used to enter plain text—HP OMi does not parse the contents of the text-entry box or check its validity in any way before saving it and allowing the user to move on to the next step of the tool-configuration process. For this reason, HP OMi does not display a warning if any syntax errors are present in the text displayed in the Script (or Command) box either when you paste the text into the text box or when you save the tool definition at the end of the tool-configuration process. If any errors present in the script or command you define, they are discovered when the tool is launched for the first time and attempts to run the specified command or script. For more information about testing custom tools, see [Tool Tests](#) on page 207.



Tools that attempt to display a graphical interface must be avoided, and tools that use the command-line interface should complete quickly and close automatically and gracefully.

The user cannot interact with the command or script that the tool starts, and HP OMi does not provide the user with any information about the tool's progress until the tool returns a response indicating either successful completion or failure. The lack of user interaction with a running tool means that command-line tools must be configured to close automatically, and tools that attempt to open a graphical user interface or run for a long time should be avoided. For example, on UNIX hosts, a test tool such as the `ping` command should use the `-c[ount]` option to stop the command process after sending a specific number of packets. On Windows nodes, the `ping` command sends only four packets by default, and the count option is `-n`. Tools that run for a long time or are generally slow to respond can give the impression that there is a problem, where none in fact exists. Tools that attempt to open a graphical user interface, for example, to prompt for data input, will not work and never exit.

If domain experts create a tool based on a URL, for example, to open a page with information about how to fix a particular type of problem, they can test the target specified in the URL (along with any run-time parameters that are specified) before saving the tool. For more information, see [Tool Tests](#) on page 207. This is the last step in the creation of a URL-based tool.

For all tool types except those that call a URL, the last step of the tool-configuration process requires you to specify the tool *target*, that is: the name of the host where you want the tool to run. Tools can run on the HP Operations Manager management server, on the host where the original event occurred, or on a specific host of your choice. Whichever target you specify, HP OMi can resolve the target name at run time, for example: using attributes from a CI, from the event that occurred, or from internal, infrastructure-related settings configured in HP OMi.

When defining the target system where the tool runs, you must specify the credentials of the user account that HP OMi uses to start the command or script referenced in the custom tool. HP OMi enables you to choose between the user account of the HP Operations Manager agent or the account of a user specified by the operator who starts the tool. If the command or script runs under the account of a user specified by an operator, the Run Tool wizard prompts for the name and password of the specified user account before running the selected tool. In this case, the nominated user account must exist on the target machine, the specified account must have permission to run the command defined in the custom tool, and the command location must be known.

Figure 79 on page 198 shows how you can exchange tool definitions and tool assignments (the association of a tool with a particular CI type) between instances of HP OMi along with other HP OMi-specific configuration data in so-called “content packs”. For more information about exchanging data between instances of HP OMi, for example, development and production systems, and the restrictions that apply, see [Exchanging Content](#) on page 181.

Figure 79 Tool Definitions in HP OMi Content Packs

Content Pack Information

ID: 17b0d0d3-e3c1-4ed9-b043-fc53a365133f

Display Name: * HPOprOra

Name: * HPOprOra

Description: Content Pack for Oracle database

Content Pack Summary

- Event Type Indicators (10)
- Health Indicators (25)
- Indicator Values (94)
- Mapping Rules (36)
- KPI Rule Definitions (2)
- Health Indicator to KPI Rule Assignments (22)
- Correlation Rules (4)
- Tool Definitions (2)
- View Mappings (1)
- Graph Family Mappings (1)
- Graph Families (1)
- Graph Categories (0)

CI Type	1 ▲	Tool	2 ▲	Type	3 ▲	Description	4 ▲
Oracle		Oracle Database Connection Check		Executable			
Oracle		Oracle Product Manuals		URL			

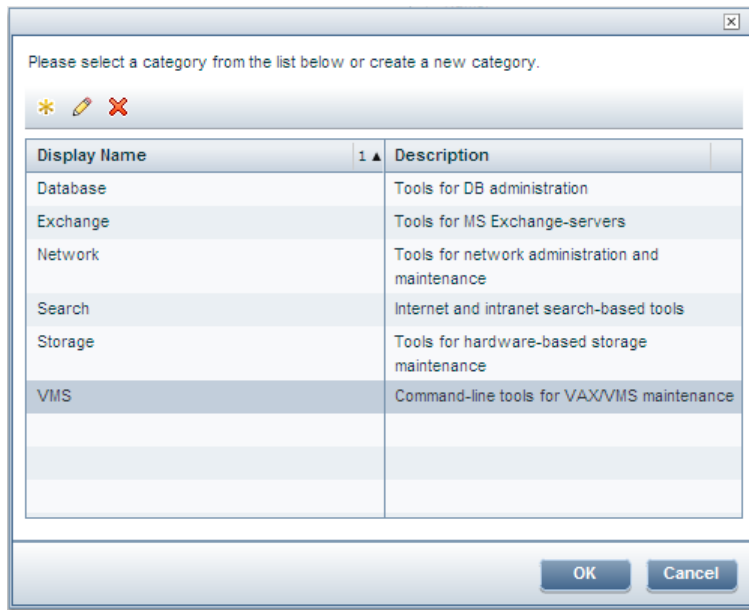
Tool Categories

If operators require a large number of tools to help investigate and fix the problems that occur in the monitored environment, you can manage some aspects of tool assignment much more efficiently by grouping the tools into categories. Tool categories are logical groups of tools that are intended for use in a particular technical area, for example: network, database, storage, and so on. If a suitable tool category does not exist, you can add one during the tool-configuration process.

One area in which HP OMi enables you to make use of tool categories is when setting up users and user groups. You can control access to tools by using tools categories in combination with the authorizations granted to users or user groups. For example, administrators and domain experts can use tool *categories* to define whether an individual user or all the members of a user group can launch the tools configured for a particular technical area. Using this strategy, network operators would only have access to the tools in the “network” tool category, database

operators would be allowed to run tools belonging to the database tool category, and so on. For more information about granting permissions to users or user groups, see [User Authorizations](#) on page 39.

Figure 80 Select Tool Category



Note that it is not currently possible to check the contents of a tool category, for example, to see which tools belong to a particular tool category.

Tool Assignment by Inheritance

Part of the tool-configuration process involves assigning the new tool to the configuration-item *type* impacted by the events you want to monitor in a particular technical domain. For example, to provide a tool that helps investigate events related to an Oracle database, you assign the Oracle tool you create to the Oracle-database configuration-item type.

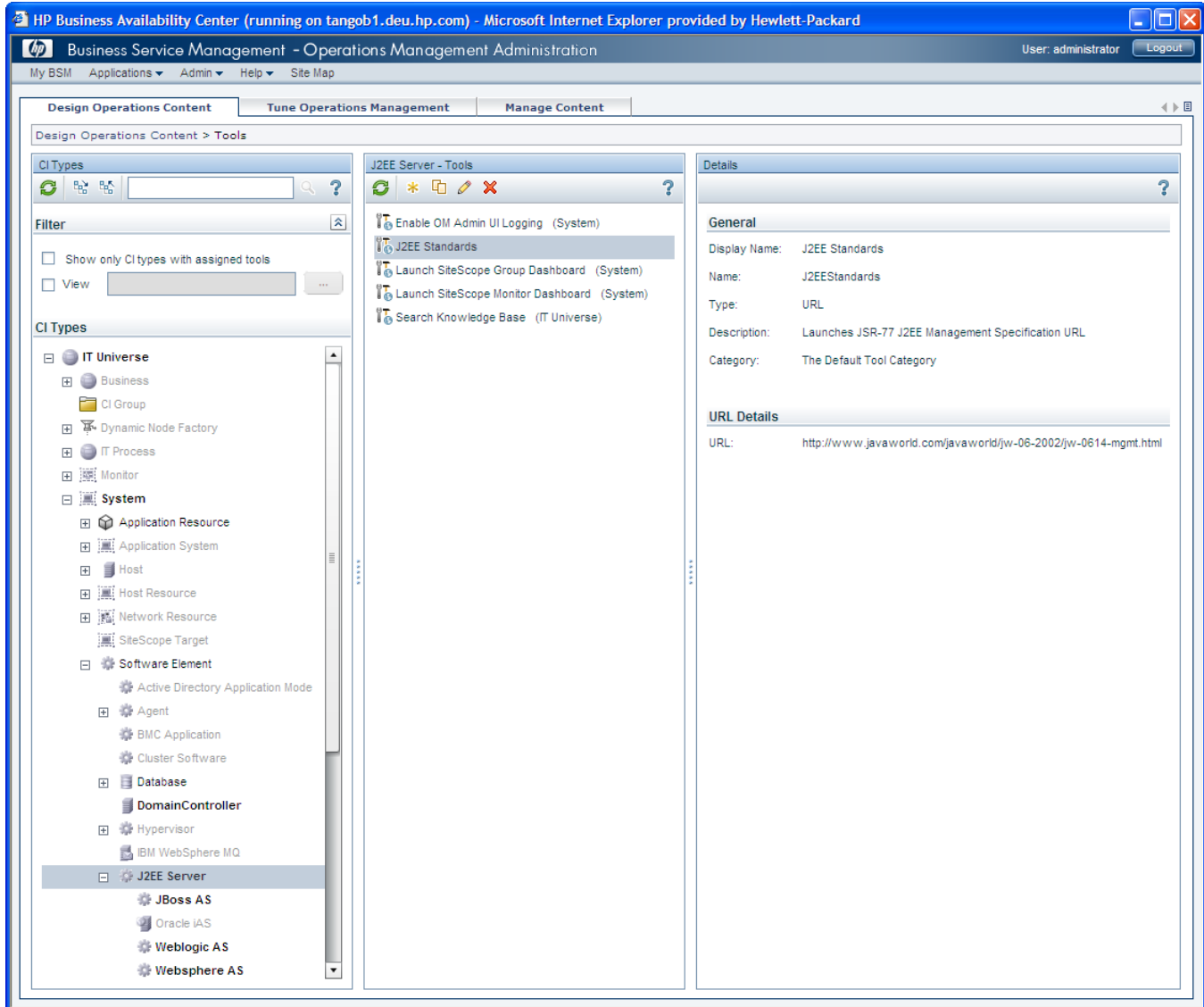


Assigning a tool to a configuration-item type *high* up the CI hierarchy enables you to make sure that the same tool assignment is passed on automatically by inheritance to all related configuration-item types lower down the hierarchy.

A global tool-assignment strategy works well for high-level tools that are useful in many different scenarios—assigning a custom tool to a single configuration-item type high up the CI tree makes the same custom tool available to a large number of tools further down the tree. However, tools that are intended to help solve problems in more specific technical areas where command names and options differ or the environment is unique (such as an Oracle database or a Microsoft Exchange server) are best assigned directly to the individual configuration-item type impacted by the events you want to monitor. Typically, these configuration-item types tend to be lower down the CI-type hierarchy.

[Figure 81](#) on page 200 shows the list of custom tools assigned to the configuration-item type “J2EE Server” either directly or by inheritance. All tools assigned to the CI type “J2EE Server” directly are passed on by inheritance to the CI types below J2EE Server in the CI tree, for example: JBoss AS, Oracle AS, Weblogic AS, and Websphere AS. If the CI types JBoss AS, Oracle AS and so on also contain CI types, too, then the tool assignments are passed on to these CI types as well.

Figure 81 Tool Inheritance Rules



HP OMi indicates tool inheritance by including (in brackets) the name of the CI type from which the original tool assignment was inherited. For example, JBoss Standards (J2EE Server) shows that the tool “J2EE Standards” was originally assigned to the CI type “J2EE Server” higher up the CI tree and was passed down (by inheritance) to the currently selected CI type, “JBoss AS”.



You can use the Tools Manager’s embedded filter to restrict the configuration-item types displayed to only those for which tools are available.

Note that tool definitions and tool assignments (the association of a tool with a particular CI type) are exportable along with other HP OMi-specific configuration data in so-called “content packs”. For more information about exchanging data between instances of HP OMi, see [Exchanging Content](#) on page 181.

Tool Parameters

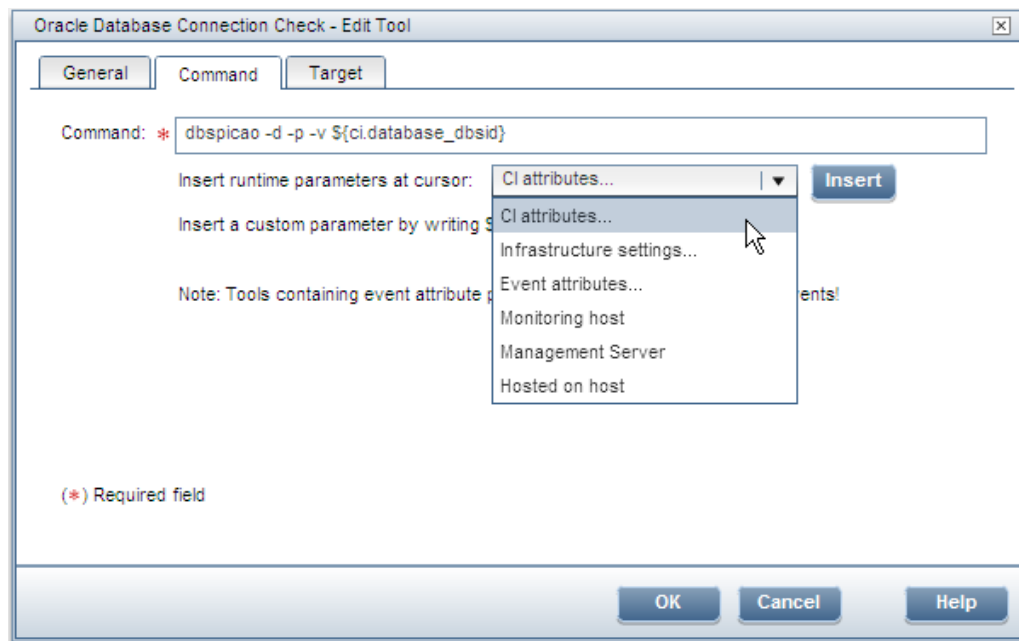
During the tool-configuration process, domain experts can add run-time parameters to define more precisely the context in which a custom tool runs—HP OMi attempts to resolve the parameters when the tool starts. For example, custom tools can use the attributes of an event that occurs (or the attributes of the configuration-item type impacted by the event) to restrict and refine the context in which the tool is available. By associating a tool with a CI type, HP OMi ensures that the most appropriate tools are always available to help solve the problems that cause the events that are most likely to have an impact on the selected type of configuration item.



Since event parameters can only be resolved when a tool is launched in the context of the event to which the parameters refer, the selection of tools available in the context of an event is different to the selection of tools available from the CI type impacted by the event. As a consequence, tools containing parameters that reference event attributes are only available in the context of the event to which the attributes refer. The tools are not available in the context of the configuration item impacted by the event.

Figure 82 on page 201 shows how to add parameters to a command you want to use as a tool. For example, you can insert parameters that resolve the date the event occurred, the time and date that notification of the event arrived, or the name of the host where the event occurred. Although you can insert any event attribute into a tool command, you need to make sure the attribute is actually resolvable and available in the event to which the tool is attached. Note that you can only insert one attribute (of any type) at a time; to insert multiple attributes, you must repeat the insert action for each of the individual attributes you want to add.

Figure 82 Add Attributes to Custom Tool



You can also combine attributes from the different areas, for example: configuration items, events, infrastructure settings, and so on. For more information about the attributes that are available, see the sections that follow. If you do choose to combine attributes from *different* areas in a *single* custom-tool definition, note that *event* parameters can only be resolved if the tool starts in the context of an *event*; event parameters cannot be resolved if you start the tool in the context of the configuration-item that is impacted *by* the event.

HP OMi enables you to add parameters to custom tools by selecting attributes from lists. However, you can add parameters manually, too. If you want to add parameters manually, or check that the overall syntax is correct, note that the parameter name and the syntax required when adding it to a tool command, script, or URL depends on the type of tool you are creating and the type of attribute you want to use. [Table 23](#) on page 202 shows the syntax requirements for parameters added to commands, scripts, or URLs called by custom tools

Table 23 Custom-Tool Syntax Requirements

Tool Type	Separator	Examples
Command	Dollar sign and braces: <code>\${...}</code>	<code>\${<attribute_type_prefix>.<attribute_name>}</code> <code>\${ci.host_hostname}</code>
Script	Two “At” signs: <code>@@...@@</code>	<code>@@<attribute_type_prefix>.<attribute_name>@@</code> <code>@@ci.unix_description@@</code>
URL	Dollar sign and braces: <code>\${...}</code>	<code>\${<attribute_type_prefix>.<attribute_name>}</code> <code>\${evt.category}</code> <code>\${evt.custom.Sis_ServerURL}</code>

[Table 24](#) on page 202 shows the required format for the names of the parameters added to commands, scripts, or URLs called by custom tools.

Table 24 Parameter Names in Custom Tools

Parameter Type	Prefix	Examples
CI Type	ci.	<ul style="list-style-type: none"> ci.host_hostname ci.host_osinstalltype
Event	evt.	<ul style="list-style-type: none"> evt.category evt.assigned.user
Infrastructure Setting	setting.	<ul style="list-style-type: none"> setting.platform.default.core.server.url setting.opr.opr.ucmdb.connection.user
HPOM host	opr.	<ul style="list-style-type: none"> opr.mgmt.server opr.monitor.host

Note that the nesting of parameters is not permitted in a custom tool. If you try to nest one parameter inside another parameter in a custom tool, HP OMi displays a warning and highlights (in red) the border of the text-entry box for the command, script, or URL. For more information about including attributes in your custom commands, scripts, and URLs, see the following sections:

- [CI Attributes](#) on page 203
- [Event Attributes](#) on page 203
- [Infrastructure Settings](#) on page 204
- [Custom Attributes](#) on page 205

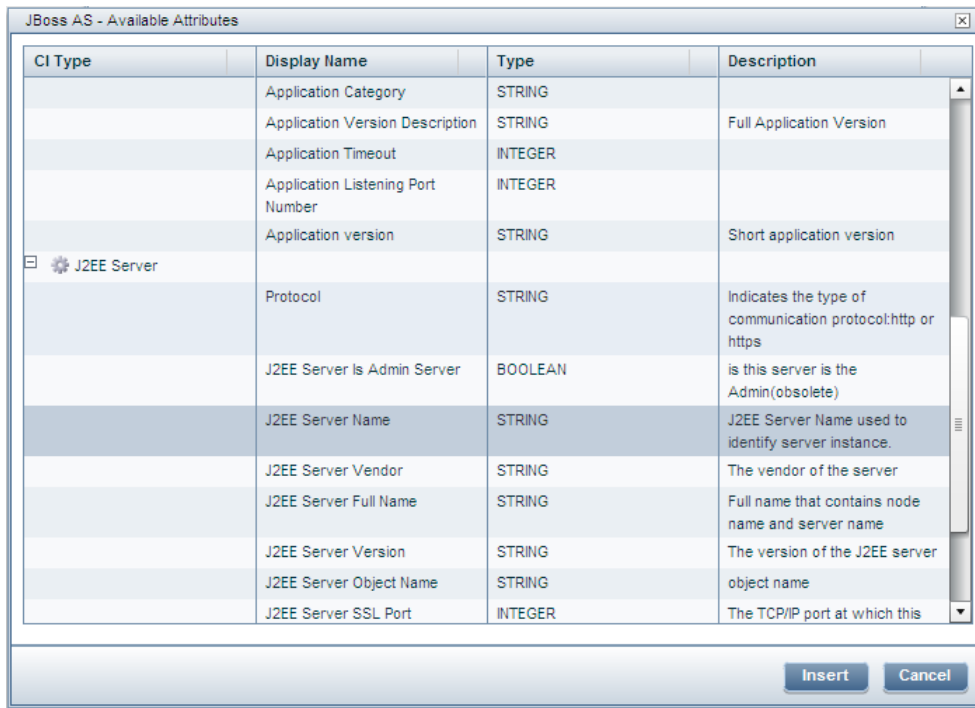
CI Attributes

HP OMi enables you to use the attributes of CI types as parameters in a tool, for example: as options in a command, variables in a script, or as part of a URL. The attributes help set and refine the context in which a custom tool runs, as illustrated in the following simple example URL, which opens the JBoss Application Server Web Console in a separate browser window:

```
http://${ci.j2eeserver_servername}:${ci.application_port}/web-console
```

Note that HP OMi restricts the contents of the list of attributes it displays for selection to those attributes that are related to the configuration-item type for which you are configuring the custom tool. [Figure 83](#) on page 203 illustrates how to display a list of the CI-type attributes that you can insert as parameters in a command, a script, or a URL and select the required attribute.

Figure 83 CI Attributes as Custom-Tool Parameters



Event Attributes

HP OMi enables you to use the attributes of events as parameters in a tool, for example: as options in a command, variables in a script, or as part of a URL. The event attributes help set and refine the context in which a custom tool runs, as illustrated in the following simple example:

```
http://www.google.com/search?q=${evt.title}
```

The example above defines a URL-based tool that uses the event title—the text that comprises the event summary displayed in the Event Browser—as the string to enter in a search engine. The tool returns a list of articles posted in knowledge bases by people who have already encountered and resolved the same (or a similar) event’s underlying problem.

[Figure 84](#) on page 204 illustrates how to display a list of the available event attributes and select the attribute you want to insert in a command, script, or URL.

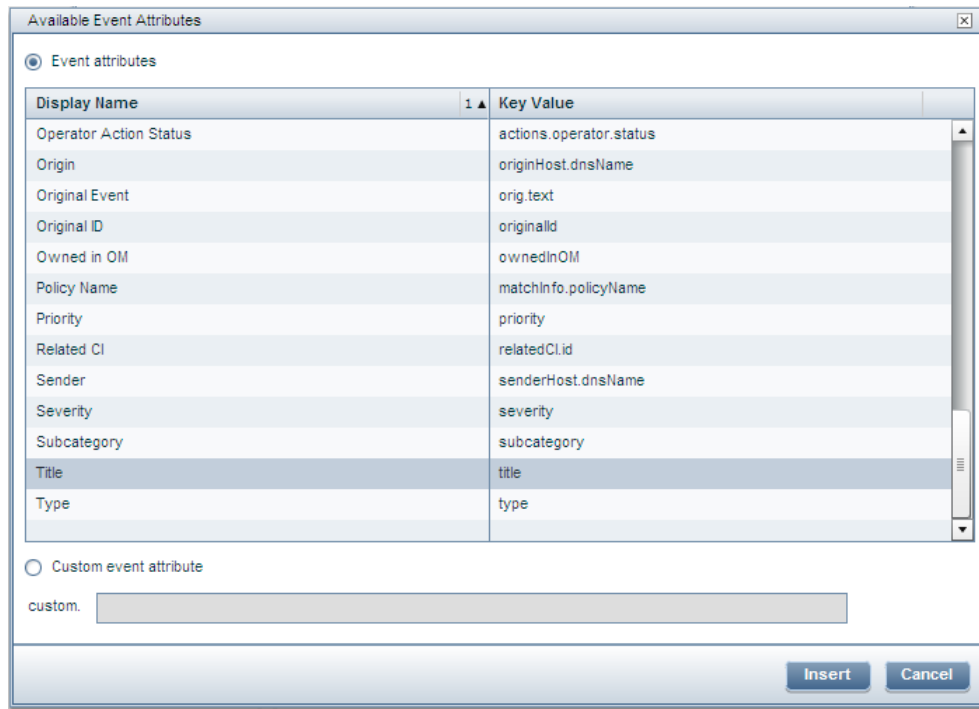
The following, more complicated example illustrates the use of *custom* event attributes in a URL-based tool. Custom attributes are event-based attributes that users define to suit the needs of their own operational environment. The tool illustrated in the following example opens the HP SiteScope monitor dashboard in a separate browser. The custom attributes included in the tool define the URL of the HP SiteScope server and the identity of the HP SiteScope monitor, both of which can change according to the user context and location.

```
http://${evt.custom.SiS_ServerURL}/servlet/
Main?activeid=${evt.custom.SiS_MonitorID}&activerighttop=dashboard&dashboard_
view=Details&dashboard_model=true&dashboard_favorite=None
```

By assigning the tool illustrated in the previous example to the “System” CI type, domain experts can make sure that the tool assignment is passed on automatically by inheritance from System to all CI types further down the CI-type hierarchy.

If HP OMi cannot resolve the value of a custom attribute when an operator runs the configured tool, HP OMi prompts the operator to enter a value for the custom event attribute during the specify-parameters step before the tool is started. For more information about the tool preview step, see [The Run-Tool Wizard](#) on page 208

Figure 84 Event Attributes as Custom-Tool Parameters



Infrastructure Settings

HP OMi enables you to use the attributes of infrastructure settings as parameters in a tool, for example: as options in a command, variables in a script, or as part of a URL. The attributes help set and refine the context in which a custom tool runs, as illustrated in the following simple example:

```
http://${setting.platform.default.core.server.url}/opr-admin-server/
swfWrapper.jsp?app=LogManager
```

The example shows how to provide a tool that enables users to enable logging and tracing in the administrator user interface. Figure 85 on page 205 illustrates how to display a list of the infrastructure settings that you can insert as parameters in a command, a script, or a URL and select the required attribute. Note that the attributes listed are the same as those available in the Platform: Settings page, which is only available to users with the authorization to access administrative tools.

Figure 85 Infrastructure Settings as Custom-Tool Parameters

Application / Foundation	Display Name	Value
<input checked="" type="checkbox"/> Offline Business Logic Engine		
<input checked="" type="checkbox"/> Online Business Logic Engine		
<input checked="" type="checkbox"/> Operations Management		
<input type="checkbox"/> Platform Administration		
Platform Administration	Locations long cache refresh interval	86400000
Platform Administration	Locations short cache refresh interval	86400000
Platform Administration	Clear Audit Log	false
Platform Administration	HTTP Reverse Proxy IPs	
Platform Administration	Clear Audit Log Value	90
Platform Administration	Default Virtual Core Services Server URL	http://tango.hp.com:80
Platform Administration	Enable Reverse Proxy	false
Platform Administration	Default CMDB Database ID	
Platform Administration	Enable evaluation (staging) mode	false
Platform Administration	Default Virtual Centers Server URL	http://tangob1.deu.hp.com:80
Platform Administration	CRS Repository Project	DEFAULT/Default
Platform Administration	CRS Repository URL	http://localhost:8080/mcrs
Platform Administration	Maximum Connected Customers	30
<input checked="" type="checkbox"/> Production Analysis		

Custom Attributes

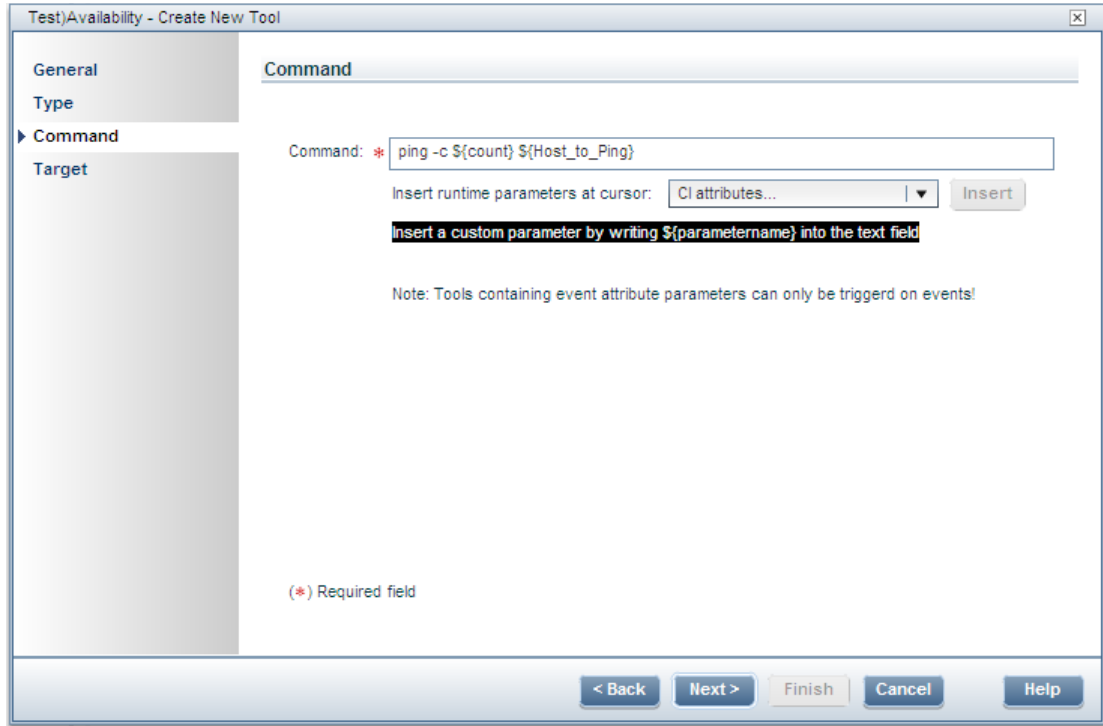
HP OMi enables you to specify your own *custom* attributes as parameters in a tool, for example: as options in a command, variables in a script, or as part of a URL. Custom attributes are most useful in a generic tool that is designed to run in many different contexts—HP OMi prompts the operator who launches the tool to specify the parameter values that set the *specific* context for the tool at run time. The following simple example tests the availability of a host by using the `Ping` command to send a defined number of packets:

```
ping -c ${Count} ${Host to Ping}
```

Custom attributes are especially useful if you want to define a generic command that prompts for information which changes according to context. For example, if the problem-resolution process requires an operator to check the availability of a server, the operator can create a custom tool to check if the host where the server runs is reachable and responding. Since custom attributes are not automatically resolvable, HP OMi prompts for a value when the tool starts. When the operator launches the custom tool illustrated in the example above, the Run Tool wizard prompts for the name of the host to ping (`${Host to Ping}`) and the number of packets to send (`${Count}`).

Figure 86 on page 206 illustrates how to enter custom attributes into a command. Custom attributes are allowed in script- and URL-based tools, too. Note that the syntax of the custom attribute you add changes according to the type of command you are creating, for example: `${Attribute_Name}` in a command, or `@@Attribute_Name@@` in a script. For more information about syntax requirements in custom tools, see Table 23 on page 202.

Figure 86 Custom Attributes in a Custom Tool



Tool Tests

One of the most important parts of the tool-configuration process is to make sure that custom tools work as expected *before* making them more widely available. HP OMi enables you to test URL-based tools during the configuration process—you can see the page called by the URL in a separate browser window. Other types of tools that use commands or scripts are best tested in the environment for which they are intended.

If domain experts create a tool based on a URL, for example, to open a page with information about how to fix a particular type of problem, they can test the target specified in the URL (along with any run-time parameters that are included) *before* they save the tool. HP OMi starts a separate browser with the specified URL and displays the results of the defined URL.



Different applications handle the requirements for web-site login credentials in different ways. Some applications allow the inclusion of names and passwords as parameters in the URL, others forbid it for security reasons and require the manual entry of login credentials. Settings for digital badges and security certificates also need to be taken into account when configuring tools that provide access to web sites, which allow secure automatic login.

The text box that HP OMi provides for the input of a custom command or script can only be used for the entry of plain text. In addition, HP OMi does not parse the contents of the Command or Script box or check the contents' validity in any way before saving it and allowing the user to move on to the next step of the tool-definitions process. For this reason, HP OMi does not display a warning if any syntax errors are present in the text displayed in the Script (or Command) box either when you paste the text into the text box or when you save the tool definition. Any errors present in the script or command you define are only discovered when the tool is launched for the first time and attempts to run the specified command or script, for example, in the Preview Tool Execution step of the Run Tool wizard. For more information about the steps that occur before and during tool execution, see [The Run-Tool Wizard](#) on page 208.

If an error occurs during the startup or execution of the tool, or the tool encounters an unexpected problem, HP OMi displays information about the error or the unexpected problem in the same wizard in which the tool was started. Note that any remote actions which occur as a result of the error, for example a window displaying standard output on a UNIX host, cannot be simulated in the Run Tool wizard.

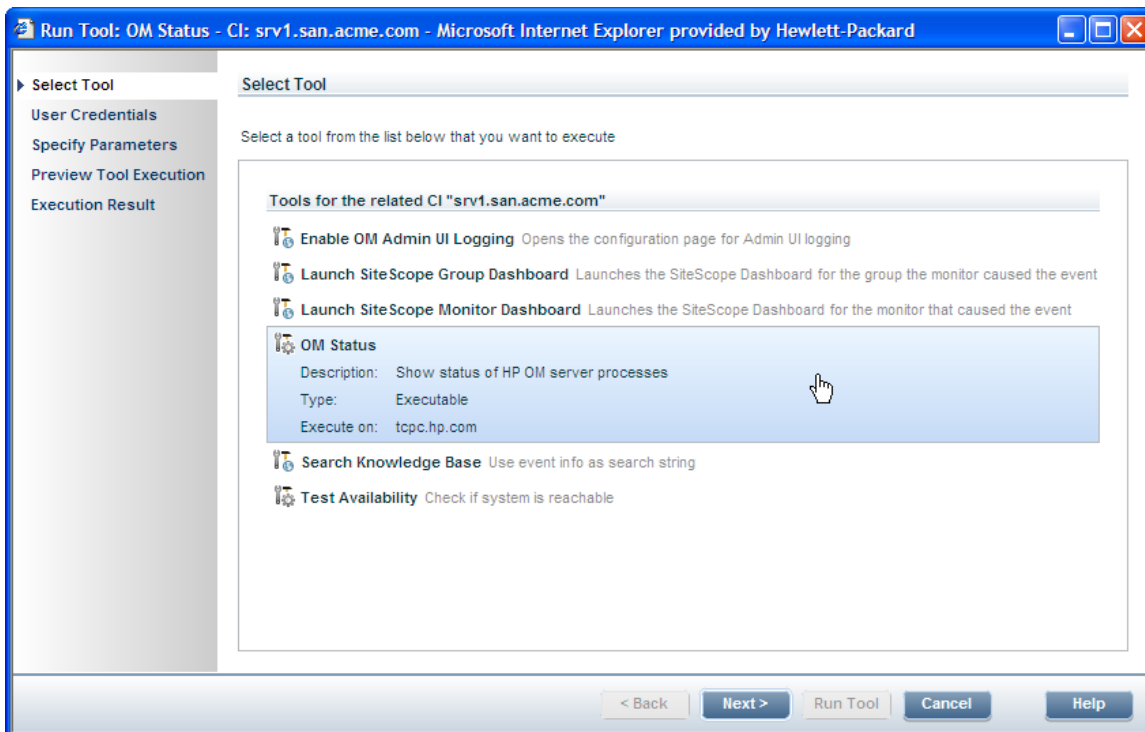
Tools that run for a long time or are generally slow to respond can give the impression that there is a problem, where none in fact exists. Tools that attempt to open a graphical user interface, for example, to prompt for data input, will not work and never exit.

It is recommended to test commands and scripts exhaustively outside the Tool Manager, preferably in their natural environment (on the command line) first. If the command is available in a known location, you can add any attributes to the command if necessary, for example, to refine the context in which the command or script runs, and test the tool to see if the attributes are resolved correctly at run time. For more information about adding attributes to custom tools, see [Tool Parameters](#) on page 201.

The Run-Tool Wizard

HP OMi enables software administrators or domain experts to configure custom tools, which are assigned to a particular *type* of configuration item. If an event occurs on an instance of a configuration-item type for which custom tools are available, HP OMi displays the configured tools in the Run Tool wizard. The Run Tool wizard pops up when you right click an event in the Event Browser or the impacted configuration item (in the CI Tree, the Top View, or the Dashboard) and select the Launch Tool... option. Domain operators or experts can start a tool by selecting the relevant tool from the context-sensitive list displayed, as illustrated in [Figure 87](#) on page 208.

Figure 87 Start Tool-Related Actions



[Figure 87](#) on page 208 also shows how the tool runner wizard walks the user through the steps required to select and start a custom tool. The number of steps an operator must perform to run a tool depends on the way the tool is configured. For example, if the tool runs in the account of a specific user, and the user credentials are not automatically available, then step two (User credentials) prompts the operator for the user credentials required to start the tool. If the tool configuration specifies any parameters whose values cannot be automatically resolved, for example, custom attributes, then HP OMi prompts the operator to enter the missing parameter values in step three (Specify Parameter).

The following list is an overview of *all* possible steps in the Run Tool wizard:

- 1 Tool Selection: choose the tool to run from a context-sensitive list of available tools. The list contains all tools configured for the selected configuration item, or the configuration-item type impacted by the currently selected event.

- 2 User Credentials (*hidden if not required*): enter the user name and password for the account under which the tool is to run.
 - ▶ If HP OMi cannot resolve the name of the host on which the problem CI resides, you must enter the name of the target host, where you want the tool to run.
- 3 Specify Parameters (*hidden if not required*): enter a value for any parameters that are *not* resolvable at run time.
- 4 Preview Tool Execution: displays a summary of the tool including any resolved parameters. You can use the summary to make sure the tool is configured correctly before starting it.
- 5 Execution Result: displays any information that the tool returns if the tool execution is successful or an error message if the tool execution fails.

The current implementation of the tool-runner interface does not allow the user to interact with the command or script that the tool starts *after* the tool starts, and HP OMi does not display any information about the tool's progress until the tool returns a response indicating either successful completion or failure. The lack of user interaction means that scripts and command-line tools must be configured to close automatically, and any tools that attempt to open a graphical user interface or run for a long time should be avoided. For more information about configuring custom tools, see [Tool Definitions](#) on page 196.

Tools can make use of the HP Operations Manager agent running on either the management server or the managed node. If the HPOM agent is not available at the time the tool starts, the tool-related action fails.

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