

HP Business Availability Center

for the Windows and Solaris operating systems

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Model Management

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Welcome to This Guide

This guide explains how to configure and work with an IT model that enables you to build a topology of your system. You populate the model with configuration items and their relationships, and then use the model to measure and manage critical business processes.

This chapter includes:

- How This Guide Is Organized on page 15
- Who Should Read This Guide on page 17
- Getting More Information on page 17

How This Guide Is Organized

The guide contains the following chapters:

Part I Modeling

Describes how to model your business environment by defining views and by building TQL queries that retrieve the required information from the CMDB; describes how to create Topology reports based on a specific Report query and how to view and modify the definitions of configuration item types (CITs) defined in the UCMDB and the relationships that define the connections between them.

Part II Model Management Settings

Describes how to manage definitions, resources, and tools that enable you to discover IT infrastructure resources, how to define schedules for tasks that are activated on a periodic basis, and how to enable specific recipients to automatically receive a specified report, via email, at regularly defined intervals.

Part III Application

Describes how to compare the hierarchies of two compound CIs or of two snapshots (taken at different times) of a view; describes the various reports listing CIs and relationships, their attribute values, changes, and other statistics.

Part IV Source Manager

Describes how to work with the default source adapters and how to work with generic custom source adapters used to communicate with third-party sources. Source adapters map source data to Configuration Items (CIs) used by HP Business Availability Center. They are automatically preconfigured and activated when HP Business Availability Center starts.

Part V View Explorer

Explains how View Explorer presents the elements of the IT universe model in HP Business Availability Center through the medium of views.

Part VI Topology Map

Explains Topology Map concepts and describes how to work with the Topology Map that shows the CIs and relationships defined in a view.

Part VII Federation and Reconciliation

Explains how to define adapters to include data in the CMDB from other sources, in such a way that the source of the data retains control of the data.

Who Should Read This Guide

This guide is intended for the following users of HP Business Availability Center:

- HP Business Availability Center administrators
- HP Business Availability Center platform administrators
- HP Business Availability Center application administrators
- HP Business Availability Center data collector administrators

Readers of this guide should be knowledgeable about enterprise system administration, have familiarity with ITIL concepts, and be knowledgeable about HP Business Availability Center in general and HP Universal CMDB technology specifically.

Getting More Information

For a complete list of all online documentation included with HP Business Availability Center, additional online resources, information on acquiring documentation updates, and typographical conventions used in this guide, see the *HP Business Availability Center Deployment Guide* PDF.

Welcome to This Guide

Part I

Modeling

1

Configuration Management Database (CMDB)

This chapter provides information on CMDB.

This chapter includes:

Concepts

- CMDB Overview on page 22
- Configuration Items (CI) on page 23
- Nodes and Relationships on page 23

Reference

- CMDB Log Files on page 24
- Log Severity Levels on page 32

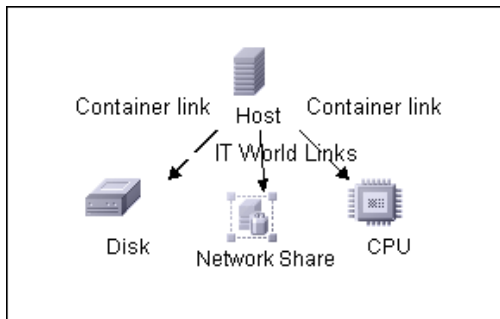
CMDB Overview

The CMDB is the central repository for the configuration information that is gathered from the Discovery and Dependency Mapping (DDM) process and the various third-party applications and tools.

The CMDB contains all the configuration items (CIs) and relationships created in HP Business Availability Center, whether created automatically from the DDM process or source adapters, or manually using IT Universe Manager. The CIs and relationships together represent a model of all the components of the IT Universe in which your business functions. The CMDB stores and handles the infrastructure data collected and updated by the DDM process. For more information about the DDM process, see *Discovery and Dependency Mapping Guide*.

The IT Universe model can be very large, containing millions of CIs. To facilitate their management, you work with the CIs in a view that provides a subset of the overall components in the IT Universe world.

You use factory views or views defined in View Manager or the Modeling Studio to display and manage the CIs and relationships in the CMDB. The views enable you to focus on specific IT areas and are available via View Explorer in different HP Business Availability Center applications, such as Dashboard and Service Level Management. An example of a view is shown in the following figure:



The CMDB also contains the TQL query definitions that are used to query and retrieve data from the CMDB, for presentation in the views; and the configuration item type (CIT) model, a repository for the CI types used to define the CIs and relationships. For information on TQL queries, see “Topology Query Language” on page 355.

In addition, the CMDB contains the object repositories for the various additional data added to CIs in Dashboard and Service Level Management, such as KPIs, context menus, and tooltips. For more information on these repositories, see “Repositories – Overview” in *Using Dashboard*.

Configuration Items (CI)

A configuration item (CI) is a component of the CMDB that represents a physical or logical entity in the system, for example, hardware, software, services, business processes, and customers. The CIs are part of the IT Universe model in the CMDB, where they are organized into a hierarchical format based on the interdependencies in your organization’s IT environment. The interdependencies in HP Business Availability Center are called relationships.

Each CI belongs to a configuration item type (CIT). The CIT defines a category of CIs used in HP Business Availability Center. The CITs provide templates for creating the CIs and associated properties in each category. You view and manage the CIs in the CMDB using views. Each view shines a spotlight on part of the IT Universe model.

Nodes and Relationships

Nodes are the components from which TQL queries are built in Enrichment Manager, View Manager, Correlation Manager, Topology Report Manager, and Query Manager.

Relationships are connections defined between CIs. Relationships are defined one at a time for each pair of nodes in a TQL query.

CMDB Log Files

CMDB log files enable you to perform basic troubleshooting of CMDB runtime problems. Additionally, by tracking CMDB behavior in the log files, you can examine the effects of changes made in the system. CMDB is composed of subsystems and each subsystem records to several log files.

Log files are located in the <HP Business Availability Center root directory>\log folders.

This section includes the following topics:

- ▶ “CMDB Server Parameters” on page 24
- ▶ “CI Type Model Log” on page 26
- ▶ “CMDB Notification Log” on page 27
- ▶ “CMDB Model Audit Short Log” on page 28
- ▶ “History Database Log” on page 29
- ▶ “CMDB Enrichment Log” on page 29
- ▶ “CMDB Plug-in Log” on page 30
- ▶ “CMDB Dal Log” on page 30
- ▶ “CMDB Operation Statistics Log” on page 31

CMDB Server Parameters

This section contains definitions for CMDB server parameter log files. For details on changing log levels, see “Changing Log Levels” on page 32.

This section includes the following topics:

- ▶ “Lifecycle Log” on page 25
- ▶ “General CMDB Log” on page 25
- ▶ “Quota Log” on page 26

Lifecycle Log

The log name is **cmdb.info.log**.

Log File	Description
Purpose	CMDB server lifecycle: <ul style="list-style-type: none"> ▶ all server tasks ▶ customer loading and unloading ▶ startup and shutdown of Task manager Contains information about any application that does not start up correctly.
Information Level	All lifecycle details.
Error Level	Startup errors of CMDB subsystems, primarily in the data access layer.
Debug Level	Not applicable
Basic Troubleshooting	<ul style="list-style-type: none"> ▶ If the CMDB client receives an exception that the customer does not exist, check that the customer is properly loaded. ▶ If the CMDB client receives an exception that it cannot find CMDB in a JNDI lookup, check that the CMDB server is bound in the JNDI tree. ▶ If the HA Controller does not load the CMDB customers, check that the CMDB server is registered in the HA controller.

General CMDB Log

The log name is **cmdb.log**.

Log File	Description
Purpose	Errors of all CMDB subsystems and CMDB CITs that do not have their own log file.
Information Level	Information from the CMDB server not directed to any specific log.
Error Level	All errors in the CMDB server.

Log File	Description
Debug Level	Debug information in the CMDB server that is not directed to a specific log.
Basic Troubleshooting	CMDB server errors during CMDB deployment.

Quota Log

The log name is **cmdb.quota.log**.

Log File	Description
Purpose	Quota names, quota values, and current quota levels.
Information Level	Quota names and values set in the server and customer levels during a customer load.
Error Level	CMDB operations that fail because they exceed quota limits.
Debug Level	A count collector runs every n minutes and gathers current counts for all quotas. Collected counts are logged.
Basic Troubleshooting	If operations fail because of quota limits, check the count growth and quota values.

CI Type Model Log

The log name is **cmdb.classmodel.log**.

Log File	Description
Purpose	CI Type Model errors and debug messages.
Information Level	When a CI Type Model is loaded, incorrect definitions are logged as informational messages. An example of an incorrect definition is duplicate attributes.
Error Level	Not available.

Log File	Description
Debug Level	<p>Every CI Type update includes the following:</p> <ul style="list-style-type: none"> ▶ original CIT in XML format ▶ new CIT in XML format ▶ differences between the CITs <p>If the CI Type Model update is rejected, the reason is logged.</p>
Basic Troubleshooting	<p>Compares the differences that the server finds between the original CIT and the new CIT. This is useful to understand the following scenarios:</p> <ul style="list-style-type: none"> ▶ a CIT in a package failed ▶ an action in the CIT browser applet failed ▶ an action in the CIT browser applet succeeded when it should have failed

CMDB Notification Log

The log name is `cmdb.notification.log`.

Log File	Description
Purpose	<p>Notification messages from the time of the component's creation in CMDB until the client's listener receives a message. Most components receive configuration changes from CMDB in push mode, by the notification mechanism, rather than in pull mode.</p>
Information Level	<ul style="list-style-type: none"> ▶ startup and shutdown of publishers ▶ register and unregister remote and internal listeners
Error Level	<ul style="list-style-type: none"> ▶ errors when messages are published ▶ errors when messages are received
Debug Level	<ul style="list-style-type: none"> ▶ unique message ID ▶ number of changes that a message includes as well as more details according to the type of the message (for example, the TQL result version) ▶ JMS header properties

Log File	Description
Basic Troubleshooting	<p>If an application does not receive a notification, check the following:</p> <ul style="list-style-type: none"> ▶ a listener is registered with the appropriate notification filter ▶ a message is published with data that matches this filter ▶ a message is received by the listener (use the unique message ID to verify)

CMDB Model Audit Short Log

The log name is `cmdb.model.audit.short.log`.

Log File	Description
Purpose	<p>Information about a CI Type operation: type of operation, data received as input, and what happened to the data in each CIT.</p> <p>Also contains information about the caller application, execution times, and persistency time.</p>
Information Level	Operation details
Error Level	Not available.
Debug Level	Not available.
Basic Troubleshooting	<p>If there are no changes when there should be, check the following:</p> <ul style="list-style-type: none"> ▶ the operation exists ▶ the input is correct ▶ what happened to the data. There may have been a false update. <p>This is especially useful when running DDM to trace the input.</p>

History Database Log

The log name is `cmdb.history.log`.

Log File	Description
Purpose	<ul style="list-style-type: none"> ➤ Records which CITs are found by the History database when the database is initialized from an existing topology. ➤ Records what is to be saved in the History database. ➤ Tracks events saved in the History database. ➤ Records when the History database was purged.
Information Level	<ul style="list-style-type: none"> ➤ When the last purge was carried out. ➤ Information about initialization of the History database.
Error Level	Lists errors that occur when event information is inserted in the History database.
Debug Level	<ul style="list-style-type: none"> ➤ Details about CITs inserted during initialization of the History database. ➤ Details about changes in the TQL results saved in the History database.

CMDB Enrichment Log

The log name is `cmdb.enrichment.log`.

Log File	Description
Purpose	<p>Enrichment definitions: adding, updating, removing, and calculating.</p> <p>Calculation results such as how many CIs were added, how many relationships were removed, and so forth.</p> <p>Supplies the reason for a calculation failure. Failure in a model update, however, is not included since it is an asynchronous execution.</p>
Information Level	<ul style="list-style-type: none"> ➤ Add, update, and remove enrichment definitions. ➤ Add, update, and remove CIs or relationships to or from a model.
Error Level	Calculation failure.

Log File	Description
Debug Level	Traces the enrichment calculation process.
Basic Troubleshooting	<ul style="list-style-type: none"> ▶ If no calculation was carried out, check the definition of add enrichment. ▶ If there are no results, check the finish calculate entry.

CMDB Plug-in Log

The log name is `cmdb.plugins.log`.

Log File	Description
Purpose	Plug-in input and output notification.
Information Level	Lifecycle of publisher.
Error Level	<ul style="list-style-type: none"> ▶ no customer name exists in the customer ID ▶ publisher failure
Debug Level	Receive or send a change.
Basic Troubleshooting	If notification did not reach the destination, check that the plug-in received the input.

CMDB Dal Log

The log name is `cmdb.dal.log`.

Log File	Description
Purpose	Information about activity that occurred in the data access layer, the layer that works with CMDB.
Information Level	Not available.
Error Level	<ul style="list-style-type: none"> ▶ connection pool errors ▶ database errors ▶ command execution errors

Log File	Description
Debug Level	<ul style="list-style-type: none"> ▶ all DAL commands executed ▶ all SQL commands executed
Basic Troubleshooting	<p>If you suspect that CMDB actions are taking too long, check the time spent on queries and updates in the DAL logs and operation logs.</p> <p>Exception details and ID are entered into the log. The exception ID appears in the exception itself.</p>

CMDB Operation Statistics Log

The log name is `cmdb.operation.statistics.log`.

Log File	Description
Purpose	Statistics for all operations performed in the past 15 minutes including worst operation instances.
Information Level	<p>Statistics per operation including operation class name, caller application, and customer ID.</p> <p>Default of 10 worst operation instances.</p>
Error Level	Disables the statistics feature.
Debug Level	Not available.
Basic Troubleshooting	Check when there is a performance slow down.

Log Severity Levels

Each log is set so that the information it records corresponds to a certain severity threshold. Because the various logs are used to keep track of different information, each is pre-set to an appropriate default level. For details on changing the log level, see “Changing Log Levels” below.

Typical log levels are listed below from narrowest to widest scope:

- ▶ **Error.** The log records only events that adversely affect the immediate functioning of HP Universal CMDB. When a malfunction occurs, you can check if Error messages were logged and inspect their content to trace the source of the failure.
- ▶ **Warning.** The log’s scope includes, in addition to Error-level events, problems for which HP Universal CMDB is currently able to compensate and incidents that should be noted to prevent possible future malfunctions.
- ▶ **Info.** The log records all activity. Most of the information is normally routine and of little use and the log file quickly fills up.
- ▶ **Debug.** This level is used by HP Software Support when troubleshooting problems.

Note: The names of the different log levels may vary slightly on different servers and for different procedures. For example, **Info** may be referred to as **Always logged** or **Flow**.

Changing Log Levels

If requested by HP Software Support, you may have to change the severity threshold level in a log, for example, to a debug level.

To change the severity threshold level:

- 1 Open the log properties file in a text editor. Log file properties are defined in files in the following directory: <HP Business Availability Center root directory>\HPBAC\conf\core\Tools\log4j.

- 2 Locate the **loglevel** parameter. For example,

```
loglevel=ERROR
```

- 3 Change the level to the required level. For example,

```
loglevel=DEBUG
```

- 4 Save the file.

2

IT Universe Manager

This chapter provides information on IT Universe Manager.

This chapter includes:

Concepts

- ▶ IT Universe Manager Overview on page 36
- ▶ Working with Views in IT Universe Manager on page 37
- ▶ View Tree Structure on page 39
- ▶ Working with CIs on page 41
- ▶ Working with Relationships on page 44

Tasks

- ▶ Create CIs and Relationships in the CMDB on page 48
- ▶ Check Status of Application Discovery (Rediscover a View) on page 49

Reference

- ▶ IT Universe Manager User Interface on page 52

IT Universe Manager Overview

IT Universe Manager enables you to manage the content of your IT Universe model. The following tasks represent the basic functionality of the application:

- ▶ **Creating CIs without creating relationships.** You can define new CIs that are added to the CMDB individually, so that no new relationships are created. For details, see “Creating a Non-Related CI” on page 41.
- ▶ **Creating CIs with relationships for them.** You can define new CIs and attach them to existing CIs, so defining a new CI and a new relationship in the CMDB. For details, see “Creating a Related CI” on page 41.
- ▶ **Adding existing CIs and creating relationships for them.** You can attach CIs to an existing CI, so creating new relationships for existing CIs. For details, see “Attaching Existing CIs” on page 47.
- ▶ **Deleting CIs.** You can delete CIs from the CMDB. For details, see “Deleting CIs” on page 42.

Populating the IT Universe Model

The IT Universe model in the CMDB contains the CIs and relationships produced by the CI-generating tools that operate within HP Business Availability Center. Most CIs and relationships originate from one of the following sources:

- ▶ **Source adapters.** Automatically creates CIs and relationships for the monitor objects in End User Management Administration and System Availability Management Administration. For details, see “Working with Source Manager” on page 617.
- ▶ **Discovery and Dependency Mapping (DDM).** Automatically creates CIs and relationships based on the discovered IT resources and topology in your company’s infrastructure. For details, see “Discovery and Dependency Mapping – Overview” in *Discovery and Dependency Mapping Guide*.
- ▶ **Dynamic Node Factory tool.** Automatically creates CIs and relationships based on data from incoming samples. For details, see “IT Universe Manager – Dynamic Node Factory” on page 93.

- ▶ **IT Universe Manager.** Enables you to manually create CIs and relationships that represent logical and physical elements of the business. For details, see “Working with CIs” on page 41.
- ▶ **End User Management Administration and System Availability Management Administration.** Enables you to manually create relationships between the CIs for monitor objects and CIs in the CMDB. For details, see “Integrating SiteScope Data with HP Business Availability Center’s Configuration Items” in *Using System Availability Management*.
- ▶ **Enrichment Manager.** Enables you to add CIs and relationships to the CMDB by receiving data from the attributes of Enrichment nodes as defined in the Enrichment TQL query. For details, see “Enrichment Manager” on page 329.

Working with Views in IT Universe Manager

In IT Universe Manager, you analyze data at the view level. Views are subsets of the IT Universe, containing only those CIs relating to a specific area of interest. All views are based on a pattern which determines the content of the view.

- ▶ Pattern views and template based views are built from a TQL (Topology Query Language) query that defines the structure of the view. The view displays only those CIs and relationships that satisfy the query definition. You build pattern views and template based views in View Manager, while TQL queries are defined in Query Manager.
- ▶ Perspective based views are built manually, by selecting a group of CIs and applying a perspective to them. The perspective is a pattern used to define which related CIs are included in the view. You build perspective based views in the Modeling Studio.

For information on the different view types and how they function, see “View Formats” on page 159.

Note: You must have **Change** permissions for a view to edit a view. If you do not have the necessary permissions, contact your HP Business Availability Center Administrator.

CI's created by DDM or by Source Manager are automatically added to each view where the CI's (and their relationships) fit the TQL definition for the view. When you open a view in View Explorer, the TQL query for the view queries the CMDB for CI's that match the defined pattern. If there are no matches (for example, in the case of a view for a DDM process where the process has not yet run) then the view remains empty.

When you define a new CI while working in any view in IT Universe Manager, the CI (and any associated relationship) is created in the CMDB. The CI is added to your current view only if it meets the view's TQL specifications.

If the created CI and relationship do not meet the TQL requirements, then the CI and relationship are created in the CMDB but are not visible in the view. Similarly, if you attach an existing CI to a CI in the view, and the new pattern does not meet the TQL requirements, then the attached CI's do not appear in the view, but the relationship is still created.

View Lifecycle

If you do not access a view from View Explorer for a specified period of time, the view is cleared out, to save memory in the system. It is not deleted from the CMDB; the view can be retrieved by clicking on it. The default time period for clearing out unused views is one hour. You can set the time period using the MAM Server configuration parameter **Views Usage Untouched Time Before Empty View** in Infrastructure Settings Manager. After changing the parameter's value, you must execute the JMX command: `Core manager\reloadSystemParameters()` for the change to take effect.

You can also modify the frequency with which the system checks whether a view has been accessed. The default frequency is for the system to check every 15 minutes. To change this value, select the **Views Usage Check Time Interval** parameter in Infrastructure Settings Manager. After you change the value, restart the server service for the change to take effect.

For details regarding Infrastructure Settings Manager, see “Infrastructure Settings Manager - Overview” in *Platform Administration*.

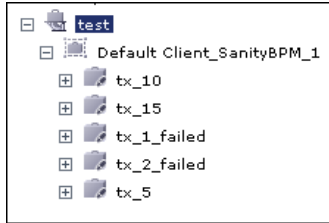
Note: Views defined as persistent are not cleared out and always remain in the memory.

View Tree Structure

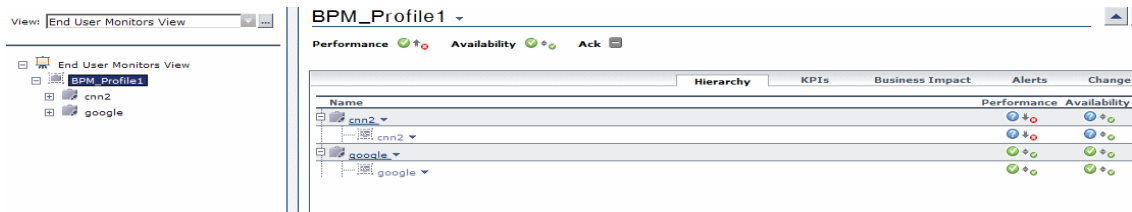
Views are organized in a hierarchical tree format in the left pane of IT Universe Manager, which is known as View Explorer (it is also called CI Selector). The view name appears in the View box above the tree and acts as the containing folder for the CIs in the view.

The first level of the View Explorer tree consists of the nodes for the root CIs. A root CI is the starting point for a view subtree. A view may contain any number of subtrees. Under the root CIs come the branch CIs, expanding down to the leaf CIs as the last nodes at the ends of each branch.

The CIs at each level in a subtree are considered to be attached to the CI on the branch directly above. This attachment generally depicts a dependent relationship, so that the higher branch (closer to the root CI) represents a component of your business that depends on the CIs on the next branch down (closer to the leaf CIs) in the business process. For example, an application depends on the servers running the application.



The attachment between a higher node and lower node is referred to as a parent-child relationship. The parent CI may have many attached child CIs, and the child CIs pass operational status to the parent. The status at each level is viewed in Dashboard.



The tree topology is determined by the folding rules defined for the view. In a pattern view, these are defined for the specific view. In a template based or a perspective based view, the folding rules are defined as part of the template or perspective. For details on defining folding rules, see **Add Rule** in “Context Menu Options” on page 371.

Working with CIs

In IT Universe Manager, you can create related and non-related CIs, delete CIs, edit the CI properties, and remove out-of-date CIs using the Aging Mechanism.

This section includes the following topics:

- ▶ “Creating a Non-Related CI” on page 41
- ▶ “Creating a Related CI” on page 41
- ▶ “Deleting CIs” on page 42
- ▶ “CI Properties” on page 43
- ▶ “Removing Out of Date CIs Using the Aging Mechanism” on page 44

Creating a Non-Related CI



You can define a new CI in IT Universe Manager by clicking the **New CI** button in the toolbar. The New CI dialog box opens, which enables you to define the properties for the new CI. The CI is created in the CMDB. For details, see “New CI Dialog Box” on page 78.

Note: The CI is added to the view only if it meets the specifications of the pattern, template, or perspective of the view.

A CI created in this way is added as an independent entity without any relationship to any other existing CI in the CMDB.

Creating a Related CI

You can define a new CI to be added as a parent, child, or sibling of an existing CI.

To define a new related CI:

- 1 Select the CI in your view to which you want to attach the new CI.
- 2 Click the **New Related CI** button in the toolbar.



- 3 In the New CI dialog box, define the properties and relationship for the CI. For details, see “New CI Dialog Box” on page 78.

The CI and relationship are created in the CMDB.

Note: The CI and relationship are added to the view only if they meet the specifications of the pattern, template, or perspective of the view.

Deleting CIs

You can delete a CI by selecting **Delete from CMDB** from the context menu in IT Universe Manager. The CI is deleted from the CMDB and from all views. If the CI has children, they are not automatically deleted when you delete the parent CI. If you delete a CI without first deleting the relationship between the CI and any child CIs that appear with the parent CI in a view, the child CIs are removed from the view.

If the child CIs do not appear in any other view, they remain in the CMDB without appearing in a view. The child CIs might appear in the future in views where they meet the pattern requirements.

One exception to this rule is when the relationship between a child and parent CI is a **Container link**; in that case, when the parent CI is deleted, the contained CI is also removed from the CMDB. For example, if a host CI is the container for a child CPU CI, then when the host CI is deleted, the CPU is also removed from the CMDB.

When you delete a CI that was created by the source adapters or the DDM process, the CI is restored the next time that DDM runs or that the CMDB is updated by that source (if the CI is still valid), and it reappears in all relevant views.

CI Properties

In IT Universe Manager, you can edit the properties of a CI. The CI properties are divided into several categories which appear in the New CI dialog box:

- ▶ The general properties of a CI are common to all CIs. Some general properties are defined automatically during CI creation; others can only be defined manually in the New CI dialog box.
- ▶ CIT-specific properties are created as part of the CIT definition in the CI Type Manager. The values for the CIT-specific properties are taken from the data samples for the source adapter CIs, or from the CIs discovered during DDM. The values can also be entered manually, when you manually create CIs to represent entities in your infrastructure. For details, see “CI Type Manager” on page 239.
- ▶ Key properties can be general or CIT-specific properties, which must be assigned a value to create an instance of the CI type.

You can access the Configuration Item Properties dialog box to view the CI properties from IT Universe Manager by right-clicking the CI and selecting **Properties** from the context menu or by clicking the Properties tab in the Advanced pane. You can edit the CI properties as well if you have the necessary permissions for editing CIs. For details on CI properties, see “Configuration Item Properties Dialog Box” on page 57.

The CIT-specific properties are displayed in the **Specific Properties** section of the Configuration Item Properties dialog box when you sort the properties using the **Categorized** button. Some properties for the automatically created CIs can be edited; however, if the CI is configured to **Allow CI Update** (in the General Properties), then DDM may override your changes when it updates the CI. A description of the selected property can be found in the Description area at the bottom of the Configuration Item Properties dialog box.

For CIs generated by the source adapters, the only editable CIT-specific property is the **Selector Expression** for the monitor-type CIs. To edit the selector, click **Edit Selector Expression**. For details on editing selectors, see “Selectors for KPIs” in *Using Dashboard*.

When the Siebel DDM process is run, the CIs that appear in the Siebel Enterprises view have most of their properties' values automatically entered in the CMDB. Some of the properties relating to the location of packages or logs must be entered manually for data to be inserted correctly in the Siebel Enterprises view. For details, see “Change the Default Timeout for the Execution of a SiteScope Monitor” in *Solutions and Integrations*.

After the selector is modified, the current CI is updated according to the new selector definition, and a new CI is generated by the source adapters from the incoming samples based on the original selector.

Some of the CIT-specific properties for DDM CIs are set by default to be monitored for changes. When one of these properties has been modified, information on the change can be viewed in a change report, and in some cases, an icon is displayed in Dashboard. For more information, see “Change Report” on page 581.

Removing Out of Date CIs Using the Aging Mechanism

If a CI or relationship is not updated or refreshed over a period of time (for example, a CI is not rediscovered by DDM and no manual update occurs), an aging mechanism deletes the CI from the CMDB. For details, see “The Aging Mechanism – Overview” on page 532.

Working with Relationships

Many of the relationships between CIs in the CMDB are created automatically, for example, by DDM, the source adapters, and the Dynamic Node Factory. In addition, you can create relationships manually in IT Universe Manager, Enrichment Manager, Correlation Manager, Query Manager, Topology Report Manager, or View Manager. You can also create relationships in System Availability Management and End User Management Administration.

This section includes the following topics:

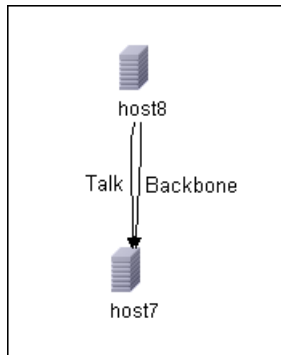
- ▶ “Creating Relationships” on page 45
- ▶ “Creating Hierarchical Relationships” on page 46

- “Attaching Existing CIs” on page 47
- “Adding Folding Rules to Relationships” on page 47
- “Deleting Relationships” on page 48

Creating Relationships

You can create relationships in IT Universe Manager by right-clicking a CI or multiple CIs in the View Explorer pane or the Topology Map and selecting **Relate to CI** from the context menu. In the Topology Map, you can define a relationship between two CIs in the view by drawing a line between the two, using the **Create Relationship** button from the toolbar. Either of these actions opens the Insert Relationship dialog box. For details, see “Insert Relationship Dialog Box” on page 65.

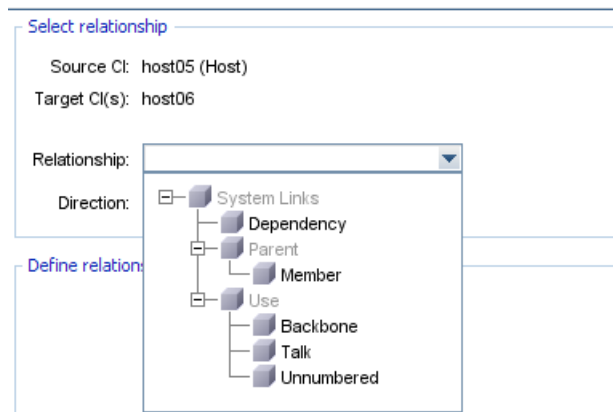
You can create as many relationships as necessary between a CI in the CMDB and other CIs. Each new relationship exists as its own entity in the CMDB, and has its own properties that can be edited in IT Universe Manager (as described in “Configuration Item Properties Dialog Box” on page 57). You can also create more than one relationship between the same two CIs, when each relationship is based on a different relationship type. In the following example, **host7** has both a **Backbone** and a **Talk** relationship with **host8**.



Creating Hierarchical Relationships

By attaching one CI to another in IT Universe Manager or System Availability Management or End User Management Administration you create a hierarchical relationship (parent-child) between them, so that one CI is influenced by the other.

Certain relationships defined in this way are restricted to the relationship type **Depends On** (if the relationship is between two non-monitoring CIs), or the relationship type **Monitored By** (if the child CI in the relationship is a monitor type CI); however, other relationship types are used between specific types of CIs. For example, if a relationship is defined between two Host CIs, there are several possible relationship types.



Note: When you attach a child CI to a parent CI, you are creating that relationship in the CMDB. The child therefore impacts on the parent CI in every view where the relationship exists, and is displayed in every view where the child and relationship match the TQL.

When performing status calculations, the Business Logic Engine only recognizes calculated relationships. For details on calculated relationships, see “Impact Rules” on page 440.

Attaching Existing CIs

You can attach existing CIs using the Insert Relationship dialog box. The dialog box has two modes:

- ▶ Selecting the CIs that you want to attach.
- ▶ Defining the relationship between the original CI and the CIs to attach. For information on relationships, see “Working with Relationships” on page 44.

When selecting the CIs to attach, you can select multiple CIs from a view to attach to the original CI. However, all CIs that you want to attach in one operation must have the same relationship type. For example, you cannot attach a CI that uses the relationship **Depends On** in the same operation as a CI that uses the relationship **Monitored By**.

You cannot create an identical relationship between the same CIs twice within a view. For example, if parent CI *Italy* depends on child CI *Rome*, *Rome* appears under the CI *Italy* in the view. If you then again attach *Rome* to *Italy* with a **Depends On** relationship, *Rome* still appears once only under that parent CI.

Adding Folding Rules to Relationships

After setting the node and relationship definitions of a view, you can add folding rules to selected relationships in View Manager. This enables you to define the organizational structure of CIs in the Topology Map by displaying selected CIs at different levels. When no folding rules are defined, the Topology Map displays all CIs included in the query results on one level by default. For example, if the query results include hosts and networks, both CI types are displayed on the same level in the Topology Map.

Note: The maximum number of CIs that can be displayed in a single layer is 900. If a view contains a layer with more than 900 CIs, the view is not displayed in the Topology Map until the folding rules are changed.

For details on adding folding rules, see **Add Rule** in “Context Menu Options” on page 371.

Deleting Relationships

The Topology Map shows only the relationships for the CIs that are part of the current view; however, the same relationships may also be part of other views. When you delete a relationship in IT Universe Manager, it is deleted from the CMDB and from all views.

When a relationship is deleted, the CI on the other end of the relationship may remain in the view, if it still matches the pattern of the view. In a perspective based view, you can remove the CI completely from the view (without deleting it from the CMDB), by deleting it from the view in the View Editor in the Modeling Studio.

When you delete a relationship that was created by the source adapters or the DDM process, the relationship is restored the next time that DDM runs or that the CMDB is updated by that source (if the relationship is still valid), and it reappears in all relevant pattern views.

It can take a few minutes to delete subtrees, or multiple CIs and relationships, from a view.

Create CIs and Relationships in the CMDB

This task describes how to create related and non-related CIs, as well as relationships between CIs, in the CMDB.

This task includes the following steps:

- “Define a New Non-related CI” on page 48
- “Define a New Related CI” on page 49
- “Attach Existing CIs” on page 49

1 Define a New Non-related CI



Click the **New** CI button in the toolbar. In the New CI dialog box, select a CI type from the tree and define the properties for the new CI. For details, see “New CI Dialog Box” on page 78.

2 Define a New Related CI



Click the **New Related CI** button in the toolbar. In the New CI dialog box, select a CI type from the tree and define the properties for the new CI. On the Relationship page of the dialog box, select the type of relationship and define its properties. For details, see “New CI Dialog Box” on page 78.

3 Attach Existing CIs

Select a CI in a view. Right-click the CI and select **Relate to CI**. In the Insert Relationship dialog box, select a target CI. On the Relationship page of the dialog box, select the type of relationship and define its properties. For details, see “Insert Relationship Dialog Box” on page 65.

Check Status of Application Discovery (Rediscover a View)

You, the application owner or administrator, need to be kept informed of any problems to your application. So, for example, you need to know that discovery is working correctly and that its current configuration can connect to the application database. This section explains how to run the rediscovery procedure that enables you to check the current status of the discovery of an application.

Note:

- ▶ Set up and configuration is performed by the UCMDDB administrator. For details, see “Prerequisites” on page 50.
 - ▶ Rediscovery is performed by the application owner/administrator. For details, see “Access the View” on page 51.
 - ▶ You do not need any knowledge of Discovery and Dependency Mapping (DDM) to run this procedure.
 - ▶ By default, you can run the rediscovery procedure on views that include less than 10,000 CIs. For details on changing this number, see “Important Information” on page 63.
-

This task includes the following steps:

- ▶ “Prerequisites” on page 50
- ▶ “Access the View” on page 51
- ▶ “View Results in the View” on page 51
- ▶ “Schedule the Rediscovery” on page 52

1 Prerequisites

Note: This step is performed by the UCMDDB administrator.

- a** In DDM, create a module that contains the jobs that must discover the application. For details, see “Run Discovery – Advanced Mode Workflow” in *Discovery and Dependency Mapping Guide*.
- b** Activate the module and all the jobs. The jobs must remain activated.
- c** Verify that the module has run without errors. For details, see “Manage Errors” and “Discovery Status Pane” in *Discovery and Dependency Mapping Guide*.

- d Correct any errors in the application and confirm that DDM finds no errors during the next run.

Important: The application owner cannot rediscover a view if DDM is reporting errors. You must set an error-free baseline.

- e In View Manager, define a view that includes the application CI or CIs to be rediscovered. These are the CIs that are created when you activate the jobs that discover the application. For details, see “View Manager Overview” on page 158.
- f Notify the application owner of the name of the view.

2 Access the View

Note: This step is performed by the application owner/administrator.

In IT Universe Manager, access the view that includes the application CIs to be rediscovered. For details, see “Search for CIs in Search Mode” on page 684.

3 View Results in the View



- a **You need to check the complete application.** You click the **Rediscover View Content** button in the CI Selector toolbar. The **Show Discovery Status and Changes of View** dialog box is displayed. The dialog box displays information about which jobs and trigger CIs discovered the CIs in the view, on the last occasion that DDM ran the discovery for the jobs. For details, see “Discovery and Changes Summary Dialog Box” on page 63.

To run the discovery, click the **Rerun Discovery** button. To view information about the jobs and trigger CIs, use the links to drill down. For details, see “Managing Problems With Error Reporting” in *Discovery and Dependency Mapping Guide*.

b You need to check specific components of your application. You select the component's CI in the Topology Map pane and display the Discovery tab in the Advanced pane. For details, see "Discovery and Changes Summary Dialog Box" on page 63.

To rediscover several CIs, press CTRL, select the CIs and display the Discovery tab.

To run the discovery, click the **Rerun Discovery** button.

4 Schedule the Rediscovery

You can schedule how often the rediscovery procedure should run. In the Job Definition window, choose the **Run Discovery on View** action. For details, see "Job Scheduler Window" on page 501.

IT Universe Manager User Interface

This section describes:

- ▶ Add Background Image Dialog Box on page 53
- ▶ CI/Relationship History Dialog Box on page 54
- ▶ Configuration Item Properties Dialog Box on page 57
- ▶ Discovery and Changes Summary Dialog Box on page 63
- ▶ Get Related CIs Report on page 64
- ▶ Insert Relationship Dialog Box on page 65
- ▶ IT Universe Manager Window on page 70
- ▶ New CI Dialog Box on page 78
- ▶ Related CIs in View/Database Map on page 86
- ▶ Selector Expression Dialog Box on page 90

Add Background Image Dialog Box

Description	<p>Enables you to add an image as a background to a view as a navigational aid.</p> <p>To access: In IT Universe Manager, select Layout > Add Background Image from the toolbar.</p>
Important Information	<p>You can add an image file (of .gif type) as the background image of a view. This can be used as a navigational aid, for example, for global networks containing different networks in different countries.</p> <p>You can add additional background images to the existing list by inserting image files (of .gif type) to the following location:</p> <p><HP Business Availability Center root directory> \AppServer\webapps\site.war\images\gui\mam_images\gui\images\backgrounds.</p> <p>Tip: Before copying this URL to a browser, copy to a text editor and remove the break markups (
).</p> <p>Note: This option is only active when Manual Layout is selected as the layout for the view.</p>



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


GUI Element (A–Z)	Description
Background Image	Displays the selected image.
File Name	<p>Contains a list of the available image files. Select the file name of the image you want to appear in the view and click OK. To remove an image from a view, select None in the File Name list and click OK. Select Layout > Save Layout to save your changes.</p>

CI/Relationship History Dialog Box

<p>Description</p>	<p>Displays a list of attributes in which changes have occurred as well as the differences between two configuration files.</p> <p>To access:</p> <ul style="list-style-type: none"> ▶ In IT Universe Manager, right-click the selected CI or relationship in View Explorer or the Topology Map and select CI History from the context menu. ▶ In Discovery and Dependency Mapping, in the Discovered by [Module or Job Name] CIs dialog box, right-click a CI and choose CI History.
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A–Z)	Description
	<p>Click Refresh to refresh the data in the table.</p>
	<p>View the difference between two configuration files. Select two CIs of type configfile and click the Show difference button to open the Visualdiff report, which displays a comparison of the two files. Text added to the second file appears highlighted in yellow. Text removed from the first file appears highlighted in red. Differences between the files appear highlighted in green.</p>






GUI Element (A–Z)	Description
	<p>Choose the export format for the table data. The available options are:</p> <ul style="list-style-type: none"> ▶ Excel. The table data is formatted as an .xls (Excel) file that can be displayed in a spreadsheet. ▶ PDF. The table data is exported in PDF format. ▶ RTF. The table data is exported in Rich Text Format. ▶ CSV. The table data is formatted as a comma-separated values (CSV) text file that can be displayed in a spreadsheet. <p>Note: For the CSV formatted table data to display correctly, the comma (,) must be defined as the list separator. In Windows, to verify or modify the list separator value, open Regional Options from the Control Panel, and on the Numbers tab ensure that the comma is defined as the List Separator value. In Solaris, you can specify the list separator in the application that opens the CSV file.</p> <ul style="list-style-type: none"> ▶ XML. The table data is formatted as an XML file that can be opened in a text or XML editor. <p>Tip: To extract HTML code from the report:</p> <ul style="list-style-type: none"> ▶ Save the file as HTML ▶ Open the file in an HTML editor ▶ Copy the relevant table into the target file
Attribute	The name of the attribute.
Change Date	The date when the last change occurred.
Filter by	<p>Filter the data in the table by one or more of the following filters:</p> <ul style="list-style-type: none"> ▶ Time Range. Select the time period for which the CI history is displayed. ▶ Change Type. Select the type of changes displayed in the table. ▶ Attribute. Select the attribute types displayed in the table.

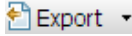
GUI Element (A-Z)	Description
Modified By	Indicates the cause of the change. For example, the field can contain the name of a user or a DDM job.
New Value	The new value of the attribute.
Old Value	The previous value of the attribute.

Configuration Item Properties Dialog Box

<p>Description</p>	<p>Enables you to view and edit basic information for an existing CI or relationship.</p> <p>To access: Select Admin > Universal CMDB > Modeling > IT Universe Manager and use one of the following:</p> <ul style="list-style-type: none"> ▶ Select a CI in the topology map or View Explorer. In the Advanced Pane, select the Properties tab and click Edit. ▶ Right-click a CI in View Explorer or the Topology map and select Properties.
<p>Important Information</p>	<p>The Configuration Item Properties dialog box contains two types of properties:</p> <ul style="list-style-type: none"> ▶ General properties, which include general information about the CI or relationship. These properties are common to all CITs and are documented below. ▶ CIT-specific properties, which include properties specific to that CI. These properties vary according to the type of CI or relationship and are not documented except in the case of Dynamic Node Factory CIs and TransactionVision Monitor CIs. For details about CIT-specific properties for Dynamic Node Factory, see “CIT-Specific Properties for Dynamic Node Factory” on page 81. For details about TV Monitor CIs, see “Other Properties Dialog Box” in <i>Using TransactionVision</i>. <p>When you sort the properties by category, the CIT-specific properties appear at the top of the list and the general properties appear at the bottom.</p> <p>You can view a description of the selected property in the Description Area at the bottom of the dialog box. Click the Show/Hide Description Area button to display the Description Area.</p> <p>When accessing the Configuration Item Properties dialog box from within certain applications, the fields are not editable.</p> <p>Mandatory fields are denoted by an asterisk.</p>
<p>Useful Links</p>	<p>“The Aging Mechanism – Overview” on page 532</p>

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

GUI Element (A-Z)	Description
	Click to display the properties by category.
	Click to display the properties alphabetically.
	Toggles between showing and hiding the description area at the bottom of the Properties window.
	Click Expand to expand the properties tree when the properties are displayed by category.
	Click Collapse to collapse the properties tree when the properties are displayed by category.

GUI Element (A–Z)	Description
	<p>Choose the export format for the table data. The available options are:</p> <ul style="list-style-type: none"> ▶ Excel. The table data is formatted as an .xls (Excel) file that can be displayed in a spreadsheet. ▶ PDF. The table data is exported in PDF format. ▶ RTF. The table data is exported in Rich Text Format. ▶ CSV. The table data is formatted as a comma-separated values (CSV) text file that can be displayed in a spreadsheet. <p>Note: For the CSV formatted table data to display correctly, the comma (,) must be defined as the list separator. In Windows, to verify or modify the list separator value, open Regional Options from the Control Panel, and on the Numbers tab ensure that the comma is defined as the List Separator value. In Solaris, you can specify the list separator in the application that opens the CSV file.</p> <ul style="list-style-type: none"> ▶ XML. The table data is formatted as an XML file that can be opened in a text or XML editor. <p>Tip: To extract HTML code from the report:</p> <ul style="list-style-type: none"> ▶ Save the file as HTML ▶ Open the file in an HTML editor ▶ Copy the relevant table into the target file
Actual Deletion Period	The number of days after which the CI or relationship is deleted.
Allow CI Update	<p>When selected, this option allows the DDM process to automatically update the CI or relationship properties with information that it discovers. If you change the value of a property supplied by the DDM process, the value is overridden by the discovered value.</p> <p>When this option is cleared, the CI or relationship properties are not overridden by the DDM process.</p>
Apply	Click Apply to save the changes made to the CI or relationship properties.

GUI Element (A–Z)	Description
City	<p>The name of the city. The list is automatically updated when you select a country (or state, when applicable). Select an option from the list.</p> <p>Note: This field does not appear for relationships.</p>
CI Type	<p>The type of the CI or relationship (read-only value). For information about CITs in HP Business Availability Center, see “CI Type Manager” on page 239.</p>
Country	<p>The country in which the CI is located. Select an option from the list. You must define a geographical location—country, state (if applicable), and city—if you want the CI to appear on the Geographical Map in Dashboard. For more information, see “Geographical Map” in <i>Using Dashboard</i>.</p> <p>Note: This field does not appear for relationships.</p>
Created By	<p>The user name of the administrator who manually created the CI or relationship, where applicable (read-only value).</p>
Create Time	<p>The date and time when the CI or relationship was created.</p>
Deletion Candidate Period	<p>The number of days after which the CI or relationship becomes a candidate for deletion.</p>
Description	<p>A brief description of the CI or relationship.</p>
Display Label	<p>The name of the CI or relationship as it appears in View Explorer.</p>
Edit	<p>In the Properties tab of the Advanced pane, you can view a CI’s properties but you cannot edit them. Click Edit to open the Configuration Item Properties dialog box where you can edit the properties.</p>


GUI Element (A–Z)	Description
Enable Aging	<p>If a CI or relationship is not updated or refreshed over a period of time (for example, a CI is not rediscovered by DDM and no manual update occurs), an aging mechanism deletes the CI from the CMDB. For details, see “The Aging Mechanism – Overview” on page 532.</p> <p>True: the aging mechanism is enabled for this CI or relationship.</p> <p>Default value: false. The default value for DDM CIs is true.</p> <p>Note:</p> <ul style="list-style-type: none"> ▶ If the aging mechanism is disabled, this field is ignored. ▶ This field is displayed for certain CIs only.
ID	The internal ID of the CI or relationship in the CMDB (read-only value).
Last Access Time	<p>The time that the CI was last accessed, whether when being updated or being discovered by DDM. This field is displayed only for certain CIs.</p> <p>This parameter is used by the aging mechanism. For details, see “The Aging Mechanism – Overview” on page 532.</p>
Name	The name of the CI or relationship.
Note	Enables you to enter other information about the CI or relationship.
Origin	An ID for the source that automatically created the CI or relationship, or the application where the CI or relationship was created (read-only value).
Reset	Click the Reset button to restore the original property settings of the CI or relationship.
State	<p>The name of the state – when applicable for the selected country. The list is automatically updated when you select a country. Select an option from the list.</p> <p>Note: This field does not appear for relationships.</p>
Updated by	The user name of the administrator who updated the CI or relationship properties.

GUI Element (A-Z)	Description
Update Time	The date and time when the CI or relationship properties were last updated.
User Label	Enables you to define a display label for the CI or relationship. If no value is entered, the CI name appears as the default label.



Context Menu

Menu Item	Description
Copy Property Name	Copies the name of the selected property to the memory.
Copy Property Value	Copies the value of the selected property to the memory.


Discovery and Changes Summary Dialog Box

Description	<p>Enables you to find recent changes, for example, to an application, by rediscovering the CIs and jobs in a view.</p> <p>To access: In IT Universe Manager:</p> <ul style="list-style-type: none"> ▶ To rediscover all CIs of a view, click the Show Discovery and Changes Summary button  in the CI Selector toolbar. The Discovery and Changes Summary dialog box is displayed. ▶ To rediscover one CI or several CIs in a view, select the CI and display the Discovery tab. <p>To rediscover CIs, you can also select Operations > Rediscover View Content.</p>
Important Information	<p>By default, you can run the rediscovery procedure on views that include less than 10,000 CIs.</p> <p>To increase the number of CIs that you can rediscover in a view:</p> <ol style="list-style-type: none"> 1 Access the Infrastructure Settings Manager (Admin > Platform > Setup and Maintenance > Infrastructure Settings). 2 Select the Foundations context, choose MamAutoDiscovery from the list, and locate the Max CIs in view supported to rediscover entry in the MamAutoDiscovery - General table. 3 Click the Edit button and change the number. 4 Restart the server for the change to take effect. <p>For details on working with the Infrastructure Settings Manager, see “Infrastructure Settings Manager - Overview” on page 134</p>
Included in Tasks	<p>“Check Status of Application Discovery (Rediscover a View)” on page 49</p>
Useful Links	<p>“Discovery Status Pane” in <i>Discovery and Dependency Mapping Guide</i></p>

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

GUI Element (A-Z)	Description
	Click to refresh the status of the selected CIs. This button is disabled when there is no data to be reloaded.
	Click to rerun the discovery.
Discovery Progress Status on View	For details, see “Discovery Status Pane” in <i>Discovery and Dependency Mapping Guide</i> .
History Changes on View	For details, see “CI/Relationship History Dialog Box” on page 54.


Get Related CIs Report

Description	Enables you to view the CIs related to a specified CI in a tree format. To access: In IT Universe Manager, click Generate Related CIs Report  from the toolbar.
Important Information	<ul style="list-style-type: none"> ➤ For information about limitations on the size of reports produced in .pdf format, see “Troubleshooting and Limitations” in <i>Reports</i>. ➤ For details on how to work with reports, see “Working in Reports - Overview” in <i>Reports</i>.

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



GUI Element (A–Z)	Description
<Related CIs data>	The report data consists of the CIs related to the selected CI, arranged in tree format with the selected CI as the root. The child CIs are arranged by CIT.
Generate	Click the Generate button to generate the data for the selected period.

Insert Relationship Dialog Box

Description	<p>Enables you to attach CIs to the CI you selected in View Explorer.</p> <p>To access: In IT Universe Manager, right-click a CI in the Topology Map or View Explorer, and select Relate to CI from the context menu.</p>
Important Information	<p>To create a relationship between two CIs, select the source CI in View Explorer or the Topology Map and then select Relate to CI from the context menu. On the first page of the dialog box (the CI Selection page), you select the target CI(s). Then click Relationship, to select the relationship type on the second page of the dialog box.</p> <p>You can also create a relationship between two CIs graphically by clicking the Create Relationship button  in the toolbar and drawing a line between the two CIs. In this case, a smaller version of the Insert Relationship dialog box opens, which contains the following tabs:</p> <ul style="list-style-type: none"> ➤ Select Relationship. Displays a tree with the available relationship types. Select the required relationship. <ul style="list-style-type: none"> Note: You can double-click the relationship you select to save using the default properties. ➤ Relationship Definition. Displays the properties of the selected relationship. You can edit the properties as described in “Define Relationship Properties Pane” on page 67.

Included in Tasks	“Create CIs and Relationships in the CMDB” on page 48
Useful Links	“View Explorer” on page 689

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

GUI Element (A–Z)	Description
	Click to add the selected CIs in the left pane to the Target CIs pane.
	Click to remove selected CIs from the Target CIs pane (this does not delete the CIs from the CMDB).
Select target CIs	Select a view to display in the view tree and select CIs to move to the Target CIs pane. The Select target CIs pane follows the standard View Explorer functionality. For details, see “View Explorer” on page 689.
Source CI	The CI you selected as the source CI.
Target CIs	Displays the CIs you have selected as target CIs for the relationship.

Relationship Page

Description	Enables you to define the relationship to be created between the original CI and the CIs selected in the CI Selection page of the dialog box. To access: Click the Relationship button from the Insert Relationship dialog box.
Important Information	When defining multiple relationships, you can define different descriptions and property values for each relationship: Skip the property definitions here and edit each relationship individually after it is created.

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

Select Relationship Pane

GUI Element (A–Z)	Description
Direction	Select the direction of the relationship. For some relationship types (for example, Container link , or between a group CI and a monitor CI), only one direction is valid.
Relationship	Define the type of relationship created between the original CI and the CIs being attached. Select an option from the list. For most relationships, only the Depends On option or the Monitored By option is available, depending on the type of CIs for which you are creating a relationship.
Source CI	Displays the name of the CI on the first end of the relationship. This is the CI that you selected in the view.
Target CI	Displays the name of the CI on the second end of the relationship, that is attached to the original CI.

Define Relationship Properties Pane

GUI Element (A–Z)	Description
Actual Deletion Period	The period after which the relationship is deleted when the aging mechanism is enabled.
Allow CI Update	When the value is set to true, the DDM process automatically updates the relationship.
Created By	The user name of the administrator who manually created the relationship, where applicable.
Create Time	The date and time when the relationship was created.
Deletion Candidate Period	The number of days after which the relationship becomes a candidate for deletion.
Description	A detailed description of the relationship.

GUI Element (A–Z)	Description
Destination Network Address	Defined only for route links. Indicates the destination network address to which this route is configured.
Enable Aging	<p>If a CI or relationship is not updated or refreshed over a period of time (for example, a CI is not rediscovered by DDM and no manual update occurs), an aging mechanism deletes the CI from the CMDB. For details, see “The Aging Mechanism – Overview” on page 532.</p> <p>True: the aging mechanism is enabled for this CI.</p> <p>Default value: false. The default value for DDM CIs is true.</p> <p>Note:</p> <ul style="list-style-type: none"> ▶ If the aging mechanism is disabled, this field is ignored. ▶ This field is displayed for certain CIs only.
Last Access Time	<p>The time that the relationship was last accessed, whether when being updated or being discovered by DDM. This field is displayed only for certain relationships.</p> <p>This parameter is used by the aging mechanism. For details, see “The Aging Mechanism – Overview” on page 532.</p>
Must	<p>When the value is set to true, the child CI is dominant when the percentage rule is used to calculate status for the parent CI. If the CI has low status, the parent must take the child CI status, if necessary overriding the percentage rule calculation. This is useful to give emphasis to an important CI. For example, you might want to define Must for a database CI, so that status is critical all the way up the subtree if the database falls, regardless of the status of the other CIs in the subtree.</p> <p>The must status defined for a relationship applies for that relationship only – it is not used in any other relationships of the child CI. For details, see “Understanding the Percentage Rule” in <i>Using Dashboard</i>.</p>
Name	A brief description of the relationship. If no value is entered, the relationship type is used in place of the name.
Note	Enables you to enter other information about the relationship.

GUI Element (A–Z)	Description
Origin	An ID for the source that automatically created the relationship, or the application where the relationship was created.
Updated By	The user name of the administrator who updated the CI properties.
Update Time	The date and time when the relationship properties were last updated.
User Label	Enables you to define a display label for the relationship. If no value is entered, the relationship name appears as the default label.
Weight	<p>When a weight value is entered, the child CI is given more weight in percentage calculations, when percentage rule is used to calculate status for the parent CI. For example, if a child CI is given a weight of 3, then it has three times more impact on the parent status calculation than its unweighted siblings.</p> <p>The weight defined for a relationship applies for that relationship only – it is not used in any other relationships the child CI may have. For more details, see “Understanding the Percentage Rule” in <i>Using Dashboard</i>.</p>



IT Universe Manager Window

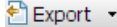

<p>Description</p>	<p>Enables you to define and manage the CIs and relationships in your views.</p> <p>The IT Universe Manager window contains the following panes:</p> <ul style="list-style-type: none"> ▶ View Explorer (CI Selector). Displays the CIs of a selected view. You can select the view from a drop-down list. For details, see “View Explorer” on page 689. ▶ Topology Map. Displays the CIs of a selected view in Map mode or Text mode. ▶ Advanced Pane. Displays properties, history, and discovery data for the selected CI or view. <p>To access: Select Admin > Universal CMDB > Modeling > IT Universe Manager.</p>
<p>Important Information</p>	<p>When working in a view in IT Universe Manager, you can create new CIs, modify existing CIs, or delete CIs. All of these actions have a direct effect on the entire IT Universe model. For example, if you delete a CI in your view, that CI is deleted from the IT Universe model and no longer appears in any view.</p>
<p>Useful Links</p>	<ul style="list-style-type: none"> ▶ “Save Snapshot Dialog Box” on page 527 ▶ “Set View Parameters/Set View Element Parameters Dialog Box” on page 198

Topology Map

Description	<p>Displays the CIs of the currently selected view in graphical or table format. By default, the CIs are displayed in graphical format.</p> <ul style="list-style-type: none">▶ Select the Map Mode tab to display the CIs in graphical format.▶ Select the Text Mode tab to display the CIs in tabular format. <p>To access: Select Admin > Universal CMDB > Modeling > IT Universe Manager.</p>
Important Information	<p>When you select a CI in View Explorer or the Topology Map, the Configuration Items drop-down in the Main Menu becomes active. The options available under that drop-down are the same as those available by right-clicking the CI.</p> <p>You can customize the Topology Map context menu to include other commands (for example, ping, run a program, open a URL) from within CI Type Manager. For details, see “Create Configuration Item Type/Relationship/Calculated Relationship Wizard” on page 259.</p> <p>Note: For grouped CIs and the relationships between them, not all of the context menu options are active. Grouped CIs appear in parentheses in View Explorer and in the Topology Map. You can double-click a link to a grouped CI to open the Link Map, which displays the individual CIs and relationships. Right-click a CI or relationship in the Link Map to display the regular context menu. For details about grouping CIs, see “Node/Relationship Grouping Dialog Box” on page 194.</p>

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

GUI Element (A-Z)	Description
	<p>Select the topology map mode from the Show window in the toolbar.</p> <p>Note: You can also select the modes from the Operations drop-down in the Main Menu.</p> <p>The following modes are available:</p> <ul style="list-style-type: none"> ▶ View Results. Displays an entire layer within a view. ▶ Related in View. Displays the interdependencies of the selected CI within the current view. ▶ Related in DB. Displays the interdependencies of the selected CI within the entire CMDB.
	<p>Specify the CIT you want displayed in the table. The table also includes the children of the selected CIT.</p> <p>Note: This option is displayed in Text mode only.</p>

GUI Element (A–Z)	Description
	<p>Choose the export format for the table data. The available options are:</p> <ul style="list-style-type: none"> ▶ Excel. The table data is formatted as an .xls (Excel) file that can be displayed in a spreadsheet. ▶ PDF. The table data is exported in PDF format. ▶ RTF. The table data is exported in Rich Text Format. ▶ CSV. The table data is formatted as a comma-separated values (CSV) text file that can be displayed in a spreadsheet. <p>Note: For the CSV formatted table data to display correctly, the comma (,) must be defined as the list separator. In Windows, to verify or modify the list separator value, open Regional Options from the Control Panel, and on the Numbers tab ensure that the comma is defined as the List Separator value. In Solaris, you can specify the list separator in the application that opens the CSV file.</p> <ul style="list-style-type: none"> ▶ XML. The table data is formatted as an XML file that can be opened in a text or XML editor. <p>Tip: To extract HTML code from the report:</p> <ul style="list-style-type: none"> ▶ Save the file as HTML ▶ Open the file in an HTML editor ▶ Copy the relevant table into the target file <p>Note: This option is displayed in Text mode only.</p>
<Main Menu>	For details, see “Main Menu” on page 729.
<Node>	<p>The nodes in the topology map represent CIs.</p> <p>Hold the pointer over a node to display its tooltip which describes the type of the CI.</p>
<Relationship>	<p>The links in the topology map represent relationships.</p> <p>Hold the pointer over a relationship to display its tooltip, which describes the type of the relationship.</p> <p>Note: When you select a calculated relationship, the Delete  button in the toolbar is disabled.</p>

GUI Element (A-Z)	Description
<Toolbar>	For details, see “Toolbar Options” on page 733 Note: When accessing the Topology map via direct links, the toolbar includes options from the Related CIs Map. For details, see “Related CIs in View/Database Map” on page 86.
<CI type attributes>	The columns appearing in Text mode represent the CIT attributes of the selected CIs.
Map Mode	Click the Map Mode tab to display the selected layer of CIs in topology map format.
Text Mode	Click the Text Mode tab to display the attribute properties of the CIs in the selected layer in table format. For details on some of the toolbar icons in Text Mode, see “Element Instances Dialog Box” on page 400.

IT Universe Manager Context Menu

The IT Universe Manager window includes the following elements (listed alphabetically) available by right-clicking a CI or relationship in the View Explorer pane, Topology Map, or CI Lifecycle page:

Menu Item	Description
Actions	Select one of the following options: <ul style="list-style-type: none"> ▶ Add CI to Discovery Job. Displays the Add CI to Discovery Job dialog box, which enables you to manually invoke a DDM job for the selected CI. You can use this option to discover additional information about the CI through one of the available DDM jobs. ▶ Remove CI from Discovery Job. Displays the Remove CI from Discovery Job dialog box, which enables you to manually remove a CI from the DDM job. ▶ Open Credentials Information. Displays the Protocol Parameters dialog box, which enables you to enter credentials for the selected CI. This option is only relevant for CIs that require credentials to be viewed. For details, see “Domain Credential References” in <i>Discovery and Dependency Mapping Guide</i>. ▶ Show Discovery status. Opens the Discovery Status dialog box for the selected CI.
CI/Relationship History	Displays the CI History dialog box. For details, see “CI/Relationship History Dialog Box” on page 54.
Delete from CMDB	Enables you to delete the selected CI or relationship from the view and from the CMDB. <p>Note: When you delete a parent CI, the selected CI and its children are removed from the view, but only the selected CI is removed from the database.</p>
Generate Direct Link to CI	Enables you to create a direct link to the selected CI using the Direct Links Wizard. For details, see “Generate Direct Link Dialog Box” on page 42.

Menu Item	Description
Get Related CIs	<p>The following options are available:</p> <ul style="list-style-type: none"> ➤ From View. Opens the Related CIs in View Map. ➤ From Database without Filter. Opens the Related CIs in Database without Filter Map. ➤ From Database with Filter. Opens a dialog box that displays the number of related CIs by type. Select the CI type you want to display in the Related CIs Map and click OK. ➤ Reveal From Database without Filter. Adds to the existing map the immediate neighbors of the selected CI in the CMDB. This option is only active within the Related in DB mode of the Topology Map. ➤ Reveal From Database with Filter. Opens a dialog box which displays the number of related CIs by type. Select the CI type you want to display in the Topology Map results. Adds to the existing map the immediate neighbors of the selected CI that match the CI type selected. This option is only active within the Related in DB mode of the Topology Map. ➤ Reveal from View. Adds to the existing map the immediate neighbors of the selected CI in the view. This option is only active within the Related in View mode of the Topology Map.
Label	<p>Select one of the following options:</p> <ul style="list-style-type: none"> ➤ Edit Label. Opens the Edit Label dialog box which enables you to edit the name of the CI. ➤ Reset Label. Resets the CI name to its default value from the CMDB.
Note	<p>Select one of the following options:</p> <ul style="list-style-type: none"> ➤ Add Note. Opens an editing box where you can add a note to the CI. ➤ Delete Note. Deletes all text saved in a note for the selected CI.
Open	<p>Appears only for configuration file CIs. Opens the configuration file in a popup window.</p>

Menu Item	Description
Properties	Displays the Properties page for the selected CI or relationship. For details, see “Configuration Item Properties Dialog Box” on page 57.
Relate to CI	Opens the Insert Relationship dialog box. For details, see “Insert Relationship Dialog Box” on page 65.
Show Compound Path	Appears only for compound relationships. Displays the Link Map for the selected relationship, which shows the CIs involved in the compound relationship.
Show Differences	Appears only for configuration file CIs. When two such CIs are selected, the option is active. Displays the differences between the two configuration files in a popup window. For details, see “CI/Relationship History Dialog Box” on page 54.
Straighten	Straightens the relationship between two nodes. This option is only available for relationships that have angles.
View Sublayer	Displays a popup window showing the CIs in the layer beneath the selected CI. Note: This option is only active for CIs with children.



Advanced Pane

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

GUI Element (A–Z)	Description
Discovery tab	Displays the DDM run status for the selected CIs. For details, see “Discovery and Changes Summary Dialog Box” on page 63 and “Discovery Status Pane” in <i>Discovery and Dependency Mapping Guide</i> .

GUI Element (A–Z)	Description
History tab	Displays the history for the selected CI. For details, see “CI/Relationship History Dialog Box” on page 54.
Properties tab	Displays the selected CI’s properties (the same properties that appear in the Configuration Item Properties dialog box). You can view the properties in the properties tab, but you must open the dialog box to edit the properties. For details, see “Configuration Item Properties Dialog Box” on page 57.

New CI Dialog Box

Description	<p>Enables you to define a new CI.</p> <p>To access: In IT Universe Manager, click the New CI icon  in the toolbar to create a non-related CI. Select a CI in the topology map and click the New Related CI icon  to create a related CI.</p>
Important Information	<p>To define a new CI, select the CI type from the tree at the top of the dialog box. The CI types in the tree that are available to be instantiated appear in black. The CI types in faded text cannot be instantiated.</p> <p>Edit the properties in the Define new CI properties area. The table below includes the properties which are common to all CIs. In addition, there are other properties specific to each CI.</p> <p>If you are creating a related CI, click the Relationship button to go to the relationship mode of the dialog box. Select a relationship and edit its properties.</p>
Included in Tasks	“Create CIs and Relationships in the CMDB” on page 48
Useful Links	“View Explorer” on page 689 Chapter 18, “CI Lifecycle and the Aging Mechanism”

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

GUI Element (A–Z)	Description
Actual Deletion Period	The period after which the CI is deleted when the aging mechanism is enabled.
Allow CI Update	<p>When the value is set to true, this option enables the DDM process to automatically update the CI properties with information that it discovers. If you change the value of a property supplied by the DDM process, the value is overridden by the discovered value.</p> <p>When the value is set to false, the CI properties are not overridden by the DDM process.</p>
City	The name of the city. The list is automatically updated when you select a country (or state, when applicable). Select an option from the list.
Country	The country in which the CI is located. Select an option from the list. You must define a geographical location – country, state (if applicable), and city – if you want the CI to appear on the Geographical Map in Dashboard. For more information, see “Geographical Map” in <i>Using Dashboard</i> .
Created By	The user name of the administrator who manually created the CI, where applicable.
Create Time	The date and time when the CI was created.
Deletion Candidate Period	The period after which the CI becomes a candidate for deletion when the aging mechanism is enabled.
Description	A description of the CI.
Display Label	The label that appears for the CI in the topology map.

GUI Element (A–Z)	Description
Enable Aging	<p>If a CI or relationship is not updated or refreshed over a period of time (for example, a CI is not rediscovered by DDM and no manual update occurs), an aging mechanism deletes the CI from the CMDB. For details, see “The Aging Mechanism – Overview” on page 532.</p> <p>True: the aging mechanism is enabled for this CI.</p> <p>Default value: false. The default value for DDM CIs is true.</p> <p>Note:</p> <ul style="list-style-type: none"> ▶ If the aging mechanism is disabled, this field is ignored. ▶ This field is displayed for certain CIs only.
Last Access Time	<p>The time that the CI or relationship was last accessed, whether when being updated or being discovered by DDM. This field is displayed only for certain CIs or relationships.</p> <p>This parameter is used by the aging mechanism. For details, see “The Aging Mechanism – Overview” on page 532.</p>
Name	The name of the CI.
Note	Enables you to enter other information about the CI.
Origin	An ID for the source that automatically created the CI, or the application where the CI was created.
Relationship	For a related CI, click Relationship to go to the relationship mode of the dialog box.
State	The name of the state – when applicable for the selected country. The list is automatically updated when you select a country. Select an option from the list.
Select CI Type	<p>Enables you to select the CI type from the tree for the new CI. The CI types that are available for the selected CI or view appear active in the CI type tree. The other CI types appear in faded text and cannot be selected.</p> <p>To limit the CI type tree to CI types from the current view, select CI Types from the current view on the right. To display all CI types in the tree, select All CI Types.</p>
Updated By	The user name of the administrator who updated the CI properties.

GUI Element (A–Z)	Description
Update Time	The date and time when the CI properties were last updated.
User Label	Enables you to define a display label for the CI. If no value is entered, the CI name appears as the default label.

CIT-Specific Properties for Dynamic Node Factory

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

GUI Element (A–Z)	Description
Create CI if groupBy value missing	Defines how to handle samples that are missing the grouping (groupBy) key. When the value is set to true, a CI is still created for the sample. Select true or false from the drop-down list. Default value: true
DNode definition key	Defines how the received data samples are processed to generate the hierarchy. For details, see “DNode Definition Key Property” on page 98. The default DNode definition key is for a Business Process Monitor source.
DNode ID	Appears in the Key Properties section of the CI Properties pane. The DNode ID is automatically assigned and cannot be edited.
Enable DNode	Select true or false from the drop-down list. When the value is set to true, the Dynamic Node Factory hierarchy is updated as required based on the incoming samples. If the value is set to false, the hierarchy is not updated (but the KPIs for the CIs still receive status updates in Dashboard). Default value: true

GUI Element (A–Z)	Description
<p>KPI status for removal</p>	<p>Select a value from the drop-down list. Defines at which KPI status the generated CIs can be considered for removal from the CMDB (default is Nodata). If all KPIs for a CI have held this status for at least 24 hours (default period), the CI is eligible to be removed from the CMDB, if it was created by this Dynamic Node Factory. Once an hour, the Dynamic Node Factory cleaner removes the CIs that are marked as removable.</p> <p>This option enables automatic cleaning of CIs that have not received corresponding data samples for 24 hours. You can select a different status from the KPI status for removal list according to the characteristics of the generated CIs. For example, you may have generated ticket CIs that change to status green (OK) when the ticket is closed; after 24 hours at OK status these CIs are considered no longer relevant for your views.</p> <p>Note: This applies to monitor (leaf) CIs. When a leaf CI is removed, the CIs above it in the hierarchy are also removed if they have no other children.</p>
<p>Max number of CIs to create</p>	<p>Defines the limit for creating CIs in the Dynamic Node Factory hierarchy, default is 1000. When a sample is received and the number of CIs in the hierarchy is below 1000, then the Dynamic Node Factory adds new CIs to the hierarchy as required by the sample, even if the number of CIs then exceeds 1000. However, if the hierarchy already has more than 1000 CIs when a sample is received, no new CIs are created.</p> <p>If you think that the number of CIs might be close to or exceeding the defined limit, check the <HP Business Availability Center root directory>\log\EJBContainer\Trinity.log file. If there is a problem, either change the limit in the Max number of CIs to create property, or modify the selector expression to narrow down the definition. (Also take into consideration the overall CI limit for IT Universe Manager.)</p>

GUI Element (A–Z)	Description
Selector expression	<p>Defines the filter that catches the samples on the bus that are required for the Dynamic Node Factory. These samples are processed according to the generator definitions in the DNode definition key property. For example, if you want the generators to be applied against all Business Process Monitor samples, you would define a selector for sampleType "trans_t". If you want to narrow the catchment area, narrow the filter by adding additional selector expression rows.</p> <p>For details on defining selector expressions, see “Selectors for KPIs” in <i>Using Dashboard</i>.</p>
Time period for removal status	<p>Defines the time period during which all KPIs for a CI must have the status defined in KPI status for removal, before the CI can be marked as removable (default is 24 hours). If you want to change the value, enter a number followed by one of the following suffixes: s - for seconds, m - for minutes, h - for hours, d - for days.</p> <p>Note: The Dynamic Node Factory cleaner is set to review Dynamic Node Factory content and remove expired CIs once an hour. If the value set for the Time period for removal status is less than an hour, then the actual removal time may still be up to an hour, when the next cleaner review takes place.</p> <p>If required, you can change the default value for the Dynamic Node Factory clean interval parameter on the Infrastructure Settings page. Select Admin > Platform > Setup and Maintenance > Infrastructure Settings, select Foundations and select Online Business Logic Engine from the drop-down menu. However, the cleaning values should be changed with care, to avoid disrupting the sensitive balance of the cleaning mechanism.</p>

 **Relationship Dialog Box**

Description	<p>Enables you to define the relationship between the new CI and the CI selected in the view, as well as the properties of the relationship.</p> <p>To access: Click the Relationship button from the New Related CI dialog box.</p>
--------------------	---

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

GUI Element (A–Z)	Description
Allow CI Update	When the value is set to true, the DDM process automatically updates the relationship.
CI Definition	Click CI Definition to return to the CI properties mode of the dialog box.
Created By	The user name of the administrator who manually created the relationship, where applicable.
Create Time	The date and time when the relationship was created.
Description	A description of the relationship.
Direction	Select the relationship direction from the drop-down box.
Enable Aging	<p>If a CI or relationship is not updated or refreshed over a period of time (for example, a CI is not rediscovered by DDM and no manual update occurs), an aging mechanism deletes the CI from the CMDB. For details, see “The Aging Mechanism – Overview” on page 532.</p> <p>True: the aging mechanism is enabled for this CI.</p> <p>Default value: false. The default value for DDM CIs is true.</p> <p>Note:</p> <ul style="list-style-type: none"> ▶ If the aging mechanism is disabled, this field is ignored. ▶ This field is displayed for certain CIs only.











GUI Element (A–Z)	Description
Last Access Time	<p>The time that the relationship was last accessed, whether when being updated or being discovered by DDM. This field is displayed for certain relationships only.</p> <p>This parameter is used by the aging mechanism. For details, see “The Aging Mechanism – Overview” on page 532.</p>
Must	<p>When the value is set to true, the child CI is dominant when the percentage rule is used to calculate status for the parent CI. If the CI has low status, the parent must take the child CI status, overriding the percentage rule calculation if necessary. This is useful to give emphasis to an important CI. For example, you might want to define Must for a database CI, so that status is critical all the way up the subtree if the database falls, regardless of the status of the other CIs in the subtree.</p> <p>The Must status defined for a relationship applies to that relationship only – it is not used in any other relationships of the child CI.</p>
Name	The name of the CI.
Network Address	Defined only for route links. Indicates the destination network address to which this route is configured.
Note	Enables you to enter other information about the CI.
Origin	An ID for the source that automatically created the relationship, or the application where the relationship was created.
Relationship	Enables you to define the type of relationship that is created between the two CIs. For most relationships, only the Depends On option is available.
Source CI	The name of the CI on the first side of the relationship. This is the CI that you selected in the view.
Target CI	The name of the CI on the second side of the relationship. This is the new CI that you are creating.
Updated By	The user name of the administrator who updated the relationship properties.









GUI Element (A–Z)	Description
Update Time	The date and time when the CI properties were last updated.
User Label	Enables you to define a display label for the relationship.
Weight	<p>When a weight value is entered, the child CI is given more weight in percentage calculations, when the percentage rule is used to calculate status for the parent CI. For example, if a child CI is given a weight of 3, then it has three times more impact on the parent status calculation than its unweighted siblings.</p> <p>The weight defined for a relationship applies to that relationship only – it is not used in any other relationships of the child CI.</p>


Related CIs in View/Database Map

Description	<p>Enables you to view the CIs related to a specified CI in the view or the CMDB in map or table format.</p> <p>To access: In IT Universe Manager, right-click the required CI and select Get Related CIs > From View or From Database with Filter or From Database without Filter.</p>
Important Information	<p>When you select From View, the Related CIs Map displays related CIs in the current view. When you select From Database without Filter, the Related CIs Map displays related CIs in the CMDB. When you select From Database with Filter, you first select the CI types you want to see in the map, which then displays related CIs of those types in the CMDB.</p> <p>The related CIs can be viewed in map mode or in text mode. The text mode format of the map includes the icons found in the Element Instances dialog box. For details, see “Element Instances Dialog Box” on page 400.</p>

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

GUI Element (A–Z)	Description
	Click Place in Center to place the map in the center of the window.
	Click Fit to Window to fit the map to the size of the window.
	Click Export Map to Image to save the map to a file.
	Click Print... to open the Print Preview dialog box, which enables you to preview or print the map.
	Click Layout Properties to open the Layout Properties dialog box which enables you to modify the layout.
	Click CI Properties to open the Configuration Item Properties dialog box.
	Click CI History to open the CI History dialog box for the selected CI.
	Select a different CI in the map and click Reveal from Database without Filter to add the related CIs in the CMDB for the new CI to the existing map. Note: This option is only available from the Related CIs from Database map.
	Select a different CI in the map and click Reveal from Database with Filter to select the CI types you want to see in the map and add the related CIs in the CMDB for the new CI to the existing map. Note: This option is only available from the Related CIs from Database map.
	Select a different CI in the map and click Reveal from View to add the related CIs in the view for the new CI to the existing map. Note: This option is only available from the Related CIs from View map.

GUI Element (A–Z)	Description
	<p>Select a different CI in the map and click Refocus on CI without Filter to redraw the Related CIs map with the new CI as the focus without using a CI type filter.</p> <p>Note: This option is only available from the Related CIs from Database map.</p>
	<p>Select a different CI in the map and click Refocus on CI with Filter to select the CI types to appear in the Related CIs map and redraw the map with the new CI as the focus.</p> <p>Note: This option is only available from the Related CIs from Database map.</p>
	<p>Select a different CI in the map and click Refocus on CI from View to redraw the Related CIs map with the new CI as the focus.</p> <p>Note: This option is only available from the Related CIs from View map.</p>
	<p>Click Reset Focus to restore the focus of the Related CIs map to the original state.</p>
	<p>Click Delete to delete the selected CI or relationship.</p>
	<p>Click New Related CI to open the New Related CI dialog box, which enables you to define a new related CI. For details, see “New CI Dialog Box” on page 78.</p>
	<p>Click Relate to CI to open the Insert Relationship dialog box, which enables you to create a relationship between two CIs. For details, see “Insert Relationship Dialog Box” on page 65.</p>
	<p>Click Add CI to Discovery Job to display the Add CI to Discovery Job dialog box, which enables you to manually invoke a DDM job for the selected CI. You can use this option to discover additional information about the CI through one of the available DDM jobs.</p>

GUI Element (A–Z)	Description
	Click Remove CI from Discovery Job to display the Remove CI from Discovery Job dialog box, which enables you to manually remove a CI from the DDM job.
<Layout box>	Select the map layout from the drop-down list.
<Mode box>	Select the map mode from the drop-down list.
Map	Select Map to view the related CIs in map mode.
Text	Select Text to view the related CIs in text mode.

Context Menu

The Related CIs Map includes the following elements (listed alphabetically) available by right-clicking a CI or relationship in the map:


Menu Item	Description
<IT Universe Manager context menu options>	<p>The following context menu options from the main IT Universe Manager window are also available in the Related CIs Map:</p> <ul style="list-style-type: none"> ▶ Properties ▶ CI History ▶ Delete ▶ Insert Relationship <p>For details, see “IT Universe Manager Window” on page 70.</p>
Get Related CIs > Refocus on CI without Filter	<p>Select a different CI in the map and select Get Related CIs > Refocus on CI without Filter to redraw the Related CIs map with the new CI as the focus.</p> <p>Note: This option is only available from the Related CIs from Database map.</p>

Menu Item	Description
Get Related CIs > Refocus on CI with Filter	Select a different CI in the map and select Get Related CIs > Refocus on CI with Filter to select the CI types to appear in the Related CIs map and redraw the map with the new CI as the focus. Note: This option is only available from the Related CIs from Database map.
Get Related CIs > Refocus on CI from View	Select a different CI in the map and select Get Related CIs > Refocus on CI from View to redraw the Related CIs map with the new CI as the focus. Note: This option is only available from the Related CIs from View map.
Get Related CIs > Reset Focus	Select Reset Focus to restore the focus of the Related CIs map to the original state.
New Related CI	Opens the New Related CI dialog box, which enables you to define a new related CI. For details, see “New CI Dialog Box” on page 78.

Selector Expression Dialog Box

Description	Enables you to edit a selector expression for a Monitor or Dynamic Node Factory CIT. To access: Click Edit Selector Expression from the Define CIT Specific Properties page of the New CI Wizard.
Important Information	For details on choosing a selector for a specific KPI, see “Working With KPIs” in <i>Using Dashboard</i> .

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

GUI Element (A-Z)	Description
	Click to delete the row of the filter.
<Sample field window>	From the sample field drop-down list, select the appropriate sample field or select Custom to enter a custom field.
Add 'OR' Expression	Click to add a row for a new 'or' condition in the filter.
And	Click to add a row for a new 'and' condition in the filter.
Field	Select a field from the drop-down list or, if Custom is selected in the Sample field window, enter a field name.
Operator	Select an operator from the drop-down list.
Value	Enter a value for the filter condition.

3

IT Universe Manager – Dynamic Node Factory

This chapter provides information on Dynamic Node Factory CIs in IT Universe Manager.

This chapter includes:

Concepts

- ▶ Working with Dynamic Node Factory Overview on page 93
- ▶ DNode Definition Key Property on page 98

Tasks

- ▶ Define a Dynamic Node Factory CI on page 109

Working with Dynamic Node Factory Overview

The Business Logic Engine is able to dynamically create CI hierarchies in the CMDB at run time, based on incoming data samples on the HP Business Availability Center bus. These hierarchies are created using the **Dynamic Node Factory CI**.

This section includes the following topics:

- ▶ “Understanding Dynamic Node Factory” on page 94
- ▶ “How Dynamic Node Factory Works” on page 95
- ▶ “When to Use Dynamic Node Factory” on page 96

Understanding Dynamic Node Factory

The Dynamic Node Factory CI includes a template that defines the rules for creating and managing the generated hierarchy, and a selector that defines which data samples are relevant.

When a Dynamic Node Factory CI is added to a view, it can immediately start generating CIs from the incoming data samples. The generated CIs are added to the IT universe model in the CMDB, and to the subtree under the Dynamic Node Factory CI in the view. These generated CIs are then available to add to other views like any other CI in the CMDB.

A Dynamic Node Factory CI is added to a view and the IT universe model in one of the following ways:

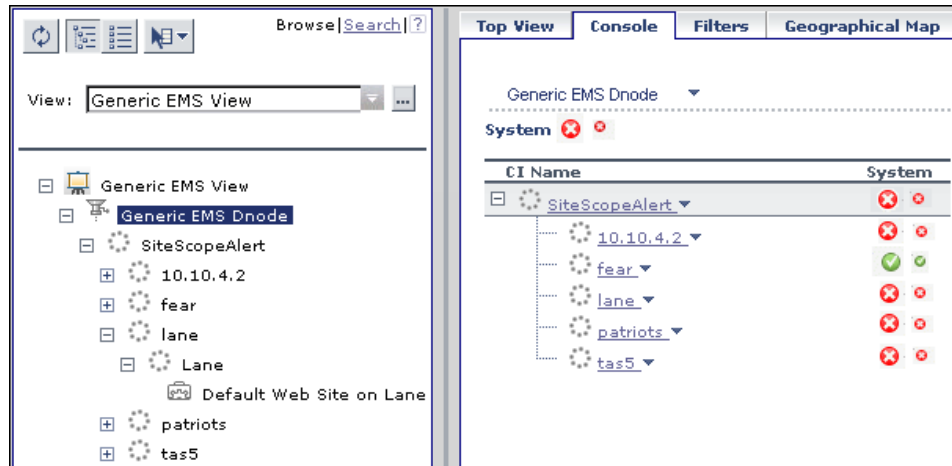
- ▶ **Automatically, by a source adapter.** Some of the HP Business Availability Center custom source adapters, for example, Real User Monitor, include a Dynamic Node Factory definition. When the source is added in Source Manager, the Dynamic Node Factory CI is added to the out-of-the-box view for Real User Monitor.

For details on adding source adapters, see Chapter 27, “Working with Source Manager.”

- ▶ **Manually, in IT Universe Manager.** You can create a new CI of type Dynamic Node Factory in the CMDB using the New CI dialog box in IT Universe Manager.

After a Dynamic Node Factory CI is added to a view, the CI properties can be edited in IT Universe Manager. For details on creating a Dynamic Node Factory CI and editing its properties, see “CIT-Specific Properties for Dynamic Node Factory” on page 81.

You can view KPI status for the CIs in the Dynamic Node Factory hierarchy in the Dashboard application as soon as the CIs are created.



How Dynamic Node Factory Works

The XML definition file generated by the Dynamic Node Factory CI defines rules for listening to the samples that reach the system, using selectors to define areas of interest. The XML file guides the Business Logic Engine on how to build the topology in the CMDB based on the incoming data, and produces its own definitions for the generated CIs.

Dynamic Node Factory CIs use the **DNode definition key** property, which defines how the samples are processed by providing example values for the XML file. These values are used as the template for the dynamic hierarchy in the CMDB. When required, you can customize the DNode definition key to produce a hierarchy that displays the information you need. For details, see “DNode Definition Key Property” on page 98.

If there is no existing CI for a received sample in the CMDB, the Business Logic Engine creates the CI and adds it to the subtree for the Dynamic Node Factory CI. If the CI already exists in the CMDB (for example, if a BPM Transaction CI that corresponds to the sample was already created by the Business Process Monitoring source adapter), the existing CI is added to the Dynamic Node Factory subtree, creating a new relationship for that CI.

Once a CI is created, the CI definitions are stored as for any other CI, and it receives update samples from the Dashboard matcher based on the selector for the Dynamic Node Factory CI. The Dynamic Node Factory hierarchy is rebuilt only as necessitated by the sample contents. (You can also define additional composite selectors for the Dynamic Node Factory XML definitions, so that the generated CI is updated independently from the Dynamic Node Factory generators. For details, see “Defining Composite Selectors in the DNode Definition Key” on page 107.)

You can modify the properties of the generated CIs, and delete them from the CMDB. (However, after deleting a CI, it may be recreated by the Dynamic Node Factory based on incoming data samples.)

When to Use Dynamic Node Factory

Dynamic Node Factory hierarchies are useful for the integration and mapping of samples from external systems (generally EMS systems), where the database structure for the source is unknown, and HP Business Availability Center does not have a predefined source adapter for handling the data. However, the decision of whether to set up a Dynamic Node Factory hierarchy or a new source adapter to import the information depends on the particular situation and your data requirements.

The Dynamic Node Factory CI may also be used to bring alternative hierarchies from adapter sources.

You should take into consideration the following points:

- ▶ The adapter provides more precise results.
- ▶ Implementation of a Dynamic Node Factory template to import the information is usually simpler than setting up a new adapter for the source.
- ▶ The Dynamic Node Factory is dynamic, reflecting changes that generate new CIs in run time, while the adapters reflect the changes only after synchronization. For example, if you create a Dynamic Node Factory CI for alerts, you can generate a hierarchy that displays alerts with event children, without knowing in advance what type of alert is received. The Dynamic Node Factory hierarchy displays a new alert when it occurs, while an adapter for alerts displays a new alert only after synchronization occurs (by default, once an hour).

However, if an alert is removed at the source, the adapter reflects this change at synchronization, while the Dynamic Node Factory may take up to 24 hours to reflect the change (depending on the Dynamic Node Factory cleaning definitions). Similarly, if a transaction name is changed or moved to a new profile in End User Management Administration, then the Dynamic Node Factory creates a new CI for it, but the old CI remains in the hierarchy until it has not had any corresponding samples for 24 hours (default value, can be changed to a different value).

Keep in mind that you affect two levels of CIs when you modify properties for a Dynamic Node Factory CI:

- ▶ The general properties for the Dynamic Node Factory CI, for example, name and country, apply only to that CI. Also, when you attach KPIs to the Dynamic Node Factory CI in Dashboard Administration, they are defined only for that CI. Modifying these properties has no influence on the generated hierarchy.
- ▶ The CIT-specific properties for the Dynamic Node Factory CI, for example, selector expression and KPI status for removal, define information relating to the CIs in the generated hierarchy under the Dynamic Node Factory CI. Modifying these properties changes the templates and handling rules for the hierarchy.

Changes to these properties should be correlated with the definitions within the DNode definition key. For example, the selector expression must identify samples that contain the keys defined in the generators, otherwise the Dynamic Node Factory hierarchy remains empty.

Note: If you change the DNode definition key or selector expression for an active (enabled) Dynamic Node Factory CI, the previous Dynamic Node Factory hierarchy is deleted from the view and the hierarchy is recreated.

If the catchment area for a Dynamic Node Factory hierarchy is too wide, you can modify the selector expression for the Dynamic Node Factory CI to narrow down the definition, for example, to include only samples coming from a particular machine.

If you require additional help with creating a Dynamic Node Factory hierarchy, contact HP Software Support.

Note: There are no default KPIs defined for the Dynamic Node Factory CI; you must manually attach KPIs after creating the CI, or no status is displayed in Dashboard.

DNode Definition Key Property

The DNode definition key property defines how the received data samples are processed to generate the hierarchy under the Dynamic Node Factory CI. This section describes the DNode definition key structure and contents, and how to customize the property.

This section contains the following topics:

- ▶ “About the DNode Definition Key” on page 98
- ▶ “Components of the DNode Definition Key” on page 100
- ▶ “Defining Composite Selectors in the DNode Definition Key” on page 107

Important: Only users with an advanced knowledge of Business Availability Center should make changes to templates. An incorrect definition may lead to loss of data, the wrong hierarchy build, and redundancy in the CMDB.

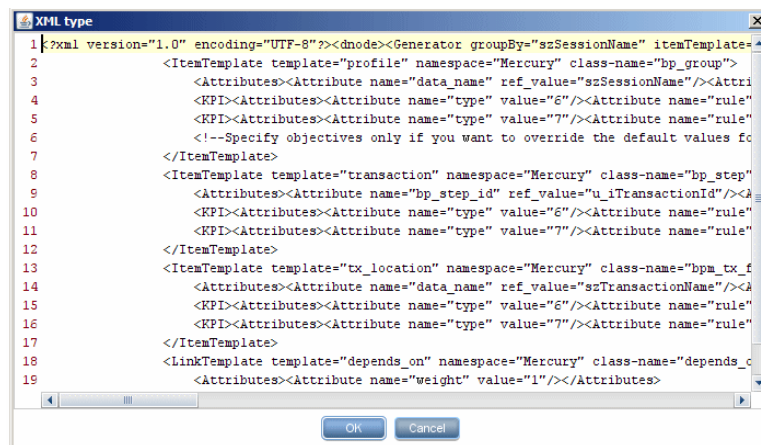
About the DNode Definition Key

The DNode definition key defines the properties for the CIs created by the received samples. This includes generators to determine how to group the incoming samples, how many CI levels to create, and which templates to use when creating each CI (KPIs, business rules, and so forth). Each different data type needs an appropriate definition in the Dynamic Node Factory file.

You can customize the definitions in the DNode definition key to make them relevant for a specific data source and to build the hierarchy structure you require. This customization can be done by:

- ▶ Editing the Dynamic Node Factory CI in IT Universe Manager (recommended method). For information on editing a Dynamic Node Factory CI, see “CIT-Specific Properties for Dynamic Node Factory” on page 81.
- ▶ Editing the template for the source adapter in Source Manager (only relevant for predefined Dynamic Node Factory CIs). For information on editing adapter templates, see “Source Adapter Templates” on page 619.

The default DNode definition key property (used when you create a new Dynamic Node Factory CI in IT Universe Manager) contains definitions for a Business Process Monitor hierarchy:



```

1 <?xml version="1.0" encoding="UTF-8"?><dnode><Generator groupBy="szSessionName" itemTemplate=
2     <ItemTemplate template="profile" namespace="Mercury" class-name="bp_group">
3         <Attributes><Attribute name="data_name" ref_value="szSessionName"/><Attri
4         <KPI><Attributes><Attribute name="type" value="6"/><Attribute name="rule"
5         <KPI><Attributes><Attribute name="type" value="7"/><Attribute name="rule"
6         <!--Specify objectives only if you want to override the default values fo
7     </ItemTemplate>
8     <ItemTemplate template="transaction" namespace="Mercury" class-name="bp_step"
9         <Attributes><Attribute name="bp_step_id" ref_value="u_iTransactionId"/><A
10        <KPI><Attributes><Attribute name="type" value="6"/><Attribute name="rule"
11        <KPI><Attributes><Attribute name="type" value="7"/><Attribute name="rule"
12    </ItemTemplate>
13    <ItemTemplate template="tx_location" namespace="Mercury" class-name="hpm_tx_f
14        <Attributes><Attribute name="data_name" ref_value="szTransactionName"/><A
15        <KPI><Attributes><Attribute name="type" value="6"/><Attribute name="rule"
16        <KPI><Attributes><Attribute name="type" value="7"/><Attribute name="rule"
17    </ItemTemplate>
18    <LinkTemplate template="depends_on" namespace="Mercury" class-name="depends_c
19        <Attributes><Attribute name="weight" value="1"/></Attributes>

```

If you are adding a Dynamic Node Factory CI for a different data source, for example, SiteScope, you must replace the definitions with ones appropriate for the source.

For explanations of the data samples and their fields, see “Data Samples” in *Reference Information*.

For descriptions of the definitions contained in the DNode Definition Key, see the following section.

Components of the DNode Definition Key

This section describes the components needed to customize a DNode Definition Key.

All changes to the parameters in the DNode definition key property must be logical and relevant for the source.

Generators

The first part of the DNode definition key contains the **Generators** defining the hierarchy for the CIs. Each generator in the DNode definition key defines a level to be built in the Dynamic Node Factory hierarchy (the XML provides for definitions of up to three levels). For example, for Business Process Monitor, the Dynamic Node Factory may build levels for profile, transaction, and location.

For example, the generators in the default DNode definition key for Business Process Monitor are as follows:

```
<Generator groupBy="szSessionName" itemTemplate="profile"
linkTemplate="depends_on">
<Generator groupBy="szTransactionName" itemTemplate="transaction"
linkTemplate="depends_on">
<Generator groupBy="szLocationName" itemTemplate="tx_location"
linkTemplate="monitored_by"/>
</Generator>
</Generator>
```

- **groupBy.** Defines the property to look for in the samples, to see if the sample is relevant for building this level of the hierarchy. A CI is created for each unique value of this key. For example, all samples with a unique value for `szSessionName` create a CI at the profile level of the hierarchy.

Note: If samples are missing this key, a CI is still created for the sample if the **Create CI if groupBy value missing** is selected for the parent Dynamic Node Factory CI. For more information, see “CIT-Specific Properties for Dynamic Node Factory” on page 81.

- **itemTemplate.** Defines the name of the CI template to be used for creating each CI at this level. The CI templates are defined in the DNode definition key after the generators.
- **linkTemplate.** Defines the name of the relationship template to be used for each CI created at this level. The relationship template defines the relationship between the created CI and its parent CI. The relationship templates are defined in the DNode definition key after the CI templates.

Note: It is possible to use the DNode definition key property to build more complex dynamic hierarchies, for example, by using more than one generator at the same level. For more information, contact HP Software Support.

CI Templates

The second part of the DNode definition key contains the **ItemTemplates**, the templates for creating the CIs. Each template defines attributes, KPIs, and business rules to be used for each generated CI. (If required, you can also add a composite selector to a monitor ItemTemplate. For details, see “Defining Composite Selectors in the DNode Definition Key” on page 107.)

For example, the following ItemTemplate creates Business Process Group CIs for the profiles in the default Business Process Monitor hierarchy:

```
<ItemTemplate template="profile" namespace="Mercury" class-name="bp_group">
  <Attributes>
    <Attribute name="data_name" ref_value="szSessionName"/>
    <Attribute name="id" ref_value="u_iSessionId"/>
    <Attribute name="app_id" value="-1"/>
  </Attributes>
  <KPI>
    <Attributes>
      <Attribute name="type" value="6"/>
      <Attribute name="rule" value="1"/>
    </Attributes>
  </KPI>
  <KPI>
    <Attributes>
      <Attribute name="type" value="7"/>
      <Attribute name="rule" value="1"/>
    </Attributes>
  </KPI>
  <!--Specify objectives only if you want to override the default values for objectives-->
</ItemTemplate>
```

Item Template Line

The first line of the ItemTemplate defines the following parameters:

```
<ItemTemplate template="profile" namespace="Mercury" class-name="bp_group">
```

- **template.** Defines the name of the template.
- **namespace.** Defines the context for the class-name: **Mercury** is used for all CIs.
- **class-name.** Defines the configuration item type (CIT) name for the CIs generated by this template. This must be a valid CMDB CIT. The attributes for the created CIs are taken from the CIT definition.

This is the internal name used for the CIT, not the display name. For example, the internal name for Business Process Group CIs is **bp_group**.

To view the internal name for each CIT: select **Admin > Universal CMDB > Modeling > CIT Manager** and select the **Details** tab for a CIT. The internal name is displayed in the **Name** field.

Attributes Section

Most of the CITs have mandatory attributes. These attributes must be included in the **Attributes** section of the ItemTemplate (in the following example, the **id** and **app_id** are mandatory attributes).

The Attributes section defines the following parameters:

```
<Attributes>
  <Attribute name="data_name" ref_value="szSessionName"/>
  <Attribute name="id" ref_value="u_iSessionId"/>
  <Attribute name="app_id" value="-1"/>
</Attributes>
```

- **name.** Defines the internal name of an attribute included in the attributes list for the relevant CIT. For example, **data_name** is the internal attribute name corresponding to the **Name** property for the created CI.

To view the list of attributes defined for a CIT: select **Admin > Universal CMDB > Modeling > CIT Manager** and select the **Attributes** tab. The **Name** column lists the attributes by their internal name.

- **ref_value.** Defines a key in the data sample that provides the value for the attribute. In the example `<Attribute name="id" ref_value="u_iSessionId"/>`, the **id** attribute for each CI is given the value from the property **u_iSessionId** in the incoming samples.
- **value.** Defines a static value for the attribute. This enables you to use a predefined value for all CIs generated by this ItemTemplate. For example, you can define a static value attribute for **data_name**, where you know that there is only one CI at this level: `<Attribute name="data_name" value="my_BPM_profile"/>`

Note: The Business Process Group CI template includes the static value attribute `<Attribute name="app_id" value="-1"/>`. This **app_id** attribute corresponds to the Business Process Monitor source adapter, and is only required for Business Process Monitor hierarchies.

Every ItemTemplate should contain attributes defining a unique name and an appropriate ID for each generated CI (otherwise the CIs are created on top of each other). You can define additional attribute keys for the template, as required.

If you want to define a context menu in the ItemTemplate, so that it applies for all CIs generated by the template, you need to use a special string format. The value for the context menu attribute is presented as XML, and so must be "escaped" from the DNode definition key XML, as in the following example:

```
<Attribute name="contextmenu"
value="&lt;Values&gt;&lt;Value&gt;groupMenu&lt;/Value&gt;&lt;/Values&gt;" />
```

The value in bold shows the internal context menu name. (You can find the internal context names in: `<HP Business Availability Center server>\AppServer\webapps\site.war\bam\conf\repositories\contextMenu\def.xml`)

KPI Section

The **KPI** section of the ItemTemplate defines the following parameters:

```
<KPI>
  <Attributes>
    <Attribute name="type" value="6"/>
    <Attribute name="rule" value="1"/>
  </Attributes>
</KPI>
```


- **name="type"** Defines the KPI to be attached to the CIs generated by this ItemTemplate. The value corresponds to the ID number for a KPI, for example, **6** is the ID number for the **Performance** KPI. The ID numbers for the KPIs are listed in the **Admin > Dashboard > Repositories > KPIs** page, under the **ID** column.

Each ItemTemplate in the DNode definition key should specify the same KPIs, and these should correlate with the KPIs defined for the Dynamic Node Factory CI itself.

- **name="rule"** Defines the business rule to be used with the KPI for the generated CIs. The value corresponds to the ID number for a rule, for example, **1** is the ID number for the **Worst Child Rule**. The ID numbers for the business rules are listed in the **Admin > Dashboard > Repositories > Business Rules** page, under the **ID** column.

The specified business rule should be a monitor rule if the ItemTemplate is defining leaf CIs, and a group rule if the ItemTemplate is defining non-leaf CIs. For more information on rule types, see “Business Rule Repository Overview” in *Using Dashboard*.

If required, you can define additional parameters in the KPI section. Attributes can use **value** or **ref_value**, as described in the “Attributes Section” on page 103.

The following additional parameters are relevant for leaf monitor CIs defined in the DNode definition key, and should be declared as part of the KPI:

- **RuleArguments.** Defines parameters used by the business rule. When you add a rule argument to a KPI definition in the DNode definition key, it overrides the default value for the parameter defined in the Rule Repository. For example, the following definition overrides the default value for the **No data timeout** parameter (used with, for example, the Transaction Availability Rule), and the generated CIs use the new value for the KPI:

```
<RuleArguments><parameter name="No data timeout" type="Integer"
value="1200"/></RuleArguments>
```

For details on the parameters used by the business rules, see “List of Dashboard Business Rules” in *Using Dashboard*.

Note: If you add definitions for **RuleArguments**, make sure to define the exact key name and to use the correct format for the value.

- **Objective.** Defines objective values that override the default objective parameter values declared in the Rule Repository. The objective values should be relevant for the rule.

For example, the following definition overrides the default value for the **Critical** (red) objective level (Objectives section shown in bold):

```
<KPI>
  <Attributes>
    <Attribute name="type" value="6"/>
    <Attribute name="rule" value="13"/>
  </Attributes>
  <RuleArguments/>
  <Objective>
    <Attributes>
      <Attribute name="critical" value="12"/>
    </Attributes>
  </Objective>
</KPI>
```

Note: The KPI definitions should be in the order shown above: KPI, business rule, rule arguments, objectives.

Relationship Templates

The final part of the DNode definition file contains the **LinkTemplates**, the templates for creating the relationships between the nodes.

For example, the LinkTemplates in the default DNode definition key for Business Process Monitor are as follows:

```
<LinkTemplate template="depends_on" namespace="Mercury" class-
name="depends_on"/>
</LinkTemplate>
<LinkTemplate template="monitored_by" namespace="Mercury" class-
name="monitored_by">
</LinkTemplate>
```

- ▶ **template.** Defines the name of the template.
- ▶ **namespace.** Defines the context for the class-name: **Mercury** is used for all CIs.
- ▶ **class-name.** Defines the internal name for the relationship generated by this template, for example, **depends_on**. The attributes for the created relationship are taken from the definitions in the CI Type Manager.

To view the internal name for each relationship: select **Admin > Universal CMDB > Modeling > CIT Manager** and select the **Details** tab for a CIT. The internal name is displayed in the **Name** field.

If required, you can define attributes for the relationships; the values defined override the default values for the relationship properties. The attribute format for LinkTemplates is the same as that for ItemTemplates.

Defining Composite Selectors in the DNode Definition Key

The Dynamic Node Factory uses the selector expression defined for the Dynamic Node Factory CI to receive samples from the bus and create the CIs in the hierarchy. If required, you can define a **composite selector** for the monitor ItemTemplate (leaf level) in the DNode definition key, so that the new selector is used to receive update samples for KPI status, rather than the original selector that generated the CI.

Composite selectors are used when you want the created CI to be independent from the Dynamic Node Factory generators. This may be required when the original selector expression information is not included in later samples.

For information on defining selector expressions, see “Selectors for KPIs” in *Using Dashboard*.

You can use static or dynamic attributes in composite selector expressions. When using static attributes, you define a known value for a known referenced property, for example:

```
<Selector key="sampleType" op="EQ" type="String" value="ss_t" />
```

Note: The attributes in a selector are case sensitive, so take care to define the attributes exactly as in the samples.

If you do not know the value of a selector attribute in advance, you can use a dynamic selector expression. The value for the dynamic attribute is defined only when the sample is received.

You make an attribute dynamic by using the prefix **ref_** with the attribute name. For example:

```
<Selector key="u_iSessionId" op="EQ" type="Long" ref_value="u_iSessionId" />
```

In this example, the **value** attribute is dynamic, so the value for the referenced property is taken from the **u_iSessionId** field in the received sample.

Note: The dynamic selector expression option is not relevant when working with custom data (fully descriptive samples are received from the source, so there is no problem of insufficient information).

The following example shows part of the ItemTemplate for a SiteScope monitor with an added composite selector (shown in bold), including dynamic selector expressions:

```
<ItemTemplate template="monitor" namespace="Mercury" class-
name="sitescope_monitor">
  <Attributes>
    ...
  </Attributes>
  <CompositeSelector logicalOp="AND">
    <Selector key="sampleType" op="EQ" type="String" value="ss_t" />
    <Selector key="u_iSessionId" op="EQ" type="Long"
      ref_value="u_iSessionId" />
    <Selector key="u_iMonitorId" op="EQ" ref_value="u_iMonitorId" />
  </CompositeSelector>
  <KPI>
    ...
  </KPI>
</ItemTemplate>
```

Note: If necessary, you can define a different composite selector for a KPI in the ItemTemplate, if the KPI requires a different selector from the default for the monitor.

Define a Dynamic Node Factory CI

You can edit the properties for a predefined Dynamic Node Factory CI in your view, or define a new Dynamic Node Factory CI to add to your view, in order to generate a hierarchy that fits your organization's needs. You can modify the mapping to the samples that create the hierarchy, and the rules and logic used to import the data and present it in Dashboard.

(It is also possible to customize the template for a predefined Dynamic Node Factory CI in the custom source adapter, but it is recommended that you customize the CI in the view, rather than in the adapter.)

This task includes the following steps:

- “Create a Dynamic Node Factory CI” on page 110
- “Define Selectors for the Dynamic Node Factory” on page 110
- “Define KPIs for the Dynamic Node Factory CI” on page 110

1 Create a Dynamic Node Factory CI

Open the New CI dialog box in IT Universe Manager and select **Dynamic Node Factory** as the Configuration Item type. Define the properties in the Define New CI properties area. These properties apply only to the Dynamic Node Factory CI, not to the CIs that are created in the hierarchy. For details, see “New CI Dialog Box” on page 78.

2 Define Selectors for the Dynamic Node Factory

Define the specific properties for Dynamic Node Factory, including the selector expression. For details, see “CIT-Specific Properties for Dynamic Node Factory” on page 81.

3 Define KPIs for the Dynamic Node Factory CI

To define KPIs for the Dynamic Node Factory CI, select **Admin > Dashboard > KPIs**. Define KPIs and business rules for the Dynamic Node Factory that are logical for the data source, for example, **Availability** and **Performance** for a Business Process Monitor source. You should select a group-type business rule for each KPI.

For details on defining KPIs, see “KPI Configuration Overview” in *Using Dashboard*.

Note: The dimensions defined for a parent Dynamic Node Factory CI should correlate with the dimensions defined within the DNode definition key property.

4

Modeling Studio

This chapter provides information on the Modeling Studio.

Tip: For more information about using Modeling Studio in HP Business Availability Center, see “Best Practices for Modeling” on page 447.

This chapter includes:

Concepts

- Modeling Studio – Overview on page 112
- Business CI Models on page 112
- Building a Perspective Based View on page 114
- Revealed CIs and Watchpoints on page 117

Tasks

- Build a Business CI Model on page 121
- Build a View Based on a Model on page 123
- Build a View Based on a Collection of CIs on page 123
- Build a Business CI Model – Scenario on page 124

Reference

- Modeling Studio User Interface on page 126

Modeling Studio – Overview

The Modeling Studio enables you to create perspective based views, which comprise a subset of the IT universe, containing only those CIs relating to a specific area of interest. Perspective based views are composed of a selection of CIs and a viewing perspective. A perspective is a template which is applied to the CI selection, similar to the pattern in a pattern view. For example, a perspective could comprise a host containing an IP. In that case, the view would include all the hosts in the CI selection along with their contained IPs.

The most basic perspective is known as the Content Only perspective and consists of only the node itself. If you apply the Content Only perspective to a CI collection, the resulting view contains only the selected CIs themselves.

The views created in the Modeling Studio can be viewed in the topology map in IT Universe Manager, like all other views. They also appear in the view tree in the Views pane of View Manager, but do not appear in the editing pane when selected. All editing of perspective based views occurs in the Modeling Studio.

Business CI Models

The collection of CIs which compose the view content can be selected in two ways. You can select CIs from the CI Selector and drag them onto the editing pane. In this case, you can build a view by applying a perspective to the collection and the collection cannot be reused in another view without repeating the selection process. The other way to select the CIs to appear in the view is by creating a model.

A model is a reusable collection of CI instances that define a business entity, such as a business service or line of business. By creating a model, you are building a CI collection that can be reused with other perspectives to create different views. Any changes you subsequently make to the model are reflected in all the views based on that model.

Building a Model

You build a model by first selecting a business CI to serve as its basis. The available business CIs include group, application, business service, business unit, and line of business. Then, you can add CIs to your model in the following ways:

- ▶ Manually, by dragging CIs from the CI Selector into the Model Editor
- ▶ Revealing related CIs using a reveal path and selecting the ones to add to the model
- ▶ Defining a watchpoint for a selected CI and automatically adding CIs to the model

You can also begin building a model by dragging CIs onto the empty canvas and selecting **Create a new model**.

The model you create is a CI itself and the CIs in your model are related to the model by **Contains** relationships. You must save your model before applying a perspective to it to build a view.

Important: The changes you make in a model affect the entire universe, not just the views based on that model. Thus, if you delete a CI from a model, you are deleting the relationship that existed between the CIs from the CMDB.

Building a Perspective Based View

A perspective based view is composed of a perspective applied to a model or a collection of CIs. The perspective is a special type of template which is designed to be applied to a subset of the IT Universe model. Perspectives are defined in View Manager, but perspective based views are built in the Modeling Studio.

The Content pane of the View Editor displays the models or CIs you have selected to serve as the basis of your view. The Perspective pane displays the selected perspective. The Preview pane displays the resulting view based upon your content and perspective selections. When you make a change in the content or perspective selections, the view is updated accordingly in the Preview pane. For details, see “View Editor” on page 151.

This section includes the following topics:

- “Content” on page 114
- “Perspectives” on page 115
- “Including and Excluding Child CIs” on page 115

Content

The content in a perspective based view can be selected in two ways:

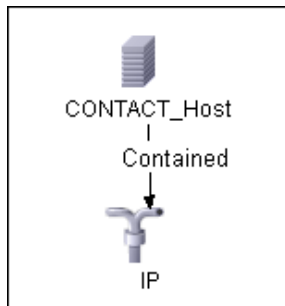
- You can add individual CIs to the view manually, using the CI Selector. The CIs in the collection are independent of each other. In this case, the collection of CIs is not defined as a model and cannot be reused in another view.
- You can add one or more models to the view, using the CI Selector. Alternatively, you can start by working with a model in the Model Editor and select Generate View from Model to build a view based on that model. In this case, the identical content can be used to build another view by selecting the same models.

You can select both individual CIs and models to form the content of a perspective based view, however in that case, the models are treated as ordinary CIs. The models themselves are included in the view without their hierarchy of child CIs.

Perspectives

The perspective you select for your view determines which CIs are included in the view. A perspective is a reusable pattern, similar to a template. The difference between a perspective and a regular template is that the perspective includes one or more nodes designated as contact nodes. A contact node is a node in the pattern which is used to apply the pattern to specific content.

For example, in the following perspective, a host is designated as the contact node and it has an IP related to it by a contained relationship.



When this perspective is applied to a CI collection, all the hosts in the collection appear in the resulting view, along with the IPs contained in them. The hosts that do not contain IPs, as well as CIs of any other type from the collection, do not appear in the view.

A perspective can have several contact nodes, but every disconnected graph within a perspective must have at least one contact node.

If you make a change to a perspective, all views based on that perspective are affected.

Including and Excluding Child CIs

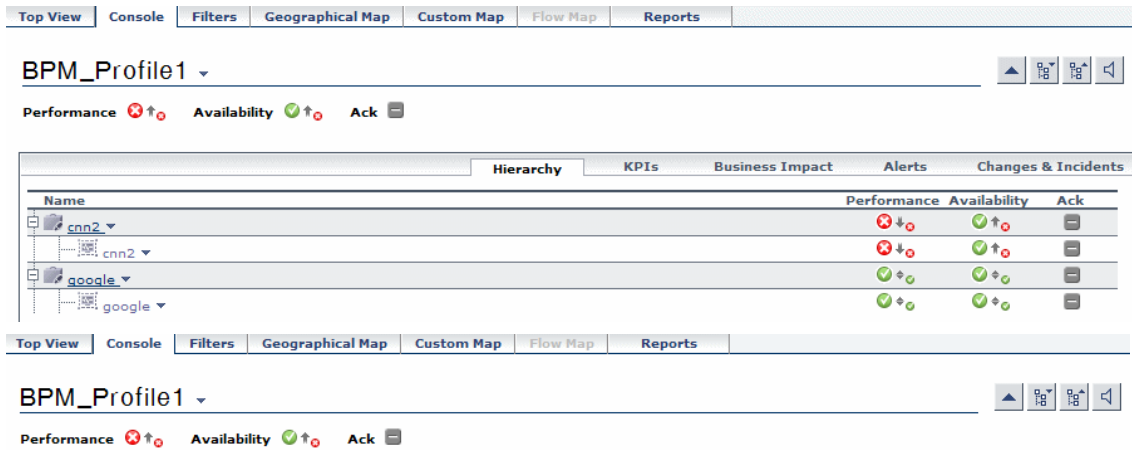
When adding CIs that have children to a view, the CI and its children are only included in the view if the pattern of the perspective includes children for the selected CI type. In that case, children are included for all CIs of that type. After creating a view, you can hide specific CIs from the view by selecting the CI in the View Results pane and selecting **Hide CI from View** from the context menu or clicking the **Hide CI from View** button in the

toolbar. This option is only available for CIs that were added to the view via the perspective and were not part of the original content on which the view was based. Thus, if the view was based on a collection of CIs, the CIs in that collection cannot be hidden from the view. If the view was based on a model, the model cannot be hidden from the view, but the CIs contained in the model can be hidden.

When KPI status is calculated for a CI and displayed in Dashboard, the status is based on all child CIs that exist in the CMDB for the parent CI. The Business Logic Engine calculates status from all child CIs attached to that parent CI, across all views. The calculation is based on all the relationships for the CI in the CMDB, without connection to the child CIs displayed in any particular view. To restrict the number of CIs displayed in the view, you can change the perspective to hide child CIs. This has no effect on KPI status – status is still calculated based on all child CIs, whether they are displayed in the view or hidden.

Whether or not all child CIs are displayed in the view does not influence the status calculations made for the parent CI and the status displayed in Dashboard.

For example, the following pictures show status in Dashboard for the same CI, Group1, in two views: In the first view, child CIs are included, and in the second, they are excluded. The same status result is shown for the CI in both views, regardless of the perspective in use.



When a CI has child CIs that are excluded from the view, the KPI tooltip in Dashboard shows the number of hidden child CIs with KPIs attached, to indicate that the KPI status of the parent is based on CIs that are not in the view.

Details - Performance	
CI name:	fist_bpm_profile_1
Status:	Critical
Calculation Rule:	Worst Child Rule
Held status since:	6/10/06 10:02:50 AM
Hidden child CIs (with attached KPIs):	5

You can use the **Find Visible and Hidden Child CIs** option to view information on hidden children. For details, see “Find Visible and Hidden Child CIs Dialog Box” in *Using Dashboard*.

Revealed CIs and Watchpoints

The Modeling Studio provides two advanced methods of adding CIs to an existing model: revealing related CIs and defining watchpoints.

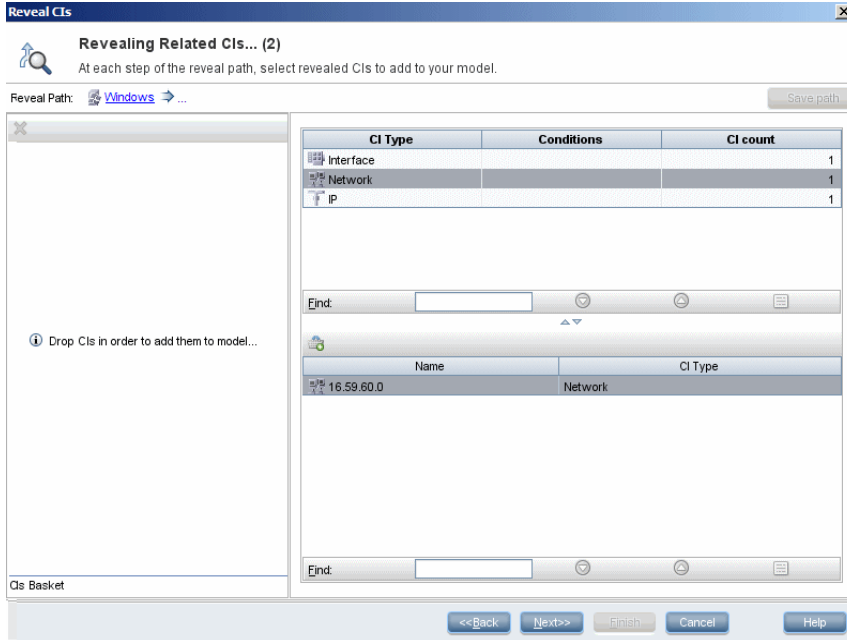
This section includes the following topics:

- “Revealing CIs” on page 117
- “Watchpoints” on page 120

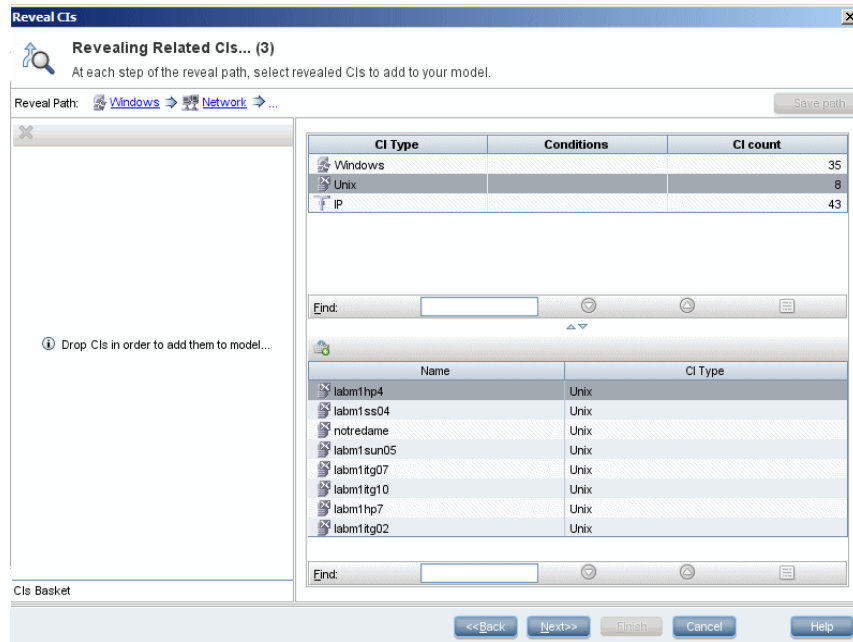
Revealing CIs

One approach to building a model is to add CIs related to the CIs in the model. The Modeling Studio provides a tool to help you reveal those CIs. The process of revealing related CIs involves constructing a reveal path, which is a chain of CI types that are related to each other. The first item in your reveal path is the CI type of the CI from which you started to reveal CIs. The Modeling Studio locates all of its related CIs and lists their CI types. By selecting one of those types, you build the next step of your path. All the related CIs of that type appear in the lower pane of the dialog box. You can select the ones you want to include in your model. The process is repeated to build the following step of the path.

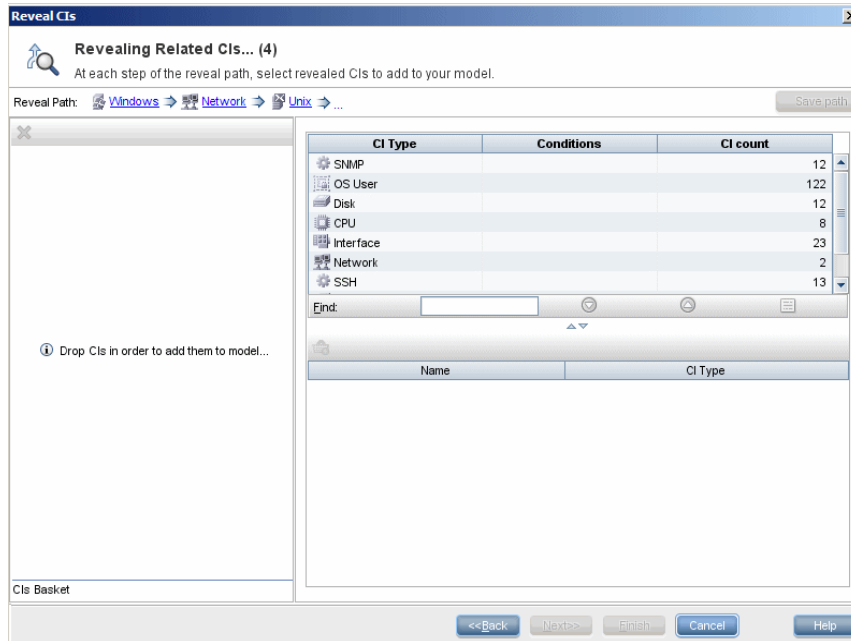
For example, if you begin to reveal CIs from a CI of type Windows, the Modeling Studio may reveal related CIs of types Interface, Network, and IP. If you select Network, the related CIs of type Network appear in the lower pane and can be added to the model by dragging them into the CIs Basket or clicking the CIs Basket icon:



Click **Next** to build the next step of the path using Network as your selection. The Modeling Studio reveals related CIs of type Windows, Unix, and IP. Unix is selected and the Unix CIs appear in the lower pane and can be added to the model by dragging the selected ones into the CIs Basket pane:



Click **Next** to build the next step of the path using Unix as your selection:



In this case, a reveal path of **Windows > Network > Unix** was constructed. At each step, you have the option of adding any of the revealed related CIs to your model. For details on revealing CIs, see “Reveal CIs Dialog Box” on page 148.

It is also possible to construct a reveal path without revealing CIs. For details, see “Create/Edit/Save Reveal Path Dialog Box” on page 131.

Watchpoints

Another method of locating related CIs to add to the model is by defining a watchpoint for a selected CI in the model. A watchpoint is a mechanism which is triggered when a new related CI of a specified type is created. Every watchpoint is defined in connection with a reveal path. If a new related CI of any CI type included in the path is created, the watchpoint is triggered and an indicator appears next to the model. For details on defining a watchpoint, see “New Watchpoint Dialog Box” on page 143.

Note: You must save a new model before defining watchpoints for its CIs.

All the related CIs detected by the watchpoint are displayed in the Watchpoints Updates dialog box. The dialog box enables you to select the ones to add to your model and the ones to suppress, or exclude from your model. For details, see “Watchpoints Updates Dialog Box” on page 155.

You also have the option to include the detected CIs in your model automatically by selecting the check box in the New Watchpoint dialog box. In this case, all CIs detected by the watchpoint are added to the model.

A watchpoint can also be used to detect CIs included in the model which are no longer related to the model. If such CIs are found along the reveal path connected to the watchpoint, they also appear in the Watchpoints Updates dialog box. You can accept the suggestion to remove the CIs from your model, or you can suppress the suggestion, thereby keeping the CIs in your model.

Note: Although a watchpoint is defined for an individual CI, the watchpoint results display related CIs of the CI types included in the reveal path for all CIs in the model.

Build a Business CI Model

This task describes how to build a business CI model which can serve as the basis for a view.

This task includes the following steps:

- ▶ “Create the New Model” on page 122
- ▶ “Add CIs to the Model Manually” on page 122

- “Reveal CIs” on page 122
- “Define Watchpoints for CIs in the Model” on page 122

1 Create the New Model

In the Modeling Studio, click the **New**  button and select **New Model** to open the New Model dialog box. Select a CI type and enter the values for its properties. For details, see “New Model Dialog Box” on page 143.

2 Add CIs to the Model Manually

In the CI Selector, search for the CIs you want to include in your model. Select them and drag them into the model.

Tip: You can select more than one CI by holding the CTRL key while selecting CIs.

3 Reveal CIs

Select a CI in the model and reveal its related CIs along a reveal path. Add selected CIs from among the revealed CIs to your model. When you are done, save the model. For details, see “Reveal CIs Dialog Box” on page 148.

4 Define Watchpoints for CIs in the Model

Right-click a CI in the model and select **Watchpoint > New Watchpoint**. The New Watchpoint dialog box opens. Select a reveal path and click **OK**. A small icon appears next to the CI indicating that a watchpoint is defined for it. For details, see “New Watchpoint Dialog Box” on page 143.


Build a View Based on a Model

This task describes how to build a view in the Modeling Studio based on a model and a perspective.

This task includes the following steps:

- “Open the Model” on page 123
- “Select a Perspective” on page 123
- “Save the View” on page 123

1 Open the Model

In the Modeling Studio, click the **Open**  button and select **Open Model** to open the relevant model. For details, see “Open Model Dialog Box” on page 144.

2 Select a Perspective

In the Model Editor, right-click the model and select **Generate View for selected model**. The Creating New View dialog box opens. Select a perspective to apply to the model. For details, see “Creating New View Dialog Box” on page 132.

3 Save the View

The View Editor opens with your new view. Rename the view and save it in the correct folder. For details, see “View Editor” on page 151.

Build a View Based on a Collection of CIs


This task describes how to build a view in the Modeling Studio based on a collection of CIs and a perspective.

This task includes the following steps:

- “Create the New View” on page 124
- “Add CIs to the View” on page 124

- ▶ “Select a Perspective and Save the View” on page 124

1 Create the New View

In the Modeling Studio, click the **New**  button and select **New View** to open the View Editor. For details, see “View Editor” on page 151.

2 Add CIs to the View

In the CI Selector, search for the CIs you want to include in your view. Select them and drag them into the view. For details on the CI Selector, see “View Explorer” on page 689.

Tip: You can select more than one CI by holding the CTRL key while selecting CIs.

3 Select a Perspective and Save the View

In the Perspective pane, select a perspective to apply to your CI collection. Rename the view and save it in the correct folder. For details, see “View Editor” on page 151.

Build a Business CI Model – Scenario

This scenario describes how to build a business CI model for use in a human resources application.

This task includes the following steps:

- ▶ “Create a Model” on page 125
- ▶ “Create Application CI Models Within Your Model” on page 125
- ▶ “Add System CIs to Your Model” on page 125
- ▶ “Add CIs to Your Model as Related CIs” on page 125

1 Create a Model


To create a model, you need to select a CI type and enter its key properties.

Select **Admin > Universal CMDB > Modeling > Modeling Studio** to open the Modeling Studio. For details about how to create a model, see “New Model Dialog Box” on page 143.

Example of a Business CI Model

In this example, a human resources application called Onboard Employee is to be created. Select **Business Process** as the CI type and enter Onboard Employee as the name under the key properties.

2 Create Application CI Models Within Your Model

You can create models within your model by clicking the New Model icon  in the Model Editor. For details, see “Model Editor” on page 134.

Example of Application CI Models

Within the Onboard Employee model, create a model of type **Application**. Enter HR Enterprise Resource Planning (ERP) as the name under the key properties. The application CI is created as a model within the Onboard Employee model. Repeat the process to create the following applications: Active Directory (AD) and Customer Relationship Management (CRM). The Onboard Employee model now includes three application models.

3 Add System CIs to Your Model

Add to your model the CIs for the servers or other software elements on which the applications are running.

Example of System CI Models

Under the HR ERP application, drag the System CI **SAP System**. Under the AD application, drag the System CI **Host**. The System CIs are included in the model and their related CIs, such as Hosts and Monitors, are automatically added to the model as related CIs.

4 Add CIs to Your Model as Related CIs

Add the CIs that are to be related to the CIs in the model but are not included in the model. For details, see “Model Editor” on page 134.

Example of Related CIs

Create an application CI of type Portal. Select the CRM application and click the Related CIs tab in the Information pane. Drag the Portal CI into the Information pane. The CI is added as a related CI to CRM.

Modeling Studio User Interface

This section describes:

- ▶ Choose Operation for Selected Item Dialog Box on page 127
- ▶ CI Conditional Search Dialog Box on page 128
- ▶ Conditions of Related CIs Dialog Box on page 129
- ▶ Create/Edit/Save Reveal Path Dialog Box on page 131
- ▶ Creating New View Dialog Box on page 132
- ▶ Hidden CIs Dialog Box on page 132
- ▶ Manage CI Watchpoints Dialog Box on page 133
- ▶ Model Editor on page 134
- ▶ Modeling Studio on page 141
- ▶ New Model Dialog Box on page 143
- ▶ New Watchpoint Dialog Box on page 143
- ▶ Open Model Dialog Box on page 144
- ▶ Open Saved Reveal Path Dialog Box on page 145
- ▶ Open View Dialog Box on page 146
- ▶ Reveal CIs Dialog Box on page 148
- ▶ Software Elements Search Dialog Box on page 150
- ▶ View Editor on page 151
- ▶ View Properties Dialog Box on page 154
- ▶ Watchpoints Updates Dialog Box on page 155

Choose Operation for Selected Item Dialog Box

Description	Enables you to create models and views from selected CIs. To access: In the Modeling Studio, drag CIs from the CI Selector onto the empty canvas.
Important Information	You can drag individual CIs or multiple CIs onto the canvas. You can select ordinary CIs and/or models to drag onto the canvas. Use the CTRL key while selecting CIs to select multiple CIs.
Useful Links	“Best Practices for Modeling” on page 447








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

GUI Element (A-Z)	Description
Create a new model	Select to build a model comprising the CIs in your selection. If the CIs you dragged onto the canvas include at least one CI that has no valid links to any of the model CI types, this option is disabled.
Create a new view	Select to build a view based on the CI collection formed by your selection.
Edit the model of the selected CI	Select to edit the selected model in the Model Editor. Note: This option only appears when a single model is dragged onto the canvas.

CI Conditional Search Dialog Box

Description	Enables you to search for CIs by attribute conditions, by related CIs and by attribute conditions of related CIs. To access: In the CI Selector in the Modeling Studio, click Advanced Search in Search mode and select CI Conditional Search .
Useful Links	“Best Practices for Modeling” on page 447

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







GUI Element (A-Z)	Description
	Click to add an attribute condition.
	Click to delete a selected row.
	Click to move a selected row up.
	Click to move a selected row down.
	Click to display the attribute conditions in a popup window.
Attribute Name	Select an attribute from the drop-down list.
CI Name	Enter a CI name for which to search.
CI Type	Enter the CI type for which to search.
Operator	Select an operator from the drop-down list.
Related CI Name	Enter the name of a related CI for the search.
Related CI Type	Click the ellipsis button  to select a CI type from the tree for a search by related CI.
Relationship Type	Click the ellipsis button  to select a relationship from the tree for a search by related CI.
Search by CI conditions	Select to run a search for CIs with the specified conditions.

GUI Element (A-Z)	Description
Search by Related CI conditions	Select to run a search for CIs related to CIs with the specified conditions.
Search by Related CI criteria	Select to run a search for CIs related to the specified CIs or CI types.
Value	Enter a value for the attribute condition.


Conditions of Related CIs Dialog Box

Description	Enables you to define conditions for the CI types in a reveal path. To access: Click the Add Condition or Edit Condition buttons from the Conditions column of the Reveal CIs dialog box.
Useful Links	“Best Practices for Modeling” on page 447


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

GUI Element (A-Z)	Description
	Add the attribute condition you have defined.
	Delete an attribute condition.
	Move a selected row up.
	Move a selected row down.
	View the condition definition.
And/Or	Click inside the And/Or field and select either And or Or to link multiple conditions.
Attribute name	Select an attribute from the list.
 Brackets	Click inside the Brackets box to display a list of brackets you can use to build more complex, logical statements.
Criteria	Contains the attribute condition definition as defined in the Element Instances dialog box.
Not	Select NOT if you want the condition statement to do the opposite of what is defined. Note: If you select NOT , query results do not include data from the CI instances that were not assigned a value. For example, your system contains three hosts: Host1 is assigned the value A, Host2 is assigned the value B and Host3 is not assigned a value. You create a query to retrieve all hosts that are equal to A and select NOT ; the results of your query only include Host2 because Host3 is not assigned a value.
Operator	Select the required operator. For details, see “Attribute Operator Definitions” on page 378.
Value	Enter or select the value of the attribute. The Value options vary according to the attribute type you select.


Create/Edit/Save Reveal Path Dialog Box

Description	<p>Enables you to define a new reveal path or edit an existing path.</p> <p>To access: To define a new reveal path, click the Reveal  button from the Model Editor, and select Create Reveal Path.</p> <p>To edit an existing reveal path, select a path from the Open Saved Reveal Path dialog box and click Edit.</p> <p>To save a reveal path, click Save Path from the Reveal CIs dialog box.</p>
Useful Links	“Best Practices for Modeling” on page 447

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

GUI Element (A-Z)	Description
Description	Enter a description of the path.
Name	Enter the name of the path.
Preview	<p>Opens the Reveal CIs dialog box displaying the related CIs in the path.</p> <p>Note: This button does not appear in the Save Reveal Path dialog box.</p>
Reveal Path	<p>Build the path by clicking the  icon to open a dialog box with a CI type tree. Select the CI type for the next item in the path.</p> <p>When you hold the pointer over a reveal path item, the following options are available:</p> <ul style="list-style-type: none"> ▶ Delete. Deletes the item from the reveal path. ▶ Add condition. Opens the Conditions of Related CIs dialog box, which enables you to set conditions for the reveal path item. ▶ Refine Node Type. Opens a CI type tree, which enables you to change the CI type of the reveal path item.

Creating New View Dialog Box

Description	Enables you to select a perspective to create a view from a model. To access: In the Modeling Studio, right-click a model in the Model Editor, View Editor, or CI Selector and select Generate view for selected Model or click the Generate view for selected model icon  from the Model Editor.
Included in Tasks	“Build a View Based on a Model” on page 123
Useful Links	“Best Practices for Modeling” on page 447

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

GUI Element (A-Z)	Description
<Perspective list>	Select a perspective from the list to apply to your model.
Description	Displays a description of the perspective.

Hidden CIs Dialog Box


Description	Enables you to restore hidden CIs to a view. To access: From the View Editor, click the Show Hidden CIs icon from the toolbar of the View Results pane.
Useful Links	“Best Practices for Modeling” on page 447

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



GUI Element (A-Z)	Description
<check box>	Select the check boxes for the CIs you want to restore.
CI Type	The CI type of the excluded CI.
Name	The name of the excluded CI.

GUI Element (A-Z)	Description
Restore	Click Restore to include the selected CIs in the view.
Select All	Click Select All to select all the CIs in the list for inclusion in the view.
Unselect All	Click Unselect All to clear the check boxes of all the CIs in the list.



Manage CI Watchpoints Dialog Box

Description	<p>Enables you to add or remove watchpoints for a CI in a model.</p> <p>To access: From within a model in the Model Editor, click the Watchpoint  button and select Manage CI Watchpoints or right-click a CI in the model and select Watchpoint > Manage CI Watchpoints.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):




GUI Element (A-Z)	Description
 Add	Click to open the New Watchpoint dialog box which enables you to add a new watchpoint.
 Remove	Click to delete the selected watchpoint.
Automated	A check mark indicates that the new CIs found by the watchpoint are to be added to the view automatically.
Source CI	Displays the CI forming the beginning of the reveal path.
Watchpoint Name	The name of the reveal path associated with the watchpoint.
Watchpoint Path	Displays the reveal path for the watchpoint.








Model Editor









Description	<p>Enables you to create and edit models.</p> <p>To access: In the Modeling Studio, click the New button  and select New Model to create a new model or click the Open button  and select Open Model to edit an existing model.</p>
Important Information	<p>The Model Editor contains the following panes:</p> <ul style="list-style-type: none"> ▶ Content pane. Lists the CIs and models contained in the model. ▶ Information pane. Displays the properties, related CIs and watchpoints for the selected CI or model. <p>You can drag CIs from the CI Selector into the Content pane of an existing model to add them to the model. However, you cannot drag in a CI that is already included in the model.</p> <p>You can drag CIs from the CI Selector into the Related CIs tab of the Information pane provided that the selected source and target CI can be related by one of the triplets that includes an Impacted By (Potentially) relationship.</p>
Useful Links	<p>“Best Practices for Modeling” on page 447</p>


Content Pane

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

GUI Element (A-Z)	Description
	<p>Select Text Mode to display the CIs in a list. Select Map Mode to display the CIs as icons in a diagram.</p>
	<p>Click CI Properties to open the Configuration Item Properties dialog box for the selected CI.</p>
	<p>Click Open selected model in a new tab to open the selected model in a separate Model Editor tab.</p>

GUI Element (A-Z)	Description
	Click New Model to open the New Model dialog box which enables you to define a new model within the existing model.
	Click Generate view for selected model to create a view based on the current model. The Creating New View dialog box opens, which enables you to select a perspective to apply.
	Click to remove a selected CI from the model (it remains in the CMDB).
	Click Expand All to expand the model hierarchy.
	Click Collapse All to collapse the model hierarchy.
	<p>Click Reveal for the following options:</p> <ul style="list-style-type: none"> ▶ Start Revealing. Opens the Reveal CIs dialog box. For details, see Reveal CIs dialog box. ▶ Create Reveal Path. Opens the Create Reveal Path dialog box. For details, see Create Reveal Path dialog box. ▶ Open Reveal Path. Opens the Open Saved Reveal Path dialog box. For details, see Open Saved Reveal Path dialog box.
	<p>Click Watchpoint for the following options:</p> <ul style="list-style-type: none"> ▶ Watchpoints Updates. Display the watchpoint results and select CIs to add to the model. For details, see Watchpoints Updates dialog box. ▶ New Watchpoint. Define a new watchpoint for the selected CI. For details, see New Watchpoint dialog box. ▶ Manage CI Watchpoints. Add new watchpoints to the CI or remove existing ones. For details, see Manage CI Watchpoints dialog box.

GUI Element (A-Z)	Description
	<p>Click Grouping to group CIs in a group model under a model. Select one of the following options:</p> <ul style="list-style-type: none"> ➤ Insert New Group. Create a new empty group. After creating the group, you can drag CIs into it from the CI Selector, the related CIs tab, or from the model itself. ➤ Join to Group. Select a CI or several CIs in the model and join them to an existing group or form a new group. ➤ Ungroup. Select a group and ungroup it. Its CIs remain directly under the main model.
	<p>Click Find to toggle between displaying and hiding the Find box and arrow controls.</p> <p>Note: This button only appears in Text mode.</p>
	<p>Click to refresh the map and optimize the map layout.</p> <p>Note: This button only appears in Map mode.</p>
	<p>Click Fit to Window to resize the map to fit the size of the window.</p> <p>Note: This button only appears in Map mode.</p>
	<p>Select the functionality of the cursor from the Mode drop-down. The following options are available:</p> <ul style="list-style-type: none"> ➤ Select ➤ Drag Map ➤ Zoom <p>Note: This feature only appears in Map mode.</p>
	<p>Select a CI and click Show External Relationships to display the related CIs for that CI.</p> <p>Note: This button only appears in Map mode.</p>
	<p>Click Hide External Relationships to hide the related CIs.</p> <p>Note: This button only appears in Map mode.</p>
	<p>Indicates that watchpoints are defined for the current CI.</p>

GUI Element (A-Z)	Description
	Indicates that the watchpoints have detected new CIs related to the current model. Click it to open the Watchpoints Updates dialog box.
CI Type column	Displays the type of each CI in the model.
Find	Enter a CI name or a portion of a CI name in the Find box to locate a CI in the model.
Find Next	Click to go to the next occurrence of the selected search phrase in the model.
Find Previous	Click to go to the previous occurrence of the selected search phrase in the model.
Highlight	Click to highlight all occurrences of the search phrase in the model.
Name column	Displays the name of each CI in the model.

Context Menu Options

Menu Item	Description
Fit to Window	Resizes the map to fit the size of the window. Note: This option only appears in Map mode.
Generate view for selected model	Select to create a view based on the current model. The Creating New View dialog box opens which enables you to select a perspective to apply.
Grouping	Click Grouping to group CIs in a group model under a model. Select one of the following options: <ul style="list-style-type: none"> ▶ Insert New Group. Create a new empty group. After creating the group, you can drag CIs into it from the CI Selector, the related CIs tab, or from the model itself. ▶ Join to Group. Select a CI or several CIs in the model and join them to an existing group or form a new group. ▶ Ungroup. Select a group and ungroup it. Its CIs remain directly under the main model.

Menu Item	Description
Hide External Relationships	Hides the related CIs from the map. Note: This option only appears in Map mode.
Insert New Model	Opens the New Model dialog box which enables you to create a new model within the existing model.
Open selected model in a new tab	Opens the selected model in a separate Model Editor tab.
Properties	Opens the Configuration Item Properties dialog box for the selected CI.
Refresh Layout	Refreshes the map and optimizes the map layout. Note: This option only appears in Map mode.
Reveal	The following options are available: <ul style="list-style-type: none"> ▶ Start Revealing. Opens the Reveal CIs dialog box. For details, see Reveal CIs dialog box. ▶ Open Reveal Path. Opens the Open Saved Reveal Path dialog box. For details, see Open Saved Reveal Path dialog box.
Remove Selected CI(s) from the Model	Deletes the selected CIs from the model (it remains in the CMDB).
Select	Select the functionality of the cursor. The following options are available: <ul style="list-style-type: none"> ▶ Select ▶ Drap Map ▶ Zoom Note: This option only appears in Map mode.
Show External Relationships	Displays the related CIs for the selected CI. Note: This option only appears in Map mode.

Menu Item	Description
Watchpoint	<p>The following options are available:</p> <ul style="list-style-type: none"> ▶ Watchpoints Updates. Display the watchpoint results and select CIs to add to the model. For details, see Watchpoints Updates dialog box. ▶ New Watchpoint. Define a new watchpoint for the selected CI. For details, see New Watchpoint dialog box. ▶ Manage CI Watchpoints. Add new watchpoints to the CI or remove existing ones. For details, see Manage CI Watchpoints dialog box.
Zoom	<p>Select the size of the map from the list of percents.</p> <p>Note: This option only appears in Map mode.</p>



Information Pane - Properties Tab

Description	<p>Displays the properties of the selected CI.</p> <p>This pane is identical to the Properties tab of the Information pane in IT Universe Manager. For details, see “Configuration Item Properties Dialog Box” on page 57.</p>
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Information Pane - Related CIs Tab

Description	<p>Displays the CIs related to the model by depends on relationships.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):


GUI Element (A-Z)	Description
	Click to delete the relationship to the selected CI.
	Click Invert Direction to switch the direction of the relationship for the selected CI.

GUI Element (A-Z)	Description
<CI list>	Lists the name and CI type of the CIs related to the model by depends on relationships, as well as the direction of the relationship.
Filter by	Select a field by which to filter the results and enter the value in the by box.

Information Pane - Watchpoints Tab

Description	Displays the watchpoints defined for the selected CI.
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):







GUI Element (A-Z)	Description
	Click to open the Manage CI Watchpoints dialog box, which enables you to edit the watchpoint.
Automated	Indicates whether the new CIs found by the watchpoint are automatically added to the view.
Source CI	Displays the CI forming the beginning of the reveal path.
Watchpoint Name	The name of the reveal path associated with the watchpoint.
Watchpoint Path	Displays the reveal path of the watchpoint.

 **Modeling Studio**


Tip: For more information about using Modeling Studio in HP Business Availability Center, see “Best Practices for Modeling” on page 447.

Description	<p>Enables you to create and edit models and views.</p> <p>The Modeling Studio window contains the following panes:</p> <ul style="list-style-type: none"> ▶ CI Selector. Enables you to browse views or search for CIs. For details, see “View Explorer” on page 689. ▶ Editor pane. Displays the CIs of a selected view or model. ▶ Information Pane. Displays properties, watchpoints, and related CIs for the selected CI. <p>To access: Select Admin > Universal CMDB > Modeling > Modeling Studio.</p>
Important Information	<p>The Editor pane is a blank canvas before any views or models are opened. When you open a view, the View Editor appears there. When you open a model, the Model Editor appears there. Multiple views and models can be open at the same time, each within a separate tab.</p>
Useful Links	<p>Model Editor, View Editor</p>


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

GUI Element (A-Z)	Description
	<p>Click the click the New button to select one of the following options:</p> <ul style="list-style-type: none"> ➤ New Model. To create a new model. ➤ New View. To create a new view.
	<p>Click the Open button to select one of the following options:</p> <ul style="list-style-type: none"> ➤ Open Model. To open an existing model. ➤ Open View. To open an existing view.
	<p>Click Save to save the changes to your view or model. For views, a dialog box opens which enables you to rename your view and save it in the appropriate folder.</p>
	<p>Click Undo to reverse the last change you made.</p>
	<p>Click Redo to repeat the last action you took.</p>
	<p>Click Maximize Workspace to toggle between the regular display and a full-screen display of the editor.</p>
<p><Menu></p>	<p>The following drop-downs are available:</p> <ul style="list-style-type: none"> ➤ Resource. Enables you to create a new view or model, open an existing view or model, and save a view or model. ➤ Edit. Enables you to undo or redo an action. ➤ Tools. Includes the options from the right-click menu in the Editor. ➤ View. Enables you to select the panes to display.


New Model Dialog Box

Description	Enables you to define a reusable model containing a collection of CIs. To access: Click the New  button and select New Model or drag a CI from the tree in the CI Selector onto the editing pane and select Create a new model .
Included in Tasks	“Build a Business CI Model” on page 121
Useful Links	“Best Practices for Modeling” on page 447

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

GUI Element (A-Z)	Description
Define new CI Properties	Enter the values for the CI properties. You must enter values for key properties and required properties. The key properties are marked with a key symbol  and the required properties are marked with an asterisk.
Select CI Type	Select a CI type from the list to serve as the basis for your model.


New Watchpoint Dialog Box

Description	Enables you to define a watchpoint for a CI in a model. To access: From within a model in the Model Editor, click the Watchpoint  button and select New Watchpoint or right-click a CI in the model and select Watchpoint > New Watchpoint .
Important Information	If no reveal paths are found for the selected CI, no watchpoints can be defined. You cannot define watchpoints for CIs in a new model until you save the model.
Included in Tasks	“Build a Business CI Model” on page 121



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


GUI Element (A-Z)	Description
Add Revealed CIs automatically	Select to automatically add all revealed CIs from the selected path to the model.
Select Watchpoint reveal path	Select a reveal path from the drop-down list.
Show reveal paths for CI type	Select a CI type from the drop-down list. All reveal paths beginning with that CI type appear in the list in the lower drop-down box.

Open Model Dialog Box


Description	Enables you to open an existing reusable model containing a collection of CIs in the Editor pane. To access: Click the Open  button in the Modeling Studio and select Open Model .
Included in Tasks	“Build a View Based on a Model” on page 123
Useful Links	“Best Practices for Modeling” on page 447

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

GUI Element (A-Z)	Description
	Click CI Properties to open the Configuration Item Properties dialog box for the selected model.
	Click Remove model to delete the selected model.
CI Type column	Displays the CI types of the existing models.
Find	Enter a CI name or a portion of a CI name in the Find box to locate a CI in the list of models.

GUI Element (A-Z)	Description
Find Next	Click to go to the next occurrence of the selected search phrase in the list of models.
Find Previous	Click to go to the previous occurrence of the selected search phrase in the list of models.
Name column	Displays the names of the existing models.
Pending Watchpoint Updates	A blue triangle indicator  appears in the Pending Watchpoint Updates column if a watchpoint defined for a selected model has found new CIs.
Show only models with content	When the check box is selected, only models containing CIs appear in the list.

Open Saved Reveal Path Dialog Box


Description	Enables you to open an existing path. To access: From within a model in the Model Editor, click the Reveal  button and select Open Reveal Path or right-click a CI in the model and select Reveal > Open Reveal Path .
Important Information	After selecting the reveal path you want to use, click Execute . If CIs are found on the selected path, the Reveal CIs dialog box opens for that path. If no CIs are found, a message appears stating that no CIs were found on the path.

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



GUI Element (A-Z)	Description
Description column	Displays the descriptions of the existing paths.
Edit	Opens the Edit Reveal Path dialog box which enables you to edit the selected path.







GUI Element (A-Z)	Description
Execute	Opens the Reveal CIs dialog box for the selected reveal path.
Find	Enter a path name or a portion of a path name in the Find box to locate a path in the list.
Find Next	Click to go to the next occurrence of the selected search phrase in the list of paths.
Find Previous	Click to go to the previous occurrence of the selected search phrase in the list of paths.
Highlight	Click to highlight all occurrences of the search phrase in the list of paths.
Name column	Displays the names of the existing paths.
Remove	Deletes the selected path.
Show reveal paths for CI type	Select a CI type from the drop-down list. All paths beginning with the selected CI appear in the table below.

Open View Dialog Box


Description	Enables you to open an existing view in the Editor pane. To access: Click the Open  button in the Modeling Studio and select Open View .
Useful Links	“Best Practices for Modeling” on page 447

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





GUI Element (A-Z)	Description
	Click Expand Tree to expand the view tree.
	Click Collapse Tree to collapse the view tree.

GUI Element (A-Z)	Description
	Click Refresh to refresh the view tree.
	Click Delete to delete the view.
	Click Disconnect view from perspective to detach a perspective based view from its template. It becomes a pattern view and is no longer affected by changes made to the perspective.
	Go directly to IT Universe Manager for the current view.
	Click to go to the next occurrence of the selected search phrase in the list of views.
	Click to go to the previous occurrence of the selected search phrase in the list of views.
<View tree>	Displays the existing views in a tree format.
Find	Enter a CI name or a portion of a CI name in the Find box to locate a CI in the list of views.

Reveal CIs Dialog Box

Description	<p>Enables you to search for CIs related to the CIs in a model and add them to the model.</p> <p>To access: In the Model Editor of the Modeling Studio, select a CI, click the Reveal  button, and select Start Revealing or right-click a CI in the model and select Reveal > Start Revealing.</p>
Important Information	<p>The upper pane displays the CI types of the CIs related to the selected CI. The lower pane displays the CIs of the type selected in the upper pane.</p> <p>The first step in the reveal path is the CI type of the CI you began with. When you select a CI type from the list in the upper pane, that CI type becomes the second step in the path. Click Next to display the CI types available for the next step of the path.</p> <p>The number at the top of the box in parentheses indicates the length of the constructed path thus far.</p>
Included in Tasks	“Build a Business CI Model” on page 121

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

GUI Element (A-Z)	Description
	Click to delete a selected item from the CIs basket.
	Click to add a selected CI from the lower pane to the CIs basket.
	Click to go to the next occurrence of the selected search phrase in the list of CIs.
	Click to go to the previous occurrence of the selected search phrase in the list of CIs.
<Lower pane>	Displays a list of related CIs of the type selected in the upper pane.
CI count	Indicates how many related CIs of each type were found.

GUI Element (A-Z)	Description
CIs Basket	Displays the related CIs you selected to include in the model.
CI Type	Displays a list of CI types of the CIs related to the selected CI.
Conditions	A check mark indicates that conditions were defined for the selected CI type. Click the Conditions column for the CI type you want to select and click the Add Condition or Edit Condition button to open the Conditions of Related CIs dialog box. This enables you to define and edit conditions for the CI type.
Find	Enter a CI name or a portion of a CI name in the Find box to locate a CI in the list of CIs.
Finish	Click Finish when you have finished adding CIs to the CI basket.
Next	Click Next to display the CI types available for the next step of the path.
Reveal Path	<p>Displays the reveal path being constructed.</p> <p>Clicking the blue arrows in the path ➔ displays a drop-down list of the CI types available for the next step of the path.</p> <p>Clicking the CI types in the path displays the following options:</p> <ul style="list-style-type: none"> ▶ Jump to page. Refreshes the table with the available CI types for the selected step of the path. ▶ Edit Condition. Opens the Conditions of Related CIs dialog box. ▶ Delete Selected Item(s). Deletes the selected CI type from the reveal path (the path ends at the previous CI type).
Save Path	Opens the Save Reveal Path dialog box which enables you to save the path. This option is only active when a unique reveal path has been constructed.



Software Elements Search Dialog Box

Description	Enables you to search for hosts by the applications running on them and for applications by the host on which they are running. To access: In the CI Selector in the Modeling Studio, click Advanced Search in Search mode and select Software Elements Search .
Useful Links	“Best Practices for Modeling” on page 447

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





GUI Element (A-Z)	Description
Host Name	Enter the name of the host for which you are searching.
Search for	Select Software Element or Host . Note: To search for a specific software element running on a specific host, enter a host name, select the required software element and search for it.
Software Element	Select a software element from the drop-down list.




View Editor

Description	<p>Enables you to create and edit views.</p> <p>To access: In the Modeling Studio, click the New button  and select New View to create a new view or drag CIs from the CI Selector onto the blank canvas and select Create new view with selected CIs. Click the Open button  and select Open View to edit an existing view.</p>
Important Information	<p>The View Editor contains the following panes:</p> <ul style="list-style-type: none"> ▶ Content pane. Drag CIs and/or models onto this pane to include them in your view. ▶ Perspective pane. Select a perspective to apply to the content to build a view. ▶ View Results pane. Displays a topology map with a preview of the current view.
Included in Tasks	<p>“Build a View Based on a Model” on page 123, “Build a View Based on a Collection of CIs” on page 123</p>
Useful Links	<p>“Best Practices for Modeling” on page 447</p>

Content Pane

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

GUI Element (A-Z)	Description
	Go directly to IT Universe Manager for the current view.
	Click Edit View Properties to open the View Properties dialog box which enables you to set properties for the view.
	Click CI Properties to open the Configuration Item Properties dialog box for the selected CI.
	Click Open selected model in a new tab to open the selected model in a separate Model Editor tab.

GUI Element (A-Z)	Description
	Click Generate view for selected model to create a view based on the selected model. The Creating New View dialog box opens which enables you to select a perspective to apply.
	Click to remove a selected CI from the view.
	Click Find to toggle between displaying and hiding the Find box and arrow controls.
CI Type column	Displays the type of each CI in the view.
Find	Enter a CI name or a portion of a CI name in the Find box to locate a CI in the view
Find Next	Click to go to the next occurrence of the selected search phrase in the view.
Find Previous	Click to go to the previous occurrence of the selected search phrase in the view.
Highlight	Click to highlight all occurrences of the search phrase in the view.
Name column	Displays the name of each CI in the view.





Context Menu Options

Menu Item	Description
Generate view for selected model	Select to create a view based on the selected model. The Creating New View dialog box opens which enables you to select a perspective to apply.
Open selected model in a new tab	Opens the selected model in a separate Model Editor tab.
Properties	Opens the Configuration Item Properties dialog box for the selected CI.
Remove Selected CI(s) from the View	Deletes the selected CI or model from the view.

Perspective Pane

GUI Element (A-Z)	Description
Apply Over Model Hierarchy	For views based on models, select the Apply Over Model Hierarchy check box to include the model hierarchy in the view and apply the perspective to the CIs included in the model as well as to the model itself. Clear the check box to exclude the model hierarchy from the view and apply the perspective to the model itself only. In this case, the model is treated as an ordinary CI. Note: This option is disabled for a view based on a collection of CIs or on a model and a collection of CIs.
Description	Displays a description of the selected perspective.
Name	Click the ellipsis button to select a perspective from the drop-down list.

View Results Pane


GUI Element (A-Z)	Description
	Click Hide CI from View to hide the selected CI from the view. This option is only relevant for CIs that were added to the view via the perspective. You cannot hide CIs from the original view content from the view. Note: Hidden CIs can be restored from the Hidden CIs dialog box.
	Click Show Hidden CIs to open the Hidden CIs dialog box which enables you to restore CIs that were hidden from the view manually.
	Click Show tree view to toggle between displaying and hiding a tree layout of the view on the left side of the pane.
	Click Expand preview display to display the preview in a separate window.

GUI Element (A-Z)	Description
<Topology Map>	The topology map in the View Results pane follows the layout of the topology map in IT Universe Manager. For details, see “Topology Map” on page 71.
<Tree View>	The tree view on the left of the View Results pane displays the CIs of the view in tree format. This enables you to easily see the structure of the view and its different layers.

Context Menu Options

Menu Item	Description
Hide CI from View	Click to hide the selected CI from the view. This option is only relevant for CIs that were added to the view via the perspective. You cannot hide CIs from the original view content from the view. In the case of a view based on a model, the model cannot be hidden but its CIs can. Note: Hidden CIs can be restored from the Hidden CIs dialog box.
Properties	Opens the Configuration Item Properties dialog box for the selected CI.


View Properties Dialog Box

Description	Enables you to set properties for a view. To access: From within the View Editor, click the Edit View Properties  button.
Important Information	The properties set in the perspective definition are the default properties that appear selected in the View Properties dialog box.

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

GUI Element (A-Z)	Description
Description	Enter a description of the view (optional field).
Merge Identical Instances	When the check box is selected, identical instances that appear on the same layer in this view are automatically merged into one symbol in the editing pane. This helps you remove redundant information and sharpen the view's focus. For details, see "Merge Identical Instances" on page 170.
Persistent View	Defines whether you want the selected view to always remain in the system memory. You should use this option only for views that are used frequently.
View Name	The name of the view.

Watchpoints Updates Dialog Box

Description	<p>Displays the changes found in related CIs by a watchpoint defined for a model.</p> <p>To access: From within a model in the Model Editor, click the Watchpoint  button and select Watchpoints Updates or right-click a CI in the model and select Watchpoint > Watchpoints Updates.</p>
Important Information	<p>The Watchpoints Updates dialog box indicates any changes found involving the CIs related to the model via the associated reveal path. If a new related CI is found which is not included in the model, the suggested update is an added CI. If a CI in the model is found to no longer be related via the path, the suggested update is a removed CI.</p> <p>This option is only enabled when watchpoints are defined for the model and CIs have been found.</p>

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

GUI Element (A-Z)	Description
Accept	Select the check boxes for the CIs you want to add to your model or remove from your model.
Accept All	Click Accept All to apply all the suggested changes to your model.
CI	The names of the CIs found by the watchpoint.
CI Type	The types of the CIs found by the watchpoint.
Clear All	Click Clear All to clear the check boxes for all the found CIs.
Restore	Select the check boxes for the CIs in the Suppressed CIs pane that you want to consider for inclusion in your model.
Show/Hide Suppressions	Toggle between hiding and displaying the Suppressed CIs pane of the dialog box.
Suggested Update	Indicates whether the suggested change is an added CI or a removed CI.
Suppress	Select the check boxes for the CIs you want to exclude from your model or leave in your model.
Suppress All	Click Suppress All to decline all the suggested changes to your model.

5

View Manager

This chapter provides information on View Manager.

This chapter includes:

Concepts

- ▶ View Manager Overview on page 158
- ▶ View Formats on page 159
- ▶ Templates and Perspectives on page 160
- ▶ Predefined Folders and Views on page 161
- ▶ Building a Business View on page 163
- ▶ Link Nodes to Application CI on page 165
- ▶ The Role of Monitor CIs in a View on page 168
- ▶ Grouping By Attribute Properties on page 169
- ▶ Merge Identical Instances on page 170

Tasks

- ▶ Create a Parameterized Template on page 171
- ▶ Create a Perspective on page 173
- ▶ Create a Template Based View on page 174
- ▶ Create a Pattern View on page 176

Reference

- ▶ View Manager User Interface on page 177

Troubleshooting and Limitations on page 210

View Manager Overview

View Manager is a tool for creating and managing views. You can create your own views, or work with the out-of-the-box (factory) views provided with your HP Business Availability Center installation.

The IT universe model in the configuration management database can be very large, holding thousands of configuration item (CI)s (CIs). A view enables you to build a subset of the overall IT universe model, containing only those CIs relating to a specific area of interest. You can define your own views to display only the information that is relevant to your organization's business needs.

The views are used to display performance status in Dashboard, and for setting up SLAs in Service Level Management. HP Business Availability Center supports three view formats, pattern views, template based views, and perspective based views, which are populated through different processes. For details, see “View Formats” on page 159.

 **View Formats**

HP Business Availability Center supports three view formats, by which to populate your view:

- ▶ **Pattern views** are built from a Topology Query Language (TQL) query that defines the structure of the view. You can create the TQL query as you build the view from within View Manager or based on an existing query. The view displays only those CIs and relationships that satisfy the query definition. When the view is displayed or refreshed, View Manager queries the CMDB for all elements that fit the query, and automatically updates the view with those elements.
- ▶ **Template based views** are based on a TQL query, to which a template is then applied. The template is a reusable view that includes parameters, folding rules, and other settings, which are saved as part of the template. This enables you to build multiple views with the same settings without having to re-enter the setting information. The view displays only those CIs and relationships that satisfy the query definition and the conditions of the template. For details on templates, see “Templates and Perspectives” on page 160.
- ▶ **Perspective based views** are built by selecting a collection of individual CIs and applying a special type of template, known as a perspective, to it. Instance views, which no longer exist, are replaced by perspective based views. Perspective based views cannot be viewed or edited in View Manager. When you select a perspective based view in View Manager, you are given the option to open the view in Modeling Studio, where you can edit it. For details, see “Modeling Studio – Overview” on page 112.

You can also create new views by selecting **Save As** from the context menu for an existing view and editing the view contents. You then follow the wizard to save the new view with a unique name.

Templates and Perspectives

The templates and perspectives which are used to build template based and perspective based views, respectively, are also defined and edited in View Manager. You can create a template using the New Template wizard. For details, see “New Template/Template Properties/Save As Template Wizard” on page 184. To create a perspective, use the New Perspective wizard. For details, see “New Perspective/Perspective Properties/Save As Perspective Wizard” on page 180.

Templates allow you to save the folding rules, relationship rules and parameters you have set in your definition. This makes it easier to build more views with the same settings. Any changes made to a template affect all existing views based on that template.

The templates you create in View Manager appear the same as pattern views in the editing pane. The same functionality applies to both pattern views and templates. The difference is that templates are reusable and they do not appear in the view list in IT Universe Manager.

Perspectives are a type of template designed to be applied to a specific collection of CIs. You create and edit perspectives in View Manager, but you can only apply them to content to build a view in the Modeling Studio. Perspective based views appear in the views tree in View Manager, but you must go to the Modeling Studio to edit them. For details, see “Building a Perspective Based View” on page 114.

In summary, the tree in the Views pane of View Manager can include five distinct entities:

- ▶ pattern views
- ▶ templates
- ▶ template based views
- ▶ perspectives
- ▶ perspective based views

The first four are created and edited in View Manager. Perspective based views are created and edited in the Modeling Studio.

You can filter the tree to select the types of views or templates to display. For details, see “View Manager Window” on page 199.

Predefined Folders and Views

The file folder system in View Manager includes predefined folders and views, as described in the following sections:

- ▶ “Predefined Folders” on page 161
- ▶ “Factory Views” on page 161
- ▶ “Predefined Perspectives” on page 162

Predefined Folders

View Manager contains a hierarchical file folder system to help you organize your views and templates, displayed in the Views pane. Predefined folders are provided for the out-of-the-box views; you can modify these folders, or add additional folders according to your organization’s requirements.

Factory Views

Your HP Business Availability Center installation includes out-of-the-box pattern views, templates, and perspectives. These views provide a quick start for working with the CMDB for setting up SLAs, and for viewing system performance information in Dashboard.

The out-of-the-box views are initially empty. As soon as CIs are added to the CMDB by one of the CI generators, the TQL query built into each pattern view is able to identify the CIs that meet the pattern requirements, and add them to the view.

Views for CIs are created when a discovery process is run; the out-of-the-box views that are provided correspond to the relevant Discovery and Dependency Mapping (DDM) packages. For example, the Oracle view (**Root > Database > Oracle > Oracle**) is populated with CIs that are created when Discovery and Dependency Mapping activates the Database - Oracle module. For details on running DDM, see “Run Discovery – Advanced Mode Workflow” in *Discovery and Dependency Mapping Guide*.

For details on the cross-application processes for setting up the Siebel and SAP views, see “HP Business Availability Center for SAP Applications” and “HP Business Availability Center for Siebel Applications Administration” in *Solutions and Integrations*.

Another type of view is a view for CIs created by source adapters, which correspond to the source adapters in Source Manager and the EMS Integrations tool. HP Business Availability Center provides various out-of-the-box monitor views for CIs from all the default sources (SiteScope, Business Process Monitor, Real User Monitor) and out-of-the-box Integrations views that each receive CIs from the relevant integrations. For example, the HP OVO view corresponds to the HP OVO integration.

For details on source adapters, see “Working with Source Manager” on page 617.

Other out-of-the-box views for CIs are created for internal HP Business Availability Center data, for example, the BAC Self-Alert View and the UDX Measurement Filters View.

Many out-of-the-box monitor views are set by default to display in all relevant HP Business Availability Center applications; other out-of-the-box views are hidden by default.

Some of the out-of-the-box views are considered basic to the system and cannot be deleted from the folders.

Predefined Perspectives

HP Business Availability Center also provides out-of-the-box perspectives. One example is the Content Only perspective, which includes only the elements of the view content itself, without any additional CIs.

The following out-of-the-box perspectives are intended to be used in Dashboard:

- ▶ **All Monitors.** This perspective enriches the model by adding child CIs down to the level of monitors. Use this perspective to create a Dashboard view that includes all monitor types.
- ▶ **System Monitors.** This perspective enriches the model by adding child CIs down to the level of monitors. Use this perspective to create a Dashboard view that includes System monitors only.
- ▶ **End User Monitors.** This perspective enriches the model by adding child CIs down to the level of monitors. Use this perspective to create a Dashboard view that includes monitor CIs for End User Management only.
- ▶ **Location Based Monitors.** This perspective enriches the model by adding child CIs down to the level of End User Management and System monitors. Use this perspective to create a Dashboard view by location.
- ▶ **Impact Hierarchy (MDW).** This perspective enriches the model with all child CIs related by impact links. Use this perspective to configure additional monitors using the Monitor Deployment Wizard.
- ▶ **Model and Dependency Hierarchy.** This perspective enriches the model with all dependent CIs in the CMDDB. Use this perspective to create a view with the full model hierarchy.

Building a Business View

You can define your own views in View Manager to model your business environment. These views should provide the business users with logical representations of your company's structure, processes, and goals.

To meet these requirements, you generally build multiple views representing different aspects of your business; for example, you could build business views that revolve around any of the following:

- ▶ Company structure, so that data is organized by the geographical location of branches, or by data centers.
- ▶ Business processes, so that data is organized by line of business, or by applications.

- ▶ Business goals, so that data is organized by sales, or by key customers.

The views you create depend on the particular demands of your organization and the actual hierarchical structure of the views should reflect those demands.

The usual hierarchical format of a view is as follows:

- ▶ **Top level.** The highest levels of the view, consisting of the root CI and the branches below it, are normally built from logical **Business** CI types such as **Location, Line of Business, Customer, Application**, and so on.
- ▶ **Intermediate level.** The intermediate branches of the view normally consist of **System** CI types, representing actual hardware and software and/or monitoring group CI types, representing groups containing monitors.
- ▶ **Bottom level.** The lowest level of the view, consisting of leaf CIs at the ends of the subtrees, is built from the **Monitor** CI types. These CIs receive the actual data from the data sources, used to determine KPI status all the way up the view subtrees, and so provide business context to the view.

In some cases, you can choose to use the Dynamic Node Factory CI type to dynamically build a hierarchy for you. For details, see “Working with Dynamic Node Factory Overview” on page 93.

Note: The bottom level is only relevant when a monitoring solution such as HP Business Availability Center is connected and modeled in the CMDB.

Link Nodes to Application CI

HP Business Availability Center enables you to define a node in a view to be linked to all the instances of that CIT in your IT universe. You can use this feature, for example, to show which hosts are serving a specific business service or to create Correlation rules that reflect problems at the business level.

When you select **Add to Applications** from the context menu for a node in View Manager, a new CI of type **application** is created. All instances of the selected node in any corresponding view are then linked to the new CI with **Contains** links. This CI is actually a model of type **application** which can be viewed in the Modeling Studio. The CIs in the model appear in read-only format. For details on models, see “Business CI Models” on page 112.

If you make a change to the existing nodes of a view, such as selecting another node to be linked to the application CI or removing the link from a node to the application CI, the recalculation is performed immediately. However, if you add a node to the view, the recalculation is performed at the next scheduled update.

This functionality can be applied to any CI type except for: IT Universe, Business, Application, and all extended CI types (from running CMDB federation functionality).

This section includes the following topics:

- “Linking a Node to an Application CI” on page 165
- “Removing the Link between a Node and the Application CI” on page 168

Linking a Node to an Application CI

To link a node to an application CI, select a node in the TQL in the editing pane of View Manager. Right-click the node and select **Add to Applications**. A dialog box opens with a default name for the new application CI, which is the name of the view from which you defined it followed by “_Application.” You can accept the default name or assign it a name of your choice. The new CI is connected by **Contains** links to all the instances of the node.

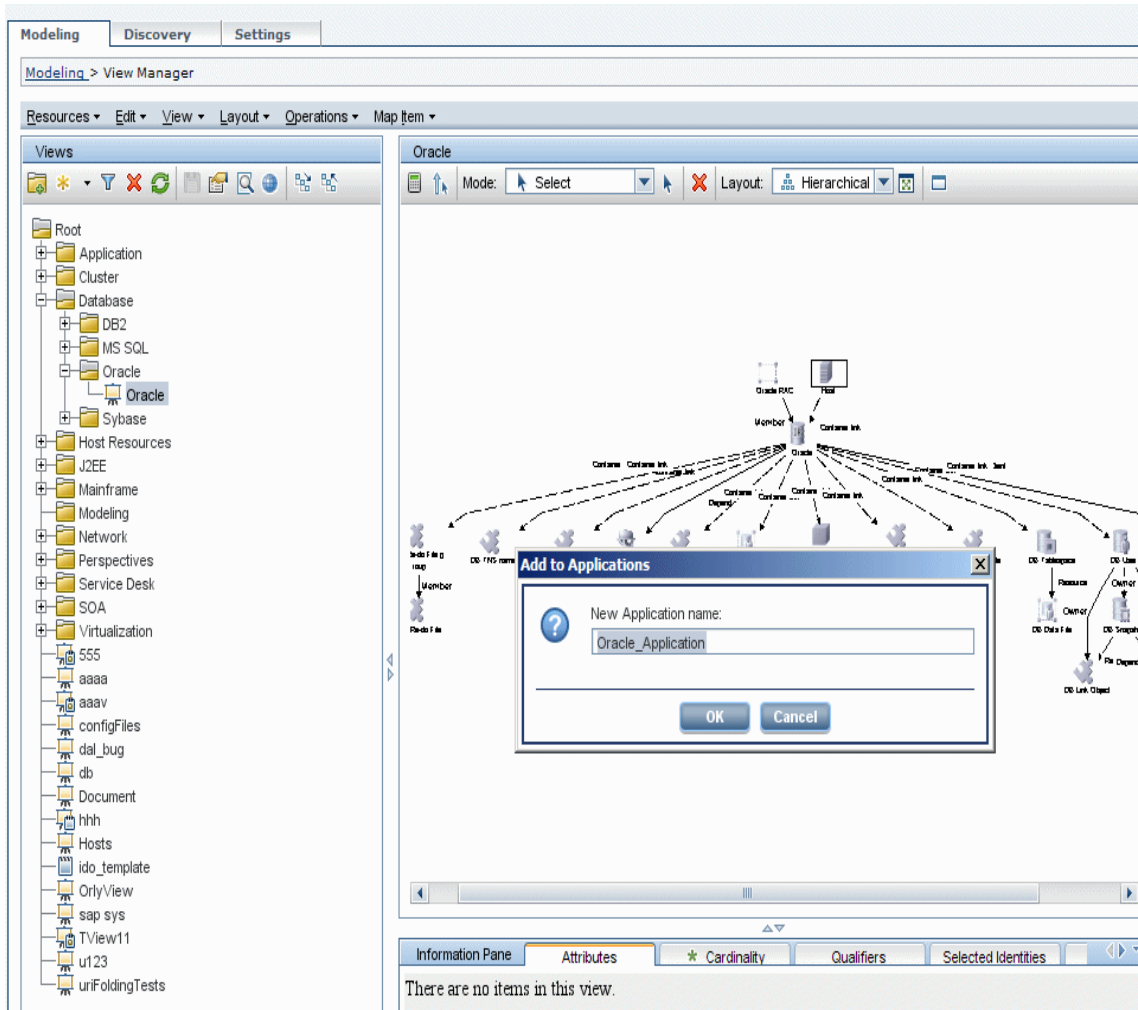


A small black briefcase icon appears to the right of the node. The creation of the application CI and the links occurs when you save the view.

If you select a different node and repeat the process, the dialog box does not open (only one application CI is created per view), but **Contains** links are created between that CI and the instances of the second node.

Example

In a view called Oracle, you select a host and click **Add to Applications** from the context menu. A new CI of type application named Oracle_Application is created and all the hosts queried in this TQL are linked to the Oracle_Application CI by Contains links.



Removing the Link between a Node and the Application CI

To remove the link between a node and the application CI, right-click the node you selected as **Add to Applications**, and select **Remove from Applications**. The briefcase icon disappears and the relationships to the application CI are removed. If there are no remaining nodes in the view selected for linking to the application CI, the application CI itself is deleted. The change takes effect when you save the view. When you delete a view, the application CI created from within the view is also deleted.

The Role of Monitor CIs in a View

In various HP Business Availability Center applications, the CIs display colored indicators (KPIs) to show operational status information for the components of your IT universe. To give color status to a KPI, it needs to have a dependency on one or more of the leaf CIs that receive actual monitoring information, for example, a SiteScope monitor or Business Process Monitor transaction. (For information on KPIs, see “Working With KPIs” in *Using Dashboard*.)

The dependency can be direct (in which case the parent CI has a monitored by relationship with the monitor child CI), or through the branches of a subtree. For example, a logical CI for location could receive KPI status from either one of the following hierarchies:

- **Location CI -> monitor leaf CI**
- **Location CI -> group CI -> group CI -> monitor leaf CI**

HP Business Availability Center automatically creates a dependency connection to a monitor CI for all CIs added using the source templates in the Source Manager, or added using the Dynamic Node Factory template. However, CIs added by the DDM process, or that you created manually, are not automatically associated with monitor CIs; you must manually define the appropriate connections.

You can manually create a monitor dependency for a CI in one of the following ways:

- ▶ By attaching a monitor CI (or a subtree containing a monitor CI) to the parent CI in IT Universe Manager. For details, see “Attaching Existing CIs” on page 47.
- ▶ By making an association between a monitor CI and an existing CI. The monitor CI is automatically attached to the selected CI. For details, see “Integrating SiteScope Data with HP Business Availability Center’s Configuration Items” in *Using System Availability Management*.
- ▶ By using the Monitor Deployment Wizard to create a new SiteScope monitor for a specific CI. The created monitor generates a new monitor CI in the CMDB, with an automatic attachment to the selected CI. For details, see “Monitor Deployment Wizard User Interface” in *Using System Availability Management*.

Grouping By Attribute Properties

When grouping CIs in View Manager by attribute using **Node Grouping**, you can group CIs of different types in the Topology Map by using a regular expression as described in “Node/Relationship Grouping Dialog Box” on page 194. Enter the expression in the **Mask to group by** field in the Advanced Attribute Properties page of the dialog box. For details about regular expressions, see “Regular Expression Examples” in *Reference Information*.

Nested Groups

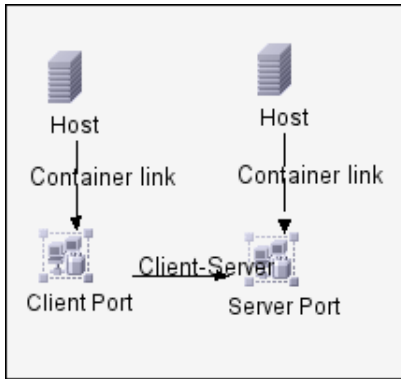
You can create nested groups (a node group inside another node group) to help fine-tune the TQL results that are displayed in the Topology Map.

For example, after grouping host nodes by their CIT, you can use their **operation state** attribute to create more focused groups.

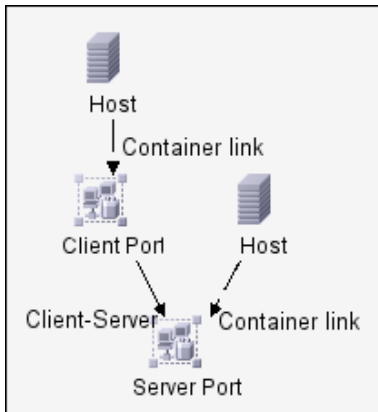
Merge Identical Instances

When defining a view, you can have identical instances that appear on the same layer in the view automatically merged into one symbol on the editing pane. This helps you remove redundant information and sharpen the view's focus.

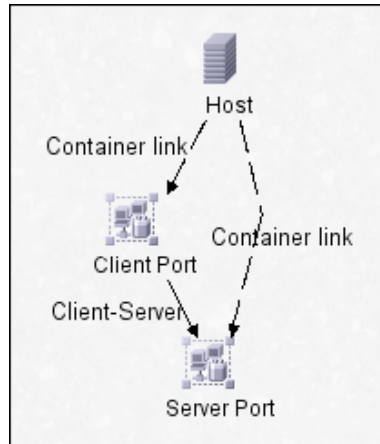
For example, if you want to discover and display hosts that are connected to other hosts in a server-client relationship, you can create the following TQL:



However, if both the server and the client are installed on the same host, one host appears twice.



To overcome the redundant host display, you define that identical instances should be merged by selecting **Merge Identical Instances** on the **Advanced Properties** page of the New View wizard:



Create a Parameterized Template

This task describes how to define a new parameterized template.

This task includes the following steps:

- “Define a Template” on page 172
- “Define the Base TQL” on page 172
- “Set the Advanced Properties” on page 172
- “Add Nodes and Relationships to a TQL Query” on page 172
- “Add Folding Rules to Relationships” on page 172
- “Set Permissions” on page 173

1 Define a Template

You define a new template using the New Template wizard. Enter the template name and description on the General Attributes page of the wizard. For details, see “Template General Attributes Page” on page 184.

Note: The template is created in the same folder as the view currently selected in the views tree.

2 Define the Base TQL

The TQL is assigned the same name as the template. For details, see “Template Base TQL Page” on page 185.

3 Set the Advanced Properties

On the Advanced Properties page of the wizard, enter the viewing options for the template. For details, see “Advanced Properties Page” on page 186.

4 Add Nodes and Relationships to a TQL Query

Add the nodes and relationships that define the query. For details on how to add nodes and relationships to a TQL query, see “Add Nodes and Relationships to a TQL Query” on page 362.

Note: You must add at least one node in order to save your template.

5 Add Folding Rules to Relationships

You can add folding rules to selected relationships by right-clicking the relationship you want and selecting **Add Rule**. For details, see **Add Rule** in “Context Menu Options” on page 371.

6 Set Permissions

Apply viewing and editing permissions to users and user groups for that template. You set permissions in **Admin > Platform > Users and Permissions**, select a user or a group and select **Permissions**. For details, see “Assign Permissions” in *Platform Administration*.

Create a Perspective

This task describes how to define a new perspective.

This task includes the following steps:

- “Define a Perspective” on page 173
- “Define the Base TQL” on page 173
- “Set the Advanced Properties” on page 174
- “Select a Contact Node” on page 174
- “Add Nodes and Relationships to a TQL Query” on page 174
- “Add Folding Rules to Relationships” on page 174
- “Set Permissions” on page 174

1 Define a Perspective

You define a new perspective using the New Perspective wizard. Enter the perspective name and description on the General Attributes page of the wizard. For details, see “Perspective General Attributes Page” on page 180.

Note: The perspective is created in the same folder as the view currently selected in the views tree.

2 Define the Base TQL

The TQL is assigned the same name as the perspective. For details, see “Perspective Base TQL Page” on page 181.

3 Set the Advanced Properties

On the Advanced Properties page of the wizard, enter the viewing options for the perspective. For details, see “Advanced Properties Page” on page 182.

4 Select a Contact Node

On the Contact Node page of the wizard, select a CI type from the tree to serve as a contact node of your perspective. For details, see “Contact Node Page” on page 181.

5 Add Nodes and Relationships to a TQL Query

Add the nodes and relationships that define the query. For details on how to add nodes and relationships to a TQL query, see “Add Nodes and Relationships to a TQL Query” on page 362.

6 Add Folding Rules to Relationships

You can add folding rules to selected relationships by right-clicking the relationship you want and selecting **Add Rule**. For details, see **Add Rule** in “Context Menu Options” on page 371.

7 Set Permissions

Apply viewing and editing permissions to users and user groups for that template. You set permissions in **Admin > Platform > Users and Permissions**, select a user or a group and select **Permissions**. For details, see “Assign Permissions” in *Platform Administration*.

Create a Template Based View

This task describes how to define a new template based view.

This task includes the following steps:

- “Prerequisites” on page 175
- “Define a New Template Based View” on page 175
- “Select a Template” on page 175

- “Set the Advanced Properties” on page 175
- “Set Parameters” on page 175
- “Set Permissions” on page 176

1 Prerequisites

If you want to base your view on a new template, create the template first. For details, see “New Template/Template Properties/Save As Template Wizard” on page 184.

2 Define a New Template Based View

You define a new template based view using the New View wizard. Select **Template Based** as the view type on the General Attributes page of the wizard. For details, see “View General Attributes Page” on page 188.

Note: The view is created in the same folder as the view currently selected in the views tree.

3 Select a Template

On the Available Templates page of the wizard, select a template on which to base your view. For details, see “Available Templates Page” on page 189.

4 Set the Advanced Properties

On the Advanced Properties page of the wizard, enter the viewing options for the view. For details, see “Advanced Properties Page” on page 191.

5 Set Parameters

On the Set Parameters page, enter the parameter values for the view. A separate wizard page appears for each item in the template for which parameterized values were defined. For details, see “Set Parameters Page” on page 193.

6 Set Permissions

Apply viewing and editing permissions to users and user groups for that view. You set permissions in **Admin > Platform > Users and Permissions**, select a user or a group and select **Permissions**. For details, see “Assign Permissions” in *Platform Administration*.

Create a Pattern View

This task describes how to create a pattern view and define its TQL query.

This task includes the following steps:

- “Define a Pattern View” on page 176
- “Define the Base TQL” on page 176
- “Set the Advanced Properties” on page 177
- “Add Nodes and Relationships to a TQL Query” on page 177
- “Add Folding Rules to Relationships” on page 177
- “Define Multiple Relationship Rules” on page 177

1 Define a Pattern View

You define a new pattern view using the New View wizard. Select **Pattern** as the view type on the General Attributes page of the wizard. For details, see “View General Attributes Page” on page 188.

Note: The view is created in the same folder as the view currently selected in the views tree.

2 Define the Base TQL

If you are basing your view on a new TQL, the TQL is assigned the same name as the view. If you are basing your view on an existing TQL, select it from the drop-down list. For details, see “View Base TQL Page” on page 190.

3 Set the Advanced Properties

On the Advanced Properties page of the wizard, enter the viewing options for the view. For details, see “Advanced Properties Page” on page 191.

4 Add Nodes and Relationships to a TQL Query

Add the nodes and relationships that define the query. For details on how to add nodes and relationships to a TQL query, see “Add Nodes and Relationships to a TQL Query” on page 362.

Note: You must add at least one node in order to save your view.

5 Add Folding Rules to Relationships

You can add folding rules to selected relationships by right-clicking the relationship you want and selecting **Add Rule**. For details, see **Add Rule** in “Context Menu Options” on page 371.

6 Define Multiple Relationship Rules

You can define multiple relationship rules to define the structure between CITs in a view using the Relationship Folding Rules dialog box. For details, see “Relationship Folding Rules Dialog Box” on page 196.

View Manager User Interface

This section describes:

- ▶ Add/Edit Relationship Folding Rule Dialog Box on page 178
- ▶ List of Dependent Views Dialog Box on page 179
- ▶ New Perspective/Perspective Properties/Save As Perspective Wizard on page 180
- ▶ New Template/Template Properties/Save As Template Wizard on page 184
- ▶ New View/View Properties/Save As View Wizard on page 188

- ▶ Node/Relationship Grouping Dialog Box on page 194
- ▶ Relationship Folding Rules Dialog Box on page 196
- ▶ Set View Parameters/Set View Element Parameters Dialog Box on page 198
- ▶ View Manager Window on page 199

Add/Edit Relationship Folding Rule Dialog Box

Description	Enables you to add a new relationship folding rule or edit an existing relationship folding rule. To access: In View Manager, click Add or Edit from the Relationship Folding Rules dialog box.
Important Information	You can define sibling and child rules for the same relationship between two CITs. However, you cannot define parent and child rules for the same relationship, or left sibling and right sibling rules.
Included in Tasks	“Create a Pattern View” on page 176
Useful Links	“Relationship Folding Rules Dialog Box” on page 196

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

GUI Element (A-Z)	Description
Node 1	Select the required Node1 node in the Node1 list.
Node 2	Select the required Node2 node in the Node2 list.
Relationship	From the Relationship list, select an available relationship connecting the Node1 node to the Node2 node. (Enabled only after you define both CITs.)
Rule	From the Rule list, select a folding rule: Parent , Right Sibling , Left Sibling , or Child . For details, see “Adding Folding Rules to Relationships” on page 47.



List of Dependent Views Dialog Box

Description	<p>Enables you to disconnect a view from a template or perspective that has changed, delete the view, or reapply the template or perspective.</p> <p>To access: In View Manager, when saving a template or perspective with a change, the List of Dependent Views dialog box automatically opens.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
Invalid Dependent Views	<p>For each dependent view listed, select one of the following options:</p> <ul style="list-style-type: none"> ▶ Disconnect. Disconnects the view from the template or perspective. The view becomes an independent pattern view. ▶ Delete. Deletes the view from the CMDB.
Valid Dependent Views	<p>For each dependent view listed, select one of the following options:</p> <ul style="list-style-type: none"> ▶ Reapply. Applies the changed template or perspective to the view and saves the view. ▶ Disconnect. Disconnects the view from the template or perspective. The view becomes an independent pattern view.

New Perspective/Perspective Properties/Save As Perspective Wizard

Description	<p>Enables you to define a new perspective or edit the properties of an existing perspective.</p> <p>To access: In View Manager, click the downward arrow next to the New button  and select New Perspective, or select New > New Perspective from the context menu in the Views pane.</p> <p>Click the Properties button  or select Properties from the context menu to edit the properties of an existing perspective.</p> <p>Select Save As from the context menu or select Resources > Save As to save an existing perspective with a different name.</p>
Important Information	<p>TQL queries should only be created by administrators with an advanced knowledge of the TQL system.</p> <p>For more information on perspectives, see “Building a Perspective Based View” on page 114.</p>
Included in Tasks	“Create a Perspective” on page 173
Wizard Map	<p>The New Perspective/Perspective Properties/Save As Perspective wizard contains:</p> <p>Perspective General Attributes Page > Contact Node Page > Perspective Base TQL Page > Advanced Properties Page</p>

Perspective General Attributes Page

Description	Enables you to define the general attributes of the new perspective.
Important Information	For more information on perspectives, see “Building a Perspective Based View” on page 114.
Wizard Map	<p>The New Perspective/Perspective Properties/Save As Perspective Wizard contains:</p> <p>Perspective General Attributes Page > Contact Node Page > Perspective Base TQL Page > Advanced Properties Page</p>

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

GUI Element (A-Z)	Description
Perspective Description	Enter a description of the new perspective.
Perspective Name	Enter a name for the new perspective.

Contact Node Page

Description	Enables you to select a contact node for a perspective.
Important Information	A perspective based view must have at least one contact node. For more information on perspectives, see “Building a Perspective Based View” on page 114.
Wizard Map	The New Perspective/Perspective Properties/Save As Perspective Wizard contains: Perspective General Attributes Page > Contact Node Page > Perspective Base TQL Page > Advanced Properties Page

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

GUI Element (A-Z)	Description
<CI Type tree>	Select a CI type from the tree to serve as the contact node of the perspective.

Perspective Base TQL Page

Description	Enables you to define the base TQL for the new perspective.
-------------	---

Important Information	For more information on perspectives, see “Building a Perspective Based View” on page 114.
Wizard Map	The New Perspective/Perspective Properties/Save As Perspective Wizard contains: Perspective General Attributes Page > Contact Node Page > Perspective Base TQL Page > Advanced Properties Page

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

GUI Element (A-Z)	Description
Base TQL Description	A description of the query.
Base TQL Name	The query is defined by default with the same name as the perspective.
Base TQL Priority	From the TQL Priority list, select a priority level for the new query (Low, Medium, High, Express). This setting determines how often the query should be rerun automatically by the system to include updated information from the CMDB.



Advanced Properties Page

Description	Enables you to enter advanced properties for the perspective.
Important Information	For more information on perspectives, see “Building a Perspective Based View” on page 114.
Wizard Map	The New Perspective/Perspective Properties/Save As Perspective Wizard contains: Perspective General Attributes Page > Contact Node Page > Perspective Base TQL Page > Advanced Properties Page

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

GUI Element (A-Z)	Description
Assign View to	<p>Select the check boxes for the applications in which you want the perspective you are creating to be visible:</p> <ul style="list-style-type: none"> ▶ IT Universe. The perspective is visible in IT Universe Manager. Selected by default. ▶ Dashboard. The perspective is visible in Dashboard and Dashboard Administration. Selected by default. ▶ Service Level Management. The perspective is visible in Service Level Management. ▶ Service Level Management Administration. The perspective is visible in Service Level Management Administration. ▶ SOA. The perspective is visible in Business Availability Center for SOA. Selected by default only for perspectives in the SOA folder.
Merge Identical Instances	<p>When the check box is selected, identical instances that appear on the same layer in this perspective are automatically merged into one symbol in the editing pane. This helps you remove redundant information and sharpen the perspective's focus. For details, see "Merge Identical Instances" on page 170.</p>
Persistent View	<p>Defines whether you want the selected perspective to always remain in the system memory. You should use this option only for perspectives that are used frequently.</p>
Track Changes	<p>Select to be notified when CIs are added or removed. The changes are tracked in the system by creating daily snapshots of the perspective.</p>

New Template/Template Properties/Save As Template Wizard

Description	<p>Enables you to define a new template or edit the properties of an existing template.</p> <p>To access: In View Manager, click the downward arrow next to the New button  and select New Template, or select New > New Template from the context menu in the Views pane.</p> <p>Click the Properties button  or select Properties from the context menu to edit the properties of an existing template.</p> <p>Select Save As from the context menu or select Resources > Save As to save an existing template with a different name.</p>
Important Information	TQL queries should only be created by administrators with an advanced knowledge of the TQL system.
Included in Tasks	“Create a Parameterized Template” on page 171
Wizard Map	<p>The New Template/Template Properties/Save As Template wizard contains:</p> <p>Template General Attributes Page > Template Base TQL Page > Advanced Properties Page</p>

Template General Attributes Page

Description	Enables you to define the general attributes of the new template.
Wizard Map	<p>The New Template/Template Properties/Save As Template Wizard contains:</p> <p>Template General Attributes Page > Template Base TQL Page > Advanced Properties Page</p>

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

GUI Element (A-Z)	Description
Template Description	Enter a description of the new template.
Template Name	Enter a name for the new template.

Template Base TQL Page

Description	Enables you to define the base TQL for the new template.
Wizard Map	The New Template/Template Properties/Save As Template Wizard contains: Template General Attributes Page > Template Base TQL Page > Advanced Properties Page

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

GUI Element (A-Z)	Description
Base TQL Description	A description of the query.
Base TQL Name	The query is defined by default with the same name as the template.
Base TQL Priority	From the TQL Priority list, select a priority level for the new query (Low, Medium, High, Express). This setting determines how often the query should be rerun automatically by the system to include updated information from the CMDB.



 **Advanced Properties Page**

Description	Enables you to enter advanced properties for the template.
Wizard Map	The New Template/Template Properties/Save As Template Wizard contains: Template General Attributes Page > Template Base TQL Page > Advanced Properties Page

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

GUI Element (A-Z)	Description
Assign View to	<p>Select the check boxes for the applications in which you want the template you are creating to be visible:</p> <ul style="list-style-type: none"> ▶ IT Universe. The template is visible in IT Universe Manager. Selected by default. ▶ Dashboard. The template is visible in Dashboard and Dashboard Administration. Selected by default. ▶ Service Level Management. The template is visible in Service Level Management. ▶ Service Level Management Administration. The template is visible in Service Level Management Administration. ▶ SOA. The template is visible in Business Availability Center for SOA. Selected by default only for templates in the SOA folder.
Merge Identical Instances	<p>When the check box is selected, identical instances that appear on the same layer in this template are automatically merged into one symbol in the editing pane. This helps you remove redundant information and sharpen the template's focus. For details, see "Merge Identical Instances" on page 170.</p>
Persistent View	<p>Defines whether you want the selected template to always remain in the system memory. You should use this option only for templates that are used frequently.</p>
Track Changes	<p>Select to be notified when CIs are added or removed. The changes are tracked in the system by creating daily snapshots of the template.</p>

New View/View Properties/Save As View Wizard

Description	<p>Enables you to define a new view or edit the properties of an existing view.</p> <p>To access: In View Manager, click the New button  or select New > New View from the context menu in the Views pane to create a new view.</p> <p>Click the Properties button  or select Properties from the context menu to edit the properties of an existing view.</p> <p>Select Save As from the context menu or select Resources > Save As to save an existing view with a different name.</p>
Important Information	TQL queries should only be created by administrators with an advanced knowledge of the TQL system.
Included in Tasks	“Create a Template Based View” on page 174, “Create a Pattern View” on page 176
Wizard Map	<p>The New View/View Properties/Save As View wizard contains:</p> <p>View General Attributes Page > (Available Templates Page) > (View Base TQL Page) > Advanced Properties Page > (Set Parameters Page)</p>

View General Attributes Page

Description	Enables you to define the general attributes of the new view.
Wizard Map	<p>The New View/View Properties/Save As View Wizard contains:</p> <p>View General Attributes Page > (Available Templates Page) > (View Base TQL Page) > Advanced Properties Page > (Set Parameters Page)</p>

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

GUI Element (A-Z)	Description
View Description	Enter a description of the new view.
View Name	Enter a name for the new view.
View Type	Select Pattern to create a pattern view. Select Template Based to create a template based view.

Available Templates Page

Description	Enables you to select a template for a template based view.
Important Information	This wizard page only appears if Template Based was selected as the view type in the previous step.
Wizard Map	The New View/View Properties/Save As View Wizard contains: View General Attributes Page > (Available Templates Page) > (View Base TQL Page) > Advanced Properties Page > (Set Parameters Page)

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

GUI Element (A-Z)	Description
Base TQL Name	Displays the name of the TQL on which the selected template is based.
Template Description	A description of the selected template.
Template Name	Select a template from the drop-down list.

 **View Base TQL Page**

Description	Enables you to define the base TQL for the new view.
Important Information	This wizard page only appears if Pattern was selected as the view type in the previous step.
Wizard Map	The New View/View Properties/Save As View Wizard contains: View General Attributes Page > (Available Templates Page) > (View Base TQL Page) > Advanced Properties Page

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

GUI Element (A-Z)	Description
Base the view on a new TQL	Select to base your view on a new TQL.
Base the view on an existing TQL	Select to base your view on an existing TQL.
Base TQL Description	A description of the query.
Base TQL Name	If you are basing your view on an existing TQL, select the TQL query from the drop-down list. Only queries of type view appear in the list. If the query you want does not appear in the list, go to Query Manager and save it as a type view query. For details, see “Query Manager User Interface” on page 317. If you are basing your view on a new TQL, the query is defined by default with the same name as the view.

GUI Element (A-Z)	Description
Base TQL Priority	From the TQL Priority list, select a priority level for the new query (Low, Medium, High, Express). This setting determines how often the query should be rerun automatically by the system to include updated information from the CMDB.
Save a new TQL based on the current definition	Select to save a new TQL based on your view definition. Note: This field only appears in the Save As View wizard.

Advanced Properties Page

Description	Enables you to enter advanced properties for the view.
Wizard Map	The New View/View Properties/Save As View Wizard contains: View General Attributes Page > (Available Templates Page) > (View Base TQL Page) > Advanced Properties Page > (Set Parameters Page)

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

GUI Element (A-Z)	Description
Ad Hoc View	<p>When the check box is selected, the view is defined as an Ad-hoc view. An Ad-hoc view is not updated automatically as changes occur in the system. The view is updated only when you schedule an update using the Scheduler.</p> <p>For details, see “Scheduler User Interface” on page 494.</p>
Assign View to	<p>Select the check boxes for the applications in which you want the view you are creating to be visible:</p> <ul style="list-style-type: none"> ▶ IT Universe. The view is visible in IT Universe Manager. Selected by default. ▶ Dashboard. The view is visible in Dashboard and Dashboard Administration. Selected by default. ▶ Service Level Management. The view is visible in Service Level Management. ▶ Service Level Management Administration. The view is visible in Service Level Management Administration. ▶ SOA. The view is visible in Business Availability Center for SOA. Selected by default only for views in the SOA folder.
Merge Identical Instances	<p>When the check box is selected, identical instances that appear on the same layer in this view are automatically merged into one symbol in the editing pane. This helps you remove redundant information and sharpen the view’s focus. For details, see “Merge Identical Instances” on page 170.</p>
Persistent View	<p>Defines whether you want the selected view to always remain in the system memory. You should use this option only for views that are used frequently.</p>
Track Changes	<p>Select to be notified when CIs are added or removed. The changes are tracked in the system by creating daily snapshots of the view.</p>

 **Set Parameters Page**

Description	Enables you to enter parameterized attribute values for the view.
Important Information	This wizard page only appears if Template Based was selected as the view type. A separate page appears for each CI or relationship that has parameterized attribute values in the selected template.
Wizard Map	The New View/View Properties/Save As View Wizard contains: View General Attributes Page > (Available Templates Page) > (View Base TQL Page) > Advanced Properties Page > (Set Parameters Page)





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

GUI Element (A-Z)	Description
Attribute	The name of each attribute with a parameterized value.
Operator	The operator defined for each attribute.
Value	Click the field to open an editing dialog box, which enables you to set the parameterized value of the attribute.

Node/Relationship Grouping Dialog Box

Description	Enables you to define a new grouping of CIs or to edit an existing grouping. To access: In View Manager, select Node Grouping or Relationship Grouping from the context menu in the editing pane.
Important Information	You select and enter the information for the CI groupings in the fields at the bottom of the dialog box. The groupings you define are displayed in the table at the center of the dialog box.

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

GUI Element (A-Z)	Description
	Click to add a grouping to the table based on the information entered.
	Deletes the selected CI group.
	Moves selected row up.
	Moves selected row down.
Attribute name	If you are grouping by attribute, select the appropriate Attribute name. You can right-click this field to select Advanced Properties , which opens the Advanced Attribute Properties dialog box.

GUI Element (A-Z)	Description
Group By	<p>Select the criteria by which to group the CIs. The following options are available:</p> <ul style="list-style-type: none"> ▶ Configuration Item Type. Groups CIs in the Topology Map by their CI type. ▶ TQL Node. Groups all CIs of the same CI type that fulfill the node grouping criteria. By default, these CIs appear in the Topology Map under a folder containing the name of the selected TQL node and an automatically added identification number. ▶ Attribute. Groups CIs of multiple CI types in the Topology Map, according to the attribute selected from the list. A CI can be a member of multiple groups.
Group label	<p>Enter the label of the group.</p> <p>Note: This field is optional.</p>
Minimum in group	<p>Enter the minimum number of matching CIs required to create the group. By default there must be at least one CI in the group.</p> <p>Note: This field is optional.</p>

Advanced Attribute Properties

GUI Element (A-Z)	Description
Attribute Name	The name of the selected attribute.






GUI Element (A-Z)	Description
Group List	Define the specific groups of the selected attribute to be created. For example, to display two groups of IP addresses that end between 0 and 100, enter 0-50, 51-100. Any IPs that fall outside this group are placed automatically into the Others group.
Mask to group by	Enter a regular expression, as follows: <ul style="list-style-type: none"> ▶ In the first field, enter the regular expression pattern. This is the structure of the selected attribute. ▶ In the second field, enter the group number. This is the part of the regular expression pattern on which to focus when creating the group. For details, see “Grouping By Attribute Properties” on page 169.

Relationship Folding Rules Dialog Box

Description	Enables you to define multiple relationship rules. To access: In View Manager, select Relationship Folding Rules from the context menu in the Views pane.
Important Information	As an alternative to adding folding rules, you can choose to define multiple relationship rules. You define relationship rules to define the structure between CITs in a view. This is in contrast to folding rules where you define the structure of two nodes connected to a specific relationship. For example, if one of the view's nodes is a host, you can specify different relationships for Windows, UNIX, router, and so on. By assigning different folding rules to different CITs, views can encompass and represent additional query data. Note: If both folding and relationship rules are defined, the definitions for the folding rules override the definitions for relationship rules.

Included in Tasks	“Create a Pattern View” on page 176
Useful Links	“Add/Edit Relationship Folding Rule Dialog Box” on page 178

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

GUI Element (A-Z)	Description
	Opens the Add Rule dialog box where you can add a rule. For details, see “Add/Edit Relationship Folding Rule Dialog Box” on page 178.
	Opens the Edit Rule dialog box where you can edit the selected rule. “Add/Edit Relationship Folding Rule Dialog Box” on page 178.
	Deletes the selected rule.
	Moves selected row up.
	Moves selected row down.
Relationship	The type of relationship.
Rule	The relevant folding rule.
Source	The source node of the relationship.
Target	The target node of the relationship.

Set View Parameters/Set View Element Parameters Dialog Box

Description	<p>Enables you to edit the predefined parameters of conditions of nodes in a view.</p> <p>To access: In View Manager, right-click a view in the Views pane and select Set View Parameters from the context menu or right-click a node in the editing pane and select Set View Element Parameters from the context menu.</p> <p>Note: This menu option is only available if a parameterized value has been set for an attribute of a node in the view.</p>
Important Information	<p>When you select Set View Element Parameters from the right-click menu for a node in the editing pane, the dialog box displays only the conditions for the selected node. When you select Set View Parameters from the right-click menu in the Views pane, the dialog box displays any conditions that are defined for all nodes in the view.</p>
Included in Tasks	“Create a Template Based View” on page 174

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

GUI Element (A-Z)	Description
Display Name	The name of each attribute with a parameterized value.
Operator	The operator defined for each attribute.
Value	Click the field to open an editing dialog box, which enables you to change the parameterized value of the attribute.



View Manager Window













Description	<p>Enables you to create, edit, and save a view.</p> <p>The View Manager window contains the following panes:</p> <ul style="list-style-type: none"> ▶ Views pane. Displays a hierarchical tree structure of the views that you defined. ▶ Editing pane. Displays the currently selected view, which consists of nodes and the relationships between them. ▶ CI Type Selector. Displays a hierarchical tree structure of the available CI types. ▶ Information Pane. Displays properties, conditions, and cardinality for the selected node or relationship. <p>To access: Select Admin > Universal CMDB > Modeling > View Manager.</p>
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Views Pane

Description	<p>Enables you to select a view to edit.</p>
Important Information	<p>The Views Pane contains a hierarchical file folder system to help you organize your views, displayed in the Views pane. Predefined folders are provided for the out-of-the-box views; you can modify these folders, or add additional folders according to your organization's requirements.</p>

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

GUI Element (A-Z)	Description
	<p>Create a new folder.</p>
	<p>Click to define a new view. For details, see “New View/View Properties/Save As View Wizard” on page 188.</p> <p>Click the downward arrow to select the New Template wizard or the New Perspective wizard.</p>

GUI Element (A-Z)	Description
	Click Filter Tree to filter the types of views and templates that appear in the tree.
	Delete the selected folder or view.
	Click to refresh the data content of the hierarchical tree structure that may have been modified by other users.
	Save the view to the CMDB.
	Opens the View Properties, Template Properties, or Perspective Properties wizard for the selected view, template, or perspective.
	Generate a preview of the existing views in the CMDB that match the pattern of the current view.
	Click Show View Results in IT Universe to go directly to IT Universe Manager for the current view. Note: This feature is not relevant for templates or perspectives.
	Click Expand All to expand all folders in the tree.
	Click Collapse All to collapse all folders in the tree.
	Denotes a view folder. Double-click the icon to expand the folder.
	Denotes a pattern view.
	Denotes a perspective based view. When you select a perspective based view in the view tree, a dialog box opens with the following options: <ul style="list-style-type: none"> ➤ Open in Modeling Studio. Opens the view in the Modeling Studio, where it can be edited. ➤ Delete. Deletes the view from the CMDB. ➤ Disconnect view from perspective. Disconnects the view from the perspective, turning it into a regular pattern view, which can be edited in View Manager.

GUI Element (A-Z)	Description
	Denotes a template based view.
	Denotes a template.
	Denotes a perspective.
Root	Denotes the top level folder, containing all other view folders.

Context Menu Options

The View Manager Window includes the following elements (listed alphabetically) available by right-clicking a folder or view in the Views pane:

Menu Item	Description
Activate/Deactivate View	If the view is active, you can select Deactivate View to make it inactive. If the view is inactive, you can select Activate View to activate it. When you deactivate a view, a red X appears on it. Inactive views are not recalculated and cannot be selected in IT Universe Manager. Note: This option is only available for pattern views.
Delete	Deletes a selected folder or view.
Disconnect View from Template	Select Disconnect View from Template to detach a template based view from its template. It becomes a pattern view and is no longer affected by changes made to the template. Note: This option only appears for template based views.
Export	Displays a standard Save As dialog box, enabling you to save the view as an XML script.
Import	Opens the Import dialog box which enables you to import XML files containing views.
New Folder	Creates a new view folder.

Menu Item	Description
New View	<p>The following options are available:</p> <ul style="list-style-type: none"> ▶ New View wizard, which enables you to define a new view. For details, see “New View/View Properties/Save As View Wizard” on page 188. ▶ New Template wizard, which enables you to define a new template. For details, see “New Template/Template Properties/Save As Template Wizard” on page 184. ▶ New Perspective wizard, which enables you to define a new perspective. For details, see “New Perspective/Perspective Properties/Save As Perspective Wizard” on page 180.
Preview	Generates a preview of the existing views in the CMDB that match the pattern of the current view.
Properties	Opens the View Properties, Template Properties, or Perspective Properties wizard for the selected view, template, or perspective.
Relationship Folding Rules	Displays the Relationship Folding Rules dialog box which enables you to define multiple relationship rules. For details, see “Relationship Folding Rules Dialog Box” on page 196.
Rename Folder	Enables you to rename the view folder.
Save As	<p>Opens the Save As View wizard which enables you to save the view to the CMDB after you have modified it. For details, see “New View/View Properties/Save As View Wizard” on page 188.</p> <p>Note: If you exit View Manager without saving, a confirmation dialog box is displayed, requesting that you save your view.</p>

Menu Item	Description
Set View Parameters	Appears if at least one node in the view has a parameterized node condition. Displays the Set View Parameters dialog box where you can edit the parameter of each condition. For details, see “Set View Parameters/Set View Element Parameters Dialog Box” on page 198.
Show View Results in IT Universe	Takes you to IT Universe Manager and opens the selected view. Note: This option does not appear for templates or perspectives.

Editing Pane

Description	Displays the selected view, which consists of nodes and the relationships between them. <ul style="list-style-type: none"> ▶ When you select a folder in the Views pane, the editing pane is empty. ▶ When you select a view in the Views pane, the editing pane displays the selected view. The name of the view appears at the top of the pane.
Important Information	After defining a view in the editing pane, you save it by clicking the Save button in the Views pane or by selecting Save from the context menu in the Views pane.
Useful Links	For information on defining a TQL query, see “Add Nodes and Relationships to a TQL Query” on page 362.

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





GUI Element (A-Z)	Description
<Context menu options>	For details, see “Context Menu Options” on page 371.
<Main menu>	For details, see “Main Menu” on page 729.


GUI Element (A-Z)	Description
<Node>	A component from which TQL queries are built.
<Relationship>	The entity that defines the relationship between two nodes.
<Toolbar>	For details, see “Toolbar Options” on page 733.
<Tooltip>	<p>Hold the cursor over a node or relationship to view its tooltip.</p> <p>The tooltips contain the following information:</p> <ul style="list-style-type: none"> ▶ Element name. The name of the node. ▶ CI Type. The CIT of the CI as defined in the CI Type Manager. For details, see “CI Type Manager User Interface” on page 250. ▶ Visible. Indicates whether the selected node is visible in the Topology map. ▶ Cardinality. Relevant for nodes with relationships. Defines how many nodes you expect to have at the other end of the relationship. For example, in a relationship between host and IP, if the cardinality is 1:3, the TQL retrieves only the hosts that are connected 1 to 3 IPs. ▶ Folding Rule. Relevant for relationships. Indicates the folding rule defined for the relationship. ▶ Condition. Appears only if a condition has been defined for the node or relationship.

CI Type Selector

Description	<p>Displays a hierarchical tree structure of the CI Types found in the CMDB. For more details, see “CI Type Manager User Interface” on page 250.</p> <p>Note: The number of instances of each CIT in the CMDB is displayed to the right of each CIT.</p> <p>To create or modify a TQL query, click and drag nodes to the Editing pane and define the relationship between them. Your changes are saved to the CMDB. For details, see “Add Nodes and Relationships to a TQL Query” in <i>Model Management</i>.</p>
Important Information	<p>The CI Type Selector is part of the following managers: View Manager, Enrichment Manager, Query Manager, Correlation Manager, Topology Report Manager, and Trigger TQL Editor.</p>
Included in Tasks	<ul style="list-style-type: none"> ▶ “Define a Correlation Rule – Workflow” on page 213 ▶ “Define an Enrichment Rule – Scenario” on page 332 ▶ “Define a TQL Query” on page 360 ▶ “Create a Pattern View” on page 176 ▶ “Define a Report Rule – Scenario” on page 278

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

GUI Element (A-Z)	Description
	Click Add CI Type to Map to move the selected CI type to the Editing pane.
	Click Refresh to refresh the CI type tree.
	Click Search to search for the CI type entered.
	Click Expand All to expand all subtrees within the CI type tree.


GUI Element (A-Z)	Description
	Click Collapse All to collapse the subtrees within the CI type tree.
<Search window>	Enter the name or part of a name of a CI type for which to search.

Context Menu Options



The CI Type Selector includes the following elements (listed alphabetically) available by right-clicking a CI Type:

Menu Item	Description
Add CI Type to Map	Select to add the selected CI type to the Editing pane.
Go to CI Type Definition	Takes you directly to the selected CI type in CIT Manager.
Show CIT Instances	Opens the Show All Instances window, which displays all instances of the selected CIT. For details, see “Element Instances Dialog Box” in <i>Model Management</i> .

Information Pane

Description	Displays the properties, conditions, and cardinality for the selected node and relationship.
Important Information	<p>The Information pane appears in the lower part of the window in the following managers and user interfaces: View Manager, Correlation Manager, Query Manager, Topology Report Manager, Enrichment Manager, Discovery Input TQL Editor, and Discovery Trigger TQL Editor.</p> <p>A small green indicator  appears next to the tabs in which a change occurred.</p>
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Define a TQL Query” on page 360 ➤ “Create a Pattern View” on page 176 ➤ “Define a Report Rule – Scenario” on page 278

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

GUI Element (A-Z)	Description
	If the window is not wide enough to display all the tabs, use the left and right arrows to move to the required tab.
	Click Show List to display a list of the available tabs for the current manager. You can select a tab from the list.
Affected Nodes	Displays which node is affected by the changes that occur in the selected trigger node. If required, you can click Edit to open and modify the Affected Nodes dialog box. For details, see “Affected Nodes Dialog Box” on page 220. Note: This tab appears only in Correlation Manager.
Attributes	Displays the attribute conditions defined for the node or the relationship. For details, see “Attribute Tab” on page 409.
Cardinality	Cardinality defines how many nodes you expect to have at the other end of a relationship. For example, in a relationship between host and IP, if the cardinality is 1:3, the TQL retrieves only those hosts that are connected to between one and three IPs. For details, see “Cardinality Tab” on page 411.
Details	Displays the following information: <ul style="list-style-type: none"> ▶ CI Type. The CIT of the selected node/relationship. ▶ Visible. A green check indicates that the selected node/relationship is visible in the topology map. A red mark indicates that it is not visible. ▶ Include subtypes. A green check indicates that both the selected CI and its children are displayed in the topology map. A red mark indicates that only the selected CI appears.
Edit	Click Edit to open the relevant dialog box for the selected tab.

GUI Element (A-Z)	Description
Enrichment Rules	<p>Displays the Enrichment rule defined for the selected node or relationship. If the Enrichment rule is used to update the attributes of a CI, click Edit to open the Node/Relationship Definition dialog box and edit the rule if required. For details, see “Node/Relationship Definition Dialog Box” on page 350.</p> <p>Note: This tab appears only in Enrichment Manager.</p>
Folding Rule	<p>Displays the folding rule defined for the selected relationship. For details about folding rules, see “Adding Folding Rules to Relationships” on page 47.</p> <p>Note: This tab appears only when a relationship is selected in View Manager.</p>
Grouping	<p>Displays the different CI groupings for the selected node, as defined in the Grouping dialog box.</p> <p>Note: This tab appears only in View Manager.</p>
Node Definition	<p>Displays the attributes to be included in the report for the selected node. If required, you can click Edit to open and modify the Report Node definition dialog box. For details, see “Report Node Definition Dialog Box” on page 308.</p> <p>Note: This tab appears only in Topology Report Manager.</p>
Qualifiers	<p>Displays the qualifier conditions defined for the node or the relationship. For details, see “Qualifier Tab” on page 414.</p>
Rule	<p>Displays the report folding rule defined for the selected relationship. For details about folding rules, see “Editing Pane” on page 302.</p> <p>Note: This tab appears only when a relationship is selected in Topology Report Manager.</p>
Selected Identities	<p>Displays the element instances that are used to define what should be included in the TQL results. For details, see “Identity Tab” on page 416.</p>

Troubleshooting and Limitations

If a known folder does not appear in the Views pane in View Manager, or if a folder appears which should not be there, execute the following JMX command to refresh the folders:

```
MAM / Service=MAM New Folders Services / refresh()
```

6

Correlation Manager

This chapter provides information on Correlation Manager.

This chapter includes:

Concepts

- ▶ Correlation Manager Overview on page 211

Tasks

- ▶ Define a Correlation Rule – Workflow on page 213

Reference

- ▶ Correlation Manager User Interface on page 219

Correlation Manager Overview

Correlation Manager enables you to define the interdependencies between components in your IT infrastructure to simulate how infrastructure changes (for example, a new software installation or upgrade) can impact your system.

By creating Correlation rules based on TQL queries, you can determine the true origin of a problem and its business impact. Each Correlation rule you define is attached to a specific Correlation TQL query. For more information about TQL queries, see “Topology Query Language” on page 355.

You define Correlation rules to specify a causal relationship between two or more Correlation nodes. Define one node as the trigger, or the node that represents the changes you want to make to the system, and another node as the one that is affected. After the causal relationship is established, Correlation Manager enables you to determine the effect of the changes occurring in root cause nodes.

You then run the Correlation rules in the Topology View tab (go to **Applications > Universal CMDB > Topology View**) to simulate how the changes impact your system and discover the root causes of the changes (for details, see “Run Correlation Dialog Box” on page 524). This enables you to evaluate and handle accordingly, the possible implications of any action, update, new deployment, or a failure of the service delivery.

A simulated change in an affected CI can alter the CI’s map status, which is manifested through an addition of a status icon to the CI’s symbol. The Topology Map displays the statuses of the trigger CIs as well as all statuses of the CIs that are affected by it. Each color represents a different status.

For details about the status icons and the colors that represent them, see “Correlation Rules Window” on page 523.

You can then generate a report displaying the following:

- ▶ CIs in the system that are impacted by the changes.
- ▶ Trigger CIs (the CIs that represent the changes you want to make to the system).
- ▶ CIs that belong to a specific business service. For details, see “Link Nodes to Application CI” on page 165.

Define a Correlation Rule – Workflow

This section describes how to define a Correlation rule whereby a change in CPU usage affects the Host node to which it is connected.

Note: To retrieve the required Correlation results, you must follow each step in this task.

This task includes the following steps:

- “Create an Enumeration Definition” on page 214
- “Define a State — Optional” on page 216
- “Create a Correlation TQL Query” on page 217
- “Define a Correlation Rule” on page 217

1 Create an Enumeration Definition

Note: This step is optional. You can use the default Enumeration definitions that appear in the System Type Manager.

To retrieve Correlation results, you must create a Correlation rule in the Correlation Manager. A Correlation rule is based on a state that exists in the State Manager. For details, see “State Manager” on page 505.

A state is based on an Enumeration definition. Enumerations are designed to be used as severity value lists by states. You can either base a state on an existing Enumeration definition in the State Manager or, if required, create one by clicking the **New Enumeration** button. For details on creating Enumeration definitions, see “Create/Update List/Enumeration Definition Dialog Box” on page 273.

Note: Alternatively, you can create an Enumeration definition in the System Type Manager. For details, see “System Type Manager” on page 242. The Enumeration definition you create appears in the State Manager.

Example of an Enumeration Definition

Select **Admin > Universal CMDB > Settings > State Manager** to open the State Manager. In the bottom-right corner, click the **New Enumeration** button to open the Create Enumeration Definition dialog box.

The following Enumeration definition creates a severity list that represents CPU usage of 10%, 20%, and 50%.

Name:

Display Name:

List Enumeration

Enumeration Definition

10% load

20% load

50% load

Value:

Key:

Color

Green

Light Olive

Yellow

Orange

Red

Gray

2 Define a State — Optional

Note: You can use the default states that appear in the State Manager or define another one if required.

When you create a Correlation Rule, you select the state on which the Correlation condition is based. The State Manager contains two default states — Change and Operation. Each one is based on its own severity list. You can use a default state, or if required, create one based on a severity list (Enumeration definition) that is more relevant to your needs.

To define a new state, select **Admin > Universal CMDB > Settings > State Manager** to open the State Manager. For details on defining a new state, see “State Manager Dialog Box” on page 507.

Example of a New State

A new state called **cpu_usage** is defined in the State Manager. Its Type Definition is based on the Enumeration definition called **cpu_usage** defined in the previous task.

Name	Description	Type Definition
change	Change State	Change States
operation	Operation State	Operation States
cpu_usage	CPU usage	<div style="border: 1px solid gray; padding: 2px;"> Admin States Test States Operation States concrete_synch_config_status synch_unit_state Status Accounting Identification Type cpu_usage </div>

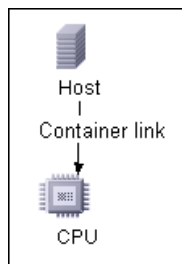
3 Create a Correlation TQL Query

To create a Correlation TQL query, you need to create a Correlation TQL and then add the TQL nodes and relationships that define the query.

Select **Admin > Universal CMDB > Modeling > Correlation Manager** to open the Correlation Manager. For details about how to create a Correlation TQL query, see “New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard” on page 233. For details about how to add nodes and relationships to a query, see “Add Nodes and Relationships to a TQL Query” on page 362.

Example of a Correlation TQL Query

In this Correlation TQL query, a CPU and a Host node are linked by a Container Link relationship. The TQL results must comply with the direction of the arrows.



Note: A Correlation TQL query is subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 433.

4 Define a Correlation Rule

When you define a Correlation rule, you must specify the required causal relationship between the nodes. Define one node as the trigger, or the node that represents the changes you want to make to the system, and another node as the one that is affected.

Right-click the node you want to define as the trigger node and select **Define Affected** to open the Affected Nodes dialog box. In the Affected Nodes dialog box, select the node you want the trigger node to affect. Then click the **Add** button to open the Correlation Definition dialog box to set conditions for defining affected nodes. For details about how to define a Correlation rule, see “Correlation Definition Dialog Box” on page 221.

Example of a Correlation Rule

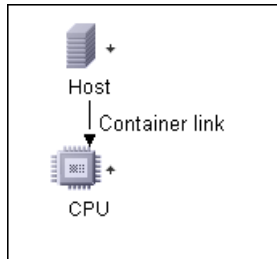
The Conditions area in the Correlation Definition dialog box defines the conditions under which the simulated change in the system is triggered. The Affected Severity area defines the severity of the Correlation impact on the affected node.

The Correlation rule in this example states that when the CPU usage of the Host node to which the CPU node is connected does not equal 10%, the Host node is automatically assigned the 50% load status, which in this case, is the color red according to the severity list.

The screenshot shows the Correlation Definition dialog box with the following configuration:

- Description:** CPU usage
- Conditions:**
 - State:** cpu_usage
 - Operator:** Not equal
 - Value comparison:** 10% load
- Scope:**
 - Any
 - All
 - Range: 0 % - 100 %
- Affected Severity:**
 - Fixed severity: 50% load
 - Severity relative to trigger severity (%): 100

In the resulting TQL query, an upward arrow appears next to the node defined as the trigger node and a downward arrow appears next to the node defined as the affected node.



Note: To retrieve the Correlation results, you must run the Correlation rule in the Topology View tab. For details, see “Retrieve Correlation Results – Scenario” on page 512.

Correlation Manager User Interface

This section describes:

- Affected Nodes Dialog Box on page 220
- Correlation Definition Dialog Box on page 221
- Correlation Manager Window on page 223
- Details Dialog Box on page 232
- New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard on page 233

Affected Nodes Dialog Box

Description	Define which node in the TQL query is the trigger Correlation node and which nodes are affected by the changes that occurred in the system. To access: Right-click the node or relationship that functions as a trigger and select Define Affected . The Affected Nodes dialog box opens to display the nodes in the TQL.
Included in Tasks	“Define a Correlation Rule – Workflow” on page 213.
Important Information	Before creating the TQL, you must know which node in the TQL query is the trigger Correlation node and which are affected by the changes beforehand. The definition is performed here.

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

GUI Element (A-Z)	Description
Affected Nodes pane	Contains a list of the Correlation nodes in the Correlation rule. Select the nodes to be affected by the trigger node.

Correlation Definition Dialog Box

<p>Description</p>	<ul style="list-style-type: none"> ▶ In the Conditions area, set conditions for defining affected nodes. When this condition is met, the simulated change in the system is triggered. For example, you can define a Correlation condition that states that the operational state of the node is other than Normal. When the operational state of the node instance changes and is no longer Normal, the condition is met and the simulated changes in the system are triggered. ▶ In the Scope area, define how many instances of the trigger node should fulfill the conditions for triggering the changes in the system. You can apply the trigger conditions not only to one of the instances of a trigger node, but also to a certain percentage of the trigger instances, or to all of them. For example, you can define that impact is calculated when at least 10% of the system's hosts are down. ▶ In the Affected Severity area, define the severity of the Correlation impact. <p>To access: Click Add in the Details dialog box.</p>
<p>Included in Tasks</p>	<p>“Define a Correlation Rule – Workflow” on page 213</p>

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

GUI Element (A-Z)	Description
<p>All</p>	<p>All instances should fulfill the conditions.</p>
<p>Any</p>	<p>One instance or more should fulfill the conditions.</p>
<p>Description</p>	<p>A description of the Correlation rule you are defining.</p>
<p>Fixed severity</p>	<p>Define a fixed severity level for every system change generated. Then, select the required severity level from the list.</p>

GUI Element (A-Z)	Description
Function	<p>Select Function (displayed when you selected the All and Range options in the Scope area) to define a severity level for the system changes, as a function of the severity levels of all the trigger node instances that are included in the range. From the list, select either Average or Max.</p> <p>For example, if you select Average, the severity level of the system changes is the average severity of all the trigger instances.</p>
Operator	<p>Select the required operator. For a list of the operators you can use for defining an attribute condition, see “Attribute Operator Definitions” on page 378.</p>
Range	<p>A certain percentage of all instances should fulfill the conditions. For example, if you enter a range of 50% to 100%, the changes are triggered when 50% or more of the instances meet the conditions.</p>
Severity relative to trigger severity (%)	<p>Select Severity relative to trigger severity (%) (displayed when you selected the Any option in the Scope area) to define a severity level for each system change that is relative (as a percentage) to the severity of the trigger event.</p> <p>Enter the percentage in the box provided.</p>
State	<p>Choose the required state. The states that appear in the list are the states that are defined in the State Manager. For details, see “State Manager” on page 505.</p>
Value Comparison	<p>Select the required attribute.</p>





Correlation Manager Window






Description	Define Correlation rules. To access: Select Admin > Universal CMDB > Modeling > Correlation Manager .
Important Information	When selecting nodes to function as Correlation triggers, they must comply with certain restrictions. For details, see “Troubleshooting and Limitations” on page 433.
Included in Tasks	“Define a Correlation Rule – Workflow” on page 213
Useful Links	“Correlation Manager Overview” on page 211

Correlation Rules Pane

Description	<p>Displays a hierarchical tree structure of predefined folders and Correlation rules. Each Correlation rule is associated with a TQL query.</p> <p>You can create your own query, or work with the default queries provided with your HP Business Availability Center installation.</p> <p>The predefined folders are provided for the default queries; you can modify these folders, or add additional folders according to your organization’s requirements.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
	Create a new folder.
	Creates a Correlation rule. Opens the New Correlation Rule Wizard.
	Deletes the selected folder or Correlation rule.
	Refreshes the data content of the hierarchical tree structure that may have been modified by other users.

GUI Element (A-Z)	Description
	(Enabled only when a new Correlation rule is created or when changes are made to an existing one.) Saves the Correlation rule to the CMDB.
	Opens the Correlation Rule Wizard. Enables you to change the description of the rule.
	Generates a preview of the results of the selected Correlation rule.
	Represents a folder.
	Represents a Correlation rule.

The following elements are available by right-clicking a folder or Correlation rule:




GUI Element (A-Z)	Description
Delete	Delete the selected folder or Correlation rule.
Export	Displays a standard Save As dialog box, enabling you to save the Correlation rule as an XML script. This option can be used to move a Correlation rule from one workstation to another, provided the related TQL query is also relocated.
Import	Imports XML files that contain saved Correlation rules to the Correlation Manager.
New	Creates a Correlation rule. Opens the New Correlation Rule Wizard.
New Folder	Creates a new folder.
Preview	Generates a preview of the results of the selected Correlation rule.
Properties	Opens the Correlation Rule Properties Wizard. Enables you to change the description of the rule.
Rename Folder	Rename the folder.

GUI Element (A-Z)	Description
Save	(Enabled only when a new Correlation rule is created or when changes are made to an existing one.) Saves the Correlation rule to the CMDB.
Save As	Displays the Save As Correlation Rule wizard, enabling you to create new Correlation rules based on an existing query.

Editing Pane

Description	<p>Displays the selected Correlation rule, which consists of nodes that are defined in the TQL query and the relationships between them.</p> <ul style="list-style-type: none"> ▶ When you select a folder in the Correlation Rules pane, the editing pane is empty. ▶ When you select a Correlation rule in the Correlation Rules pane, the editing pane displays the selected rule, which consists of TQL nodes that are defined in the TQL query and the relationships between them.
Useful Links	“Add Nodes and Relationships to a TQL Query” on page 362
Important Information	When selecting nodes to function as Correlation triggers, they must comply with certain restrictions. For details, see “Troubleshooting and Limitations” on page 433.

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





GUI Element (A-Z)	Description
	Indicates a trigger node. Located to the right of the trigger node's icon.
	Indicates an affected node. Located to the right of the affected node's icon.
	Indicates nodes that are both affected and trigger nodes.


GUI Element (A-Z)	Description
<Context menu options>	For details, see “Context Menu Options” on page 371.
<Main Menu>	For details, see “Main Menu” on page 729.
<Node>	A component from which TQL queries are built.
<Relationship>	The entity that defines the relationship between two nodes.
<Toolbar>	For details, see “Toolbar Options” on page 733.
<Tooltip>	<p>Hold the cursor over a node or relationship to view its tooltip.</p> <p>The tooltips contain the following information:</p> <ul style="list-style-type: none"> ▶ Element name. The name of the node. ▶ CI Type. The CIT of the node as defined in the CI Type Manager. For details, see “CI Type Manager” on page 239. ▶ Definitions of the selected nodes and relationships. The attribute conditions, as described in “Node/Relationship Properties Dialog Box” on page 407. ▶ Names of the trigger and the affected nodes. This is only relevant if the node over which the cursor is hovering is the trigger node.
Define Affected	Displays the Affected Nodes dialog box.

CI Type Selector

Description	<p>Displays a hierarchical tree structure of the CI Types found in the CMDB. For more details, see “CI Type Manager User Interface” on page 250.</p> <p>Note: The number of instances of each CIT in the CMDB is displayed to the right of each CIT.</p> <p>To create or modify a TQL query, click and drag nodes to the Editing pane and define the relationship between them. Your changes are saved to the CMDB. For details, see “Add Nodes and Relationships to a TQL Query” in <i>Model Management</i>.</p>
Important Information	<p>The CI Type Selector is part of the following managers: View Manager, Enrichment Manager, Query Manager, Correlation Manager, Topology Report Manager, and Trigger TQL Editor.</p>
Included in Tasks	<ul style="list-style-type: none"> ▶ “Define a Correlation Rule – Workflow” on page 213 ▶ “Define an Enrichment Rule – Scenario” on page 332 ▶ “Define a TQL Query” on page 360 ▶ “Create a Pattern View” on page 176 ▶ “Define a Report Rule – Scenario” on page 278

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

GUI Element (A-Z)	Description
	Click Add CI Type to Map to move the selected CI type to the Editing pane.
	Click Refresh to refresh the CI type tree.
	Click Search to search for the CI type entered.
	Click Expand All to expand all subtrees within the CI type tree.

GUI Element (A-Z)	Description
	Click Collapse All to collapse the subtrees within the CI type tree.
<Search window>	Enter the name or part of a name of a CI type for which to search.


Context Menu Options

The CI Type Selector includes the following elements (listed alphabetically) available by right-clicking a CI Type:



Menu Item	Description
Add CI Type to Map	Select to add the selected CI type to the Editing pane.
Go to CI Type Definition	Takes you directly to the selected CI type in CIT Manager.
Show CIT Instances	Opens the Show All Instances window, which displays all instances of the selected CIT. For details, see “Element Instances Dialog Box” in <i>Model Management</i> .

Information Pane

Description	Displays the properties, conditions, and cardinality for the selected node and relationship.
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Important Information	<p>The Information pane appears in the lower part of the window in the following managers and user interfaces: View Manager, Correlation Manager, Query Manager, Topology Report Manager, Enrichment Manager, Discovery Input TQL Editor, and Discovery Trigger TQL Editor.</p> <p>A small green indicator  appears next to the tabs in which a change occurred.</p>
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Define a TQL Query” on page 360 ➤ “Create a Pattern View” on page 176 ➤ “Define a Report Rule – Scenario” on page 278

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

GUI Element (A-Z)	Description
	If the window is not wide enough to display all the tabs, use the left and right arrows to move to the required tab.
	Click Show List to display a list of the available tabs for the current manager. You can select a tab from the list.
Affected Nodes	Displays which node is affected by the changes that occur in the selected trigger node. If required, you can click Edit to open and modify the Affected Nodes dialog box. For details, see “Affected Nodes Dialog Box” on page 220. Note: This tab appears only in Correlation Manager.
Attributes	Displays the attribute conditions defined for the node or the relationship. For details, see “Attribute Tab” on page 409.
Cardinality	Cardinality defines how many nodes you expect to have at the other end of a relationship. For example, in a relationship between host and IP, if the cardinality is 1:3, the TQL retrieves only those hosts that are connected to between one and three IPs. For details, see “Cardinality Tab” on page 411.
Details	Displays the following information: <ul style="list-style-type: none"> ➤ CI Type. The CIT of the selected node/relationship. ➤ Visible. A green check indicates that the selected node/relationship is visible in the topology map. A red mark indicates that it is not visible. ➤ Include subtypes. A green check indicates that both the selected CI and its children are displayed in the topology map. A red mark indicates that only the selected CI appears.
Edit	Click Edit to open the relevant dialog box for the selected tab.

GUI Element (A-Z)	Description
Enrichment Rules	<p>Displays the Enrichment rule defined for the selected node or relationship. If the Enrichment rule is used to update the attributes of a CI, click Edit to open the Node/Relationship Definition dialog box and edit the rule if required. For details, see “Node/Relationship Definition Dialog Box” on page 350.</p> <p>Note: This tab appears only in Enrichment Manager.</p>
Folding Rule	<p>Displays the folding rule defined for the selected relationship. For details about folding rules, see “Adding Folding Rules to Relationships” on page 47.</p> <p>Note: This tab appears only when a relationship is selected in View Manager.</p>
Grouping	<p>Displays the different CI groupings for the selected node, as defined in the Grouping dialog box.</p> <p>Note: This tab appears only in View Manager.</p>
Node Definition	<p>Displays the attributes to be included in the report for the selected node. If required, you can click Edit to open and modify the Report Node definition dialog box. For details, see “Report Node Definition Dialog Box” on page 308.</p> <p>Note: This tab appears only in Topology Report Manager.</p>
Qualifiers	<p>Displays the qualifier conditions defined for the node or the relationship. For details, see “Qualifier Tab” on page 414.</p>
Rule	<p>Displays the report folding rule defined for the selected relationship. For details about folding rules, see “Editing Pane” on page 302.</p> <p>Note: This tab appears only when a relationship is selected in Topology Report Manager.</p>
Selected Identities	<p>Displays the element instances that are used to define what should be included in the TQL results. For details, see “Identity Tab” on page 416.</p>


 **Details Dialog Box**

Description	Displays the new Correlation rule you created in the Correlation Definition dialog box. To access: Click Next in the Affected Nodes dialog box.
Included in Tasks	“Define a Correlation Rule – Workflow” on page 213

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

GUI Element (A-Z)	Description
Description	The description of the new Correlation rule.
State	The category you chose from the State list in the Correlation Definition dialog box.

New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard

Description	<p>Creates or modifies a Correlation rule.</p> <p>To access:</p> <ul style="list-style-type: none"> ▶ To create a Correlation rule, right-click anywhere in the Correlation Rules pane and click New or click the New  button. ▶ To modify a Correlation rule, right-click a Correlation rule in the Correlation Rules pane and select Properties. ▶ To create a new Correlation rule based on an existing query, right-click a Correlation rule in the Correlation Rules pane and select Save As.
Important Information	<ul style="list-style-type: none"> ▶ Any major changes made to the TQL query after creating a Correlation rule causes the system to delete the rule. These changes include deleting a root cause or affected node or changing the Min and Max relationship definitions (for details, see “Cardinality Tab” on page 411). ▶ Minor changes, such as adding a node to the TQL, do not cause the deletion of the rule. ▶ The Correlation TQL that serves as the basis of the Correlation rule, is subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 433. If the TQL is not valid, it cannot be used for the creation of a Correlation rule.
Included in Tasks	“Define a Correlation Rule – Workflow” on page 213
Wizard Map	<p>The New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard contains:</p> <p>Rule General Attributes Page > Rule Base TQL Page > Rule Groups Page</p>

 **Rule General Attributes Page**

Description	Enables you to enter a unique name and description for the Correlation rule.
Included in Tasks	“Define a Correlation Rule – Workflow” on page 213
Important Information	<ul style="list-style-type: none"> ▶ The Correlation TQL that serves as the basis of the Correlation rule, is subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 433. If the TQL is not valid, it cannot be used for the creation of a Correlation rule. ▶ For important information on the effects of making changes to the TQL after creating it, see “New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard” on page 233. ▶ By default, this wizard is set to display a Welcome page. You can choose not to display the Welcome page by changing the user preferences. For details, see “User Preferences Dialog Box” on page 432.
Useful Links	“Topology Query Language” on page 355
Wizard Map	The New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard contains: Rule General Attributes Page > Rule Base TQL Page > Rule Groups Page

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

GUI Element (A-Z)	Description
Description	(Optional) Enter a description of the rule.
Rule Name	<p>Enter a unique name for the Correlation rule.</p> <p>The rule name cannot contain any of the following characters: \ / : " < > % ?</p> <p>Note: If the Correlation rule name is either empty, contains a name used by another Correlation rule, or uses invalid characters, the Next and Finish buttons are disabled.</p>

 **Rule Base TQL Page**

Description	Enables you to define the properties of the TQL on which the Correlation rule is based.
Included in Tasks	“Define a Correlation Rule – Workflow” on page 213
Important Information	<ul style="list-style-type: none"> ▶ The Correlation TQL that serves as the basis of the Correlation rule, is subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 433. If the TQL is not valid, it cannot be used for the creation of a Correlation rule. ▶ For important information on the effects of making changes to the TQL after creating it, see “New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard” on page 233.
Useful Links	“Topology Query Language” on page 355
Wizard Map	The New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard contains: Rule General Attributes Page > Rule Base TQL Page > Rule Groups Page

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

GUI Element (A-Z)	Description
Base the Correlation rule on a new TQL	Select this check box if you want to base the Correlation rule on a new TQL query. The TQL results are based on the attributes defined for the new TQL query.
Base the Correlation rule on an existing TQL	Select this check box if you want to base the Correlation rule on an existing TQL query. Select the required Correlation TQL query from the drop-down list.
Base TQL Description	(Optional) Enter a description of the TQL query.

GUI Element (A-Z)	Description
Base TQL Name	Enter a unique name for the Correlation TQL query. If you selected the Base the Correlation rule on an existing TQL option, select the Correlation TQL query on which you want to base the rule.
Base TQL Priority	Select a priority level for the new TQL query (Low, Medium, High, Express). This setting determines how often the query is rerun automatically by the system to include updated information from the CMDB.

Rule Groups Page

Description	Enables you to define where you can run Correlation rules.
Included in Tasks	“Define a Correlation Rule – Workflow” on page 213
Important Information	<ul style="list-style-type: none"> ▶ The Correlation TQL that serves as the basis of the Correlation rule, is subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 433. If the TQL is not valid, it cannot be used for the creation of a Correlation rule. ▶ For important information on the effects of making changes to the TQL after creating it, see “New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard” on page 233. ▶ By default, this wizard is set to display a Completion page after clicking Next in this page. You can choose not to display the Completion page by changing the user preferences. For details, see “User Preferences Dialog Box” on page 432.
Useful Links	“Topology Query Language” on page 355
Wizard Map	The New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard contains: Rule General Attributes Page > Rule Base TQL Page > Rule Groups Page

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

GUI Element (A-Z)	Description
Others	Currently not supported.
PI	Enables you to run correlation rules, which are used by the on-demand monitors in Problem Isolation. For details, see “On-demand Monitors” in <i>Using Problem Isolation</i> .
UCMDB	Enables you to run a Correlation rule in the Topology View Application tab. For details, see “Topology View Overview” on page 512.

7

CI Type Manager

This chapter provides information on CI Type Manager.

Note to HP Software-as-a-Service customers: The data in CI Type Manager can be viewed but not edited.

This chapter includes:

Concepts

- CI Types Overview on page 240
- CI Type Attributes on page 241
- CI Type Relationships on page 242
- System Type Manager on page 242

Tasks

- Create a CI Type on page 243
- Create a Relationship Type on page 244
- Create a Calculated Relationship Type on page 246
- Create List and Enumeration Definitions on page 247
- Enumeration Definition – Workflow on page 248

Reference

- View Descriptions for CI Types and Relationships on page 250
- CI Type Manager User Interface on page 250

CI Types Overview

A configuration item (CI) can represent hardware, software, services, business processes, or any component of your IT infrastructure. CIs with similar properties are grouped under a CI type (CIT). Each CIT provides a template for creating a CI and its associated properties.

Every CI must belong to a CI type. The following are the main categories of CITs:

- ▶ **Business.** CITs that correspond to the logical elements of your business, such as processes and organizational groups.
- ▶ **Dynamic Node Factory.** CITs that dynamically generate CIs in response to incoming data from your data sources.
- ▶ **IT Process.** CITs that correspond to changes that occur in your IT infrastructure.
- ▶ **Monitor.** CITs that handle incoming metrics collected from your business universe.
- ▶ **System.** CITs that correspond to the physical elements (hardware and software) installed in your business environment.

The CITs are arranged in a tree structure under these categories in the CI Types pane. You can browse the CI Type model by expanding the tree in the CI Types pane. The CIT selected in the left pane is displayed in the topology map along with all the potential valid relationships to other CITs.

You can also define new CITs to match your business needs. For details on defining new CITs, see “Create Configuration Item Type/Relationship/Calculated Relationship Wizard” on page 259.

CI Type Attributes

Every CI type has attributes which define it such as name, description, and default value. The CITs grouped under other CITs in the CI Type tree inherit attributes from the higher-level CITs.

When you define a new CI type, you first select a Base Configuration Item Type from a list of existing CITs. Your new CIT inherits the attributes of the existing CIT. You can then set the attributes for the new CIT. You edit the attributes of an existing CIT by selecting a CIT from the tree in the CI Types pane and selecting the Attributes tab of the topology map. For details on CIT attributes, see “Attributes Page” on page 261.

Every CIT must have at least one key attribute. A key attribute is an attribute that is used as an identifier of the CIT. When you define an instance of a CIT, the CIT’s key attributes are mandatory fields for CIs of that type. You can assign as many key attributes as you want to a given CIT. If you do not assign a key attribute when defining a new CIT, the CIT is created, but it remains abstract, that is, you are unable to create instances of it (you are prompted to include the ABSTRACT_CLASS qualifier on the Qualifier page of the wizard).

Entity names in HP Business Availability Center for CMDB-based applications follow the conventions described below:

- ▶ **CIT attributes values.** All primitive types are supported: long, double, float, string, and so on.
- ▶ **CIT attributes values-type string.** All special characters are supported. The maximum length is 4000 characters.
- ▶ **CIT names and attributes names.** The following are permitted: a-z, A-Z, and underscore (_). The length is limited to 200 characters. The CIT name must be in English.
- ▶ **CIT attribute length.** The total length of all the attributes in one CIT cannot exceed 8K due to a Microsoft SQL Server limitation.

CI Type Relationships

A relationship defines the link between two CIs. Relationships represent the dependencies and connections between the entities in your IT environment. When you select relationships or calculated relationships in the drop-down box in the CI Types pane, the topology map displays all the valid instances of CITs linked by the selected relationship. For details about calculated relationships, see “Impact Modeling” on page 439.

The same attributes defined for CITs are also defined for relationships. You can also assign key attributes for relationships but it is not required. For details on defining new relationship types, see “Create Configuration Item Type/Relationship/Calculated Relationship Wizard” on page 259.

System Type Manager

System Type Manager enables you to create a predefined list whose values define an attribute type. For more details on System Type Manager, see “System Type Manager Dialog Box” on page 276.

You can create the following attribute types:

- ▶ **List.** Enables you to create a predefined list of values, for example, Location.
- ▶ **Enumeration.** Enables you to create a predefined list of values, as well as assign each value a color. Enumerations are designed to be used as severity value lists by states. For details, see “State Manager” on page 505.

Severity lists are used for:

- ▶ Retrieving Correlation results in Topology View Application. For details, see “Topology View Application” on page 511.
- ▶ Creating a Correlation rule. For details, see “Correlation Manager” on page 211.

You can use both List and Enumeration values for:

- ▶ Editing the attributes of a CIT. For details, see “Create a CI Type” on page 243.

- Defining an attribute condition for a TQL node or relationship. For details, see “Node/Relationship Properties Dialog Box” on page 407.

Create a CI Type

This task describes the process you follow to create a CIT using the Create CI Type wizard.

This task includes the following steps:

- “Prerequisites” on page 243
- “Define the CI Type” on page 243
- “Set the CI Type Attributes” on page 243
- “Assign Qualifiers to the CI Type” on page 244
- “Assign an Icon to the CI Type” on page 244
- “Customize the CI Type Menu” on page 244
- “Define the CI Type Default Label” on page 244

1 Prerequisites



From the CI Type Manager, select **CI Types** from the list box in the CI Types pane. Then select **New** to start the Create CI Type Wizard.

2 Define the CI Type

Enter the name, description and base configuration item type for the new CI type. For details, see “Details Page” on page 260.

3 Set the CI Type Attributes

Edit the attributes of the new CI type and define key attributes for it. For details, see “Attributes Page” on page 261.

Note: List and Enumeration definitions are created in the System Type Manager. If required, you can create additional List and Enumeration definitions. For details, see “Create List and Enumeration Definitions” on page 247.

4 Assign Qualifiers to the CI Type

Assign qualifiers to the definition of the new CI type. For details, see “Qualifiers Page” on page 263.

5 Assign an Icon to the CI Type

Select an icon to assign to the new CI type. For details, see “Icon Page” on page 266.

6 Customize the CI Type Menu

Select the menu items and commands to appear in the shortcut menu for the new CI type. For details, see “Attached Menu Page” on page 268.

7 Define the CI Type Default Label

Define the attributes to appear in the CI type label. For details, see “Default Label Page” on page 271.

Create a Relationship Type

This task describes the process you follow to create a relationship type using the Create Relationship wizard.

This task includes the following steps:

- “Prerequisites” on page 245
- “Define the Relationship” on page 245
- “Set the CI Type Attributes” on page 245

- “Assign Qualifiers to the Relationship” on page 245
- “Customize the Relationship Menu” on page 245
- “Define the Relationship Default Label” on page 246

1 Prerequisites



From the CI Type Manager, select **Relationships** from the list box in the CI Types pane. Then select **New** to start the Create Relationship Wizard.

2 Define the Relationship

Enter the name, description and base CI type for the new relationship. For details, see “Details Page” on page 260.

3 Set the CI Type Attributes

Edit the attributes of the new relationship and define key attributes for it. For details, see “Attributes Page” on page 261.

Note: List and Enumeration definitions are created in the System Type Manager. If required, you can create additional List and Enumeration definitions. For details, see “Create List and Enumeration Definitions” on page 247.

4 Assign Qualifiers to the Relationship

Assign qualifiers to the definition of the new relationship. For details, see “Qualifiers Page” on page 263.

5 Customize the Relationship Menu

Select the menu items and commands to appear in the shortcut menu for the new relationship. For details, see “Attached Menu Page” on page 268.

6 Define the Relationship Default Label

Define the attributes to appear in the relationship label. For details, see “Default Label Page” on page 271.

Create a Calculated Relationship Type

This task describes the process you follow to create a calculated relationship type using the Create Calculated Relationship wizard.

This task includes the following steps:

- “Prerequisites” on page 246
- “Define the Calculated Relationship” on page 246
- “Assign Qualifiers to the Relationship” on page 246
- “Add Required Triplets” on page 246

1 Prerequisites



From the CI Type Manager, select **Calculated Relationships** from the list box in the CI Types pane. Then select **New** to start the Create Calculated Relationship Wizard.

2 Define the Calculated Relationship

Enter the name, description and base CI type for the new calculated relationship. For details, see “Details Page” on page 260.

3 Assign Qualifiers to the Relationship

Assign qualifiers to the definition of the new relationship. For details, see “Qualifiers Page” on page 263.

4 Add Required Triplets

Add the required triplets. For details, see see “Triplets Page” on page 265.

Create List and Enumeration Definitions

This section describes the tasks for creating List and Enumeration definitions.

This task includes the following steps:

- “Create a List Definition” on page 247
- “Create an Enumeration Definition” on page 247

1 Create a List Definition

You can create a **List** definition of predefined values. For example, a List definition called Location might contain:

- New York
- Boston
- Baltimore

For details, see “Create/Update List/Enumeration Definition Dialog Box” on page 273.

2 Create an Enumeration Definition


You can create an **Enumeration** definition, which enables you to assign a color for each value on the list. For details, see “Create/Update List/Enumeration Definition Dialog Box” on page 273. For an example of an Enumeration definition, see “Enumeration Definition – Workflow” on page 248.

Enumeration Definition – Workflow

The following steps describe how to create an Enumeration definition.

Note: To retrieve the required results, you must follow each step in this task.

To create an Enumeration definition:


- 1** Select **Admin > Universal CMDB > Modeling > CI Type Manager**.
-  **2** In the left pane, click the **System Type Manager** button to open the System Type Manager dialog box.
- 3** Click the **Add** button to open the Create List/Enumeration Definition dialog box.

Note: Alternatively, you can select **Admin > Universal CMDB > Settings > State Manager** and then click the **New Enumeration** button to open the Create List/Enumeration Definition dialog box.

- 4** Select **Enumeration**.
- 5** In the **Name** box, enter the required name.
- 6** (Optional) In the **Display Name** box, enter the required display name.

This example describes how to create the following severity list:

Key	Value	Severity Represented
0	Green	Normal
1	Orange	Major
2	Red	Critical

-  **7** Click the **Add** button to create a new row.
- 8** In the **Value** box, enter Normal.

- 9 In the **Key** box, enter 0.
- 10 In the **Color** section, select **Green**.
- + 11 Click the **Add** button to create another row.
- 12 In the **Value** box, enter Major.
- 13 In the **Key** box, enter 1.
- 14 In the **Color** section, select **Orange**.
- + 15 Click the **Add** button to create another row.
- 16 In the **Value** box, enter Critical.
- 17 In the **Key** box, enter 2.
- 18 In the **Color** section, select **Red**.

The following image shows the Enumeration Definition section after the changes:

The screenshot displays the 'Enumeration Definition' section of the CI Type Manager. At the top, the 'Name' field contains 'Oper_States' and the 'Display Name' field is empty. Below these are two radio buttons: 'List' (unselected) and 'Enumeration' (selected). The 'Enumeration Definition' section is divided into two panes. The left pane shows a list of items: 'Normal', 'Major', and 'Critical'. The 'Critical' item is selected, indicated by a dark background and a red 'X' icon. The right pane shows the 'Value' field containing 'Critical' and the 'Key' field containing '2'. Below these fields is a 'Color' section with six radio buttons: 'Green' (checked), 'Light Olive', 'Yellow', 'Orange', 'Red' (selected), and 'Gray'. A scrollbar is visible at the bottom of the right pane.

- 19 Click **OK** to save your changes.

View Descriptions for CI Types and Relationships

You can view a complete list of available CI types in tree format in the left pane of CI Type Manager. You can search incrementally for a specific CI type as described in “CI Type Manager” on page 254. To see a description for a particular CI type, select it from the tree and hold the pointer over the icon which corresponds to it in the Topology Map. A tooltip containing a description of the CI type is displayed.

For relationships, select **Relationships** in the left pane and search incrementally by the first letter of the relationship. Select the relationship you want and hold the pointer over its icon in the Topology Map to display a tooltip containing a description of the relationship.


You can also view a list of relationships in “Relationship Definitions” in *Reference Information*.

CI Type Manager User Interface

This section describes:

- ▶ Add/Edit Attribute Dialog Box on page 251
- ▶ Add/Remove Relationship Dialog Box on page 254
- ▶ CI Type Manager on page 254
- ▶ Create Configuration Item Type/Relationship/Calculated Relationship Wizard on page 259
- ▶ Create/Update List/Enumeration Definition Dialog Box on page 273
- ▶ System Type Manager Dialog Box on page 276

Add/Edit Attribute Dialog Box

Description	<p>Enables you to define a new attribute to add to a CIT or to edit an existing attribute of a CIT.</p> <p>To access: In the CIT Manager, select the Attributes tab, then click the Add  button, or select an attribute and click the Edit button or double-click the attribute.</p>
Important Information	In Edit mode, fields that cannot be changed are disabled.

Details Tab

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

GUI Element (A-Z)	Description
Attribute Name	<p>Enter a unique name for the new attribute. The name can contain all characters except the following: " \ / [] : < > + = ; , ? *</p> <p>Note: The attribute name is not case sensitive.</p>
Attribute Type	<p>Select one of the following options:</p> <ul style="list-style-type: none"> ▶ Primitive. Choose from one of the following field types: boolean, bytes, date, double, float, integer, integer_list, long, string, string_list, xml. ▶ Enumeration/List. Contains a list of Enumerations and Lists defined in the System Type Manager. For details, see “System Type Manager” on page 242. <p>This option enables you to define an attribute with a predefined value. For example, a location attribute might be defined by a location list containing the following values: Singapore, Paris, New York.</p>
Default Value	<p>Enter or select a default value for the attribute. The options for the Default Value field vary depending on the attribute type you selected.</p> <p>Note: If you select the integer_list or string_list Primitive attribute type, you can enter multiple values.</p>

GUI Element (A-Z)	Description
Description	Enter a description for the new attribute. Note: This field is optional.
Display Name	Enter a name for the new attribute to identify it in HP Business Availability Center. Note: This field is optional.
Value Size	Enter a value for the maximum physical size of the new attribute. (Enabled for bytes and string only).

Advanced Tab

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

GUI Element (A-Z)	Description
<Advanced tab options>	<p>You can set the following optional parameters:</p> <ul style="list-style-type: none"> ▶ Visible. Select to display this attribute in the Properties tab in IT Universe Manager. ▶ Editable. Select to enable future editing of the attribute. Only attributes that are marked as Editable (or ones that have values) are displayed in the Properties tab in IT Universe Manager. ▶ Comparable. Select to enable this attribute to be used for comparing compound CIs. ▶ Required. Select to define this attribute as a required one, if its value is required for the creation of the CIT. ▶ Index. Select to accelerate the attribute retrieval performance. This option is recommended for attributes that are used frequently in search conditions. For example, IP address is usually an index attribute of a host. ▶ Change Monitored. Select to define attributes whose values are being marked as Change Monitored in CI Type Manager. For every change in an attribute defined as Change Monitored, you are notified by a Change event in the Topology View. ▶ Upper Case. When this option is selected, the attribute value appears in upper case. ▶ Lower Case. When this option is selected, the attribute value appears in lower case. ▶ Static. Select to define this attribute as static. ▶ Asset Data. Select to display the attribute value in the Asset Report. ▶ Password. When this option is selected, the attribute value appears as asterisks (a hidden value). ▶ Unique. When this option is selected, different instances of this CI type must have unique values.

Add/Remove Relationship Dialog Box

Description	<p>Enables you to add or remove default or new relationships between CITs, which define their physical or logical connections.</p> <p>To access: In the CIT Manager, right-click a CIT or two CITs and select Add/Remove Relationship from the context menu.</p>
Important Information	<p>When adding a relationship between two CITs, select the two CITs to be linked by holding down CTRL and clicking the CIT names. Then right-click one of them to display the context menu and select Add/Remove Relationship.</p>







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

GUI Element (A-Z)	Description
<node1 to node2>	Select the relationships to add in the direction of the first node to the second.
<node2 to node1>	Select the relationships to add in the direction of the second node to the first.
Relationship Name	A list of the possible relationships.

CI Type Manager

Description	<p>Enables you to view the information in the CI Type model, which contains the definitions of all configuration item types (CITs) defined in the system and the relationships that define the connections between them. Each CIT has its own attributes, as well as the attributes inherited from its parent CIT.</p> <p>To access: Select Admin > Universal CMDB > Modeling > CI Type Manager.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets):

GUI Element (A-Z)	Description
	Click the New button to open the Create Configuration Item Type Wizard which enables you to define a new CI type. For details, see “Create Configuration Item Type/Relationship/Calculated Relationship Wizard” on page 259.
	Click Delete to delete the selected CI type or relationship.
	Click to refresh the data content of the hierarchical tree structure that may have been modified by other users.
	Click the Save button to save changes made to a CI type.
	Enables you to import CITs from an external file.
	Enables you to export a CIT as an XML file. Use this option to move CITs from one server to another.
<CI Type/Relationship Box>	Select one of the following options: <ul style="list-style-type: none"> ▶ CI Types. Display the CI types in the CIT model. ▶ Relationships. Display the relationships in the CIT model. ▶ Calculated Relationships. Display the calculated relationships in the CIT model.
<Main Menu>	For details, see “Main Menu” on page 729.
<Toolbar>	For details, see “Toolbar Options” on page 733.

GUI Element (A-Z)	Description
<p>CI Types Pane</p>	<p>A hierarchical tree structure of the CI Type model containing the inheritance relationships among CITs, and displaying the number of instances of each CIT in the UCMDB. All CITs included in the CI Type model are classified as either a CIT or a relationship. You can drill down and view the relationships and neighbors of the selected CIT in the topology map. You can search in the list of CITs or relationships using the Incremental Search by entering the first letter of the CIT or relationship repeatedly until you reach the required selection. You can also search for a CIT or relationship by entering its full name.</p> <p>Note: Each CI type is represented by a unique icon. (If an icon has not been defined for the CIT, it takes the icon of its parent.)</p>


GUI Element (A-Z)	Description
Main Window	<p>The following tabs are available:</p> <ul style="list-style-type: none"> ▶ Dependencies. Displays the CI Type model in a topology map, including the CITs and the relationships between them. The name of the selected CI type or relationship appears in the border at the top of the pane. When you point to a CIT, a tooltip displays the display name of the CIT and its description. ▶ Details. Enables you to edit the basic information about the CI type selected in the left pane. For details, see “Details Page” on page 260. ▶ Attributes. Enables you to edit the attributes of the selected CIT. For details, see “Attributes Page” on page 261. ▶ Qualifiers. Enables you to assign qualifiers to the selected CIT. For details, see “Qualifiers Page” on page 263. ▶ Triplets. Enables you to create a calculated relationship. For details, see “Triplets Page” on page 265. This page appears only for calculated relationships. ▶ Icon. Enables you to assign an icon to the selected CIT. For details, see “Icon Page” on page 266. This tab does not appear for relationships. ▶ Attached Menu. Enables you to customize the shortcut menu of a CI by adding menu items and commands (for example, ping, run a program, open a URL). The customized menu is displayed when you right-click a CI instance in IT Universe Manager. For details, see “Attached Menu Page” on page 268. ▶ Default Label. Enables you to define attributes that appear in the CIT label. You can include more than one attribute by using the function buttons. For details, see “Default Label Page” on page 271.

Context Menu

CI Type Manager includes the following context menu options available by right clicking a CI type in the CI Types pane or the Dependencies map:

GUI Element (A-Z)	Description
Add/Remove Relationship	Opens the Add/Remove Relationship dialog box, which enables you to add or remove relationships from CITs. For details, see “Add/Remove Relationship Dialog Box” on page 254.
Delete	Deletes the selected CI type. This option is only available for CI types that have no children and no instances.
Export	Enables you to export a CIT as an XML file. Use this option to move CITs from one server to another.
New	Opens the Create Configuration Item Type Wizard which enables you to define a new CI type. For details, see “Create Configuration Item Type/Relationship/Calculated Relationship Wizard” on page 259.
Show CIT Instances	Opens the Show All Instances window, which displays all instances of the selected CIT. For details, see “Element Instances Dialog Box” on page 400.

Create Configuration Item Type/Relationship/Calculated Relationship Wizard

Description	<p>Enables you to define a new configuration item type or relationship.</p> <p>To access:</p> <ul style="list-style-type: none"> ▶ Click a CI type or relationship in the topology map or CI Types pane of the CIT Manager and select New from the context menu. ▶ Click the New button  in the CI types pane.
Wizard Map	<p>The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains:</p> <p>Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page</p>

The Create Configuration Item Type wizard includes the following pages:

- ▶ “Details Page” on page 260
- ▶ “Attributes Page” on page 261
- ▶ “Qualifiers Page” on page 263
- ▶ “Triplets Page” on page 265
- ▶ “Icon Page” on page 266
- ▶ “Attached Menu Page” on page 268
- ▶ “Default Label Page” on page 271

 **Details Page**

Description	Enables you to enter basic information about the new CI type you are defining.
Important Information	For general information about the Create Configuration Item Type Wizard, see “Create Configuration Item Type/Relationship/Calculated Relationship Wizard” on page 259.
Wizard Map	The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains: Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page





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




GUI Element (A-Z)	Description
Base CI Type	Select a base CIT for the CIT you are creating. The new CIT inherits the base CIT's attributes. Note: This field only appears in the Create CI Type Wizard. It is not relevant when editing an existing CIT in the Details tab of CI Type Manager.
Description	A description for the new CIT. Note: This field is optional.
Display Name	The name of the CIT as it appears in the HP Business Availability Center interface.
Name	The unique name of the new CIT. The name can contain all characters except the following: " \ / [] : < > + = ; , ? * Note: The name field is case sensitive, but you cannot use the same name with different cases for two different CITs.

Attributes Page

Description	Enables you to edit the attributes of the CIT.
Wizard Map	The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains: Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page

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

GUI Element (A-Z)	Description
	To define an attribute as a key attribute, click in the left column beside the attribute name. A key icon appears in the cell. A key attribute is an attribute that must be defined for CIs of that CI type. To remove the key attribute definition, click in the left column again. The key icon disappears. For more information on key attributes, see “CI Type Attributes” on page 241.
	Denotes a static attribute. A static attribute takes the same value for all the CIs of that type. If it is changed, all the CIs of that type are affected and automatically display the new value. A static attribute cannot be defined as a key attribute. Note: You cannot define an attribute as static from within the CIT Manager. It is done by deploying the relevant package. Static attributes are for internal use only.
	Click the Add button to define a new attribute. For details, see “Add/Edit Attribute Dialog Box” on page 251.
	Select a row and click the Edit button to open the Edit Attribute dialog box. For details, see “Add/Edit Attribute Dialog Box” on page 251. Note: If you modify an attribute belonging to a CIT’s parent, the text turns light blue. If you modify an attribute belonging to the CIT itself, the text turns dark blue.

GUI Element (A-Z)	Description
	Click the Delete button to delete a selected attribute. This option is only active for newly defined attributes.
	Click the Reset button to reset the attribute settings after editing a pre-existing attribute.
	Click Select Columns to select the columns to appear using the Select Columns dialog box.
<Attributes>	Displays all attributes associated with the new CIT. Attributes appearing in black are ones that the new CIT inherits from the base CIT. Attributes appearing in blue are ones that are private to this CIT and its descendants. Attributes appearing in light blue are inherited ones that have been modified for the new CIT.
Asset Data	Select to display the attribute value in the Asset Report. For details see “Asset Report User Interface” on page 632. Note: When this qualifier is selected for a given attribute, the attribute appears as a visible column in the Element Instances dialog box. For details, see “Element Instances Dialog Box” on page 384.
Change Monitored	Select to define attributes whose values are being marked as Change Monitored in CI Type Manager. The changes in the values of such attributes are saved in the CMDB History. Note: <ul style="list-style-type: none"> ▶ When this qualifier is selected for a given attribute, the attribute appears as a visible column in the Element Instances dialog box. For details, see “Element Instances Dialog Box” on page 384. ▶ Change Monitored is only relevant for attributes of CI types and not for attributes of relationships. ▶ Change Monitored is not relevant for attributes of the type list of integers or list of strings.
Comparable	Select to enable this attribute to be used for comparing compound CIs. For details, see “Compare CIs User Interface” on page 625. Note: When this qualifier is selected for a given attribute, the attribute appears as a visible column in the Element Instances dialog box. For details, see “Element Instances Dialog Box” on page 384.






GUI Element (A-Z)	Description
Default Value	The default value for the attribute. This value appears when the new CIT is defined and there is no runtime value for the attribute.
Description	A description of the attribute.
Display Name	The attribute name that appears in the HP Business Availability Center interface.
Editable	Select to enable future editing of the attribute. Only attributes that are marked as Editable (or ones that have values) are displayed in the Properties tab in IT Universe Manager.
Index	Select to accelerate the attribute retrieval performance. This option is recommended for attributes that are used frequently in search conditions. For example, IP address is usually an index attribute of a host.
Lower Case	Select to keep the attribute value in lower case.
Name	The actual name of the attribute (compare to Display Name).
Required	Select to define this attribute as a required one, if its value is required for the creation of the CIT.
Type	The type of the attribute.
Visible	Select to display this attribute in the Properties tab in IT Universe Manager.

Qualifiers Page

Description	Enables you to assign qualifiers to a CIT definition.
Important Information	Qualifiers enable you to define added attribute definitions to the CIT. In the Qualifiers list, select the required qualifiers using the Add buttons to move your selections to the Configuration Item Type Qualifiers list. You can make multiple selections by holding down the CTRL key.

Wizard Map	<p>The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains:</p> <p>Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets):



GUI Element (A-Z)	Description
	Click this button to move all qualifiers to the Configuration Item Type Qualifiers list.
	Select the qualifier and click this button to add the qualifier to the Configuration Item Type Qualifiers list. Select multiple qualifiers by holding down the CTRL key.
	To remove a qualifier from the CIT definition, select the qualifier from the Configuration Item Type Qualifiers list and click this button.
	Click this button to remove all qualifiers from the Configuration Item Type Qualifiers list
	To define a new, custom qualifier, enter the qualifier name in the window and click Insert . The qualifier appears in the Configuration Item Type Qualifiers list.
< Configuration Item Type Qualifiers >	The list of qualifiers that define attributes of the new CIT. For example, you can use a qualifier to define a CIT as abstract, which means that you cannot create instances from it.
< Qualifiers >	For a list of the available qualifier options, see “Qualifier Tab” on page 410.

 **Triplets Page**

Description	<p>Enables you to create a calculated relationship.</p> <p>Each row on the Triplets page represents one of the allowed steps in the path leading from the source CI to the target CI in the topology map.</p> <p>Note: This step of the wizard is relevant only for calculated relationships.</p>
Important Information	<ul style="list-style-type: none"> ▶ For details about calculated relationships, see “Impact Modeling” on page 439. ▶ For general information about the Create Configuration Item Type Wizard, see “Create Configuration Item Type/Relationship/Calculated Relationship Wizard” on page 259.
Useful Links	“Impact Modeling” on page 439
Wizard Map	<p>The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains:</p> <p>Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page</p>

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



GUI Element (A-Z)	Description
	Click to define the allowed steps in a path in the topology graph leading from the source CI to the target CI in the calculated relationship. Opens the Add Triplet dialog box. For details, see “Add Triplet Dialog Box” on page 396.
	Select a row and click the Edit button to edit the triplet. Opens the Edit Triplet dialog box. For details, see “Add Triplet Dialog Box” on page 396.
	Click the Delete button to delete a selected triplet.
Relationship	The required relationship connecting the two nodes.

GUI Element (A-Z)	Description
Relationship Direction	<p>The required relationship direction.</p> <ul style="list-style-type: none"> ➤  Indicates the direction of the physical relationship. ➤  Indicates the direction opposite to the physical relationship.
Source	The required source node.
Target	The required target node.

 **Icon Page**

Description	<p>Enables you to select an icon to assign to the new CI Type.</p> <p>Note: This step of the wizard is not relevant for relationships.</p>
Important Information	<p>Each CIT is displayed with a default icon. However, you can attach different icons to the same CIT when certain conditions apply. For example, you can associate different icons with the same CIT when one of its attribute values changes.</p>
Wizard Map	<p>The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains:</p> <p>Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page</p>





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

GUI Element (A-Z)	Description
	Click to add a row. Note: Only active if Change the Configuration Item Type icon according to its attribute value is selected.
	Click to remove a row. Note: Only active if Change the Configuration Item Type icon according to its attribute value is selected.
Attribute Name	Select an attribute to determine the icon assigned to the CIT.
Change the Configuration Item Type icon according to its attribute value	Enables you to assign an icon for each attribute value. For example, you could define two values for the City attribute: if City=London, one icon is displayed. If City=Beijing, another icon is displayed. Note: If you change the icon of a CIT that appears in an existing view, the CIT's icon is not updated in the view.
Configuration Item Type Main Icon	Select the group to which the CIT belongs.
Icon	Select an icon to associate with the value you entered in the Value column.
Value	Enter a value corresponding to the attribute you selected. You can add a new line for each value you enter.

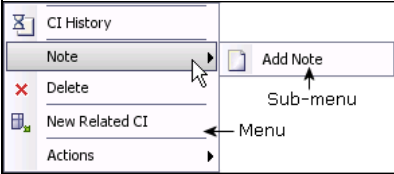
Attached Menu Page

Description	Enables you to customize the shortcut menu of a CI by adding menu items and commands (for example, ping, run a program, open a URL). The customized menu is displayed when you right-click a CI instance in IT Universe Manager.
Important Information	If a CIT does not have a method defined specifically for it, the CIT inherits all the menus from its parent CIT or the nearest ancestor that does have a method defined for it. If you create or modify a menu, the change occurs only in the specific CIT that is being edited.
Wizard Map	The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains: Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page

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

GUI Element (A-Z)	Description
	Select a menu item from the tree and click the button. A new entry appears under the selected item.
	Click to remove a menu item.
	Click to move a selected menu item up in the menu.
	Click to move a selected menu item down in the menu.
<Tree>	Hierarchical tree containing the default menu items. Caution: It is not recommended to edit the definitions of the default menu items.


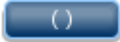
GUI Element (A-Z)	Description
Command	<p>To connect to a specific location on the World Wide Web, select URL, and enter the exact Internet address, for example, <code>http://www.hp.com/go/software</code>. (Available only if you select the URL command type option.)</p> <p>Note: If you use a variable in the Command field, use the format <code>command name %1</code> and define the CIT attributes as described in Parameters. The parameter values replace %1 according to their order in the list. For example, %1 is replaced by the first parameter in the list, %2 is replaced by the second parameter in the list, and so on.</p>
Description	Enter a description for the method. (This is for internal use only and does not appear in the menu.)
Existing Method	Select to choose a command from a list of defined methods inherited from the IT Universe CIT and all its ancestors.
Icon	<p>Select the icon to appear next to the menu option in the context menu.</p> <p>Note: This field is optional.</p>
Menu Item Name	Enter a name for the new menu item as it should appear in the menu.
Method	<p>Enables you to add a command to the menu.</p> <p>Note: To create a method and not override the existing method, it is recommended to create a new menu item and place the new method there.</p>
Method Name	Enter a name for the command.
New Method	Select to add an action (for example, ping) to the menu item.
Parameters	<p>To add attributes to the command or URL, click the Add Parameter button and select the attribute from the list.</p> <p>To delete an existing entry, select it and click the Remove Parameter button.</p> <p>Note: Parameters are not relevant when Inner Process is selected.</p>

GUI Element (A-Z)	Description
Require user confirmation?	Select the check box for users to confirm access to a menu item before the item is displayed.
Separator	To place a separator between two menu items: Click OK to place a separator underneath the selected menu option.
Shortcut	Press any key combination to create a shortcut for the menu item, for example, CTRL+H. Note: This field is optional.
Sub-Menu	Select to create a sub-menu under the selected menu option.  The screenshot shows a menu titled 'CI History' with several items: 'Note', 'Delete', 'New Related CI', and 'Actions'. The 'Note' item is selected, and a sub-menu is displayed to its right. The sub-menu contains an 'Add Note' option. An arrow labeled 'Sub-menu' points to the sub-menu, and another arrow labeled 'Menu' points to the 'Note' item.
Type	Choose a command type: <ul style="list-style-type: none"> ▶ URL. Opens a web page to the specified URL. Enter the URL of a Web page for the command to open in the URL box. ▶ Inner Process. Triggers an internal HP Business Availability Center action. Select an action from the drop-down list of actions. ▶ Execute. Triggers an executable action. Enter an executable command in the Executable box.

Default Label Page

Description	<p>Enables you to define attributes that appear in the CIT label. You can include more than one attribute by using the function buttons.</p> <p>The final step of the Create Configuration Item Type Wizard.</p>
Important Information	<p>The label appears as the title under a CI of the new CI Type. The label definition can be customized to include different attribute values. For example, if the function label of the host CIT is composed of <code>hostname</code> and <code>network</code>, the displayed label is: <code>server1 10.0.65.0</code>.</p> <p>Labels can also be created using regular expressions.</p>
Wizard Map	<p>The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains:</p> <p>Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page</p>

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

GUI Element (A-Z)	Description
	Selects the attributes to appear in the Format box. Use the following function buttons to display multiple attributes in the label.
	Adds parentheses to the formatted text (use in conjunction with the other functions).
And	Places an AND operator between two attributes in the formatted text. For example, <code>network_netaddr&network_domain</code> displays the network address and the domain of a node.
Attribute Name	Displays the available options of attributes to be included in the CIT label.
Clear	Click to clear the Format window.

GUI Element (A-Z)	Description
Format	<p>Displays the attributes that you select to appear in the CIT label.</p> <p>For example, to label a host by its host name and operating system, choose the host_hostname and host_os attributes. The CIT label is host1 UNIX.</p> <p>You can define conditions using AND and OR combinations.</p> <p>Note: To delete an attribute from the Format box, highlight it and press the DELETE key.</p>
Or	<p>Places an OR operator between two attributes in the formatted text.</p>
RegExp	<p>Adds a regular expression (using regular expression syntax) to the label definition. The structure of the entry is (v1, v2, v3), where v1 represents the selected attribute, v2 represents the regular expression itself (which divides the value into groups), and v3 represents the number of the selected group.</p> <p>For example, if the selected attribute is a name, consisting of a first name, a space, and a surname, the regular expression would be (name, (\S*)(\s*)(\S*), 3), which indicates that the surname can be used for the name attribute in the default label.</p> <p>For examples of how to use regular expression syntax, see “Regular Expression Examples” in <i>Reference Information</i>.</p>
Undo	<p>Click to undo the last change in the Format window.</p>

Create/Update List/Enumeration Definition Dialog Box

Description	Enables you to define a new List or Enumeration definition. The List or Enumeration definition you have created appears in the System Type Manager dialog box, where you can edit it if required (for details, see “System Type Manager Dialog Box” on page 276). To access: Click the Add button in the System Type Manager dialog box.
Important Information	You can access the Create/Update Enumeration Definition dialog box from the State Manager as well. For details, see “State Manager” on page 505.
Included in Tasks	“Create List and Enumeration Definitions” on page 247



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

GUI Element (A-Z)	Description
Display Name	Enter the name you want to appear in the list of System Type Definitions. If you leave this field empty, the entry in the Name field is used.
Enumeration	Enables you to create a predefined list of values, as well as assign each value a color. For details, see “Enumeration Definition Area” on page 275.
List	Enables you to create a predefined list of values. For details, see “List Definition Area” on page 274.
Name	Enter a unique name for the definition.

List Definition Area

Description	<p>Create a predefined list of values. For example, a Location attribute might be defined by a location list containing the following values:</p> <ul style="list-style-type: none"> ➤ New York ➤ Boston ➤ Baltimore <p>To access: Select List in the Create List/Enumeration Definition dialog box.</p>
--------------------	---



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

GUI Element (A-Z)	Description
	<p>Add a List definition. Double-click inside the row and either select a date from the calendar that appears (if you chose the type Date) or type the required value.</p>
	<p>Delete a List definition.</p>
Type	<p>Choose one of following field types:</p> <ul style="list-style-type: none"> ➤ Date ➤ Double ➤ Integer ➤ Long ➤ String

Enumeration Definition Area

Description	Enables you to create a list from a predefined list of values (similar to List), with capabilities such as assigning a color for every value. Enumerations are designed to be used as severity value lists by states. You can use Enumerations for lists that require key values. To access: Select Enumeration in the Create List/Enumeration Definition dialog box.
Useful Links	“Enumeration Definition – Workflow” on page 248




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

GUI Element (A-Z)	Description
	Add an Enumeration definition.
	Remove an Enumeration definition.
Color	Select a color that indicates the severity level.
Key	Type a number to create an enumeration that describes a severity list for a category. Assign key values according to the following rules: <ul style="list-style-type: none"> ▶ The list of key values must always begin with zero (0). (Zero represents the Normal state.) Otherwise, it does not appear in the State Manager (for details, see “State Manager” on page 505). ▶ The list must always be numbered consecutively. For an example of an Enumeration definition, see “Enumeration Definition – Workflow” on page 248.
Value	Type a value, either a string or a number, for example, Red or my value. The value appears in the tooltip for the CI in IT Universe Manager.

System Type Manager Dialog Box

Description	Displays the attribute types you defined in the Create List/Enumeration Definition dialog box. To access: Select CI Types > System Type Manager .
Included in Tasks	“Create List and Enumeration Definitions” on page 247
Useful Links	“Enumeration Definition – Workflow” on page 248

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

GUI Element (A-Z)	Description
	Create a predefined list whose values define an attribute type. You can create a definition for the following attribute types: <ul style="list-style-type: none"> ▶ List definition. ▶ Enumeration definition. For a description of these attribute types, see “Create/Update List/Enumeration Definition Dialog Box” on page 273.
	Delete an existing definition. Select the system type definition you want to delete and click the Delete button.
	Enables you to edit an existing definition. For details, see “Create/Update List/Enumeration Definition Dialog Box” on page 273.
<System Type Definitions>	The list of Enumeration and List definitions created in the System Type Manager.

8

Topology Report Manager

This chapter provides information on Topology Report Manager.

This chapter includes:

Concepts

- ▶ Topology Report Manager Overview on page 278

Tasks

- ▶ Define a Report Rule – Scenario on page 278
- ▶ Compare a CI Configuration to a Gold Master Template on page 288

Reference

- ▶ Topology Report Manager User Interface on page 288

Troubleshooting and Limitations on page 313

Topology Report Manager Overview

Topology Report Manager enables you to define the following reports:

- ▶ **Topology reports.** Contains information about selected Report nodes in the managed world. Each report is based on a specific Report TQL query, which is created especially for it. (If required, you can define multiple reports for each query.) For more information about TQL queries, see “Topology Query Language” on page 355. Topology Report Manager enables you to define exactly which information appears in each report, including the order in which nodes are listed and their placement relative to other nodes, and how the information within each report is sorted. For details, see “Topology Report Manager Window” on page 299.
- ▶ **Gold Master reports.** Compares the configuration of a Gold Master CI to other CIs of the same CI type. Select the CI you want to use as the Gold Master CI, and then the CIs whose configuration you want to compare to the Gold Master template. You can choose the CIs from existing views or from the CMDB. The report that is generated specifies which of the selected CIs are configured differently. For details, see “Gold Master Report Pane” on page 293.

Define a Report Rule – Scenario

This scenario describes how to create a Report TQL definition whose query results retrieve hosts that run on a Windows operating system. Then, by changing a report’s parameterized values, you can generate a report from that same TQL query displaying hosts that run on a Linux operating system.

Note: To retrieve the required query results, you must follow each step in this scenario.

This task includes the following steps:

- “Create a Report TQL Query” on page 279
- “Set TQL Node Definitions” on page 280
- “Define the Column Content of the Selected Node” on page 281
- “Sort the Column Information” on page 282
- “Set the Node Order” on page 283
- “Refine the Report Layout” on page 284
- “View a Topology Report Displaying Hosts that Run on a Windows Operating System” on page 286
- “View a Topology Report Displaying Hosts that Run on a Linux Operating System” on page 287

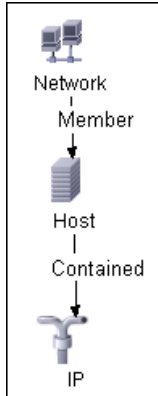
1 Create a Report TQL Query

To create a Report TQL query, you need to define a Report rule and then add the TQL nodes and relationships that define the query.

Select **Admin > Universal CMDB > Modeling > Topology Report Manager** to open Topology Report Manager. For details about how to create a Report TQL query, see “New Report/Report Properties/Save As Report Wizard” on page 295. For details about how to add nodes and relationships to a query, see “Add Nodes and Relationships to a TQL Query”.

Example of a Report TQL Query

In this Report TQL query, a Network and a Host node are linked by a Member relationship and the Host node is linked to an IP node by a Contained relationship. The TQL results must comply with the direction of the arrows.



Note: A TQL query is subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 433.

2 Set TQL Node Definitions

You can set attribute definitions for the nodes and relationships you added to the TQL query. In the editing pane, right-click the required node, and select **Node Properties** to open the Node Properties dialog box. Then click the Attribute tab. For details on how to define node and relationship definitions, see “Node/Relationship Properties Dialog Box” on page 407.

Example of a TQL Node Definition

In Topology Report Manager, the attribute condition of the Host node are defined in the Attribute tab in the Node Properties dialog box to retrieve only hosts that run on a Windows operating system.

To do this, in the Attribute tab, select the following:

- **Attribute name** — Host Operating System
- **Operator** — Like ignore case
- **Parameterized Value**
- **Value** — %windows%

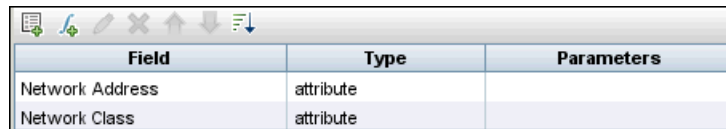
When the **Parameterized Value** equals %windows%, all hosts that run on a Windows operating system are displayed in the query results.

3 Define the Column Content of the Selected Node

Define which nodes to include in the report, and which attributes and functions to display for each node. In the editing pane, right-click the required node, and select **Report Node Definition** to open the Report Node Definition dialog box. Click the **Add Attributes** button to select the required attributes. For details, see “Report Node Definition Dialog Box” on page 308.

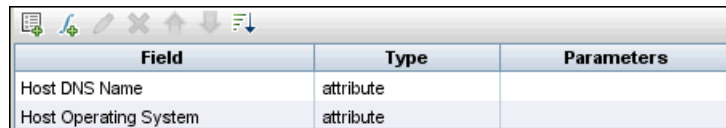
Example of Nodes to Be Included in a Report

- The attributes **Network Address** and **Network Class** are selected for the Network node.



Field	Type	Parameters
Network Address	attribute	
Network Class	attribute	

- The attributes **Host DNS Name** and **Host Operating System** are selected for the Host node.



Field	Type	Parameters
Host DNS Name	attribute	
Host Operating System	attribute	

- The attributes **IP Network Address**, **IP Network Mask**, and **Last Access Time** are selected for the IP node.

Field	Type	Parameters
IP Network Address	attribute	
IP Network Mask	attribute	
Last Access Time	attribute	

4 Sort the Column Information

Determine the order of the information displayed for each node, and the method by which the data is sorted in each column. In the editing pane, right-click the appropriate node and select **Report Node Definition** to open the Report Node Definition dialog box. Then click **Sort** to open the Attribute Column dialog box to define the order in which the node's attributes appear in the Topology report. For details, see "Attribute Columns Dialog Box" on page 291.

Example of the Order in Which the Node Information is Displayed in a Report

In the Attribute Columns dialog box, the attributes for the Network node are defined to appear in the Topology report in the following order:

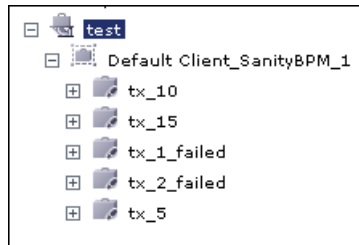
Sort Items by

Network Class Ascending Descending

Then by

Network Address Ascending Descending

In the Attribute Columns dialog box, the attributes for the Host node are defined to appear in the Topology report in the following order:



In the Attribute Columns dialog box, the attributes for the IP node are defined to appear in the Topology report in the following order:



5 Set the Node Order

Determine the order of the nodes in the report. Right-click any node from the query and select **Node Order** to open the Set Node Order dialog box. The Set Node Order dialog box displays a row for each node that is included in the report. Use the up and down arrows to move the nodes to the required location in the report. For details, see “Set Node Order Dialog Box” on page 310.

Example of How the Order of the Nodes is Displayed in a Report

Use the up and down arrows to move the **Network** node to the beginning of the list and the **IP** node to the bottom. The **Network** node is the parent node, so it should appear at the beginning of the report. The data of the **Host** node is displayed next, followed by the **IP** node.



Nodes
Network
Host
IP

6 Refine the Report Layout

You can display nodes dependent on other nodes either aligned underneath or indented underneath the parent node a generated report. Displaying nodes indented beneath one another enables you to better distinguish between parent nodes and their children.

The editing pane enables you to define how nodes are displayed in a generated report in relation to one another. For details about the editing pane, see “Topology Report Manager Window” on page 299.

Example of How Nodes are Displayed in Relation to One Another

- In this report, the **IP** CI is defined as the child of the **Host** CI, and the **Host** CI is defined as the child of the **Network** CI. As a result, the **IP** CI is indented underneath the **Host** CI and the **Host** CI is indented under the **Network** CI in the generated report.

[-] 192.168.59.0 (Network)	
Network Address: 192.168.59.0 Network Class: C	
[-] labm2am141 (Host) (Path: 192.168.59.0 (Network))	
Host DNS Name: devlab.ad Host Operating System: Windows 2003	
[-] 192.168.140.1 (IP) (Path: 192.168.59.0 (Network) --> labm2am141 (Host))	
IP Network Address: 192.168.140.0 Last Access Time: Sat Feb 9, 2008 06:29 AM	
IP Network Mask: 255.255.255.0	
[-] 192.168.59.1 (IP) (Path: 192.168.59.0 (Network) --> labm2am141 (Host))	
IP Network Address: 192.168.59.0 Last Access Time: Sat Feb 9, 2008 06:29 AM	
IP Network Mask: 255.255.255.0	
[-] 16.59.57.130 (IP) (Path: 192.168.59.0 (Network) --> labm2am141 (Host))	

- In this report, the **IP**, **Host**, and **Network** CIs are defined as siblings, so all the CIs are displayed aligned with one another.

[-] 192.168.59.0 (Network)
Network Address: 192.168.59.0 Network Class: C
[-] labm2am141 (Host)
Host DNS Name: devlab.ad Host Operating System: Windows 2003
[-] 192.168.140.1 (IP)
IP Network Address: 192.168.140.0 Last Access Time: Sat Feb 9, 2008 06:29 AM
IP Network Mask: 255.255.255.0

7 View a Topology Report Displaying Hosts that Run on a Windows Operating System

In the Reports pane, right-click the Report TQL query definition and select **Generate**.

[-] 192.168.59.0 (Network)	
Network Address: 192.168.59.0 Network Class: C	
[-] labm2am141 (Host) (Path: 192.168.59.0 (Network))	
Host DNS Name: devlab.ad	Host Operating System: Windows 2003
[-] 192.168.140.1 (IP) (Path: 192.168.59.0 (Network) --> labm2am141 (Host))	
IP Network Address: 192.168.140.0	Last Access Time: Sat Feb 9, 2008 06:29 AM
IP Network Mask: 255.255.255.0	
[-] 192.168.59.1 (IP) (Path: 192.168.59.0 (Network) --> labm2am141 (Host))	
IP Network Address: 192.168.59.0	Last Access Time: Sat Feb 9, 2008 06:29 AM
IP Network Mask: 255.255.255.0	
[-] 16.59.57.130 (IP) (Path: 192.168.59.0 (Network) --> labm2am141 (Host))	
IP Network Address: 16.59.57.0	Last Access Time: Sun Feb 10, 2008 04:22 AM
IP Network Mask: 255.255.255.0	
[-] 192.168.214.0 (Network)	
Network Address: 192.168.214.0 Network Class: C	
[-] labm2am22 (Host) (Path: 192.168.214.0 (Network))	

This report displays an instance of a host CI that runs on a Windows 2003 operating system.

8 View a Topology Report Displaying Hosts that Run on a Linux Operating System

In the Reports pane, right-click the Report TQL query and select **Set Report Parameters** to open the **Set Report Parameters** wizard. Click **%windows%**, and in the Editing window that opens, enter **%linux%**. Save the new definition. Then right-click the **Hosts** report definition and select **Generate**.

16.59.57.0 (Network)	
Network Address: 16.59.57.0	Network Class: C
beatboxqa2 (Host) (Path: 16.59.57.0 (Network))	
Host DNS Name:	Host Operating System: Linux
16.59.57.207 (IP) (Path: 16.59.57.0 (Network) --> beatboxqa2 (Host))	
IP Network Address: 16.59.57.0	Last Access Time: Sun Feb 10, 2008 04:22 AM
IP Network Mask: 255.255.255.0	
LABM2PCOE26 (Host) (Path: 16.59.57.0 (Network))	
Host DNS Name:	Host Operating System: Linux
16.59.57.122 (IP) (Path: 16.59.57.0 (Network) --> LABM2PCOE26 (Host))	
IP Network Address: 16.59.57.0	Last Access Time: Sun Feb 10, 2008 04:22 AM
IP Network Mask: 255.255.255.0	
labm2am154 (Host) (Path: 16.59.57.0 (Network))	
Host DNS Name:	Host Operating System: Linux
16.59.57.212 (IP) (Path: 16.59.57.0 (Network) --> labm2am154 (Host))	
IP Network Address: 16.59.57.0	Last Access Time: Sun Feb 10, 2008 04:22 AM

This report displays an instance of a host CI that runs on a Linux operating system.

Compare a CI Configuration to a Gold Master Template

This task describes how to create a Gold Master report definition and then generate a Gold Master report.

This task includes the following steps:

- “Create a Gold Master Report Definition” on page 288
- “Generate a Gold Master Report” on page 288

1 Create a Gold Master Report Definition

Define a Gold Master report that compares the configuration of a Gold Master CI to other CIs of the same CI type, or a child of the CI type. Select the CI you want to use as the Gold Master CI and then the CIs whose configuration you want to compare to the Gold Master template. You can select the CIs from existing views or from the CMDB. For details, see “Gold Master Report Pane” on page 293.

2 Generate a Gold Master Report

Generate a report that specifies which of the selected CIs are configured differently. For details, see “Gold Master Report Pane” on page 293.


Topology Report Manager User Interface

This section describes:

- Add Attributes Dialog Box on page 289
- Add/Edit Function Dialog Box on page 290
- Attribute Columns Dialog Box on page 291
- Edit Attribute Dialog Box on page 292
- Filter CITs Dialog Box on page 292
- Gold Master Report Pane on page 293
- New Report/Report Properties/Save As Report Wizard on page 295

- Topology Report Manager Window on page 299
- Report Node Definition Dialog Box on page 308
- Set Node Order Dialog Box on page 310
- Set Report Parameters Wizard on page 311
- Set View-specific Report Dialog Box on page 312


Add Attributes Dialog Box

Description	Enables you to define the content of the selected Report node's columns. To access: Click the Add Attributes  button in the Report Node Definition dialog box.
Included in Tasks	"Define a Report Rule – Scenario" on page 278
Important Information	Attributes that have already been selected in the Report Node Definition dialog box do not appear on the list.

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

GUI Element (A-Z)	Description
<Click a column header>	For details, see "Customizing Columns" in <i>Reference Information</i> .
<Right-click a column header>	For details, see "Customizing Columns" in <i>Reference Information</i> .
Add	Select the check box of the attributes you want to appear in the report. The selected attributes appear in the Report Node Definition dialog box. Each attribute you add represents a column in the report.
Attribute	The name of the attribute.
Column Title	The column title, by default, takes the same name as the selected attribute. You can change the title of the column in the Edit Attribute dialog box.


Add/Edit Function Dialog Box

Description	Enables you to define which of the node's functions and parameters you want to include in the report. To access: Click the Add Function  button in the Report Node Definition dialog box.
Included in Tasks	"Define a Report Rule – Scenario" on page 278

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

GUI Element (A-Z)	Description
Attribute	Define the necessary parameters.
Function	From the Function list, select the function you want to use to calculate the results on these columns. Following are the available options: <ul style="list-style-type: none"> ▶ average. The average value of all the attributes of the connected nodes. ▶ count. Calculate the number of node instances connected to the selected node. ▶ max. The maximum value of all the attributes of the connected nodes. ▶ min. The minimum value of all the attributes of the connected nodes. ▶ sum. The sum of all the attributes of the connected nodes.
Related	The node on which you want to perform the function.
Title	The name of the function attribute displayed in the report.


Attribute Columns Dialog Box

Description	Determine the order of the information displayed for each Report node, and the method by which the data is sorted in each column. To access: Click the Sort  button in the Report Node Definition dialog box.
Included in Tasks	“Define a Report Rule – Scenario” on page 278

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

GUI Element (A-Z)	Description
Ascending	Sort the information in ascending order.
Descending	Sort the information in descending order.
Sort Items by	Select the primary sort column from the Sort Item by list.
Then by	Define up to three secondary sort columns from the Then by lists.


Edit Attribute Dialog Box

Description	Modify the name of the column title. To access: Select the required attribute in the Report Node Definition dialog box and click the Edit/Attribute Function  button.
Included in Tasks	“Define a Report Rule – Scenario” on page 278

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

GUI Element (A-Z)	Description
Attribute	Displays the node’s selected attribute. This box cannot be edited.
Column Title	Modify the column title as required. The name that appears in the Column Title box is, by default, the same name as the attribute. The modified column title appears in the Field column in the Report Node Definition dialog box.


Filter CITs Dialog Box

Description	Enables you to exclude the CI types you do not want to appear in the Gold Master report. To access: Click the Filter CI Types  button in the Gold Master Report pane.
--------------------	--




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

GUI Element (A-Z)	Description
<List of CI types>	The CI types you select are excluded from the report.

Gold Master Report Pane

<p>Description</p>	<p>Define a Gold Master report definition that compares the configuration of a Gold Master CI to other CIs of the same CI type or a child of the CI type. You choose the CI you want to use as the Gold Master CI and then the CIs whose configuration you want to compare to the Gold Master template. You can choose the CIs from existing views or from the CMDB. The report that is generated specifies which of the selected CIs are configured differently.</p> <p>To access:</p> <ol style="list-style-type: none"> 1 Select Admin > Universal CMDB > Modeling > Topology Report Manager. 2 Right-click anywhere in the Reports pane and click New or click the New  button to open the New Report Wizard. 3 Define the report and select Gold Master.
<p>Important Information</p>	<ul style="list-style-type: none"> ▶ You can also define a schedule that generates and saves Gold Master reports on a periodic basis. For details, see “Scheduler” on page 491. ▶ The CIs appear in this report under the following circumstances: <ul style="list-style-type: none"> ▶ Their attributes are marked as Comparable in the Add Attribute dialog box in the CI Type Manager. ▶ The CIs have descendants that are defined as Comparable. <p>For details, see “Add/Edit Attribute Dialog Box” on page 251.</p>

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

GUI Element (A-Z)	Description
	Determines which CI types are not included in the Gold Master report. Opens the Filter CITs dialog box.
	Generates a Gold Master report. For details, see “Gold Master Report” on page 547.
	Moves the required CIs back and forth between the left pane and the Master CIs pane and the Compared CIs panes.
Include Similar Items	Select this check box if you want to include the compared CIs whose configuration is identical to that of the Gold Master CI.

Compared CIs Pane

Description	Contains the CIs that you want to compare to the Gold Master CI.
Important Information	You can select multiple CIs.


Master CI Pane

Description	Contains the CI you want to use as a Gold Master CI.
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Left Pane

Description	<p>The left pane contains the following tabs:</p> <ul style="list-style-type: none"> ▶ Browse. Select the required CI from different levels of the view hierarchy. For details, see “Browse Tab” on page 570. ▶ Search. Search for a specific CI in existing views or in the entire CMDB. For details, see “Search Tab” on page 570.
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New Report/Report Properties/Save As Report Wizard

Description	<p>Create or modify a Topology or Gold Master report definition.</p> <p>To access:</p> <ul style="list-style-type: none"> ▶ To create a Topology or Gold Master report definition, right-click anywhere in the Reports pane and click New or click the New  button. ▶ To modify a Topology or Gold Master report definition, right-click a report definition in the Reports pane and select Properties. ▶ To create a new report based on an existing query, right-click a report definition in the Reports pane and select Save As.
Included in Tasks	“Define a Report Rule – Scenario” on page 278
Wizard Map	<p>The New Report/Report Properties/Save As Report Wizard contains:</p> <p>Report General Attributes Page > Report Titles Page > Report Base TQL Page > Report Completion Page</p>

Report General Attributes Page

Description	Enables you to enter a unique name and description for a Topology or Gold Master report.
Included in Tasks	“Define a Report Rule – Scenario” on page 278
Important Information	By default, this wizard is set to display a Welcome page. You can choose not to display the Welcome page by changing the user preferences. For details, see “User Preferences Dialog Box” on page 432.
Useful Links	“Topology Query Language” on page 355
Wizard Map	<p>The New Report/Report Properties/Save As Report Wizard contains:</p> <p>Report General Attributes Page > Report Titles Page > Report Base TQL Page > Report Completion Page</p>

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

GUI Element (A-Z)	Description
Report Description	(Optional) Enter a description of the report.
Report Name	<p>Enter a unique name for the Topology or Gold Master report.</p> <p>The report name cannot contain any of the following characters: \ / : " < > % ?</p> <p>Note: If the Report name is either empty, contains a name used by another report, or uses invalid characters, the Next and Finish buttons are disabled.</p>
Report Type	<p>Select one of the following options:</p> <ul style="list-style-type: none"> ▶ Gold Master. Create a Gold Master report. For details on how to define a Gold Master report, see “Gold Master Report Pane” on page 293. ▶ Topology. Create a Topology report. For details, see “Topology Report” on page 589.

Report Titles Page

Description	Enables you to define the report titles.
Included in Tasks	“Define a Report Rule – Scenario” on page 278
Important Information	This page is relevant to Topology reports only.
Useful Links	“Topology Query Language” on page 355
Wizard Map	<p>The New Report/Report Properties/Save As Report Wizard contains:</p> <p>Report General Attributes Page > Report Titles Page > Report Base TQL Page > Report Completion Page</p>

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

GUI Element (A-Z)	Description
Report Subtitle	Enter the subtitle of the Topology report. This title appears underneath the title at the head of the report.
Report Title	Enter the title of the Topology report. This title appears at the head of the report.

Report Base TQL Page

Description	Enables you to define the properties of the TQL on which the Topology report is based.
Included in Tasks	“Define a Report Rule – Scenario” on page 278
Important Information	<ul style="list-style-type: none"> ▶ This page is relevant to Topology reports only. ▶ By default, this wizard is set to display a Completion page after clicking Next in this page. You can choose not to display the Completion page by changing the user preferences. For details, see “User Preferences Dialog Box” on page 432.
Useful Links	“Topology Query Language” on page 355
Wizard Map	<p>The New Report/Report Properties/Save As Report Wizard contains:</p> <p>Report General Attributes Page > Report Titles Page > Report Base TQL Page > Report Completion Page</p>

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

GUI Element (A-Z)	Description
Base the report on a new TQL	Select this check box if you want to base the Topology report on a new TQL query. The report that is generated displays the results of the attributes defined for the new TQL.
Base the report on an existing TQL	Select this check box if you want to base the Topology report on an existing TQL query. Select the required Report TQL query from the drop-down list.
Base TQL Description	(Optional) Enter a description of the TQL query.
Base TQL Name	Enter a unique name for the Report TQL query. If you selected the Base the report on an existing TQL option, select the Report TQL query on which you want to base the Topology report.
Base TQL Priority	Select a priority level for the new TQL query (Low, Medium, High, Express). This setting determines how often the query is rerun automatically by the system to include updated information from the CMDB.

Report Completion Page

Description	Enables you to complete the definition of the report.
Included in Tasks	“Define a Report Rule – Scenario” on page 278
Important Information	This page is relevant to Topology reports only.
Useful Links	“Topology Query Language” on page 355
Wizard Map	The New Report/Report Properties/Save As Report Wizard contains: Report General Attributes Page > Report Titles Page > Report Base TQL Page > Report Completion Page











Topology Report Manager Window

Description	<p>Topology Report Manager enables you to:</p> <ul style="list-style-type: none"> ▶ Define Topology reports about specific Report nodes. Each report is based on a specific Report TQL query, which is created especially for it. You can define exactly what information appears in each report, including the order in which Report nodes are listed and their placement relative to other Report nodes, and how the information within each report is sorted. ▶ Define a report that compares the configuration of a Gold Master CI to other CIs of the same CI type or a child of the CI type. For details, see “Gold Master Report Pane” on page 293. <p>To access: Select Admin > Universal CMDB > Modeling > Topology Report Manager.</p>
Important Information	<p>You can also define a schedule that creates Topology reports based on a specific Report query, on a periodic basis. For details, see “Scheduler” on page 491.</p>
Included in Tasks	<ul style="list-style-type: none"> ▶ “Define a Report Rule – Scenario” on page 278 ▶ “Compare a CI Configuration to a Gold Master Template” on page 288

Reports Pane

Description	<p>Displays a hierarchical tree structure of predefined folders containing report definitions. Each report is associated with a TQL query.</p> <p>You can create your own TQL query, or work with the default queries provided with your HP Business Availability Center installation.</p> <p>The predefined folders are provided for the default queries. You can modify these folders, or add additional folders according to your organization’s requirements.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
	Create a new folder.
	Create a TQL Report or Gold Master report definition. Opens the New Report wizard.
	Delete the selected folder or report.
	Refresh the data content of the hierarchical tree structure that may have been modified by other users.
	(Enabled only when a report is created or when changes are made to an existing one.) Save the Gold Master or Topology report to the CMDB.
	Open the New Report Properties wizard. Enables you to change the description and activation state of the report.
	Generates a preview of the results of the selected Report TQL.
	Represents a folder.
	Represents a Gold Master report definition.
	Represents a Topology report definition.

The following elements are available by right-clicking a folder or report:

GUI Element (A-Z)	Description
Delete	Delete the selected folder or report definition from the CMDB.
Export	Displays a standard Save As dialog box, enabling you to save the report as an XML script. This option can be used to move a report from one workstation to another, provided the related TQL Report query is also relocated. Note: Only relevant for Topology reports and not Gold Master reports.
Import	Import XML files that contain saved Report queries to Topology Report Manager.
New	Create a TQL Report or Gold Master report definition. Opens the New Report Wizard.
New Folder	Create a new folder.
Properties	Open the Report Properties wizard. Enables you to change the description and activation state of the report.
Rename Folder	Rename the folder.
Preview	Generates a preview of the results of the selected Report TQL.
Save	(Enabled only when a new TQL Report or Gold Master report definition is created or when changes are made to an existing one.) Save the TQL Report or Gold Master report definition to the CMDB.
Save As	Displays the Save As dialog box, enabling you to define a new name and description for a TQL Report or Gold Master report definition. This option can be used for creating a new report based on an existing one.

GUI Element (A-Z)	Description
Set Report Parameters	Enables you to generate a report using values different than the ones you defined in the Attribute tab in the Node/Relationship dialog box. Opens the Set Report Parameters wizard. Note: This option only appears if you defined a parameterized value in the Attribute tab in the Node/Relationship Properties dialog box.
Set View-specific report	(Optional) Enables you to generate a report of the selected Report TQL query based on a certain view rather than the entire CMDB. Select the view on which you want to base the report.

Editing Pane

Description	Create and define Report nodes and relationships. <ul style="list-style-type: none"> ▶ When you select a folder in the Reports pane, the editing pane is empty. ▶ When you select a report in the Reports pane, the editing pane displays the TQL Report query, which consists of TQL nodes that are defined in the TQL query and the relationships between them, or the Gold Master report.
Useful Links	"Add Nodes and Relationships to a TQL Query" on page 362

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

GUI Element (A-Z)	Description
<Context menu> options	For details, see "Context Menu Options" on page 371.
<Main Menu>	For details, see "Main Menu" on page 729.
<Node>	A component from which TQL queries are built.

GUI Element (A-Z)	Description
<Relationship>	The entity that defines the relationship between two nodes.
<Toolbar>	For details, see “Toolbar Options” on page 733.
<Tooltips>	<p>Hold the cursor over a node or relationship to view its tooltip.</p> <p>The tooltips contain the following information:</p> <ul style="list-style-type: none"> ▶ Node Report Order: The order in which the Report node appears in the report. ▶ Node Report Label: A title for the selected Report node definition. For details, see Report Node Definition dialog box. ▶ Column Title: The title of each column for that node. For details, see Edit Attribute dialog box.





The following elements are available by right-clicking a relationship. These options define how nodes are displayed in a generated report in relation to one another.


GUI Element (A-Z)	Description
Add Relationship Folding Rule	<p>Enables you to define how nodes are displayed in a generated report in relation to one another.</p> <p>You can use one of the following options:</p> <p>Child. Define one Report node as a child of the Report node to which it is linked. In the report, the child Report nodes are displayed indented beneath the parent nodes.</p> <p>None. Does not define any rules for this relationship. In the Topology report, the Report nodes appear in different tables.</p> <p>Sibling. Define one Report node as a sibling of the Report node to which it is linked. In the report, the two Report nodes appear aligned with one another.</p> <p>SonGrid. Groups all the leaf instances in a table under their parent’s node. This option applies to leaf nodes only.</p>

CI Type Selector

Description	<p>Displays a hierarchical tree structure of the CI Types found in the CMDB. For more details, see “CI Type Manager User Interface” on page 250.</p> <p>Note: The number of instances of each CIT in the CMDB is displayed to the right of each CIT.</p> <p>To create or modify a TQL query, click and drag nodes to the Editing pane and define the relationship between them. Your changes are saved to the CMDB. For details, see “Add Nodes and Relationships to a TQL Query” in <i>Model Management</i>.</p>
Important Information	<p>The CI Type Selector is part of the following managers: View Manager, Enrichment Manager, Query Manager, Correlation Manager, Topology Report Manager, and Trigger TQL Editor.</p>
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Define a TQL Query” on page 360 ➤ “Create a Pattern View” on page 176 ➤ “Define a Report Rule – Scenario” on page 278

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

GUI Element (A-Z)	Description
	Click Add CI Type to Map to move the selected CI type to the Editing pane.
	Click Refresh to refresh the CI type tree.
	Click Search to search for the CI type entered.
	Click Expand All to expand all subtrees within the CI type tree.

GUI Element (A-Z)	Description
	Click Collapse All to collapse the subtrees within the CI type tree.
<Search window>	Enter the name or part of a name of a CI type for which to search.


Context Menu Options

The CI Type Selector includes the following elements (listed alphabetically) available by right-clicking a CI Type:



Menu Item	Description
Add CI Type to Map	Select to add the selected CI type to the Editing pane.
Go to CI Type Definition	Takes you directly to the selected CI type in CIT Manager.
Show CIT Instances	Opens the Show All Instances window, which displays all instances of the selected CIT. For details, see “Element Instances Dialog Box” in <i>Model Management</i> .

Information Pane

Description	Displays the properties, conditions, and cardinality for the selected node and relationship.
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<p>Important Information</p>	<p>The Information pane appears in the lower part of the window in the following managers and user interfaces: View Manager, Correlation Manager, Query Manager, Topology Report Manager, Enrichment Manager, Discovery Input TQL Editor, and Discovery Trigger TQL Editor.</p> <p>A small green indicator  appears next to the tabs in which a change occurred.</p>
<p>Included in Tasks</p>	<ul style="list-style-type: none"> ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Define a TQL Query” on page 360 ➤ “Create a Pattern View” on page 176 ➤ “Define a Report Rule – Scenario” on page 278

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

GUI Element (A-Z)	Description
	<p>If the window is not wide enough to display all the tabs, use the left and right arrows to move to the required tab.</p>
	<p>Click Show List to display a list of the available tabs for the current manager. You can select a tab from the list.</p>
<p>Affected Nodes</p>	<p>Displays which node is affected by the changes that occur in the selected trigger node. If required, you can click Edit to open and modify the Affected Nodes dialog box. For details, see “Affected Nodes Dialog Box” on page 220.</p> <p>Note: This tab appears only in Correlation Manager.</p>
<p>Attributes</p>	<p>Displays the attribute conditions defined for the node or the relationship. For details, see “Attribute Tab” on page 409.</p>
<p>Cardinality</p>	<p>Cardinality defines how many nodes you expect to have at the other end of a relationship. For example, in a relationship between host and IP, if the cardinality is 1:3, the TQL retrieves only those hosts that are connected to between one and three IPs. For details, see “Cardinality Tab” on page 411.</p>







GUI Element (A-Z)	Description
Details	<p>Displays the following information:</p> <ul style="list-style-type: none"> ▶ CI Type. The CIT of the selected node/relationship. ▶ Visible. A green check indicates that the selected node/relationship is visible in the topology map. A red mark indicates that it is not visible. ▶ Include subtypes. A green check indicates that both the selected CI and its children are displayed in the topology map. A red mark indicates that only the selected CI appears.
Edit	Click Edit to open the relevant dialog box for the selected tab.
Enrichment Rules	<p>Displays the Enrichment rule defined for the selected node or relationship. If the Enrichment rule is used to update the attributes of a CI, click Edit to open the Node/Relationship Definition dialog box and edit the rule if required. For details, see “Node/Relationship Definition Dialog Box” on page 350.</p> <p>Note: This tab appears only in Enrichment Manager.</p>
Folding Rule	<p>Displays the folding rule defined for the selected relationship. For details about folding rules, see “Adding Folding Rules to Relationships” on page 47.</p> <p>Note: This tab appears only when a relationship is selected in View Manager.</p>
Grouping	<p>Displays the different CI groupings for the selected node, as defined in the Grouping dialog box.</p> <p>Note: This tab appears only in View Manager.</p>
Node Definition	<p>Displays the attributes to be included in the report for the selected node. If required, you can click Edit to open and modify the Report Node definition dialog box. For details, see “Report Node Definition Dialog Box” on page 308.</p> <p>Note: This tab appears only in Topology Report Manager.</p>
Qualifiers	Displays the qualifier conditions defined for the node or the relationship. For details, see “Qualifier Tab” on page 414.

GUI Element (A-Z)	Description
Rule	<p>Displays the report folding rule defined for the selected relationship. For details about folding rules, see “Editing Pane” on page 302.</p> <p>Note: This tab appears only when a relationship is selected in Topology Report Manager.</p>
Selected Identities	<p>Displays the element instances that are used to define what should be included in the TQL results. For details, see “Identity Tab” on page 416.</p>

Report Node Definition Dialog Box

Description	<p>Displays the node attributes that are included in the report, that is, the report’s columns. Each row in the table represents a column that appears in the report.</p> <p>You select the required attributes from the Add Attributes dialog box.</p> <p>To access: Right-click a node and select Report Node Definition.</p>
Included in Tasks	<p>“Define a Report Rule – Scenario” on page 278</p>
Important Information	<p>Only defined nodes are included in the final report. However, other nodes are included in the report calculations, since they are part of the TQL that the report reflects, and they can influence the data that is displayed in it. For example, in a Report TQL, which consists of a linked Host and IP, the IP has an attribute condition that states that only IPs that are in a critical state are included in the query results. Consequently, the report includes only hosts that are connected to IPs in a critical state, even if the IPs themselves are not included in the report.</p> <p>Note: The nodes to be included in the reports must be connected to each other through the TQL scenario. You cannot define nodes that are not linked to at least one other node that is included in the report.</p>

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


GUI Element (A-Z)	Description
	Select the attributes you want to appear in the report template. Opens the Add Attributes dialog box.
	Define the function you want to perform on the Report node. Opens the Add Function dialog box.
	<p>Modify the attributes, functions and parameters, defined for each Report node.</p> <p>Enables you to:</p> <ul style="list-style-type: none"> ▶ Modify the name of the column title for that attribute. Select an attribute that displays attribute in the Function column. Opens the Add/Edit Attribute dialog box. ▶ Modify the functions and parameters you defined for the selected report node. Select an attribute that displays the parameters included for each node and the function (such as sum or max) performed on them in the Function and Parameter columns. Opens the Add/Edit Function dialog box.
	Delete the selected report node definition. A column for the node definition you deleted does not appear in the report.
	Use the up and down arrows to determine the order of each node included in the report.
	Define the sort order of the information reported for each Report node. Opens the Attribute Columns dialog box.
<Click a column header>	For details, see “Customizing Columns” in <i>Reference Information</i> .
<Right-click a column header>	For details, see “Customizing Columns” in <i>Reference Information</i> .

GUI Element (A-Z)	Description
Field	Displays the nodes that are included in the report, that is, the report's columns. The title of the column as displayed in the Field box is the way the column title appears in the report template. By default, column titles take the same name as the selected attribute. You can change the title of the column in the Edit Attribute dialog box.
Parameters	Displays the parameters you defined for the Report node. For details, see the Add/Edit Function dialog box.
Title	A title for the selected Report node definition.
Type	Displays the functions you defined for the Report node. For details, see the Add/Edit Function dialog box.

Set Node Order Dialog Box

Description	Determine the order in which the Report nodes appear in the report. To access: Right-click any node displayed in the editing pane and select Node Order to open the Set Node Order dialog box. The Set Node Order dialog box displays a row for each node that is included in the report.
Included in Tasks	"Define a Report Rule – Scenario" on page 278

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

GUI Element (A-Z)	Description
	Use the up and down arrows to determine the order of each node included in the report.
Nodes	The list of nodes contained in the selected Report query.

Set Report Parameters Wizard

Description	<p>Displays all the parameterized values defined for the nodes in the TQL as configured in the Attribute tab in the Node/Relationship dialog box.</p> <p>Enables you to modify the value and then generate a report based on the changed value.</p> <p>To access: In the Reports pane, right-click a Report definition whose report was defined with parameterized values from the Attribute tab in the Node/Relationship dialog box.</p>
Important Information	<ul style="list-style-type: none"> ▶ Changing the value in the Set Report Parameters wizard changes what is displayed in the generated report and not the TQL query results. ▶ This dialog box is available only if you defined parameterized values in the Attribute tab in the Node/Relationship dialog box.
Included in Tasks	“Define a Report Rule – Scenario” on page 278
Useful Links	“Topology Report” on page 589
Wizard Map	<p>The Set Report Parameters Wizard contains:</p> <p>Set Parameters on <node> > Set Parameterized Values Summary Page</p>

Set Parameters on <node>

Description	Enables you to modify the parameterized value and then generate a report based on the changed value.
Wizard Map	<p>The Set Report Parameters Wizard contains:</p> <p>Set Parameters on <node> > Set Parameterized Values Summary Page</p>

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

GUI Element (A-Z)	Description
Attribute name	The attribute used in the attribute condition.
Operator	The operator used in the attribute condition.
Value	The value of the attribute.

Set Parameterized Values Summary Page

Description	Displays all the parameterized values defined for all the TQL's nodes as configured in the Attribute tab in the Node/Relationship dialog box.
Wizard Map	The Set Report Parameters Wizard contains: Set Parameters on <node> > Set Parameterized Values Summary Page

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


GUI Element (A-Z)	Description
<Parameterized values>	Displays all the parameterized values defined for the TQL's nodes.

Set View-specific Report Dialog Box

Description	Enables you to generate a report of the selected Report TQL query based on a specific view rather than the entire CMDB. To access: In the Reports pane, right-click a Report definition and select View-Specific Report .
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Included in Tasks	“Define a Report Rule – Scenario” on page 278
Useful Links	“Topology Report” on page 589

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

GUI Element (A-Z)	Description
	Click to open the Select View dialog box. Select the view on which you want to base the report.
View	Opens the View tree. Select the view on which you want to base the report.

Troubleshooting and Limitations

You cannot create a new report if the report’s name contains more than 16 Japanese characters. For details, see “New Report/Report Properties/Save As Report Wizard” on page 295.

9

Query Manager

This chapter provides information on Query Manager.

This chapter includes:

Concepts

- ▶ Query Manager Overview on page 315

Tasks

- ▶ Create a TQL Query on page 317

Reference

- ▶ Query Manager User Interface on page 317

Query Manager Overview

Query Manager enables you to create TQL queries that can be used in other managers.

It is recommended to use the relevant managers (Correlation Manager, Enrichment Manager, View Manager, Topology Report Manager, Trigger TQL Editor) to create your TQL queries, rather than Query Manager. All TQL queries that are created in the other managers automatically appear in Query Manager.

You can use the Save As option in Query Manager to change the type of a TQL, so you do not have to recreate it. For details, see “Queries Pane” on page 321. Then, to see the query results in the Topology Map, you can create, in View Manager, a view based on the TQL query created in Query Manager.

Once you create and save a TQL query of the types View, Correlation, Enrichment, and Report, you cannot edit it. To edit a TQL of these types, you can go to the relevant manager, for example, the View Manager, and create a new view based on the TQL query that you created in Query Manager. Then you can edit the TQL query which was created in Query Manager, in the View Manager. Any changes you make to the query in the View Manager appear in the TQL query in Query Manager. You can only edit queries of the types Integration or Discovery in Query Manager.

You can display the retrieved data of the view's TQLs in a topology map where you can monitor the data. For details, see "Topology View Application" on page 511. The TQL resides in the system's memory and generates updated results automatically. For more information about Topology Query Language, see "Topology Query Language" on page 355.

Create a TQL Query

To create a TQL query, you need to create a TQL and then add the TQL nodes and relationships that define the query.

Select **Admin > Universal CMDB > Modeling > Query Manager** to open Query Manager. For details about how to create a TQL query, see “New Query/Save Query As/Query Properties Dialog Box” on page 317.


For details about how to add nodes and relationships to a query, see “Add Nodes and Relationships to a TQL Query” on page 362.

Query Manager User Interface

This section describes:

- New Query/Save Query As/Query Properties Dialog Box on page 317
- Query Manager Window on page 320

New Query/Save Query As/Query Properties Dialog Box

Description	<p>Create or modify a TQL query.</p> <p>To access:</p> <ul style="list-style-type: none"> ➤ Right-click anywhere in the Queries pane and click New or click the New  button. or ➤ Right-click a TQL query and select Properties.
Important Information	<p>TQL queries are subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 433.</p> <p>If the TQL is not valid, you cannot save it.</p>
Included in Tasks	<p>“Create a TQL Query” on page 317</p>

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

GUI Element (A-Z)	Description
Persistent	(Optional) Define whether the selected TQL should always remain in the system memory. Use this option only for frequently used TQLs.
Query Description	(Optional) Enter a description of the TQL query.
Query Name	Enter a unique name for the TQL query.
Query Priority	Select a priority level for the new TQL query (Low , Medium , High , or Express). This setting determines how often the query should be rerun automatically by the system to include updated information from the CMDB. Note: If you are creating a TQL of the type Enrichment , you can choose a priority of either Low or Medium only.

GUI Element (A-Z)	Description
Query Type	<p>You can create a TQL query of the following types:</p> <ul style="list-style-type: none"> ▶ View. Creates queries for pattern views whose results are displayed in IT Universe. For details, see “View Manager” on page 157. <p>Note: Perspectives cannot be deleted from the Query Manager.</p> <ul style="list-style-type: none"> ▶ Correlation. Creates queries containing Correlation nodes, defined using the Correlation Manager. For details, see “Correlation Manager” on page 211. ▶ Enrichment. Creates queries containing Enrichment nodes and relationships. For details, see “Enrichment Manager” on page 329. ▶ Report. Creates queries whose results are compiled into reports using Topology Report Manager. For details, see “Topology Report Manager” on page 277. ▶ Discovery. Creates queries for use by the Discovery and Dependency Mapping (DDM) system. For details, see, “Trigger TQL Editor Window” in <i>Discovery and Dependency Mapping Guide</i>. ▶ Integration. Creates queries for use with the CMDB API. For details, see “The HP Universal CMDB Web Service API” in <i>Solutions and Integrations</i>. <p>Note: Discovery TQLs should be created only by users who are thoroughly familiar with the DDM patterns used by the DDM system. For details, contact HP Software Support.</p>












Query Manager Window








Description	<p>Enables you to query the CMDB by defining TQL queries or to change the type of an existing TQL.</p> <p>To access: Click Admin > Universal CMDB > Modeling > Query Manager.</p>
Important Information	<ul style="list-style-type: none"> ▶ It is recommended to use the relevant Managers (Correlation Manager, Enrichment Manager, View Manager, Topology Report Manager, Trigger TQL Editor) to create your TQL queries, rather than Query Manager. All TQLs that are created in the other managers automatically appear in Query Manager. You can use the Save As option in Query Manager to change the type of TQL, so you do not have to recreate it. For details, see “Queries Pane” on page 321. ▶ Once you create and save a TQL query of the types View, Correlation, Enrichment, and Report, you cannot edit it. To edit a TQL of these types, you can go to the relevant manager, for example, the View Manager, and create a new view based on the TQL query that you created in Query Manager. You can then edit the TQL query (which was created in Query Manager) in the View Manager. Any changes you make to the query in the View Manager appear in the TQL query in Query Manager. You can only edit queries of the Integration or Discovery types in Query Manager. ▶ For TQL queries to be valid, they must comply with the restrictions described in “Troubleshooting and Limitations” on page 433.
Useful Links	<p>“Topology Query Language (TQL) Overview” on page 356</p>

Queries Pane

Description	<p>Displays a hierarchical tree structure of predefined folders and TQL queries.</p> <p>You can create your own query, or work with the default queries provided with your HP Business Availability Center installation.</p> <p>Predefined folders are provided for the out-of-the-box queries; you can modify these folders, or add additional folders according to your organization's requirements.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
	Creates a new folder.
	Enables you to create a TQL query of the types View, Correlation, Enrichment, Report, Discovery, or Integration. You can only edit queries of the types Integration or Discovery in Query Manager. Opens the New Query dialog box.
	Deletes the selected folder or TQL query.
	Refreshes the data content of the hierarchical tree structure that may have been modified by other users.
	(Enabled only when a TQL query is created or when changes are made to an existing one.) Save the TQL query to the CMDB.
	Opens the Query Properties dialog box. For a description, see "Properties" below.
	Generates a preview of the results of the selected TQL query.
	Represents a folder.
	Represents a TQL query of the type Integration.

GUI Element (A-Z)	Description
	Represents a TQL query of the type (pattern) View.
	Represents a TQL query of the type Template.
	Represents a TQL query of the type Perspective.
	Represents a TQL query of the type Correlation.
	Represents a TQL query of the type Enrichment.
	Represents a TQL query of the type Report.
	Represents a TQL query of the type Discovery.

The following elements are available by right-clicking a folder or a TQL query:

GUI Element (A-Z)	Description
Delete	Delete the selected folder or TQL query.
Export	Displays a standard Save As dialog box, enabling you to save the TQL query in XML script format. This option can be used to move TQL queries from one workstation to another.
Import	Imports XML files that contain saved TQL queries to Query Manager.
New	Create a TQL query. For details, see “New Query/Save Query As/Query Properties Dialog Box” on page 317.
New Folder	Create a new folder.
Preview	Generates a preview of the results of the selected TQL query.
Properties	Opens the TQL Properties dialog box. Enables you to change the priority and description of the selected TQL query, and define whether the TQL should always remain in the system memory (Persistent).

GUI Element (A-Z)	Description
Rename Folder	Rename the folder.
Save	(Enabled only when a new TQL is created or when changes are made to an existing TQL) Save the query to the CMDB after you have defined the specific attribute conditions of the nodes and relationships in the query. Note: If you exit the Query Manager without saving, a confirmation dialog box is displayed, requesting that you save your query.
Save As	Opens the Save Query As dialog box, enabling you to create a query by copying an existing one. You can change the type of the query. For a description of the available query types, see “Query Type” on page 319.

Editing Pane

Description	Displays the currently selected TQL. <ul style="list-style-type: none"> ▶ When you select a folder in the Queries pane, the editing pane is empty. ▶ When you select a TQL query in the Queries pane, the editing pane displays the selected query, which consists of TQL nodes that are defined in the TQL query and the relationships between them.
Useful Links	“Add Nodes and Relationships to a TQL Query” on page 362.

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

GUI Element (A-Z)	Description
<Context menu> options	For details, see “Context Menu Options” on page 371.
<Main Menu>	For details, see “Main Menu” on page 729.
<Node>	A component from which TQL queries are built.






GUI Element (A-Z)	Description
<Relationship>	The entity that defines the relationship between two nodes.
<toolbar>	For details, see “Toolbar Options” on page 733.
<tooltips>	<p>Hold the cursor over a node or relationship to view its tooltip.</p> <p>The tooltips contain the following information:</p> <ul style="list-style-type: none"> ▶ Element name. The name of the node. ▶ CI Type. The CIT of the node as defined in the CI Type Manager. For details, see “CI Type Manager” on page 239. ▶ Definitions of the selected nodes and relationships. The attribute conditions, as described in “Node/Relationship Properties Dialog Box” on page 407.

CI Type Selector

Description	<p>Displays a hierarchical tree structure of the CI Types found in the CMDB. For more details, see “CI Type Manager User Interface” on page 250.</p> <p>Note: The number of instances of each CIT in the CMDB is displayed to the right of each CIT.</p> <p>To create or modify a TQL query, click and drag nodes to the Editing pane and define the relationship between them. Your changes are saved to the CMDB. For details, see “Add Nodes and Relationships to a TQL Query” in <i>Model Management</i>.</p>
Important Information	The CI Type Selector is part of the following managers: View Manager, Enrichment Manager, Query Manager, Correlation Manager, Topology Report Manager, and Trigger TQL Editor.

Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Define a TQL Query” on page 360 ➤ “Create a Pattern View” on page 176 ➤ “Define a Report Rule – Scenario” on page 278
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):


GUI Element (A-Z)	Description
	Click Add CI Type to Map to move the selected CI type to the Editing pane.
	Click Refresh to refresh the CI type tree.
	Click Search to search for the CI type entered.
	Click Expand All to expand all subtrees within the CI type tree.
	Click Collapse All to collapse the subtrees within the CI type tree.
<Search window>	Enter the name or part of a name of a CI type for which to search.

Context Menu Options



The CI Type Selector includes the following elements (listed alphabetically) available by right-clicking a CI Type:

Menu Item	Description
Add CI Type to Map	Select to add the selected CI type to the Editing pane.
Go to CI Type Definition	Takes you directly to the selected CI type in CIT Manager.
Show CIT Instances	Opens the Show All Instances window, which displays all instances of the selected CIT. For details, see “Element Instances Dialog Box” in <i>Model Management</i> .

Information Pane

Description	Displays the properties, conditions, and cardinality for the selected node and relationship.
Important Information	<p>The Information pane appears in the lower part of the window in the following managers and user interfaces: View Manager, Correlation Manager, Query Manager, Topology Report Manager, Enrichment Manager, Discovery Input TQL Editor, and Discovery Trigger TQL Editor.</p> <p>A small green indicator  appears next to the tabs in which a change occurred.</p>
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Define a TQL Query” on page 360 ➤ “Create a Pattern View” on page 176 ➤ “Define a Report Rule – Scenario” on page 278

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

GUI Element (A-Z)	Description
	If the window is not wide enough to display all the tabs, use the left and right arrows to move to the required tab.
	Click Show List to display a list of the available tabs for the current manager. You can select a tab from the list.
Affected Nodes	Displays which node is affected by the changes that occur in the selected trigger node. If required, you can click Edit to open and modify the Affected Nodes dialog box. For details, see “Affected Nodes Dialog Box” on page 220. Note: This tab appears only in Correlation Manager.
Attributes	Displays the attribute conditions defined for the node or the relationship. For details, see “Attribute Tab” on page 409.
Cardinality	Cardinality defines how many nodes you expect to have at the other end of a relationship. For example, in a relationship between host and IP, if the cardinality is 1:3, the TQL retrieves only those hosts that are connected to between one and three IPs. For details, see “Cardinality Tab” on page 411.
Details	Displays the following information: <ul style="list-style-type: none"> ▶ CI Type. The CIT of the selected node/relationship. ▶ Visible. A green check indicates that the selected node/relationship is visible in the topology map. A red mark indicates that it is not visible. ▶ Include subtypes. A green check indicates that both the selected CI and its children are displayed in the topology map. A red mark indicates that only the selected CI appears.
Edit	Click Edit to open the relevant dialog box for the selected tab.

GUI Element (A-Z)	Description
Enrichment Rules	<p>Displays the Enrichment rule defined for the selected node or relationship. If the Enrichment rule is used to update the attributes of a CI, click Edit to open the Node/Relationship Definition dialog box and edit the rule if required. For details, see “Node/Relationship Definition Dialog Box” on page 350.</p> <p>Note: This tab appears only in Enrichment Manager.</p>
Folding Rule	<p>Displays the folding rule defined for the selected relationship. For details about folding rules, see “Adding Folding Rules to Relationships” on page 47.</p> <p>Note: This tab appears only when a relationship is selected in View Manager.</p>
Grouping	<p>Displays the different CI groupings for the selected node, as defined in the Grouping dialog box.</p> <p>Note: This tab appears only in View Manager.</p>
Node Definition	<p>Displays the attributes to be included in the report for the selected node. If required, you can click Edit to open and modify the Report Node definition dialog box. For details, see “Report Node Definition Dialog Box” on page 308.</p> <p>Note: This tab appears only in Topology Report Manager.</p>
Qualifiers	<p>Displays the qualifier conditions defined for the node or the relationship. For details, see “Qualifier Tab” on page 414.</p>
Rule	<p>Displays the report folding rule defined for the selected relationship. For details about folding rules, see “Editing Pane” on page 302.</p> <p>Note: This tab appears only when a relationship is selected in Topology Report Manager.</p>
Selected Identities	<p>Displays the element instances that are used to define what should be included in the TQL results. For details, see “Identity Tab” on page 416.</p>

10

Enrichment Manager

This chapter provides information on Enrichment Manager.

This chapter includes:

Concepts

- ▶ Enrichment Manager Overview on page 329

Tasks

- ▶ Define an Enrichment Rule – Scenario on page 332

Reference

- ▶ Enrichment Manager User Interface on page 335

Enrichment Manager Overview

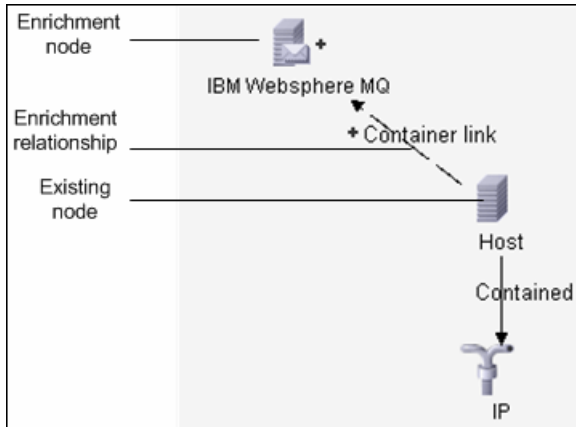
Enrichment rules can be used for several purposes:

- ▶ Adding new CIs and relationships to the CMDB.
- ▶ Deleting specific CI instances from the CMDB.
- ▶ Updating the attribute values of specific CI instances in the CMDB.

Enrichment nodes and relationships differ from other nodes and relationships in that they are conceptual deductions that represent real relationships and CIs that cannot be discovered automatically by the discovery process.

Enrichment nodes and relationships are created as part of a TQL, whose other TQL nodes are regular ones, meaning TQL nodes that already exist in the CMDB. For more information about TQL queries, see “Topology Query Language” on page 355.

The following example displays a regular **Host** node linked to an **IBM Websphere MQ Enrichment** node by an Enrichment **Container link** relationship.

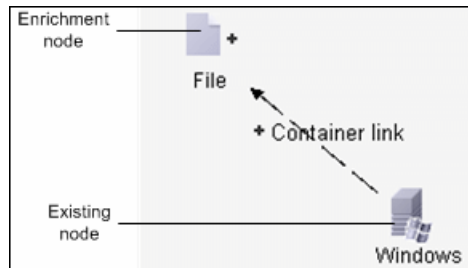


By placing an Enrichment node within a TQL query context, the query receives data from its attributes, and uses it to insert new information into the CMDB.

When you create Enrichment rules, the following results can occur:

- ▶ **The CMDB is enlarged.** Add Enrichment nodes and relationships that are currently not included in the CMDB.

The following Enrichment rule example displays a regular **Windows** node (that already exists in the CMDB) connected to a **File** Enrichment node by an Enrichment **Container link** relationship.



This Enrichment rule states that for every **Windows** CI instance that is found in the CMDB, a new **File** CI instance is created, and linked to the **Windows** CI with a **Container link** relationship.

- ▶ **Specific CI instances are deleted from the CMDB.** For an example, see “Define an Enrichment Rule – Scenario” on page 332.
- ▶ **The values of CI attributes are updated.** Use an Enrichment rule to update the attributes of a CI that already exists in the CMDB.

The following Enrichment rule example illustrates that a regular **File System** node (that already exists in the CMDB) has been updated with an Enrichment rule.



File System

This Enrichment rule states that every **File System** CI found in the CMDB is updated with the attribute value defined in the Enrichment rule.

Define an Enrichment Rule – Scenario

This task describes how to create an Enrichment rule where, for every instance in the CMDB in which an **IP** CI is connected to two identical **Host** CIs, but one **Host** CI is identified by its IP address and the other host is identified by its lowest MAC address, the **Host** CI that is identified by its IP address is deleted from the CMDB.

Note: To reach the required result, you must implement each one of the following steps.

This task includes the following steps:

- ▶ “Create an Enrichment TQL Query” on page 332
- ▶ “Define the Host Node that Is Identified by its Lowest MAC Address” on page 334
- ▶ “Define the Host Node that is Identified by its IP Address” on page 334
- ▶ “Define the Enrichment Rule” on page 335

1 Create an Enrichment TQL Query

To create an Enrichment TQL query, you need to define an Enrichment rule and then add the regular TQL nodes and relationships that define the query.

Note: You can add Enrichment nodes and relationships only after at least one regular node has been added to the query. In this task then, you must first add regular nodes and relationships.

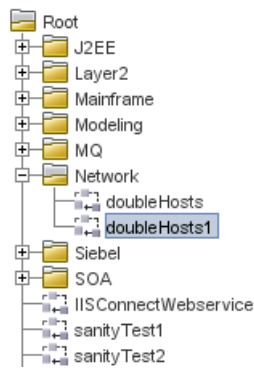
Select **Admin > Universal CMDB > Modeling > Enrichment Manager**. For details about how to create an Enrichment TQL query, see “New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard” on page 346. For details about how to add nodes and relationships to a query, see “Add Nodes and Relationships to a TQL Query” on page 362.

Example of an Enrichment TQL Query

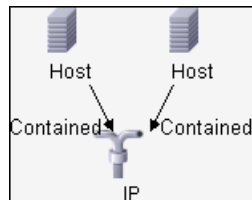
A new Enrichment TQL query called `doubleHosts1` (located under the **Network** folder) is created in the Enrichment Manager.

The screenshot shows the configuration for the `doubleHosts1` rule. The **Rule Name** field contains `doubleHosts1`. The **Rule Description** field contains the text "Delete incomplete host". At the bottom, there is a checkbox labeled **Rule is Active** which is checked.

The **doubleHosts1** Enrichment rule is displayed in the Enrichment Rules pane.



In this Enrichment TQL query, an **IP** node is linked to two **Host** nodes by a **Contained** relationship. The TQL results must comply with the direction of the arrows.



Note: A TQL query is subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 433.

2 Define the Host Node that Is Identified by its Lowest MAC Address

At the top of the Enrichment Manager window, select **TQL** mode. In the editing pane, right-click the required **Host** node, select **Node Properties** to open the Node Properties dialog box. Then define an attribute condition in the Attribute tab. For details on how to define an attribute condition, see “Attribute Tab” on page 409.

Example of an Attribute Condition Definition that Identifies the Host by its Lowest Mac Address

In the Attribute tab, this attribute condition definition identifies the required Host by its lowest MAC address.

- **Attribute name** — Host is Complete
- **Operator** — Equal
- **Value** — True

3 Define the Host Node that is Identified by its IP Address

At the top of the Enrichment Manager window, select **TQL** mode. In the editing pane, right-click the required **Host** node, and select **Node Properties** to open the Node Properties dialog box. Then define two attribute conditions in the Attribute tab. For details on how to define an attribute condition, see “Attribute Tab” on page 409.

Example of an Attribute Condition that Enables a Host to Be Identified by its IP Address

This attribute condition is the first attribute condition you need to define in the Attribute tab to enable the Host node to be identified by its IP address.

- **Attribute name** — Host is Complete
- **Operator** — Equal

- **Value** — False

This is the second attribute condition you need to define in the Attribute tab to enable the Host node to be identified by its IP address.

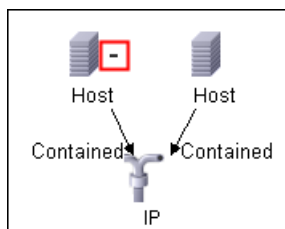
- **Attribute name** — Host is Complete
- **Operator** — Is null
- **Value** — Value cannot be changed

4 Define the Enrichment Rule

Define the Enrichment rule that deletes all instances of the **Host** node that are identified by their IP address. From the Enrichment Manager window toolbar, select **Enrichment** mode. In the Enrichment Rules pane, select the **doubleHosts1** Enrichment rule. Then right-click the **Host** node that is identified by its IP address and select **Delete Relationship/Node Item**.

Example of a Host Node Containing a Removed Indicator

The **Host** node now has a removed indicator to denote that all host instances that have identical attribute and cardinality settings are removed from the CMDB. The Enrichment query now looks like this.



Enrichment Manager User Interface

This section describes:

- Enrichment Manager Window on page 336
- New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard on page 346

- ▶ Node/Relationship Definition Dialog Box on page 350
- ▶ Node Definition – Advanced Attribute Dialog Box on page 352










Enrichment Manager Window

Description	<p>Define Enrichment rules. These rules, which are based on a specific TQL query, can be used for several purposes:</p> <ul style="list-style-type: none"> ▶ Adding new CIs and relationships to the CMDB. ▶ Deleting specific CI instances from the CMDB. ▶ Updating the attribute values of specific CI instances in the CMDB. <p>To access: Select Admin > Universal CMDB > Modeling > Enrichment Manager.</p>
Important Information	<p>Enrichment Manager has two modes in which you can work. Always check the Enrichment/TQL mode list in the toolbar to verify the currently selected mode.</p>
Included in Tasks	<p>“Define an Enrichment Rule – Scenario” on page 332</p>

Enrichment Rules Pane

Description	<p>Displays a hierarchical tree structure of predefined folders and Enrichment rules. Each Enrichment rule is associated with a TQL query.</p> <p>You can create your own query, or work with the out-of-the-box (factory) queries provided with your HP Business Availability Center installation.</p> <p>The default folders are provided for the out-of-the-box queries. You can modify these folders, or add additional folders according to your organization’s requirements.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
	Creates a new folder.
	Creates an Enrichment rule. Opens the New Enrichment Rule/Properties wizard.
	Deletes the selected folder or Enrichment rule.
	Refreshes the data content of the hierarchical tree structure that may have been modified by other users.
	(Enabled only when an Enrichment rule is created or when changes are made to an existing one.) Saves the Enrichment rule to the CMDB.
	Opens the New Enrichment Rule/Properties wizard. Enables you to change the description and the activation state of the Enrichment rule.
	Generates a preview of the results of the selected Enrichment rule.
	Represents a folder.
	Represents an Enrichment rule.

The following elements are available by right-clicking a folder or Enrichment rule:




GUI Element (A-Z)	Description
Delete	Deletes the selected folder or Enrichment rule.
Export	Displays a standard Save As dialog box, enabling you to save the Enrichment rule as an XML script. This option can be used to move an Enrichment rule from one workstation to another, provided the related TQL query is also relocated.

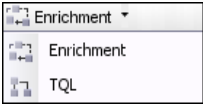
GUI Element (A-Z)	Description
Import	Imports XML files that contain saved Enrichment queries to the Enrichment Manager.
New	Creates an Enrichment rule. Opens the New Enrichment Rule dialog box.
New Folder	Creates a new folder.
Preview	Generates a preview of the results of the selected Enrichment rule.
Properties	Opens the New Enrichment Rule/Properties dialog box. Enables you to change the description and the activation state of the rule.
Rename Folder	Renames the folder
Save	(Enabled only when a new Enrichment query is created or when changes are made to an existing one.) Saves the Enrichment rule to the CMDB.
Save As	Displays the Save As dialog box, enabling you to define a new name and description for a query. This option can be used for creating a new Enrichment rule based on an existing one.

Editing Pane

Description	<p>Create and define Enrichment nodes and relationships.</p> <ul style="list-style-type: none"> ▶ When you select a folder in the Enrichment Rules pane, the editing pane is empty. ▶ When you select an Enrichment rule in the Enrichment Rules pane, the editing pane displays the selected rule, which consists of TQL nodes that are defined in the TQL query and the relationships between them, and the Enrichment nodes and relationships that are created and added to the rule.
Important Information	<ul style="list-style-type: none"> ▶ The Enrichment Manager has two modes in which you can work: Enrichment mode and TQL mode. The right-click options that appear when you click a node or relationship depends on the which mode in which you are working. For details, see the editing pane description below. ▶ You can calculate the number of instances that were created as a result of an Enrichment rule and remove the instances created from an Enrichment rule from the CMDB. For details, see “Additions Count” on page 733 and “Remove Enrichment Results” on page 738.
Included in Tasks	“Define an Enrichment Rule – Scenario” on page 332
Useful Links	For details on how to create a TQL query, see “Add Nodes and Relationships to a TQL Query” on page 362.

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





GUI Element (A-Z)	Description
	Indicates an added Enrichment node or relationship.
	Indicates a node or relationship that has been deleted from the CMDB.
	Indicates an updated node or relationship.


GUI Element (A-Z)	Description
 <p>TQL and Enrichment mode</p>	<p>The Enrichment Manager has two modes in which you can work: Enrichment mode and TQL mode.</p> <p>Working in:</p> <ul style="list-style-type: none"> ▶ TQL mode enables you to define regular (non-Enrichment) relationships and nodes and add them to the TQL query you defined. ▶ Enrichment mode enables you to define Enrichment relationships and nodes and add them to the TQL query you defined.
<Context menu> options	For details, see “Context Menu Options” on page 371.
<Main Menu>	For details, see “Main Menu” on page 729.
<Node>	A component from which TQL queries are built.
<Relationship>	The entity that defines the relationship between two nodes.
<Toolbar>	For details, see “Toolbar Options” on page 733.
<Tooltips>	<p>Hold the cursor over a node or relationship to view its tooltip.</p> <p>The tooltips contain the following information:</p> <ul style="list-style-type: none"> ▶ Element name. The name of the node. ▶ CI Type. The CIT of the node as defined in the CI Type Manager. For details, see “CI Type Manager” on page 239. ▶ Definitions of the selected nodes and relationships. The attribute conditions, as described in “Node/Relationship Properties Dialog Box” on page 407.

CI Type Selector

Description	<p>Displays a hierarchical tree structure of the CI Types found in the CMDB. For more details, see “CI Type Manager User Interface” on page 250.</p> <p>Note: The number of instances of each CIT in the CMDB is displayed to the right of each CIT.</p> <p>To create or modify a TQL query, click and drag nodes to the Editing pane and define the relationship between them. Your changes are saved to the CMDB. For details, see “Add Nodes and Relationships to a TQL Query” in <i>Model Management</i>.</p>
Important Information	<p>The CI Type Selector is part of the following managers: View Manager, Enrichment Manager, Query Manager, Correlation Manager, Topology Report Manager, and Trigger TQL Editor.</p>
Included in Tasks	<ul style="list-style-type: none"> ▶ “Define a Correlation Rule – Workflow” on page 213 ▶ “Define an Enrichment Rule – Scenario” on page 332 ▶ “Define a TQL Query” on page 360 ▶ “Create a Pattern View” on page 176 ▶ “Define a Report Rule – Scenario” on page 278

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

GUI Element (A-Z)	Description
	Click Add CI Type to Map to move the selected CI type to the Editing pane.
	Click Refresh to refresh the CI type tree.
	Click Search to search for the CI type entered.
	Click Expand All to expand all subtrees within the CI type tree.

GUI Element (A-Z)	Description
	Click Collapse All to collapse the subtrees within the CI type tree.
<Search window>	Enter the name or part of a name of a CI type for which to search.


Context Menu Options

The CI Type Selector includes the following elements (listed alphabetically) available by right-clicking a CI Type:



Menu Item	Description
Add CI Type to Map	Select to add the selected CI type to the Editing pane.
Go to CI Type Definition	Takes you directly to the selected CI type in CIT Manager.
Show CIT Instances	Opens the Show All Instances window, which displays all instances of the selected CIT. For details, see “Element Instances Dialog Box” in <i>Model Management</i> .

Information Pane

Description	Displays the properties, conditions, and cardinality for the selected node and relationship.
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Important Information	<p>The Information pane appears in the lower part of the window in the following managers and user interfaces: View Manager, Correlation Manager, Query Manager, Topology Report Manager, Enrichment Manager, Discovery Input TQL Editor, and Discovery Trigger TQL Editor.</p> <p>A small green indicator  appears next to the tabs in which a change occurred.</p>
Included in Tasks	<ul style="list-style-type: none">➤ “Define a Correlation Rule – Workflow” on page 213➤ “Define an Enrichment Rule – Scenario” on page 332➤ “Define a TQL Query” on page 360➤ “Create a Pattern View” on page 176➤ “Define a Report Rule – Scenario” on page 278

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

GUI Element (A-Z)	Description
	If the window is not wide enough to display all the tabs, use the left and right arrows to move to the required tab.
	Click Show List to display a list of the available tabs for the current manager. You can select a tab from the list.
Affected Nodes	Displays which node is affected by the changes that occur in the selected trigger node. If required, you can click Edit to open and modify the Affected Nodes dialog box. For details, see “Affected Nodes Dialog Box” on page 220. Note: This tab appears only in Correlation Manager.
Attributes	Displays the attribute conditions defined for the node or the relationship. For details, see “Attribute Tab” on page 409.
Cardinality	Cardinality defines how many nodes you expect to have at the other end of a relationship. For example, in a relationship between host and IP, if the cardinality is 1:3, the TQL retrieves only those hosts that are connected to between one and three IPs. For details, see “Cardinality Tab” on page 411.
Details	Displays the following information: <ul style="list-style-type: none"> ➤ CI Type. The CIT of the selected node/relationship. ➤ Visible. A green check indicates that the selected node/relationship is visible in the topology map. A red mark indicates that it is not visible. ➤ Include subtypes. A green check indicates that both the selected CI and its children are displayed in the topology map. A red mark indicates that only the selected CI appears.
Edit	Click Edit to open the relevant dialog box for the selected tab.

GUI Element (A-Z)	Description
Enrichment Rules	<p>Displays the Enrichment rule defined for the selected node or relationship. If the Enrichment rule is used to update the attributes of a CI, click Edit to open the Node/Relationship Definition dialog box and edit the rule if required. For details, see “Node/Relationship Definition Dialog Box” on page 350.</p> <p>Note: This tab appears only in Enrichment Manager.</p>
Folding Rule	<p>Displays the folding rule defined for the selected relationship. For details about folding rules, see “Adding Folding Rules to Relationships” on page 47.</p> <p>Note: This tab appears only when a relationship is selected in View Manager.</p>
Grouping	<p>Displays the different CI groupings for the selected node, as defined in the Grouping dialog box.</p> <p>Note: This tab appears only in View Manager.</p>
Node Definition	<p>Displays the attributes to be included in the report for the selected node. If required, you can click Edit to open and modify the Report Node definition dialog box. For details, see “Report Node Definition Dialog Box” on page 308.</p> <p>Note: This tab appears only in Topology Report Manager.</p>
Qualifiers	<p>Displays the qualifier conditions defined for the node or the relationship. For details, see “Qualifier Tab” on page 414.</p>
Rule	<p>Displays the report folding rule defined for the selected relationship. For details about folding rules, see “Editing Pane” on page 302.</p> <p>Note: This tab appears only when a relationship is selected in Topology Report Manager.</p>
Selected Identities	<p>Displays the element instances that are used to define what should be included in the TQL results. For details, see “Identity Tab” on page 416.</p>

New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard

Description	<p>Creates or modifies an Enrichment rule.</p> <p>To access:</p> <ul style="list-style-type: none"> ▶ To create a new Enrichment rule, right-click anywhere in the Enrichment Rules pane and click New or click the New  button. ▶ To modify an existing Enrichment rule, right-click an Enrichment rule in the Enrichment Rules pane and select Properties. ▶ To create a new Enrichment rule based on an existing query, right-click an Enrichment rule in the Enrichment Rules pane and select Save As.
Included in Tasks	“Define an Enrichment Rule – Scenario” on page 332
Important Information	<ul style="list-style-type: none"> ▶ When creating a new Enrichment rule, bear in mind that the application does not allow you to make any changes in the TQL that are necessary for the rule. These changes include the following: <ul style="list-style-type: none"> ▶ Deleting, from the Enrichment TQL, the nodes or relationships connected to the Enrichment node, causing a node to become unattached to any relationship. ▶ You cannot change the cardinality definition to 0 (not required) of a node or relationship that is used in an Enrichment rule. For details on relationship cardinality, see “Node/Relationship Properties Dialog Box” on page 407. ▶ An Enrichment TQL that serves as the basis for Enrichment rules, is subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 433. If the TQL is not valid, you cannot save it.
Useful links	“Topology Query Language” on page 355
Wizard Map	<p>The New Enrichment Rule /Enrichment Rule Properties/Save As Correlation Rule wizard contains:</p> <p>Rule General Attributes Page > Rule Base TQL Page</p>

 **Rule General Attributes Page**

Description	Enables you to enter a unique name and description for the Enrichment rule.
Included in Tasks	“Define an Enrichment Rule – Scenario” on page 332
Important Information	<ul style="list-style-type: none"> ▶ An Enrichment TQL that serves as the basis for Enrichment rules, is subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 433. If the TQL is not valid, you cannot save it. ▶ For important information on the effects of making changes to the TQL after creating it, see “New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard” on page 346. ▶ By default, this wizard is set to display a Welcome page. You can choose not to display this page by changing the user preferences. For details, see “User Preferences Dialog Box” on page 432.
Useful Links	“Topology Query Language” on page 355
Wizard Map	The New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard contains: Rule General Attributes Page > Rule Base TQL Page

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

GUI Element (A-Z)	Description
Description	(Optional) Enter a description of the rule.
Enrichment Rule is Active	<p>(Optional) Select this option to activate the rule in the system as soon as it is saved.</p> <p>Default: Not selected</p> <p>Notes:</p> <ul style="list-style-type: none"> ▶ If an active Enrichment rule is deactivated (by clearing the Enrichment Rule is Active check box), all changes that occurred in the CMDB relating to the rule are deleted from the system. When you deactivate an Enrichment rule, a red X appears next to the Enrichment rule in the Enrichment Rules pane. ▶ To reactivate the rule, right-click the rule in the Enrichment Rules pane and select Properties. In the General Attributes page , select Enrichment Rule is Active.
Rule Name	<p>Enter a unique name for the Enrichment rule.</p> <p>The rule name cannot contain any of the following characters: \ / : " < > % ?</p> <p>Note: If the Enrichment rule name is either empty, contains a name used by another Enrichment rule, or uses invalid characters, the Next and Finish buttons are disabled.</p>

 **Rule Base TQL Page**

Description	Enables you to define the properties of the TQL on which the Enrichment rule is based.
Included in Tasks	“Define an Enrichment Rule – Scenario” on page 332
Important Information	<ul style="list-style-type: none"> ▶ An Enrichment TQL that serves as the basis for Enrichment rules, is subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 433. If the TQL is not valid, you cannot save it. ▶ For important information on the effects of making changes to the TQL after creating it, see “New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard” on page 346. ▶ By default, this wizard is set to display a Completion page after clicking Next in this page. You can choose not to display the Completion page by changing the user preferences. For details, see “User Preferences Dialog Box” on page 432.
Useful Links	“Topology Query Language” on page 355
Wizard Map	The New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard contains: Rule General Attributes Page > Rule Base TQL Page

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

GUI Element (A-Z)	Description
Base the Enrichment rule on a new TQL	Select this check box if you want to base the Enrichment rule on a new TQL query. The TQL results are based on the attributes defined for the new TQL query.
Base the Enrichment rule on an existing TQL	Select this check box if you want to base the Enrichment rule on an existing TQL query. Select the required Enrichment TQL query from the drop-down list.
Base TQL Description	(Optional) Enter a description of the TQL query.

GUI Element (A-Z)	Description
Base TQL Name	Enter a unique name for the Enrichment TQL query. If you selected the Base the Enrichment rule on an existing TQL option, select the Enrichment TQL query on which you want to base the rule.
Base TQL Priority	Select a priority level for the new TQL query (Low and Medium). This setting determines how often the query is rerun automatically by the system to include updated information from the CMDB.

Node/Relationship Definition Dialog Box

Description	<p>Displays the attributes of the selected node/relationship. The key attributes and the required attributes of the selected node appear in bold.</p> <p>Use an Enrichment rule to update the value of CI attributes in the CMDB, or to add data to attributes that currently do not have values. You can use this option, for example, for adding a note simultaneously to all CI instances.</p> <p>To access: Right-click a node or relationship when in Enrichment mode (select Enrichment from the TQL/Enrichment list at the top of the Enrichment Manager window) and select Update Relationship/Node.</p>
Important Information	<p>You must fill in the value of the key attributes and the required attributes of the Enrichment node. The method you use to define these values determines the number of instances created.</p> <p>If you enter a dynamic value, you can create numerous instances. For example, entering the dynamic value of a <code>host_key</code> for the CIT Host or an IP address attribute for the CIT IP.</p>
Included in Tasks	“Define an Enrichment Rule – Scenario” on page 332


Attributes Area

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

GUI Element (A-Z)	Description
Name	The attribute name.
Type	The field type of the selected attribute.
Value	<p>The value as defined in one of the following:</p> <ul style="list-style-type: none"> ▶ The Value box in the Set Attributes area. ▶ The combination of the values in the By Attribute boxes in the Set Attributes area. ▶ The Value column if you selected Simple in the Type column in the Node Definition - Advanced Attribute dialog box. ▶ The combination of the values in the Value column and the column to the right of the Value column if you selected By Attribute in the Type column in the Node Definition - Advanced Attribute dialog box.

Set Attributes Area

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







GUI Element (A-Z)	Description
	<p>(Appears only if you selected an attribute of the field type string.) Opens the Node Definition - Advanced Attribute dialog box.</p> <p>Define node and relationship attributes of the type string using simple or complex expressions. You can also create complex expressions using regular expression format.</p>
Advanced	<p>(Appears only if you selected an attribute of the field type string.) Displays the attribute value you defined in the Node Definition - Advanced Attribute dialog box.</p>


GUI Element (A-Z)	Description
By Attribute	<p>Define an attribute using attributes from other nodes in the TQL query.</p> <ul style="list-style-type: none"> ➤ In the box to the left, select the required node. ➤ In the box to the right, select the node's required attribute. <p>The attribute definition appears in the Value column in the Attributes area.</p>
RegExp Group	<p>(Appears only when you select an attribute of the field type string.) Enter the group number only if you are adding a regular expression using regular expression syntax. This is the part of the regular expression pattern to focus on when creating the attribute. A set of parentheses () constitutes a group.</p>
Regular Expression	<p>(Appears only when you select an attribute of the field type string.) Add a regular expression using regular expression syntax. Enter the regular expression pattern.</p>
Value (in the Set Attributes area)	<p>Define a constant value. Enter the required value in the Value box or select a value from the Value list.</p> <p>Note: The value definition appears in the Value column in the Attributes area.</p>

Node Definition – Advanced Attribute Dialog Box

Description	<p>Define node and relationship attributes of the type String using simple or complex expressions. You can also create complex expressions using regular expression format.</p> <p>To access:</p> <ol style="list-style-type: none"> 1 Select an attribute of the type string in the Node Definition dialog box. 2 Select Advanced and then click the Advanced button.
Included in Tasks	<p>“Define an Enrichment Rule – Scenario” on page 332</p>

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

GUI Element (A-Z)	Description
	Define an attribute value using simple or complex expressions. Creates a new entry in the Type column. Click the new entry and select either Simple or By Attribute . For details, see the description for the Type column below.
	Delete an attribute value.
	Move a selected row up.
	Move a selected row down.
Advanced Value	(This list is only available if you select By Attribute in the Type column.) Click the entry inside the box and select the required attribute.
Concatenate	Use all the attribute values listed in this dialog box.
RegExp Group	(This list is only available if you select By Attribute in the Type column.) Click inside the RegExp Group column, click the  button, and enter the group number in the Value for RegExp Group dialog box that opens. This is the part of the regular expression pattern to focus on when creating the attribute. A set of parentheses () constitutes a group.
Regular Expression	(This list is only available if you select By Attribute in the Type column.) Click inside the Regular Expression column, click the  button, and enter the regular expression pattern in the Value for Regular Expression dialog box that opens.

GUI Element (A-Z)	Description
<p>Type</p>	<p>Click the entry inside the Type column and select one of the following options:</p> <ul style="list-style-type: none"> ▶ Simple. Define a constant value using a simple expression. ▶ By Attribute. Define an attribute using attributes from other nodes in the TQL. <p>Default is: Simple</p>
<p>Use first attribute with value</p>	<p>Use the first attribute value listed in this dialog box that is not empty.</p>
<p>Value</p>	<ul style="list-style-type: none"> ▶ If you select Simple in the Type column, click inside the Value column, click the  button, and enter the required value in the Value for Simple dialog box. ▶ If you select By Attribute in the Type column, click inside the Value column and select the required value from the list.

11

Topology Query Language

This chapter provides information on Topology Query Language (TQL).

This chapter includes:

Concepts

- ▶ Topology Query Language (TQL) Overview on page 356
- ▶ Topology Query Language on page 356
- ▶ The Roles of TQL on page 357
- ▶ Where TQL Queries Are Created on page 357
- ▶ Viewing TQL Query Results on page 358
- ▶ Compound Relationship on page 358
- ▶ Join Relationship on page 359
- ▶ Subgraph Definition on page 360

Tasks

- ▶ Define a TQL Query on page 360
- ▶ Add Nodes and Relationships to a TQL Query on page 362
- ▶ Add Enrichment Nodes and Relationships to an Enrichment TQL Query on page 363
- ▶ Define a Compound Relationship — Scenario on page 364
- ▶ Define a Join Relationship — Scenario on page 367
- ▶ Create a Subgraph Definition — Scenario on page 369

Reference

- ▶ Context Menu Options on page 371

- ▶ Attribute Operator Definitions on page 378
- ▶ TQL Logs on page 380
- ▶ Topology Query Language User Interface on page 384
- ▶ **Troubleshooting and Limitations** on page 433

Topology Query Language (TQL) Overview

Topology Query Language (TQL) is a language and tool for discovering, organizing, and managing IT infrastructure data. It enables you to create TQL queries that retrieve business service data from the configuration management database (CMDB) and displays the data in a visual representation that facilitates data monitoring and managing. For details on CMDB, see “Configuration Management Database (CMDB)” on page 21.

Topology Query Language

TQL extends the standard SQL language by adding two important capabilities:

- ▶ TQL enables you to draw conceptual relationships between configuration items (CIs), which represent their actual interdependencies. Using predefined operators, the different types of interconnections (relationships) that exist between CIs can be established, and consequently the infrastructure design and performance are more accurately represented. This representation serves as a basis and a model for the discovery, arrangement, query, and management of complex infrastructures.
- ▶ TQL includes a graphical aspect, consisting of visual symbols and syntax, that represents the resources and their interconnections. This visualization of an IT infrastructure simplifies the understanding, monitoring, and managing of the IT business operations.

The Roles of TQL

TQL plays several roles:

- ▶ Builds a business service model that defines and delineates the interconnection between IT assets that function together as business services. The business service model guides the discovery and identification of these business services, from the ever-increasing number and complexity of infrastructure resources. After the resources that comprise the business services are discovered, the business service model structures the way they are organized and managed in the CMDB.
- ▶ Constantly searches the CMDB for changes that occur in the state of managed resources. When such changes are detected, the relevant subsystems are informed and updated.
- ▶ Creates queries that retrieve business service data from the CMDB, and displays the data in a visual representation that facilitates data monitoring and managing.

Where TQL Queries Are Created

The following managers use TQL:

- ▶ **Correlation Manager.** Create a Correlation TQL query to simulate how infrastructure changes can impact your system. A Correlation rule is based on either a Correlation TQL query created from within the Correlation Manager, or on an existing query. By creating Correlation rules based on TQL queries, you can determine the true origin of a problem and its business impact. For details, see “Correlation Manager” on page 211.
- ▶ **Enrichment Manager.** Create an Enrichment rule based on either an Enrichment TQL query from within the Enrichment Manager, or on an existing query. An Enrichment rule enables you to either enlarge the CMDB, delete CI instances from the CMDB, or update the attributes of a CI that already exists in the CMDB. For details, see “Enrichment Manager” on page 329.
- ▶ **Query Manager.** Create TQL queries that can be used in other managers. For details, see “Query Manager” on page 315.

- ▶ **Topology Report Manager.** Create a report definition based on either a Report TQL query from within the Topology Report Manager, or on an existing query. You can define exactly which information appears in each report, including the order in which nodes are listed and their placement relative to other nodes, and how the information within each Report is sorted. For details, see “Topology Report Manager” on page 277.
- ▶ **View Manager.** Create a pattern view, template, or perspective based on a TQL query, or create a template based view using an existing template. For details, see “View Manager” on page 157.

Viewing TQL Query Results

You view the resulting data in a visual representation in the Topology View application. The queries define the structure of the resulting topology view. The view displays only those CIs and relationships that meet the query definition. For more details about Topology View application, see “Topology View Application” on page 511.

Compound Relationship

A compound relationship represents a path in the topological graph. You use a compound relationship to define the allowed steps in the path between the source and the target CIs.

Each row represents one of the allowed steps in the path leading from the source CI to the target CI in the topology map.

Source	Relationship	Target
Host	Contained	IP
Network	Member	Host

For an example of a compound definition, see “Define a Compound Relationship — Scenario” on page 364. For details on defining compound relationships, see “Add/Edit Compound Relationship Dialog Box” on page 387.

Join Relationship

A join relationship is a logical connection, which appears only in the topology view containing the TQL query results, and represents the relationship between two CIs. It does not exist in the CMDB. A join relationship is created by defining an attribute for each node, whose values are used for comparison.

The TQL results retrieve all CIs whose attribute values meet the conditions defined in the join definition.

For example, you can create a join definition that links all **Host** CIs connected to **IP** CIs whose **Created by** attribute values are equal (see the example below).

Host	Operator	IP
Created By	Equal	Created By

Each join definition represents one condition defined for the join relationship.

Note: You can define multiple conditions.

For an example of a join definition, see “Define a Join Relationship — Scenario” on page 367. For details on defining join relationships, see “Add/Edit Join Relationship Dialog Box” on page 391.

Subgraph Definition

A subgraph definition enables you to create a graph that represents additional TQL query data related to a specific CI. The DDM job searches for the results from both the TQL query and the subgraph definitions. The query recursively retrieves all the related CIs by a defined depth. For details on defining subgraph definitions, see “Subgraph Definition Dialog Box” on page 422.

In the graph, you can define the relationship that is connected to a specific node. For example, if one of the nodes is a host, you can specify different relationships for Windows, router, and IP. You can also define attribute conditions for nodes. For details, see “Subgraph Condition Definition Dialog Box” on page 420.

The DDM job retrieves data that meets the criteria that is defined in the subgraph.

For an example of a subgraph definition, see “Create a Subgraph Definition — Scenario” on page 369.

Define a TQL Query

This task describes how to create a TQL query in Correlation Manager, Query Manager, View Manager, Topology Report Manager, and Enrichment Manager.

This task includes the following steps:

- “Create a TQL Query” on page 360
- “Add Nodes and Relationships to the Query” on page 361

1 Create a TQL Query

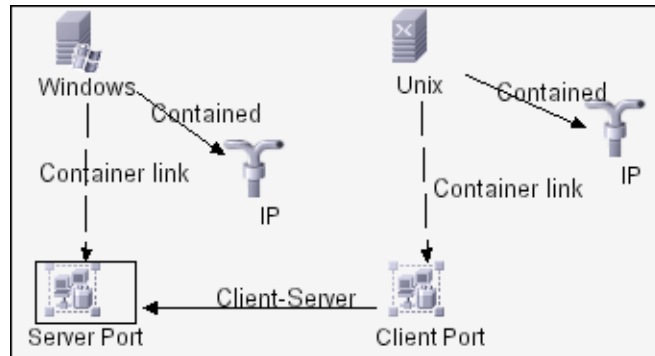
Create a new query by giving the query a unique name in the relevant manager. For details about the managers in which you can create a TQL query, see “Where TQL Queries Are Created” on page 357. In this task, you create a TQL query in the Query Manager. For details, see “New Query/Save Query As/Query Properties Dialog Box” on page 317.

2 Add Nodes and Relationships to the Query

Add the TQL nodes and relationships that define the query. The TQL nodes represent the CITs, as defined in the CI Type Manager, and the relationships represent the connections between them. Relationships are defined one at a time for each pair of TQL nodes in the query. For details, see “Add Nodes and Relationships to a TQL Query” on page 362. For details on the CI Type Manager, see “CI Type Manager” on page 239.

Example of a TQL Query Definition

The direction of the relationship indicates which node is dependent on the other. The following example displays two hosts, a Server Port, and a Client Port, which are linked to one another via a client/server connection. The TQL results must comply with the direction of the arrows.




Note: A TQL query is subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 433.

Add Nodes and Relationships to a TQL Query

This section explains how to add nodes and relationships to a TQL query. It is relevant for View Manager, Query Manager, Correlation Manager, Enrichment Manager, and Topology Report Manager.

Note: For TQL queries to be valid, they must comply with certain restrictions. For details, see “Troubleshooting and Limitations” on page 433.

To add nodes and relationships to a TQL query:

-  **1** From the tree in the left pane, select the required query or click the **New** button to create one.
- 2** From the tree displayed in the CI Type Selector, click and drag one or more required TQL nodes on to the editing pane. These are the TQL nodes that are included in the query.
- 3** To add a relationship between two nodes:
 - ▶ Select the required TQL nodes by holding down CTRL and clicking the TQL nodes, right-click and select **Add Relationship**.

or



- ▶ Click the **Create Relationship** icon and draw a line between the required nodes.

The Select Relationship Type dialog box opens. Select the required relationship type. For details, see “Select Relationship Type Dialog Box” on page 419.

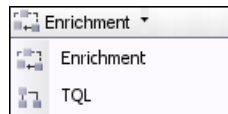
- 4** Click **OK**. The selected nodes are linked by the relationship you have selected.

Add Enrichment Nodes and Relationships to an Enrichment TQL Query

This section describes how to add Enrichment nodes and relationships to an Enrichment TQL query in the Enrichment Manager. For more information on Enrichment Manager, see “Enrichment Manager” on page 329.

To add Enrichment nodes and relationships to a TQL query:

- 1** From the tree in the Enrichment Rules pane, select the Enrichment rule to which you want to add Enrichment nodes and relationships or create a new one. For details, see “New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard” on page 346.
- 2** From the **TQL/Enrichment** list at the top of the Enrichment Manager window, select **Enrichment** mode.



- 3** From the tree displayed in the CI Type Selector, click and drag the nodes you want to function as an Enrichment node on to the editing pane. These are the TQL nodes that are included in the query. Added Enrichment nodes are displayed by an added indicator.



Note: You can add more than one Enrichment node to a rule.

- 4** The next step is to link the Enrichment node to an existing TQL node or nodes, to provide the Enrichment node with the needed context for its operation.

Following are the Enrichment rule validations:

- ▶ You must link the new Enrichment node to at least one of the existing TQL nodes in the rule.
- ▶ Enrichment nodes can only be linked to one another with an Enrichment relationship.

- ▶ If the new Enrichment node must be contained (according to its CIT definition) in another node, you must use the **Container link** relationship to connect this Enrichment node to an existing TQL node.
- ▶ You cannot link an Enrichment node to a TQL node that is not visible.

5 To add a relationship between two nodes:

- ▶ Select the required nodes by holding down CTRL and clicking the TQL nodes, right-click and select **Add Relationship**.

or



- ▶ Click the **Create Relationship** icon and draw a line between the required nodes.

Added Enrichment relationships are displayed by an added indicator.

The Add Relationship dialog box opens. For details, see “Add/Edit Relationship Dialog Box” on page 394.

6 Click **OK**. The selected nodes are linked by the relationship you have selected.

Define a Compound Relationship — Scenario

This section describes how to define the allowed steps that form a compound relationship between a **Network** and an **IP** CI.

Note: To reach the required result, you must implement each one of the following steps.

To define a compound relationship between a Network CI and an IP CI:

- 1** Create a TQL query and drag the following nodes from the CI Type Selector onto the editing pane:
 - ▶ Network
 - ▶ IP

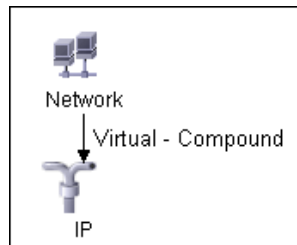
- 2 Right-click the **Network** and **IP** nodes and select **Add Compound Relationship** to open the Add Compound Relationship dialog box.
- + 3 Click the **Add** button to open the Add Triplet dialog box and do the following.
 - From the **Source** list, select **Network**.
 - From the **Target** list, select **Host**.
 - From the **Relationship** list, select **Member**.
 - Select the required **Relationship** direction.
- 4 Click **OK** to save your changes.
- + 5 Click the **Add** button to open the Add Triplet dialog box and do the following:
 - From the **Source** list, select **Host**.
 - From the **Target** list, select **IP**.
 - From the **Relationship** list, select **Contained**.
 - Select the required **Relationship** direction.
- 6 Click **OK** to save your changes.

The compound definitions now look like this.

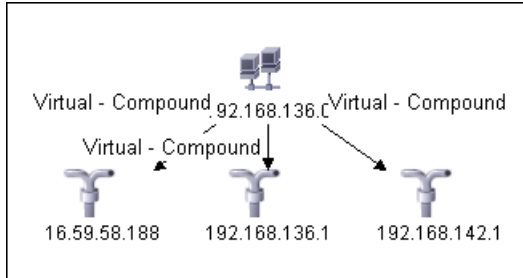
Source	Relationship	Target
Network	Member	Host
Host	Contained	IP

- 7 Click **OK** to save your changes.

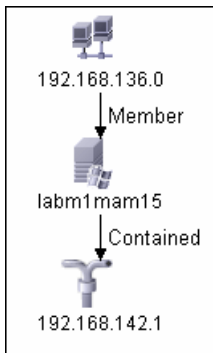
The TQL query in the editing pane now looks like this:



- 8 Go to the required view in IT Universe to view the results. If you did not select the **Show full path between source and target CIs** option, then the results display the names of the relationships that link the CIs as **Virtual-Compound** rather than the actual names of the relationships. See the illustration below:

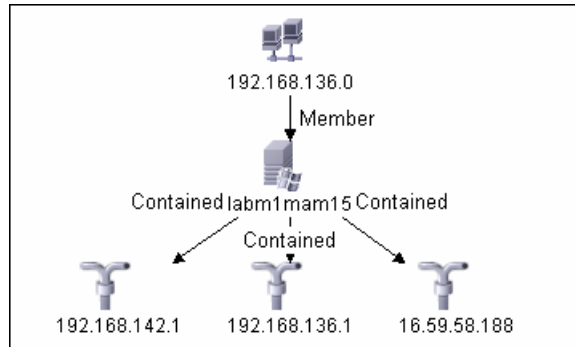


You can double-click the **Virtual - Compound** relationship in IT Universe to open the Link Map, which displays the CIs and relationships that comprise the allowed steps used to link the **Network** and **IP** CIs.



In the example above, the **192.168.136.0** (Network) CI is linked to the **192.168.142.1** (IP) CI through the **labm1mam15** (Host) CI.

If you did select the **Show full path between source and target CIs** option, then the results in IT Universe display the actual names of the relationships that link the CIs and the full path between the source and target CIs. See the illustration below:



Define a Join Relationship — Scenario

This section explains how to define a join relationship that links **Host** CIs to **IP** CIs whose **Created by** attribute values are equal.

Note: To reach the required result, you must implement each one of the following steps.

To define a join relationship that links all IP and Host CIs whose Created by attribute values are equal:

- 1 Create a TQL query and drag the following nodes from the CI Type Selector onto the editing pane:
 - Host
 - IP
- 2 Select the **Host** and **IP** nodes and right-click to open the Add Join Relationship dialog box.



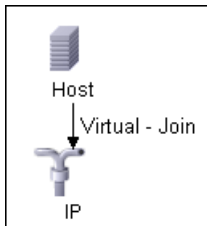
- 3 Click the **Add** button to open the Join Relationship Condition dialog box and do the following:
 - In the **Host Attribute** box, select **Created by**.
 - In the **Operator** box, select **Equal**.
 - In the **IP Attribute** box, select **Created by**.
- 4 Click **OK** to save your changes.

The Join Definition area now looks like this.

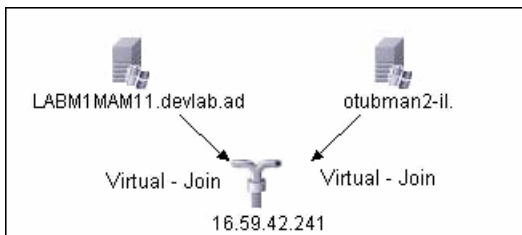
Host	Operator	IP
Created By	Equal	Created By

- 5 Click **OK** to save your changes.

The TQL query in the editing pane now looks like this:



Go to the required view in IT Universe to view the results. Double-click the **Virtual - Join** relationship in IT Universe to open the Link Map (as seen below), which displays all the **Host** CIs that are connected to an **IP** CI whose **Created by** attribute values are equal.





Create a Subgraph Definition — Scenario

This section describes how to create a subgraph definition. In this example, the TQL query results retrieve all CIs that are connected to a host whose host's display label is <host display label> by either a **Container link** or a **Contained** relationship.

Note: To reach the required result, you must implement each one of the following steps.

To create this sample subgraph definition:

- 1** Create a TQL query and drag a **Host** node from the CI Type Selector onto the editing pane.
- 2** Right-click the **Host** node and select **Subgraph Definition** to open the Subgraph Definition dialog box.
- 3** Select the default subgraph definition that appears and delete it.
-  **4** Click the **Add** button to open the Add Triplet dialog box and do the following:
 - From the **Source** list, select **IT Universe**.
 - From the **Target** list, select **IT Universe**.
 - From the **Relationship** list, select **Contained**.
- 5** Click **OK** to save your changes.
-  **6** Click the **Add** button to open the Add Triplet dialog box and do the following:
 - From the **Source** list, select **IT Universe**.
 - From the **Target** list, select **IT Universe**.
 - From the **Relationship** list, select **Container link**.
- 7** Click **OK** to save your changes.



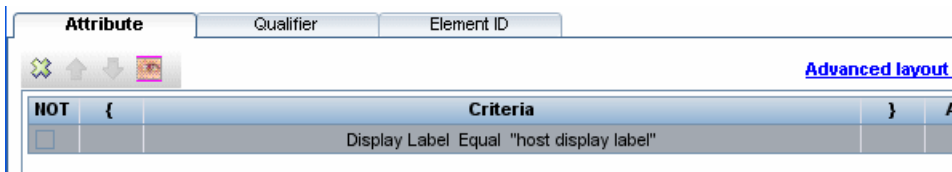
- 8 Click the **Add** button to open the Add Triplet dialog box and do the following:
 - From the **Source** list, select **IT Universe**.
 - From the **Target** list, select **IT Universe**.
 - From the **Relationship** list, select **Contains**.
- 9 Click **OK** to save your changes.

The Add Triplet dialog box now looks like this.

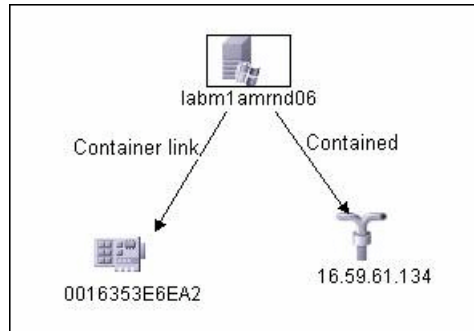
Source	Relationship	Target
IT Universe	Contained	IT Universe
IT Universe	Container link	IT Universe
IT Universe	Contains	IT Universe

- 10 Click **OK** in the Subgraph Definition dialog box.
- 11 Right-click the **Host** node and select **Node Properties** to open the Node Properties dialog box.
- 12 Click the **Attribute** tab.
- 13 From the **Attribute Name** list, select **Display Label**.
- 14 From the **Operator** list, select **Equal**.
- 15 Select **Fixed Value**.
- 16 In the **Value** box, enter <host display label>.
- 17 Click **OK** to save your changes.

The Attribute tab now looks like this.



Go to the required view in IT Universe to view the results.




The results show that the **labm1amrnd06** (Host) CI is linked to the **16.59.61.134** (IP) CI by the **Contained** relationship and to the **0016353E6EA2** (Interface) CI by the **Container link** relationship.

Context Menu Options


This section includes a list of TQL context menu options (listed alphabetically):

GUI Element (A–Z)	Description
Add Calculated Relationship	<p>Enables you to create a calculated relationship.</p> <ul style="list-style-type: none"> ▶ For details on how to create a calculated relationship, see “Triplets Page” on page 265. ▶ For details about Impact Modeling, see Chapter 12, “Impact Modeling.”
Add Compound Relationship	<p>Enables you to define the connection between two nodes using a compound relationship.</p> <p>For details, see “Add/Edit Compound Relationship Dialog Box” on page 387.</p>


GUI Element (A–Z)	Description
Add Join Relationship	<p>Enables you to define join relationships, which is created by defining an attribute for each node, whose values are used for comparison.</p> <p>For details, see “Add/Edit Join Relationship Dialog Box” on page 391.</p>
Add Relationship	<p>Enables you to create a relationship for your nodes by selecting it from a predefined list. Displays the Add Relationship dialog box.</p> <p>For details, see “Add/Edit Relationship Dialog Box” on page 394.</p> <p>Note: In Enrichment Manager, this option adds an Enrichment relationship to the rule when working in Enrichment mode. Applicable for regular and Enrichment nodes. For details, see “Enrichment Manager” on page 329. Added relationships are denoted by an added  indicator.</p>

GUI Element (A–Z)	Description
Add Rule	<p>Enables you to add folding rules to a relationship. Right-click the relationship for which you want to define a folding rule. Select one of the following options to define the organizational structure between the two CI types connected by the selected relationship:</p> <ul style="list-style-type: none"> ▶ Parent. Select this option to display Node1 as the parent of Node2. That is, double-clicking the Node1 element on one map level displays a new map level with Node2 elements. ▶ Right Sibling. Select this option to display Node1 elements wherever Node2 elements are displayed. That is, both CIs are displayed on the same map level. ▶ Left Sibling. Select this option to display Node2 elements wherever Node1 elements are displayed. That is, both CIs are displayed on the same map level. ▶ Child. Select this option to display Node1 as the child of Node2. That is, double-clicking a Node2 element on one map level displays a new map level with Node1 elements. ▶ None. Do not define any folding rules for this relationship. <p>Note: Only relevant for View Manager.</p>
Add to Applications	<p>Click to create an application CI and link it to all CIs of the type selected. For details, see “Link Nodes to Application CI” on page 165.</p> <p>Note: Only relevant for View Manager.</p>
Clear	<p>Available by right-clicking a node or relationship when working in Enrichment mode in the Enrichment Manager. Clears the node/relationship’s Enrichment rule definition. For details, see “Enrichment Manager” on page 329.</p> <p>Appears only if you have updated or deleted a node/relationship using an Enrichment rule.</p> <p>Note: Only relevant for Enrichment Manager.</p>

GUI Element (A–Z)	Description
Clear Contact Node	<p>Changes the selected node from a contact node to a regular node.</p> <p>Note: Only relevant for perspectives in View Manager.</p>
Clear Node Definition	<p>Deletes the report definition for the selected Report node. For details, see “Topology Report Manager” on page 277.</p> <p>Note: Only relevant for Topology Report Manager.</p>
Copy/Paste	<p>Copy/paste an existing TQL node/relationship in the same query or into another TQL query.</p> <p>The copied TQL node/relationship includes all TQL definitions.</p> <p>You can copy and paste relationships provided that the TQL nodes to which the relationships are connected are also selected. A relationship on its own cannot be copied without its connecting TQL nodes.</p> <p>You can select multiple TQL nodes/relationships as well.</p> <p>Note: The Paste option is available only after using the Copy option to copy an existing TQL node/relationship.</p>
Define Affected	<p>Define which node in the TQL query is the trigger Correlation node and which nodes are affected by the changes that occur in the system. For details, see “Affected Nodes Dialog Box” on page 220.</p> <p>Note: Only relevant for Correlation Manager.</p>
Delete	<p>Deletes the selected node/relationship/CI.</p> <p>Note: This option is not available for calculated relationships.</p>

GUI Element (A–Z)	Description
Delete Relationship/Node	<p>Available by right-clicking a node or relationship when working in Enrichment mode.</p> <p>Creates a specific Enrichment rule that is designed to delete CIs/relationships from the CMDB. Applicable to regular nodes and relationships only. You can use this option, for example, for removing unnecessary data from the CMDB. For details, see “Enrichment Manager” on page 329.</p> <p>Deleted nodes and relationships are denoted by a removed  indicator.</p> <p>Note: Only relevant for Enrichment Manager.</p>
Edit Relationship Type	<p>Displays the Edit Relationship Type dialog box. For details, see “Add/Edit Relationship Dialog Box” on page 394.</p> <p>Note: This option appears only when the selected relationship has descendants.</p>
Node Order	<p>Displays the Set Node Order dialog box, enabling you to determine the order in which Report node information is displayed in the report, that is, the order of the report’s columns. For details, see “Set Node Order Dialog Box” on page 310.</p> <p>Note: Only relevant for Topology Report Manager.</p>
Node/Relationship Definition	<p>Displays the Grouping dialog box which enables you to group CIs in the topology map. For details, see “Node/Relationship Grouping Dialog Box” on page 194.</p> <p>Note: Only relevant for View Manager.</p>
Node/Relationship Properties	<p>Displays the Node/Relationship Properties dialog box, enabling you to define the attribute conditions for the selected TQL node/relationship. For details, see “Node/Relationship Properties Dialog Box” on page 407.</p> <p>Note: This option is not available for calculated relationships.</p>

GUI Element (A–Z)	Description
Refine Node Type	<p>Displays the Refine Node Type dialog box. Enables you to change the CI type of the node after you have created it. For details, see “Refine Node Type Dialog Box” on page 418.</p> <p>Note: This option only appears if a child of the CI type exists.</p>
Remove from Applications	<p>Click to remove a business service item from a business service view. For details, see “Link Nodes to Application CI” on page 165.</p> <p>Note: Only relevant for View Manager.</p>
Remove Subgraph	<p>Only appears if you have defined a subgraph definition. For details, see “Subgraph Definition Dialog Box” on page 422.</p>
Report Node Definition	<p>Displays the Report Node Definition dialog box, enabling you to determine the content of the report. For details, see “Report Node Definition Dialog Box” on page 308.</p> <p>Note: Only relevant for Topology Report Manager.</p>
Reset Affected	<p>Removes the Define Affected definition applied to that node. For details on the Define Affected definition, see “Affected Nodes Dialog Box” on page 220.</p> <p>Note: Only relevant for Correlation Manager.</p>
Reset Inner Relationship	<p>Redraws a self-referential relationship in the Topology map as a square for ease of viewing.</p> <p>Note: Only relevant for self-referential relationships which are not square.</p>
Set As Contact Node	<p>Designates the selected node as a contact node for the perspective.</p> <p>Note: Only relevant for perspectives in View Manager.</p>

GUI Element (A–Z)	Description
Set View Element Parameters	<p>Appears only when a parameterized condition is defined for the selected CI.</p> <p>Displays the Set View Element Parameters dialog box where you can edit the parameter of each condition. For details, see “Set View Parameters/Set View Element Parameters Dialog Box” on page 198.</p> <p>Note: Only relevant for View Manager and Topology Report.</p>
Show Element’s instances	<p>Displays the Element Instances dialog box which displays all the instances found for each node in a table. For details, see “Element Instances Dialog Box” on page 400.</p>
Straighten	<p>Straightens the relationship between two nodes. This option is only available for relationships that have angles.</p>
Subgraph Definition	<p>Displays the Subgraph Definition dialog box, where you can create a graph that represents additional TQL query data related to a specific node. For details, see “Subgraph Definition Dialog Box” on page 422.</p>
TQL Node Wizard	<p>Displays the TQL Node Wizard dialog box which enables you to build a TQL query. For details, see “TQL Node Wizard” on page 424.</p>
Update Relationship/Node	<p>Use an Enrichment rule to update the value of CI attributes in the CMDB, or to add data to attributes that currently do not have values. Opens the Node Definition - Attributes dialog box. For details, see “Node/Relationship Definition Dialog Box” on page 350. This is applicable for both regular and Enrichment nodes. Updated nodes are denoted by an updated  indicator.</p> <p>Note: Only relevant for Enrichment Manager.</p>

Attribute Operator Definitions

This section contains a list of operators used to define attribute conditions in various dialog boxes, such as the Subgraph Condition dialog box, the Add Relationship dialog box, Correlation Definition dialog box, or the Node/Relationship Properties dialog box.

Operator	Description
Changed during	(Displayed only when you select the Create Time attribute.) Displays only the instances that changed during the period specified in the Value comparison box.
Equal	Checks whether the attribute value is equal to the value specified in the Value Comparison box.
Equal ignore case	Checks whether the attribute value is equal to the value specified in the value box regardless of the case.
Greater than or equal	Checks whether the attribute value is greater than or equal to the value specified in the Value comparison box.
Greater	Checks whether the attribute value is greater than the value specified in the Value comparison box.
In	Displays only the instances where this attribute value equals one of the selected values. For example, for CIs that have a Change state that equals Plan and New , select the operator In from the Operator list and select both Plan and New from the Value box.
In list	Equals one of the elements that appears in the list. For example: 320,4445,3483.
Is null	Checks whether the attribute value is null.
Less	Checks whether the attribute value is less than the value specified in the Value comparison box.

Operator	Description
Less than or equal	Checks whether the attribute value is less than or equal to the value specified in the Value comparison box.
Like	Uses a wildcard (%). Use Like when you are not sure of the complete name for which you are searching.
Like ignore case	Uses a wildcard (%). Use Like ignore case when you are not sure of the complete name for which you are searching. The case of the string is ignored.
Not equal	Checks whether the attribute value is not equal to the value specified in the Value Comparison box.
Unchanged during	(Displayed when you select a date type attribute.) Displays only the instances that did not change during the period specified in the Value comparison box.

Note:

- For **Not equal** or **Not like** operators, query results do not include data from the CI instances that are not assigned a value. For example, a system contains three hosts: Host1 is assigned the value A, Host2 is assigned the value B, and Host3 is not assigned a value. If you create a query to retrieve all hosts that are **Not equal** to A, the results of your query include Host2 only, because Host3 is not assigned a value.
 - HP Business Availability Center supports both Microsoft SQL Server and Oracle Server servers. Microsoft SQL Server is not case sensitive by default (unlike Oracle Server which is case sensitive). Consequently, if you are using Microsoft SQL Server, the **Equal** operator retrieves the same query results as the **Equal ignore case** operator. For example, if you select the attribute **City**, the operator **Equal**, and type **NEW YORK** in the **Value comparison** box, case differences are ignored and query results include **NEW YORK**, **New York** and **new york**.
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TQL Logs

This section contains definitions for TQL parameter log files.

This section includes the following topics:

- “Pattern Log” on page 380
- “Pattern Statistics Log” on page 381
- “Audit Short/Detailed Log (TQL Perspective)” on page 382
- “Incremental Statistics Log” on page 382
- “Incremental Splitter Log” on page 383
- “Incremental Detailed Log” on page 384

Pattern Log

The log name is **cmdb.pattern.log**.

Log File	Description
Purpose	Information about the lifecycle of a TQL query that is handled and calculated in the CMDB. Only TQLs stored in the CMDB are included. Information about ad hoc TQLs is not included.
Information Level	Not available.
Error Level	Not available.
Debug Level	Possible actions performed on each TQL query include: <ul style="list-style-type: none"> ➤ status changes ➤ model changes ➤ query changes ➤ completed calculations

Log File	Description
Basic Troubleshooting	<p>Check if a TQL query has the same status for a long time:</p> <ul style="list-style-type: none"> ▶ new – the query is in lazy loading ▶ inactive ▶ calculation – the calculation may have failed but the scheduler was not informed <p>You can also view the number of notifications that a TQL received.</p>

Pattern Statistics Log

The log name is `cmdb.pattern.statistics.log`.

Log File	Description
Purpose	General calculation data for each TQL, updated at predefined intervals.
Information Level	<p>The following information is given for each TQL:</p> <ul style="list-style-type: none"> ▶ name ▶ average, minimum, and maximum calculation times ▶ number of calculations ▶ last calculation time ▶ result size
Error Level	Not available.
Debug Level	Not available.
Basic Troubleshooting	<ul style="list-style-type: none"> ▶ Verify that a specific TQL was updated. ▶ Evaluate a TQL's calculation time. ▶ Evaluate a TQL's result size.

Audit Short/Detailed Log (TQL Perspective)

The log name is `cmdb.audit.short.log`.

Log File	Description
Purpose	CMDB state changes, CI Type changes, and TQL results. You can use this log to follow the results of TQL queries.
Information Level	Not available.
Error Level	Not available.
Debug Level	<ul style="list-style-type: none"> ▶ Final calculation for TQLs is logged. ▶ If the final TQL calculation is unchanged from the previous calculation, this is noted. ▶ If the final TQL calculation is changed from the previous calculation, results of the CIs and relationships are recorded in the detailed log. The number of CIs and relationships are recorded in the short log.
Basic Troubleshooting	<ul style="list-style-type: none"> ▶ Use this log to verify which notifications are published by the TQL subsystem. ▶ Check the section at the end of each result. This section includes added, removed, and updated CIs and relationships. ▶ Track the CIT changes and see if the query results also change. You can thus correlate the CIT changes to the results of the query calculations.

Incremental Statistics Log

The log name is `cmdb.incremental.statistics.log`.

Log File	Description
Purpose	Traces the calculation procedure, full or incremental, of every query.
Information Level	Not available.

Log File	Description
Error Level	Not available.
Debug Level	<ul style="list-style-type: none"> ▶ Gives the date, time, query name, and whether an incremental statistic calculation was performed (yes/no). ▶ If an incremental statistic calculation was not performed, states the reason, the number of subcalculations (relevant for incremental calculations only), and the complete calculation time.
Basic Troubleshooting	<p>Monitors the calculation process.</p> <p>If a specific query calculation takes a long time, check if it is a full or incremental calculation:</p> <ul style="list-style-type: none"> ▶ If full, check whether a full calculation is necessary. ▶ If incremental, check how many subcalculations have been performed.

Incremental Splitter Log

The log name is **cmdb.incremental.splitter.log**.

Log File	Description
Purpose	Monitors the incremental splitter result made during an incremental calculation.
Information Level	Not available.
Error Level	Not available.
Debug Level	Gives the set of node numbers of each query graph created by the incremental splitter.
Basic Troubleshooting	If the TQL result calculated by the incremental calculator is wrong, verify that the splitter result is correct.

Incremental Detailed Log

The log name is `cmdb.incremental.detailed.log`.

Log File	Description
Purpose	Monitors the incremental calculation process.
Information Level	Not available.
Error Level	Not available.
Debug Level	Each incremental subcalculation entry includes the following: <ul style="list-style-type: none"> ▶ the trigger node ▶ the number of elements classified to the trigger node ▶ whether the subcalculation step is driven by new elements added to the model or by existing elements ▶ the calculated query graph
Basic Troubleshooting	Follows the basic steps of an incremental calculation.


Topology Query Language User Interface

This section describes:

- ▶ Add/Edit Calculated Relationship Dialog Box on page 385
- ▶ Add/Edit Compound Relationship Dialog Box on page 387
- ▶ Add/Edit Join Relationship Dialog Box on page 391
- ▶ Add/Edit Relationship Dialog Box on page 394
- ▶ Add Triplet Dialog Box on page 396
- ▶ Element Instances Dialog Box on page 400
- ▶ Filter CI Instances Dialog Box on page 403
- ▶ Join Relationship Condition Dialog Box on page 404
- ▶ Layout Settings Dialog Box on page 406

- Node/Relationship Properties Dialog Box on page 407
- Refine Node Type Dialog Box on page 418
- Select Relationship Type Dialog Box on page 419
- Subgraph Condition Definition Dialog Box on page 420
- Subgraph Definition Dialog Box on page 422
- TQL Node Wizard on page 424
- User Preferences Dialog Box on page 432

Add/Edit Calculated Relationship Dialog Box


<p>Description</p>	<p>Enables you to define the connection between two nodes using a calculated relationship from the CI Type model.</p> <p>To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: Right-click the required node in the editing pane in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, View Manager and select Add Calculated Relationship.</p> <p>Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Add Relationship option.</p> <p>To access in Manage Discovery Resources in Discovery:</p> <ol style="list-style-type: none"> 1 Select a pattern in the Discovery Resources pane. 2 In the Pattern Signature tab, click the  Edit Input TQL button to the right of the Input TQL box to open the Input TQL Editor. 3 Right-click the required node and select Add Calculated Relationship.
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Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176 ➤ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.
Useful Links	<ul style="list-style-type: none"> ➤ Chapter 12, “Impact Modeling” ➤ “CI Type Relationships” on page 242




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

GUI Element (A-Z)	Description
<List of calculated relationships>	Select the calculated relationship that defines the connection between two nodes.
Relationship Direction	The direction of the relationship that indicates which node is dependent on the other.
Relationship Name	The name of the calculated relationship.
Relationship Restrictions	<p>Select an option to define how to handle relationships between identical nodes or self relationships in the query results. A self relationship is a relationship that leads from a node to itself.</p> <p>Note: This list appears only when you select one node or two identical nodes.</p> <ul style="list-style-type: none"> ➤ Allow All Relationships. All relationships appear in the query results. ➤ Allow Self Relationships only. Only self-relationships (a relationship that leads to itself) appear in the query results. ➤ Allow Non Self Relationships only. Self-relationships do not appear in the query results.

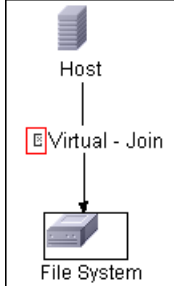
Add/Edit Compound Relationship Dialog Box

<p>Description</p>	<p>Enables you to define the connection between two nodes using a compound relationship.</p> <p>To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager:</p> <p>Right-click the required node in the editing pane in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, View Manager and select Add Compound Relationship.</p> <p>Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Add Relationship option.</p> <p>To access in Manage Discovery Resources in Discovery and Dependency Mapping (DDM):</p> <ol style="list-style-type: none"> 1 Select a pattern in the Discovery Resources pane. 2 In the Pattern Signature tab, click the  Edit Input TQL button to the right of the Input TQL box to open the Input TQL Editor. 3 Right-click the required node and select Add Compound Relationship.
<p>Important Information</p>	<p>You can create as many compound definitions as necessary.</p>
<p>Included in Tasks</p>	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176 ➤ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.
<p>Useful Links</p>	<ul style="list-style-type: none"> ➤ “Compound Relationship” on page 358 ➤ “Define a Compound Relationship — Scenario” on page 364


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

GUI Element (A-Z)	Description
	Add a compound definition. Opens the Add Triplet dialog box.
	Delete the selected compound definition.
	Edit the selected compound definition. Opens the Add Triplet dialog box.
Max steps	The longest path allowed between the two CIs in the CMDB to be included in the discovery process. Default is: 5
Min steps	The shortest path allowed between the two CIs in the CMDB to be included in the discovery process. Default is: 1
Relationship	The relationship connecting the two nodes.
Relationship Direction	The direction of the relationship that indicates which node is dependent on the other.
Relationship Name	The name of the compound relationship.
Relationship Restrictions	Select an option to define how to handle relationships between identical nodes or self relationships in the query results. A self relationship is a relationship that leads from a node to itself. Note: This list appears only when you select one node or two identical nodes. <ul style="list-style-type: none"> ➤ Allow All Relationships. All relationships appear in the query results. ➤ Allow Self Relationships only. Only self-relationships (a relationship that leads to itself) appear in the query results. ➤ Allow Non Self Relationships only. Self-relationships do not appear in the query results.




GUI Element (A-Z)	Description
Show full path between source and target CIs	If you select this option, then the query results display the actual names of the relationships that link the CIs and the full path between the source and target CIs.
Source	The required source node.
Stop at first compound level	<p>Select this option if you want the system to stop looking for TQL results once it reaches the first target in the path.</p> <p>In the following sample compound link definition, Depth is defined as 10 and Stop at first compound level is selected.</p> <div data-bbox="622 583 1243 874" data-label="Diagram"> </div> <p>The TQL results include the Target 1, Target 3, and Target 4 because they are all at level 1 (the first CI found in the path). Target 2 is not included in the TQL results because it is at level 2 (the second CI found in the path).</p>

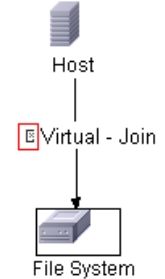
GUI Element (A-Z)	Description
Target	The required target node.
Visible	<p>Select Visible to include query results relating to a join or compound relationship. By default, Visible is selected. When Visible is cleared, a box <input type="checkbox"/> appears to the left of the of the relationship's name in the editing pane, denoting that any query results pertaining to the relationship are not displayed in the topology map.</p> 

Add/Edit Join Relationship Dialog Box



<p>Description</p>	<p>Enables you to define join relationships.</p> <p>To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager:</p> <p>Right-click the required nodes in the editing pane in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, View Manager and select Add Join Relationship.</p> <p>Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Add Relationship option.</p> <p>To access in Manage Discovery Resources in Discovery:</p> <ol style="list-style-type: none"> 1 Select a pattern in the Discovery Resources pane. 2 In the Pattern Signature tab, click the  Edit Input TQL button to the right of the Input TQL box to open the Input TQL Editor. 3 Right-click the required node and select Add Join Relationship.
<p>Included in Tasks</p>	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176 ➤ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.
<p>Useful Links</p>	<p>“Join Relationship” on page 359</p> <p>“Define a Join Relationship — Scenario” on page 367</p>

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

GUI Element (A-Z)	Description
	Define a join definition. Opens the Join Relationship Condition dialog box.
	Delete the selected join definition.
	Edit the join definition. Opens the Join Relationship Condition dialog box.
<Selected node1>	A selected node. The first attribute applies to <end_1>.
<Selected node2>	A selected node. The second attribute applies to <end_2>.
And	All join definitions are linked by the And operator.
Operator	The operator selected in the Join Relationship Condition dialog box. For details about operator definitions, see “Attribute Operator Definitions” on page 378.
Relationship Direction	The direction of the relationship that indicates which node is dependent on the other.
Relationship Name	The name of the join relationship.

GUI Element (A-Z)	Description
Relationship Restrictions	<p>Select an option to define how to handle relationships between identical nodes or self relationships in the query results. A self relationship is a relationship that leads from a node to itself.</p> <p>Note: This list appears only when you select one node or two identical nodes.</p> <ul style="list-style-type: none"> ➤ Allow All Relationships. All relationships appear in the query results. ➤ Allow Self Relationships only. Only self-relationships (a relationship that leads to itself) appear in the query results. ➤ Allow Non Self Relationships only. Self-relationships do not appear in the query results.
Visible	<p>Select Visible to include query results relating to a join or compound relationship. By default, Visible is selected. When Visible is cleared, an invisible box <input type="checkbox"/> appears to the left of the of the relationship's name in the editing pane. Any query results pertaining to the relationship are not displayed in the topology map.</p> <div data-bbox="611 907 782 1197" style="border: 1px solid black; padding: 5px; margin: 10px 0;">  <pre> graph TD Host[Host] --> VirtualJoin[Virtual - Join] VirtualJoin --> FileSystem[File System] </pre> </div>




Add/Edit Relationship Dialog Box

<p>Description</p>	<p>Enables you to define the connection between two nodes in a query.</p> <p>To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager:</p> <ul style="list-style-type: none"> ➤ Right-click the required node in the editing pane in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, View Manager and select Add Relationship. or ➤ Click the Create Relationship  icon and draw a line between the required nodes. <p>Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Add Relationship option.</p> <p>To access in Manage Discovery Resources in Discovery:</p> <ol style="list-style-type: none"> 1 Select a pattern in the Discovery Resources pane. 2 In the Pattern Signature tab, click the  Edit Input TQL button to the right of the Input TQL box to open the Input TQL Editor. 3 Right-click the required node and select Add Relationship.
<p>Included in Tasks</p>	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176 ➤ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.
<p>Important Information</p>	<p>This option does not appear when two selected nodes (or a single selected node) do not have a valid relationship between them.</p>


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

GUI Element (A-Z)	Description
<List of relationships from which to choose>	Select the relationship that defines the connection between two nodes.
Relationship Direction	The direction of the relationship that indicates which node is dependent on the other.
Relationship Name	The name of the relationship.
Relationship Restrictions	<p>Select an option to define how to handle relationships between identical nodes or self relationships in the query results. A self relationship is a relationship that leads from a node to itself.</p> <p>Note: This list appears only when you select one node or two identical nodes.</p> <ul style="list-style-type: none"> ▶ Allow All Relationships. All relationships appear in the query results. ▶ Allow Self Relationships only. Only self-relationships (a relationship that leads to itself) appear in the query results. ▶ Allow Non Self Relationships only. Self-relationships do not appear in the query results.

Add Triplet Dialog Box

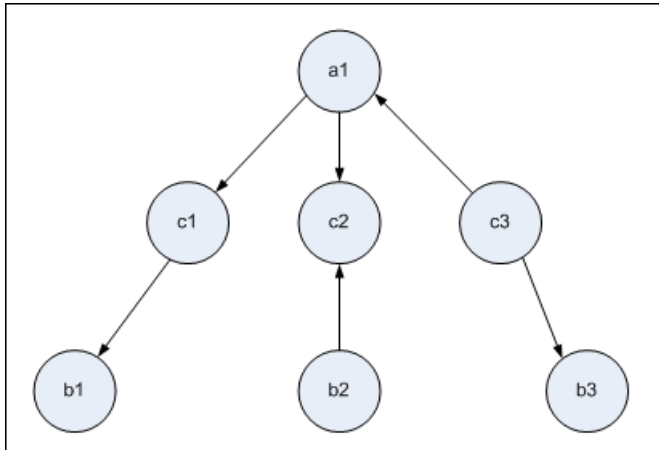
<p>Description</p>	<p>Enables you to define the allowed steps in a path in the topology graph leading from the source CI to the target CI when creating a subgraph definition, a compound relationship, or a calculated relationship.</p> <p>Select the nodes and relationships to be included in the topology graph.</p> <p>To access:</p> <ul style="list-style-type: none"> ▶ In the Add Compound Relationship dialog box, click the Add  button. For details, see “Add/Edit Compound Relationship Dialog Box” on page 387. ▶ In the Subgraph Definition dialog box, click  Add. For details, see “Subgraph Definition Dialog Box” on page 422. ▶ In CI Type Manager, select Calculated Relationships from the drop-down list in the CI Types pane. In the main window, select the Triplets page and then click  Add.
<p>Included in Tasks</p>	<ul style="list-style-type: none"> ▶ “Define a Report Rule – Scenario” on page 278 ▶ “Define a Correlation Rule – Workflow” on page 213 ▶ “Define an Enrichment Rule – Scenario” on page 332 ▶ “Create a TQL Query” on page 317 ▶ “Create a Pattern View” on page 176 ▶ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.
<p>Useful Links</p>	<ul style="list-style-type: none"> ▶ “Compound Relationship” on page 358 ▶ “Define a Compound Relationship — Scenario” on page 364 ▶ “Subgraph Definition” on page 360

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

GUI Element (A-Z)	Description
	<p>Define attribute conditions for the source and target nodes you selected. Opens the Subgraph Condition Definition dialog box.</p> <p>The Condition button is enabled only after you select a node from the Source or Target lists.</p> <p>Note: You cannot define attribute conditions for the source and target nodes in the CI Type Manager.</p>
Relationship	<p>Select an available relationship connecting the two nodes. The list of available relationships appears only after defining both nodes.</p>
Relationship Direction	<p>Select the required direction. Setting different relationship directions can achieve different query results. For an example, see “Setting Different Relationship Directions for Compound Definitions” on page 398.</p> <p>Note: The Relationship list remains empty until you have selected a source and target.</p>
Source	<p>Select the required source node.</p>
Target	<p>Select the required target node.</p>

Setting Different Relationship Directions for Compound Definitions

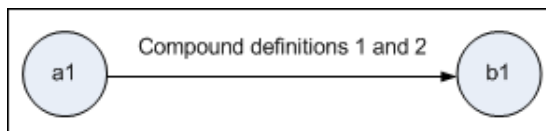
You can achieve different TQL results by setting different relationship directions. For example, in your business world, as illustrated below, you want to create a compound relationship that connects between a node of the CIT **a** and a node of the CIT **b**. Depth is defined at 5 (for details, see “Depth” on page 423).



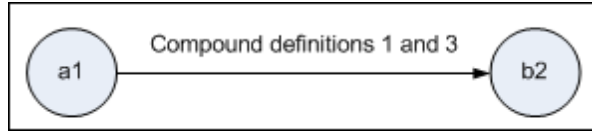
In the Add Triplet dialog box, you can create compound definitions to link nodes **a** and **b** using different relationship directions.

Compound Definition	Source	Target	Relationship	Relationship Direction
#1	node a	node c	<relationship>	source --> target
#2	node c	node b	<relationship>	source --> target
#3	node c	node b	<relationship>	source <-- target

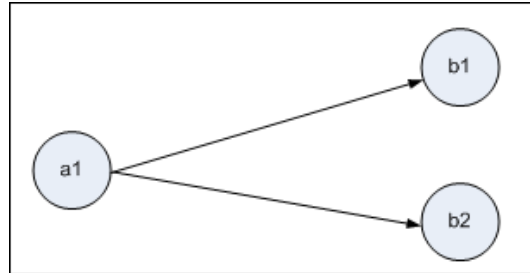
- Compound definitions 1 and 2 result in the following query:




- Compound definitions 1 and 3 result in the following query:










- Compound definitions 1, 2, and 3 result in the following query:

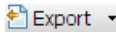

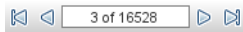


Element Instances Dialog Box

<p>Description</p>	<p>Displays all of the CI instances found for the selected TQL node in a table.</p> <p>To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: In the editing pane, right-click the required node and select Show Element's Instances.</p> <p>Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Show Element's Instances option.</p> <p>To access in Manage Discovery Resources in Discovery:</p> <ol style="list-style-type: none"> 1 Select a pattern in the Discovery Resources pane. 2 In the Pattern Signature tab, click the  Edit Input TQL button to the right of the Input TQL box to open the Input TQL Editor. 3 Right-click the required node and select Show Element's Instances.
<p>Important Information</p>	<p>The columns in the report display the attributes of the selected CI type. The attributes displayed vary according to the CI type selected.</p> <p>By default, only columns corresponding to attributes that have been defined with the Asset Data, Change Monitored, and Comparable attribute qualifiers in the CIT Manager are displayed as columns in the dialog box. For details, see “Attributes Page” on page 261.</p> <p>If required, you can click the Display Hidden Columns button to display the attributes that are defined as Visible but not Static. For details on Static attributes, see “Attributes Page” on page 261.</p>
<p>Included in Tasks</p>	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176



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

GUI Element (A–Z)	Description
	Specify the CIT you want displayed in the table. The table also includes the children of the selected CIT.
	Click Show CI Properties to open the Configuration Item Properties dialog box for the selected CI.
	Click to refresh the list of CI instances.
	Filters the CI instances you want to display for the selected node. Opens the Filter CI Instances dialog box.
	Clears the filter definitions you created in the Filter CI Instances dialog box.
	Enables you to select the columns to be displayed. For details, see, “Select Columns Dialog Box” in <i>Reference Information</i> .
	Enables you to set the order of the visible columns. For details, see, “Sort Column Content Dialog Box” in <i>Reference Information</i> .

GUI Element (A–Z)	Description
	<p>Choose the export format for the table data. The available options are:</p> <ul style="list-style-type: none"> ➤ Excel. The table data is formatted as an .xls (Excel) file that can be displayed in a spreadsheet. ➤ PDF. The table data is exported in PDF format. ➤ RTF. The table data is exported in Rich Text Format. ➤ CSV. The table data is formatted as a comma-separated values (CSV) text file that can be displayed in a spreadsheet. <p>Note: For the CSV formatted table data to display correctly, the comma (,) must be defined as the list separator. In Windows, to verify or modify the list separator value, open Regional Options from the Control Panel, and on the Numbers tab ensure that the comma is defined as the List Separator value. In Solaris, you can specify the list separator in the application that opens the CSV file.</p> <ul style="list-style-type: none"> ➤ XML. The table data is formatted as an XML file that can be opened in a text or XML editor. <p>Tip: To extract HTML code from the report:</p> <ul style="list-style-type: none"> ➤ Save the file as HTML ➤ Open the file in an HTML editor ➤ Copy the relevant table into the target file <p>Note: This option is displayed in Text mode only.</p>
	<p>Select the number of rows to be displayed.</p>
	<p>Click to navigate through the results page by page or to jump to the first or last page.</p>
<p><Element Instances></p>	<p>The CI instances found for the selected TQL node. You can double-click an instance to open the Configuration Item Properties dialog box for that CI.</p>
<p><Element instances context (right-click) menu></p>	<p>For details, see “IT Universe Manager Context Menu” on page 75.</p>

GUI Element (A–Z)	Description
<Toolbar>	For details, see “Toolbar Options” on page 733.
Display Label	The name of the CI instance as it appears in the topology map.


Filter CI Instances Dialog Box

<p>Description</p>	<p>Enables you to reduce the number of CI instances to be displayed in a list by selecting a condition and a value for a specific CI.</p> <p>A description of the filter condition you defined appears above the table columns in the Element Instances dialog box. For example, the following illustration shows that a filter condition was created to display only CI instances whose CI type is Windows.</p>  <p>To access:</p> <ul style="list-style-type: none"> ▶ Click the Filter  button in the Element Instances dialog box.
<p>Included in Tasks</p>	<ul style="list-style-type: none"> ▶ “Define a Report Rule – Scenario” on page 278 ▶ “Define a Correlation Rule – Workflow” on page 213 ▶ “Define an Enrichment Rule – Scenario” on page 332 ▶ “Create a TQL Query” on page 317 ▶ “Create a Pattern View” on page 176 ▶ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.

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

GUI Element (A-Z)	Description
Attribute	Displays all the attributes of the CI type to which the CI belongs.
Condition	Select the required operator. For details, see “Attribute Operator Definitions” on page 378.
Value	Select or enter the required value.

Join Relationship Condition Dialog Box

Description	<p>Enables you to define the connection between two nodes using a join relationship. The join definition appears in the Join Definition area.</p> <p>To access: Click the Add  button in the Add Join Relationship dialog box.</p>
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176 ➤ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.

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

GUI Element (A-Z)	Description
<Selected node1>	A selected node. The first attribute applies to <end_1>.

GUI Element (A-Z)	Description
<Selected node2>	A selected node. The second attribute applies to <end_2>.
Operator	<p>Select one of the following operators:</p> <ul style="list-style-type: none"> ▶ Equal. The system checks whether two selected attributes are equal. ▶ Not equal. The system checks whether two selected attributes are not equal. ▶ Sub string. The system checks whether the value of the first attribute is a substring of the value of the second attribute. ▶ Sub string ignore case. The system checks whether the value of the first attribute is a substring of the value of the second attribute regardless of the string's case. <p>Important: When using the operator Not equal, ensure that both sides of the join relationship have a limited result size. It is recommended to define more specific conditions so as not to overload the system with large results.</p>


Layout Settings Dialog Box

Description	<p>Enables you to determine which attributes are used in the calculation of the TQL query when using the UCMDB API. For details, see “The HP Universal CMDB Web Service API” in <i>Solutions and Integrations</i>.</p> <p>To access: Click Advanced layout settings in the Node/Relationship Properties dialog box.</p>
Important Information	<ul style="list-style-type: none"> ▶ Since this option is only relevant when querying the CMDB API, the query results in the user interface is not impacted by the attributes you select in this dialog box. ▶ Once you have selected the required attributes and clicked OK, you cannot clear the selections you have made.
Included in Tasks	<ul style="list-style-type: none"> ▶ “Define a Report Rule – Scenario” on page 278 ▶ “Define a Correlation Rule – Workflow” on page 213 ▶ “Define an Enrichment Rule – Scenario” on page 332 ▶ “Create a TQL Query” on page 317 ▶ “Create a Pattern View” on page 176 ▶ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.


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

GUI Element (A-Z)	Description
Attribute name	The name of the attribute.
Calculate	Select this check box to include the attribute in the query’s calculation.

Node/Relationship Properties Dialog Box

<p>Description</p>	<p>Enables you to define the attribute conditions for the selected TQL node/relationship.</p> <p>To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager:</p> <p>In the editing pane, right-click the required node and select Node/Relationship Properties.</p> <p>Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Node Properties option.</p> <p>To access in Discovery:</p> <ol style="list-style-type: none"> 1 To access from the Discovery Resources pane, select a pattern. In the Pattern Signature tab, click the  Edit Input TQL button to the right of the Input TQL box to open the Input TQL Editor. 2 Right-click the required node/relationship and select Node/Relationship Properties.
<p>Included in Tasks</p>	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176 ➤ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.






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


GUI Element (A-Z)	Description
Advanced layout settings	<p>Enables you to determine which attributes are used in the calculation of the TQL query when querying the CMDB using third-party or custom tools.</p> <p>Opens the Layout Settings dialog box.</p>
Element name	<p>(Optional) The Element name box contains the name of the selected node/relationship. By default, the CI type is assigned as the element's name. You can rename a TQL node in the Element name box giving it a unique label. This can be helpful when there is more than one node of the same CI type in the TQL query.</p>
Include subtypes	<p>Select to display both the selected CI and its children in the topology map.</p>
Visible	<p>Select Visible to display the selected TQL node in the editing pane. When this option is cleared, an invisible box  appears to the right of the selected TQL node in the editing pane.</p> <div data-bbox="572 925 886 1220" data-label="Diagram"> <pre> graph TD Windows[Windows] -- Contained --> IP[IP] Windows -- Member --> Network[Network] style Network stroke-dasharray: 5 5 </pre> </div> <p>Any query results pertaining to that TQL node are not displayed in the topology map. This can be useful when certain relationships or TQL nodes are required to build the query but are not needed in the results. For example, Windows are connected to the network by defining specific IPs, but in any query results you may want to view the IP elements only and not the Windows elements.</p>

Attribute Tab

Description	<p>Enables you to create an expression defining conditions that restrict the number of nodes that appear in the query:</p> <ul style="list-style-type: none"> ➤ Add an attribute condition to a node or relationship. ➤ Filter the query results. <p>To access:</p> <ul style="list-style-type: none"> ➤ Click the Attribute tab in the Node/Relationship Properties dialog box. or ➤ Click Next in the New TQL Relationship Page in the TQL Node Wizard.
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176 ➤ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.

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

GUI Element (A-Z)	Description
	Add the attribute condition you have defined.
	Delete an attribute definition.
	Move a selected row up.
	Move a selected row down.
	View the condition definition.
And/Or	Click inside the And/Or field and select either And or Or to link multiple conditions.






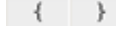
GUI Element (A-Z)	Description
Attribute name	Choose an attribute from the list.
 Brackets	Click inside the Brackets box to display a list of brackets you can use to build more complex, logical statements.
Criteria	Contains the attribute condition definition as defined in the Element Instances dialog box.
Fixed value	<p>Select one of the following options:</p> <p>Fixed value. You cannot change the value of the parameter.</p> <p>Parameterized value. Enables you to change the value of the parameter.</p> <ul style="list-style-type: none"> ▶ When a parameterized value is selected in View Manager, an option called Set View Element Parameters is included in the right-click menu. For details on how to change the value when using the TQL, see “Layout Settings Dialog Box” on page 406. <p>Note: If you select this option, you can enter a value here that is saved in the view. If you do not enter a value here, you are forced to enter one before saving the view.</p> <ul style="list-style-type: none"> ▶ When a parameterized value is selected in Topology Report Manager, a Set parameters values option is displayed at the top right of a generated Topology report, enabling you to edit the predefined parameters of node conditions in a Topology report. For details, see “Topology Report” on page 589.
Not	<p>Select NOT if you want the condition statement to do the opposite of what is defined.</p> <p>Note: If you select NOT, query results do not include data from the CI instances that were not assigned a value. For example, your system contains three hosts: Host1 is assigned the value A, Host2 is assigned the value B and Host3 is not assigned a value. You create a query to retrieve all hosts that are equal to A and select NOT; the results of your query only include Host2 because Host3 is not assigned a value.</p>

GUI Element (A-Z)	Description
Operator	Select the required operator. For details, see “Attribute Operator Definitions” on page 378.
Update	Update an attribute condition that has been modified.
Value	Enter or select the value of the attribute. The Value options vary according to the attribute type you select.

Cardinality Tab

Description	<p>Define a relationship cardinality, which enables you to define how many CI instances you expect to have at the end of a relationship in your query result.</p> <p>Select the required relationship to which the selected node is attached. Then define the lower and upper limits for including the node at the other end of the relationship in the query results.</p> <p>You can define relationship conditions that enable the relationship’s connecting node to be included in the TQL query results by creating an expression defining that condition. For an example, see “Example of a Relationship Condition” on page 413.</p> <p>To access: Click the Cardinality tab in the Node/Relationship Properties dialog box.</p>
Important Information	This tab appears only when a node is selected.
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176 ➤ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.

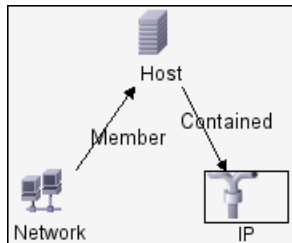
The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
	Add the cardinality definition you have defined.
	Delete a cardinality definition from the Cardinality area.
	Move a selected row up.
	Move a selected row down.
	View the cardinality condition definition.
And/Or	Click inside the And/Or field and select either And or Or to link multiple conditions.
 Brackets	Click inside the Brackets box to display a list of brackets you can use to build more complex, logical statements.
Criteria	Contains the attribute condition definition as defined in the Element Instances Dialog Box.
Max	Enter the value that defines the upper limits for including the node at the other end of the relationship in the query results. Note: You can use an asterisk (*) in the Max box to represent an infinite value.
Min	Enter the value that defines the lower limits for including the node at the other end of the relationship in the query results. For example, if <end_1> is IP and <end_2> is Windows , entering 1 in the Min box and asterisk (*) in the Max box instructs the system to retrieve only those IPs that are connected to at least one Windows operating system. (The asterisk indicates an infinite value.) Entering 3 in the Min box and asterisk (*) in the Max box instructs the system to retrieve only those Windows operating systems that are connected to at least three IPs.

GUI Element (A-Z)	Description
Node	Select the required relationship to which the selected node is attached. The list contains all the relationships that are linked to the selected node.
Not	Select NOT if you want the condition statement to do the opposite of what is defined. Note: If you select NOT , query results do not include data from the CI instances that were not assigned a value. For example, your system contains three hosts: Host1 is assigned the value A, Host2 is assigned the value B and Host3 is not assigned a value. You create a query to retrieve all hosts that are equal to A and select NOT ; the results of your query only include Host2 because Host3 is not assigned a value.
Update	Update a cardinality definition that has been modified.

Example of a Relationship Condition

The example of relationship conditions is based on the following TQL query:



In the Relationship Cardinality dialog box, the following relationship conditions are defined for the TQL:

- Member – **Min: 1, Max: ***
- Contained – **Min: 2, Max: 4**

Using the OR operator, the definitions appear in the **Cardinality** section, as follows:

NOT	{	Criteria	}	And/Or
<input type="checkbox"/>		Member (Network, Host) : 1..*		OR
<input type="checkbox"/>		Contained (Host, IP) : 2..4		

- [member (Network, Host)] OR [contained (Host, IP)] means that the host must either have between two and four IPs OR be a member of the network.

Using the AND operator, the definitions appear in the **Cardinality** section, as follows:

NOT	{	Criteria	}	And/Or
<input type="checkbox"/>		Member (Network, Host) : 1..*		AND
<input type="checkbox"/>		Contained (Host, IP) : 2..4		

- [member (Network, Host)] AND [contained (Host, IP)] means that the host must have between two and four IPs AND also be a member of the network.

Qualifier Tab

Description	<p>Enables you to define qualifier conditions for the selected node or relationship. For example, you can use a qualifier to define a CIT as abstract, meaning you cannot create instances from it.</p> <p>To access: Click the Qualifier tab in the Node/Relationship Properties dialog box.</p>
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176 ➤ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.
Important Information	<p>Important: By default, multiple selection links the conditions with the OR operator.</p>

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



GUI Element (A-Z)	Description
ABSTRACT_CLASS	You cannot create instances of this CIT.
BLE_LINK_CLASS.	A relationship that has been assigned this qualifier is loaded by an online BLE engine TQL and becomes part of the Dashboard status calculations.
CONTAINER	This qualifier is assigned to relationships that signify a containment relationship, such as Member, Container link, Contains, or Contained.
HIDDEN_CLASS	Instances of this CIT do not appear anywhere in the application.
ITU_HIDDEN_CLASS	Instances of this CIT do not appear in the topology map application.
MAJOR_APP	CI types that are assigned this qualifier appear in the Major Application Type Breakdown overview report. For details, see “Major Application Type Breakdown Report” on page 610.
MODELING_ENABLED	Enables a CIT to act as model in Modeling Studio. For details, see “Business CI Models” on page 112.
NETWORK_DEVICES	A qualifier common to all the CI types that represent a network device. It can be used for TQL queries related to network devices and serves as a replacement for CI types in a query.
Negate Qualifiers	If this check box is selected, then multiple selection links the conditions with the AND operator.
PM_SUSPECT	Used by Problem Isolation to determine which CIs are to be considered as suspects when isolating a problem. For details, see “Problem Isolation Reactive Analysis” in <i>Using Problem Isolation</i> .
ProtocolDialog	For internal use only.
ProtocolFields	For internal use only.




GUI Element (A-Z)	Description
READ_ONLY_CLASS	This CIT cannot be edited.
TRACK_LINK_CHANGES	Changes that occur in the specified relationship appear in Change reports. For details, see “Change Report” on page 581.

Identity Tab

Description	<p>Enables you to filter the TQL results according to the element ID of the instances found for the selected TQL node.</p> <p>Move the required element from the Optional identities pane on the left to the Selected identities pane on the right to define what you want included in the TQL results using the left and right arrows.</p> <p>To access: Click the Identity tab in the Node Properties dialog box.</p>
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176 ➤ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.
Important Information	This tab appears only when a node is selected.

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

GUI Element (A-Z)	Description
	Filter the CI instances you want to display for the selected node. Opens the Filter CI Instances dialog box.
	Clear the filter definitions you created in the Filter CI Instances dialog box.

GUI Element (A-Z)	Description
	Hide or display specific columns. For details, see “Select Columns Dialog Box” in <i>Reference Information</i> .
	Update the table.
	Click to navigate through the results page by page or to jump to the first or last page.
Optional identities pane	Displays all the instances found for the selected TQL node. For details, see “Optional Identities Pane” on page 417.
Selected identities pane	Displays the elements that are used to define what should be included in the TQL results. For details, see “Selected Identities Pane” on page 418.
Set Rows per Page	Determine the number of CI instances that appear on a page.

Optional Identities Pane

Description	Displays all the instances found for the selected TQL node in a table. To access: Click the Identity tab in the Node Properties dialog box.
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
CI Type	The CI type.
Display label	The label that is displayed for the node’s instance.

Selected Identities Pane

Description	Displays the elements that are used to define what should be included in the TQL results. To access: Click the Identity tab in the Node Properties dialog box.
--------------------	---

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

GUI Element (A-Z)	Description
CI Type	The CI type.
Display label	The label that is displayed for the node's instance.


 **Refine Node Type Dialog Box**

Description	Enables you to change the CI type of the TQL node after you have created a TQL query. To access: Right-click the required node and select Refine Node Type . Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Refine Node Type option.
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176 ➤ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.
Important Information	You can change the CI type to a type from one of the CI type's children, if one exists. If one does not exist, this option does not appear.


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

GUI Element (A-Z)	Description
List of CI types from which to choose	Select the required CI type.






Select Relationship Type Dialog Box


Description	<p>Enables you to select the type of TQL relationship to be created.</p> <p>To access: In the editing pane of IT Universe, Query Manager, View Manager, Correlation Manager, Enrichment Manager, and in the Topology Report Manager, click the Create Relationship  button in the toolbar and draw a line between two nodes. The Select Relationship Type dialog box opens automatically.</p>
Important Information	<p>Select one of the following relationship types:</p> <ul style="list-style-type: none"> ▶ Regular Relationship. For details, see “Add/Edit Relationship Dialog Box” on page 394. ▶ Join Relationship. For details, see “Add/Edit Join Relationship Dialog Box” on page 391. ▶ Compound Relationship. For details, see “Add/Edit Compound Relationship Dialog Box” on page 387. ▶ Calculated Relationship. For details, see “Add/Edit Calculated Relationship Dialog Box” on page 385.
Included in Tasks	<ul style="list-style-type: none"> ▶ “Define a Report Rule – Scenario” on page 278 ▶ “Define a Correlation Rule – Workflow” on page 213 ▶ “Define an Enrichment Rule – Scenario” on page 332 ▶ “Create a TQL Query” on page 317 ▶ “Create a Pattern View” on page 176 ▶ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.

Subgraph Condition Definition Dialog Box



Description	<p>Enables you to create conditions that restrict the number of nodes that appear in the query.</p> <p>Contains the following tabs:</p> <ul style="list-style-type: none"> ▶ Conditions. Enables you to define attribute conditions for nodes and relationships. See a description of the elements in the Conditions tab in the table below. ▶ Qualifiers. Enables you to define qualifier conditions for the selected node or relationship. For details, see “Qualifier Tab” on page 414. <p>To access: Click CONDITION  in the Add Triplet dialog box.</p>
Included in Tasks	<ul style="list-style-type: none"> ▶ “Define a Report Rule – Scenario” on page 278 ▶ “Define a Correlation Rule – Workflow” on page 213 ▶ “Define an Enrichment Rule – Scenario” on page 332 ▶ “Create a TQL Query” on page 317 ▶ “Create a Pattern View” on page 176 ▶ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.

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




GUI Element (A-Z)	Description
	Add the subgraph condition definition.
	Delete the subgraph condition definition.
	Move a selected row up.
	Move a selected row down.
	View the subgraph condition definition.
And/Or	Click inside the And/Or field and select either And or Or to link multiple conditions.

GUI Element (A-Z)	Description
Attribute name	Choose an attribute from the list.
 Brackets	Click inside the Brackets box to display a list of brackets you can use to build more complex, logical statements.
Criteria	Contains the attribute condition definition as defined in the Element Instances Dialog Box.
CIT	Contains the CIT selected from the Source and Target lists.
Not	<p>Select NOT if you want the condition statement to do the opposite of what is defined.</p> <p>Note: If you select NOT, query results do not include data from the CI instances that were not assigned a value. For example, let us assume that your system contains three hosts. Host1 is assigned the value A, Host2 is assigned the value B and Host3 is not assigned a value. If you create a query in which you want to retrieve all hosts that are equal to A and you select NOT, the results of your query only include Host2 because Host3 is not assigned a value.</p>
Operator	Select the required operator. For details, see “Attribute Operator Definitions” on page 378.
Value	Enter or select the value of the attribute. The Value options vary according to the attribute type you select.



Subgraph Definition Dialog Box

<p>Description</p>	<p>Enables you to create a graph that represents additional TQL query data related to a specific CI.</p> <p>To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: In the editing pane, right-click the required node and select Subgraph Definition.</p> <p>Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Subgraph Definition option.</p> <p>To access in Manage Discovery Resources in Discovery:</p> <ol style="list-style-type: none"> 1 Select a pattern in the Discovery Resources pane. 2 In the Pattern Signature tab, click the  Edit Input TQL button to the right of the Input TQL box to open the Input TQL Editor. 3 Right-click the required node and select Subgraph Definition.
<p>Important Information</p>	<p>The following icon is displayed next to the node for which you define a subgraph:</p> 
<p>Included in Tasks</p>	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176 ➤ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.
<p>Useful Links</p>	<p>“Subgraph Definition” on page 360</p> <p>“Create a Subgraph Definition — Scenario” on page 369</p>

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

GUI Element (A-Z)	Description
	Add a subgraph definition. Opens the Add Triplet dialog box.
	Delete a subgraph definition.
	Edit a subgraph definition. Opens the Edit Triplet dialog box.
Depth	A number that represents the longest path (that is, the maximum connecting nodes) allowed between two CIs in the CMDB that should be included in the DDM process. Default: 5
Element condition exists	A green asterisk appears next to either the source, relationship, or target in the subgraph definition if an attribute condition has been defined for one of them in the Subgraph Condition Definition dialog box. For details, see “Subgraph Condition Definition Dialog Box” on page 420.
Relationship	The relationship selected in the Add Triplet dialog box connecting the source to the target node.
Relationship Direction	The direction of the relationship selected in the Add Triplet dialog box, indicating which node is dependent on the other.
Source	The required source node selected in the Add Triplet dialog box.
Target	The required target node selected in the Add Triplet dialog box.

TQL Node Wizard

<p>Description</p>	<p>Enables you to build a TQL query.</p> <p>To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: In the editing pane, right-click the required node and select TQL Node Wizard.</p> <p>Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane.</p> <p>To access in Job Configuration in Discovery:</p> <ol style="list-style-type: none"> 1 Select a job in the Discovery Modules pane. 2 Select a Trigger TQL in the Properties pane. Click the Open the TQL Editor  button to open the Trigger TQL Editor. 3 Right-click the required node and select TQL Node Wizard. <p>To access in Manage Discovery Resources in Discovery:</p> <ol style="list-style-type: none"> 1 Select a pattern in the Discovery Resources pane. 2 In the Pattern Signature tab, click the  Edit Input TQL button to the right of the Input TQL box to open the Input TQL Editor. 3 Right-click the required node and select TQL Node Wizard.
<p>Important Information</p>	<p>If the TQL query is empty, drag the required TQL nodes on to the editing pane from the tree displayed in the CI Type Selector.</p>
<p>Included in Tasks</p>	<ul style="list-style-type: none"> ➤ “Define a Report Rule – Scenario” on page 278 ➤ “Define a Correlation Rule – Workflow” on page 213 ➤ “Define an Enrichment Rule – Scenario” on page 332 ➤ “Create a TQL Query” on page 317 ➤ “Create a Pattern View” on page 176 ➤ “Implement a Pattern” in <i>Discovery and Dependency Mapping Guide</i>.

Useful Links	“Topology Query Language” on page 356
Wizard Map	The TQL Node Wizard contains: New TQL Node Page > New TQL Relationship Page > TQL Node Properties Page > Element Instances Page

New TQL Node Page

Description	Enables you to add a node to the TQL query.
Important Information	If the TQL query is empty, drag the required TQL node on to the editing pane from the tree displayed in the Configuration Item Types pane. For general information on the TQL Node Wizard, see “TQL Node Wizard” on page 424.
Wizard Map	The TQL Node Wizard contains: New TQL Node Page > New TQL Relationship Page > TQL Node Properties Page > Element Instances Page

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

GUI Element (A-Z)	Description
<node> is required	<p>Define the relationship cardinality. For details, see “Cardinality Tab” on page 411.</p> <ul style="list-style-type: none"> ▶ Select the <node> is required check box for each node to include a minimum of one instance of the node at the other end of the relationship in the query results. Selecting the check box gives the relationship a cardinality value of 1*. ▶ Clear the <node> is required check box to give the relationship a cardinality value of 0*.
<TQL Node hierarchy tree>	<p>Select the required node. The node you select appears in the Element name box.</p> <p>This list only includes the nodes of the CI types that have valid relationships to the selected (source) node.</p> <p>To the right of each node, the number of CI instances that exist in the CMDB for that CI type is displayed. The number of instances is only updated after you close the TQL Node Wizard and open it again.</p> <p>Note: The first node in the hierarchy tree is selected by default.</p>
Element name	<p>(Optional) Contains the name of the selected node. By default, the CI type is assigned as the element’s name.</p> <p>You can rename a TQL node in the Element name box giving it a unique label. This can be helpful when there is more than one node of the same CI type in the TQL query.</p>
Show only CITs with instances	<p>Select this check box to display only the CITs of which there are instances in the CMDB.</p> <p>Note: The Show only CITs with instances check box is selected by default.</p>

 **New TQL Relationship Page**

Description	Enables you to add a relationship to a TQL query.
Wizard Map	The TQL Node Wizard contains: New TQL Node Page > New TQL Relationship Page > TQL Node Properties Page > Element Instances Page







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

GUI Element (A-Z)	Description
<TQL Relationship hierarchy tree>	Select the required relationship. The node you select appears in the Relationship Type box.
Direction	Select the required relationship direction. The direction indicates which node is dependent on the other.
Relationship direction	Select the required relationship direction. The direction indicates which node is dependent on the other.
Relationship Type	A valid relationship that defines the connection between the selected nodes. The box displays the relationship you selected in the relationship hierarchy tree.
Show only relationships with instances	Display only the relationships of which there are instances in the CMDB.


TQL Node Properties Page

Description	Enables you to create an expression that restricts the number of nodes that appear in the query by adding an attribute condition to a node or relationship.
Wizard Map	The TQL Node Wizard contains: New TQL Node Page > New TQL Relationship Page > TQL Node Properties Page > Element Instances Page

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

GUI Element (A-Z)	Description
	Add an attribute condition.
	Delete an attribute condition.
	Move a selected row up.
	Move a selected row down.
	View the condition definition.
And/Or	Click inside the And/Or field and select either And or Or to link multiple conditions.
Attribute name	Choose an attribute from the list.
 Brackets	Click inside the Brackets box to display a list of brackets you can use to build more complex, logical statements.
Criteria	Contains the attribute condition definition as defined in the Element Instances Dialog Box.

GUI Element (A-Z)	Description
Fixed value	<p>Select one of the following options:</p> <p>Fixed value. You cannot change the value of the parameter.</p> <p>Parameterized value. Enables you to change the value of the parameter.</p> <ul style="list-style-type: none"> ▶ When a parameterized value is selected in View Manager, an option called Set View Element Parameters is included in the right-click menu. For details on how to change the value when using the TQL, see “Set View Parameters/Set View Element Parameters Dialog Box” on page 198. <p>Note: If you select this option, you can enter a value here that is saved in the view. If you do not enter a value here, you are forced to enter one before saving the view.</p> <ul style="list-style-type: none"> ▶ When a parameterized value is selected in Topology Report Manager, a Set parameters values option is displayed in a generated Topology report, enabling you to edit the predefined parameters of node conditions in a Topology report. For details, see “Topology Report” on page 589.
Include subtypes	Display both the selected CI and its children in the topology map.
Not	<p>Select NOT if you want the condition statement to do the opposite of what is defined.</p> <p>Note: If you select NOT, query results do not include data from the CI instances that were not assigned a value. For example, your system contains three hosts: Host1 is assigned the value A, Host2 is assigned the value B and Host3 is not assigned a value. You create a query to retrieve all hosts that are equal to A and select NOT; the results of your query only include Host2 because Host3 is not assigned a value.</p>
Operator	Select the required operator. For details, see “Attribute Operator Definitions” on page 378.

GUI Element (A-Z)	Description
Update	Update an attribute condition that has been modified.
Value	Enter or select the value of the attribute. The Value options vary according to the attribute type you select.
Visible	<p>Select Visible to display the selected TQL node in the editing pane. When Visible is cleared, an invisible box  appears to the right of the selected TQL node in the editing pane.</p> <div data-bbox="582 508 901 800" data-label="Diagram"> <pre> graph TD Windows[Windows] -.- Contained --> IP[IP] Network[Network] -.- Member --> Windows </pre> </div> <p>Any query results pertaining to that TQL node are not displayed in the topology map. This can be useful when certain relationships or TQL nodes are required to build the query but are not needed in the results. For example, Windows are connected to the network by defining specific IPs, but in any query results you may want to view the IP elements only and not the Windows elements.</p>

 **Element Instances Page**

Description	Displays all the instances found for the selected TQL node in a table.
Important Information	<p>The columns displayed in the report vary according to the CI type selected.</p> <p>By default, only columns corresponding to attributes that have been defined with the Asset Data, Change Monitored, and Comparable attribute qualifiers in the CIT Manager are displayed as columns in the dialog box. For details, see “Attributes Page” on page 261.</p> <p>If required, you can click the Display Hidden Columns button to display the attributes that are defined as Visible but not Static. For details on Static attributes, see “Attributes Page” on page 261.</p> <p>Note: For information on the elements included in the Element Instances page, see “Element Instances Dialog Box” on page 400.</p>
Wizard Map	<p>The TQL Node Wizard contains:</p> <p>New TQL Node Page > New TQL Relationship Page > TQL Node Properties Page > Element Instances Page</p>

User Preferences Dialog Box

Description	Enables you to reset system preferences. To access: Select Edit > User Preferences .
Important Information	All the preferences you select (such as whether to display certain wizard pages or warning message preferences) are stored in the system. This dialog box enables you to reset those preferences.

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

GUI Element (A-Z)	Description
<Left pane>	Select the preferences page to edit. The following options are available: <ul style="list-style-type: none"> ▶ Wizard Preferences ▶ Optional Messages Preferences ▶ Discovery Preferences
Preferences list	The list of warning messages and their user-selected preferences.
Reset Page	Click to reset the selected preference to its default value.
Reset All	Click to reset all the preferences to their default values.

Troubleshooting and Limitations

For TQL queries to be valid, they must comply with certain restrictions.

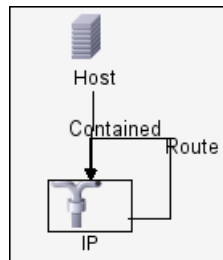
This section includes the following topics:

- “Understanding Validation Restrictions” on page 433
- “Correlation TQL Validation” on page 435
- “Enrichment TQL Validation” on page 436

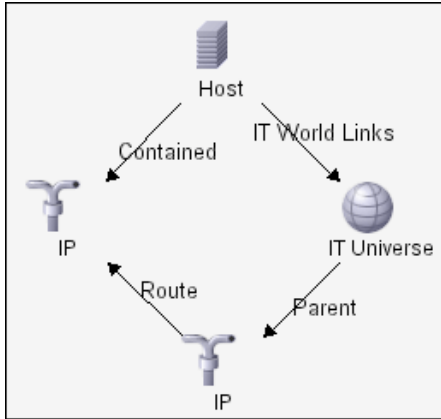
Understanding Validation Restrictions

For Correlation, Enrichment, and DDM TQL types to be valid, they must comply with the following restrictions:

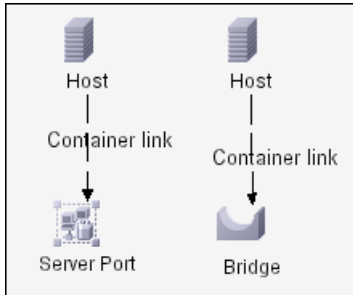
- **Self Relationships.** A TQL must not contain self relationships, that is, a relationship must not lead from a node to itself, as the following example illustrates:



- **Cyclic Graph.** The TQL structure cannot be a closed circle, as shown in the following example:



- **Separate Nodes and Groups.** All the TQL nodes must be linked to one another, that is, the TQL cannot contain separate nodes or groups, as the following example illustrates:

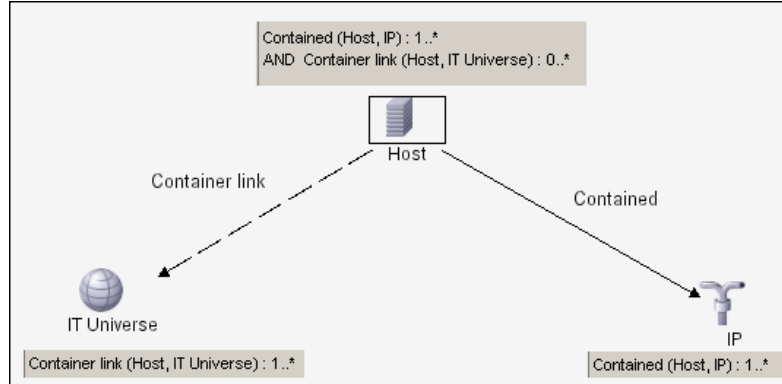


Note: This restriction also applies to Report TQLs.

Correlation TQL Validation

A Correlation TQL must also comply with the following restrictions:

- **Number of nodes.** A Correlation TQL must consist of at least two nodes.
- **Trigger and affected nodes must be connected.** There must be a path of relationships from the triggered node to the affected nodes.
- **Selecting nodes to function as Correlation triggers.** When selecting nodes to function as Correlation triggers, the nodes must comply with the following restrictions:
 - You can select more than one node as a trigger. However, you cannot define a node as affected and as a trigger.
 - If a node has a relationship whose minimum limit is 0 (meaning that one of its ends does not necessarily have a node linked to it), the node that is linked to its other end cannot be a root cause node (because it may or may not exist in the TQL). For details about minimum limits, see “Cardinality Tab” on page 411. For example, **IT Universe** cannot be either a root cause or affected node because it is connected to the host with a **Min** limit of 0.



Note: A node that is not visible cannot be a root cause or an affected node.

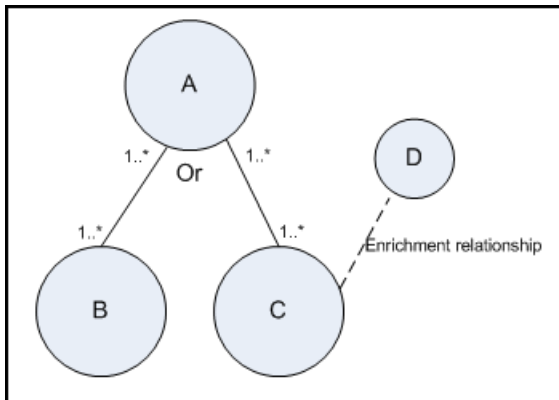
- **The connection between trigger and affected nodes.** The trigger node and affected nodes you define must be connected by a path of relationships from the triggered node to the affected nodes.

Enrichment TQL Validation

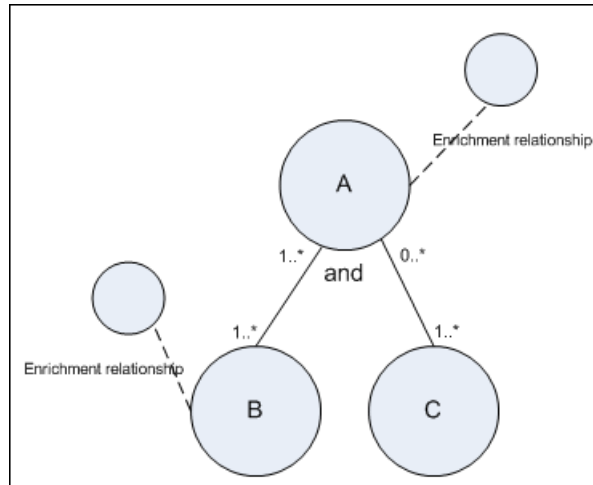
Enrichment TQL queries must comply with the following restriction:

- **Required elements.** You cannot perform Enrichment on a non-required node, that is, a node that does not necessarily appear in the TQL results.

Example 1. In this example, the TQL results can be either **A** and **B** or **A** and **C**. Therefore, you cannot add an Enrichment node to nodes **B** or **C** because they are not required elements. You can add an Enrichment node to node **A** because it always appears in the TQL results. For details on how to add Enrichment nodes and relationships, see “Add Enrichment Nodes and Relationships to an Enrichment TQL Query” on page 363.



Example 2. In this example, both **A** and **B** are required elements that always appear in the TQL results. Only **C** is not a required element because it has a cardinality of 0. Therefore, you cannot add an Enrichment node to it.



12

Impact Modeling

This chapter provides information on impact modeling.

This chapter includes:

Concepts

- Impact Modeling Overview on page 439
- Impact Layer on page 440
- Impact Rules on page 440
- Propagation Reversal on page 442
- Calculated Relationship Types on page 444
- Creating Views Based on the Impact Model on page 446

Impact Modeling Overview

The impact model enables you to determine the direction of the propagation of the IT infrastructure CIs in your business world. The direction of the impact is not always the same direction as the physical relationships taken from the CI Type model.

The impact model uses the impact layer to change the propagation direction. The impact layer is used in the applications where propagation occurs. You change the direction of the impact using the impact layer, regardless of the direction of the physical relationships.

All KPI propagation is affected by the impact model. For details on KPI propagation in Dashboard, see “Propagations” in *Using Dashboard*. For details on KPI propagation in Service Level Management, see “Propagations” in *Using Service Level Management*.

For information on troubleshooting and limitations relating to Impact Modeling in upgraded environments, see “Impact Modeling” in the *HP Business Availability Center Deployment Guide* PDF.

Impact Layer

The impact layer changes the direction of the impact. The impact layer separates the impact direction from the CI Type model, creating an independent layer on top of the CI Type model. This means that components affected by the impact model are no longer relying on the physical relationships as defined in the CI Type model. As a result, the impact direction is no longer necessarily identical to the direction of the physical relationships in the CI Type model.

Impact Rules

The impact layer consists of impact rules. The impact rules are defined in the CI Type Manager. For details, see “Triplets Page” on page 265.

An impact rule is defined by one or more triplets. For details, see “Triplets Page” on page 265. Each triplet is defined by the following components:

- ▶ One source CI type
- ▶ One target CI type
- ▶ A physical relationship that links the two CI types
- ▶ The required impact direction. The direction of the impact can be identical to or opposite from the direction of the relationship in the class model.

HP Business Availability Center implements the impact layer by creating calculated relationships that are defined by impact rules. Once one of the triplets fulfills the impact rule condition, HP Business Availability Center automatically creates the calculated relationship based on the triplet definition.

Since calculated relationships are defined by physical relationships from within the class model, their lifetime is determined by the lifetime of the physical relationships defined in the impact rule. When the physical relationship in the class model is removed, the corresponding calculated relationship is removed from all view results as well.

Note: If you create a new CI type or relationship in the CI Type Manager, you need to define the required triplets. For example, to enable the impact model to properly affect KPI propagation. If the triplets are not defined, the required KPIs are not included in the Dashboard views and SLA agreements.

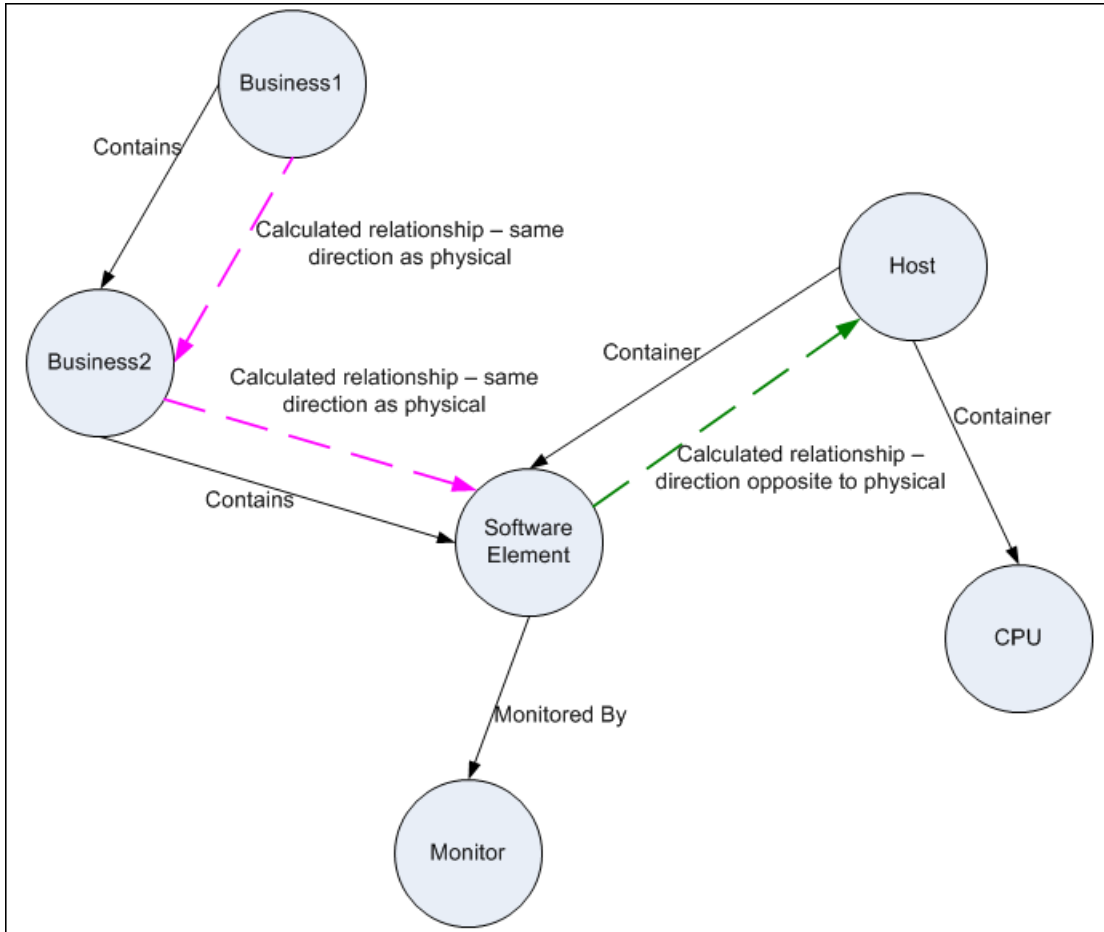
You can use calculated relationships to create TQL queries just like any other relationship in the CI Type model. This enables you to base Enrichment rules, Correlation rules, Report rules, and views on calculated relationships. Calculated relationships affect the results of all TQLs that use that calculated relationship since calculated relationships are part of the class model.

Example of an Impact Rule Definition



Propagation Reversal

The following example illustrates a scenario in which propagation is reversed.



Based on the impact rules defined in the CI Type Manager, the impact is propagating from the **Business2** CI to **Business1**, the same direction as the physical relationship that is connecting the **Software Element** CI to **Business2**.

According to the direction of the physical relationship between the **Software Element** CI and the **Host**, the **Software Element** CI should impact the **Host**.

But based on the following impact rule, a calculated relationship is automatically created and HP Business Availability Center reverses the impact of the propagation.



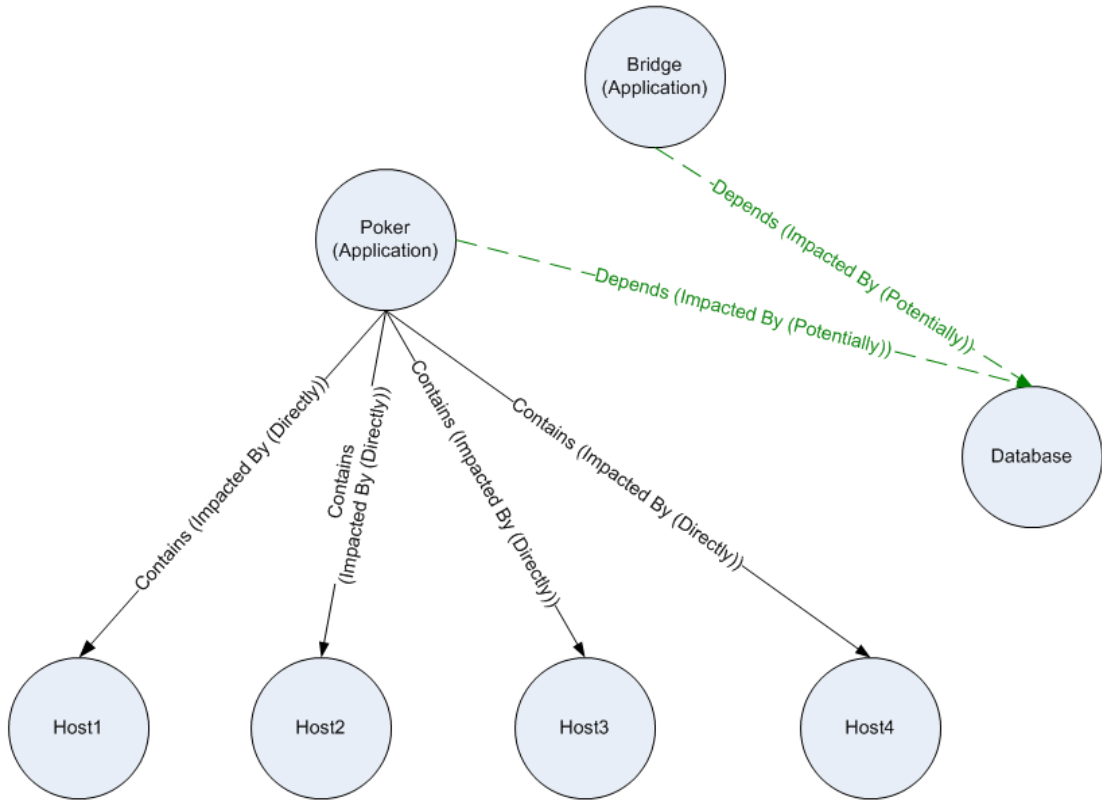
The impact is now propagated from the **Host** to the **Software Element**.

Calculated Relationship Types

There are two types of out-of-the-box calculated relationships. Each one represents a different type of relation.

- **Impacted by (Directly).** Represents the fact that one CI that is linked to another CI using an Impacted By (Directly) relationship is part of that CI. You use an Impacted By (Directly) relationship for those CIs that you want to see in your model. The ownership of the two CIs may be the same, but this is not always the case.
- **Impacted By (Potentially).** Represents the fact that one CI consumes the products of another. CIs that are linked by an Impacted By (Potentially) relationship are not part of that model, but are listed as related CIs. For details, see “Model Editor” on page 134.

The example below illustrates the difference between the Impacted By (Directly) and Impacted By (Potentially) relationships.



- If **Host4** experiences downtime, it impacts only the **Poker** application.
- If the **Database** CI experiences downtime, it impacts both the **Poker** and **Bridge** applications.
- If there is a planned downtime for **Poker**:
 - The four hosts are also in downtime because they are contained within the **Poker** application.
 - The **Database** CI continues to be active.

Creating Views Based on the Impact Model

As a best practice, you should use Modeling Studio to create a view of calculated relationships based on a model. Modeling Studio enables you to create perspective based views that use calculated relationships instead of physical relationships. For details, see “Modeling Studio” on page 111.

For details on how to create and edit models, see “Model Editor” on page 134.

Note: For an in-depth description of the Impact Modeling Solution, see “Best Practices for Modeling” on page 447.

13

Best Practices for Modeling

This chapter includes the best practices for modeling using HP Business Availability Center.

This chapter includes:

Reference

- ▶ Using Modeling Studio on page 448
- ▶ Models and Perspectives on page 448
- ▶ Building Models on page 449
- ▶ Model Dependencies on Other CIs in the CMDB on page 453
- ▶ Modeling an Application with Software Elements on page 455
- ▶ Creating Views Using the Modeling Studio on page 455
- ▶ Working with Upgraded Views on page 457

Using Modeling Studio

Modeling Studio is a new component introduced in HP Business Availability Center. It replaces the Instance View Editor for building views for display in Dashboard. This document details the required flow to create Dashboard views using the Modeling Studio tool.

The motivation behind developing the Modeling Studio was to create a separation between the need to change the CMDB content by creating CIs and relationships and the need to consume (view) the CMDB content. In earlier versions, altering the CMDB content was part of the view creation workflow. Hence, users were unintentionally changing the CMDB and influencing other users' views. In the Modeling Studio, you build models and transform your content into views to be consumed by HP Business Availability Center.

Models and Perspectives

A model is a CI collection that represents a managed business entity such as an application, business service, or line of business. A model is usually created by solution or application architects who are familiar with the content and hierarchy of the model. The model content can include system CIs (typically hosts), software elements (such as web servers, databases, and J2EE servers), end user monitoring components (Business Process Monitor or Real User Monitor applications), business processes, groups, and other existing models.

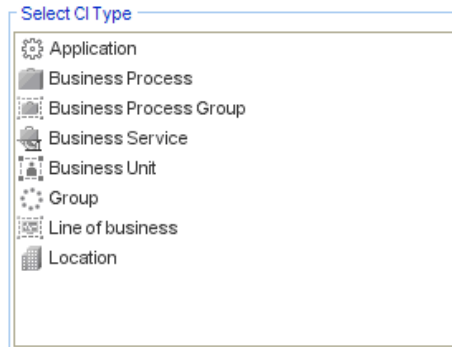
To generate a view from a model, a perspective needs to be applied. A perspective is a TQL-based tool that enriches the model content by adding additional CIs, thus creating a view. The default perspectives that are applied to create Dashboard views add all descendent CIs that are related by impact links down to the level of monitor CIs. There are other perspectives provided out of the box that can be used to address additional use cases.

The resulting view shows the model content as it is monitored by HP Business Availability Center.

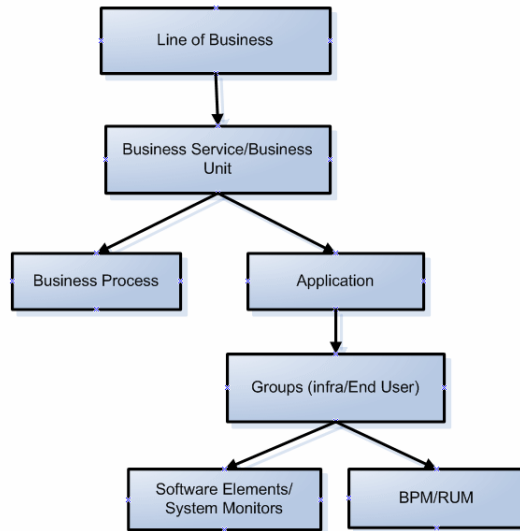
Building Models

The information required to define a model includes the CI content, the hierarchy, and the dependencies upon additional CIs.

HP Business Availability Center is configured with a predefined list of CI types that represent your business entities. When creating a new model using the Modeling Studio, the following list of valid models appears:



The model CI types can be arranged in hierarchies to reflect the organization's specific needs. Here is an example of a typical recommended model hierarchy:



A model can be nested in any logical hierarchy, but it is best to create a hierarchy that starts from high level business entities down to more specific model types.

It is strongly recommended to build models in a way that allows them to be reused as components of other models.

Building a model creates a **contains** link between the model and its CIs according to the defined hierarchy.

The creation of a CI which is a model CI results in the creation of an empty model by default. Therefore, if you want to create a model for a CI that does not yet exist, you create a new model and thus, a new CI. If you want to model an existing CI for the first time you select **Open Model** and select that CI.

Preconfigured Models

HP Business Availability Center creates out-of-the-box models for applications monitored by Business Process Monitor and Real User Monitor.

The Business Process Monitor model is of type business process group and it contains business process step CIs.

Name	CI Type
Credit cards	Business Process Group
Future debits	Business Process Step
Select credit card	Business Process Step
Request data from Amex	Business Process Step
Request new credit card	Business Process Step
Last statement	Business Process Step

The Real User Monitor model is of type application and contains the End User Management Application related group and business process step CIs. The Real User Monitor model is also impacted by the Real User Monitor Sessions monitor CIs, Real User Monitor Errors events CIs, and Real User Monitor Informational events CIs, which are visible in the Related CIs pane.

Name	CI Type
Saving Account	Application
Business Processes	End User Management Application Related Group
Show accounts list	Business Process Step
Select account	Business Process Step
Update profile	Business Process Step
Search by dates	Business Process Step
request check book	Business Process Step
Account history	Business Process Step

Direction	CI	CI type	Relation type
→	RUM Info Events	RUM Informational Events	Impacted By (Potentially)
→	Application Sessions	RUM Sessions monitor	Impacted By (Potentially)
→	RUM Errors	RUM Errors events	Impacted By (Potentially)

Building Model Content

Create a model of the desired type and assign it a name. The new model appears as the top CI in the content pane of the Model Editor. Drag and drop CIs from the CI Selector into the content pane to build the model content.

A model can contain system CIs, software elements, SiteScope groups, and other models (both existing models and new ones created during the modeling process).

The only CIs that cannot be part of a model containment tree are monitors. Monitor CIs are added to a model after you generate a view from the model using one of the monitor perspectives. You can include monitors in view by dragging them into the Related CIs pane when a model CI is selected in the upper pane of the Model Editor. If you try to drop a monitor CI into the upper pane, a message appears prompting you to add the monitor CI to the Related CIs pane.

The CI Selector pane offers two ways to search for a CI (both model CIs and non-model CIs):

► Browse Views

Use this option when you are familiar with a view that contains the CI you are looking for. The following out-of-the-box views can help you find commonly used CIs:

- End User Monitors view - contains business process groups and their content.
- Real Users Applications view - contains Real User Monitor applications and their content.
- System Monitors view - contains SiteScope groups hierarchy.
- System Software Monitoring view - contains software elements and the servers on which they are deployed.

In the CI Selector, select **Browse Views** and begin entering the view name or use the view tree to look for a CI in a specific folder.

► Search CIs

If you know the CI type you are looking for, select the **Search CIs** mode and use the quick search dialog to locate the desired CI. Use the Advanced Search option for CIs that do not appear in the quick search mode.

The search result appears in the left pane. After the list of CIs is refreshed, you can drag and drop CIs into the model content pane. It is possible to drag and drop multiple CIs in a single selection.

Models can be placed in a hierarchical mode. During the process of building the content you can insert new models and create groups.

Hierarchies between CI types which are not models is not supported.

Grouping

In some cases, there is a need to divide the model into logical groups according to ownerships, locations or any other custom representation.

In the following example the application contains two groups that represent data centers:

Name	CI Type
BankOne Data Centers	Business Service
NY Data Center	Group
10.128.0.10	Host
16.59.57.145	Windows
LA Data Center	Group
Wabm2am28	Windows
Wabm2am37	Windows
Wabm2amdb02	Windows
low	Windows

For details on creating groups in a model, see “Grouping” on page 137.



Model Dependencies on Other CIs in the CMDB

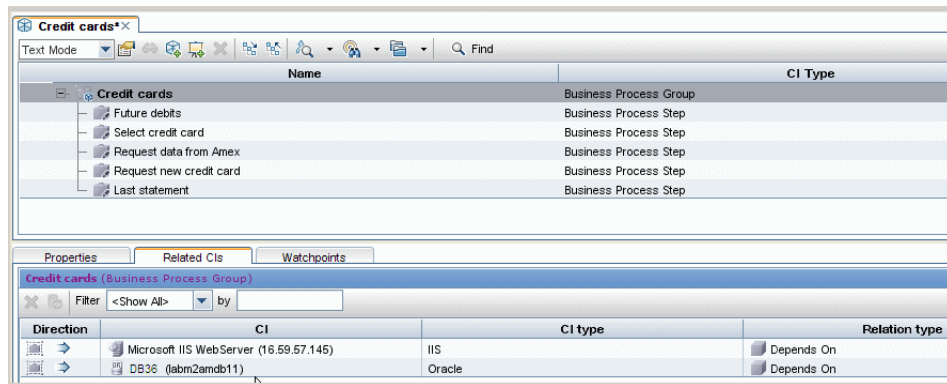
Each model CI in the model can be dependent on other CIs that exist in the CMDB but are not part of the model itself. Examples of such CIs include shared resources such as database servers and storage devices.

The model structure may vary between organizations according to policies and responsibilities in the IT department. There are organizations where shared resources are considered to be part of the application and are monitored as part of it, while in other organizations they are considered external to the application. In the first case, shared resources are part of the model and appear in the content pane, whereas in the second case they appear as related CIs (in the lower pane of the Model Editor).

To create a dependency between a CI in the model and another CI in the CMDB, search for a CI in the left pane and drag it into the Related CIs tab. This operation creates a **depends on** link in the CMDB.

In order to create a dependency relationship between two CIs, there must be a valid link in the CMDB between the two CI types. By default, all business CIs can be dependent on other business CIs.

The following example shows an application that depends on a web server and Oracle software elements:



HP Business Availability Center offers a revised out-of-the-box impact model. The impact model describes the impact relationships between CI types. For example, a software element is impacted by the host on which it is deployed. In the Modeling Studio, when you include a software element as part of a model, the host on which it is deployed appears in the Related CIs tab, since the software element is dependent on the server.

Modeling an Application with Software Elements

Software elements are CIs that describe the implementation components of an application. Examples include web servers such as IIS or Apache, application servers such as WebSphere or WebLogic, and databases.

In previous versions, those CIs were discovered only by using Discovery and Dependency Mapping. Starting from SiteScope version 10.00, software elements are discovered by SiteScope as well.

To build the implementation model of a three-tier application using its software elements, create an application model.

You can use the Software Elements search in the Advanced Search dialog or browse the System Software Monitoring view to locate software elements. The names of the software elements are formed by combining the software element CI type with the server name, for example, Microsoft IIS web server (Server1).

Drag the relevant software elements into the modeling pane. The server on which the software element was deployed as well as the monitor of the software element both appear automatically in the Related CIs pane. This change derives from the new SiteScope monitoring model. In previous versions, all monitors (of both hardware and software) were connected to the Server CI. The SiteScope model was enhanced and now hardware monitors are connected to the server CI, while software monitors are connected to the software elements.

Creating Views Using the Modeling Studio

There are two methods of creating views using the Modeling Studio. The first option is to create a view based on a model (or on several models); the second one is to create a view out of CI collection that is not a model.

A view based on a model is updated automatically when the model content is updated. For example, a view was generated using a business process group model that initially contained five business process steps. The business process group was then updated to include additional business process steps. Those changes are automatically reflected in the view.

This option is the recommended one, since it creates a dynamic view.

In a view based both on models and individual CIs, the view content is updated according to changes in the models.

Generating a View from a Model

After building a model and saving the model definition, select the top model and select **Generate view for selected model**. In the dialog box that opens, select the desired perspective according to the desired view content.

The recommended perspective is All Monitors. It creates a view with all the CIs in the model and for each CI, it adds all the child CIs including the monitor CIs. Additional perspectives that may be used for other purposes are described in “Predefined Perspectives” on page 162.

If the selected model includes dependent CIs (which appear in the Related CIs tab), they are also enriched by the perspective and become part of the view.

The Content Only perspective does not make any changes in the view, even for model CIs.

Hiding Irrelevant CIs from a View

The view result appears in the View Results pane. At this point, you may choose to hide CIs that appear in the view.

Hiding CIs from a view does not change the status calculation of CIs in the view (the status calculation is performed according to the CMDB hierarchy). For example, hiding two business process steps from a business process group with five steps does not affect the business process group status. If a hidden CI has a critical status and the remaining CIs are OK, the business process group shows a critical status.

For details on hiding CIs and restoring them to a view, see “Including and Excluding Child CIs” on page 115.

Working with Upgraded Views

After the upgrade from version 7.x, all instance views remain available for further editing in the Modeling Studio.

The view content pane shows only the first level in the view. The complete view content can only be seen in the preview.

During the upgrade process all CIs of types that can be models are converted into models.

The upgrade includes model CIs and non-model CIs. To edit a model CI, double click the CI and the model is opened for editing in a new tab.

To edit the view, use one of the following options:

- To add a CI under the view root, drag and drop it onto the view content pane.
- To remove a CI from the first level of the hierarchy, select the CI and delete it from the view content.
- To remove CIs which are not under the view root, use the Hide CI option.
- To add or remove CIs within a model CI, double click the CI. The selected model is opened in a new tab and can be edited as required. After editing the model and saving it, the changes appear in the view.

Part II

Model Management Settings

14

Package Manager

This chapter provides information on Package Manager.

This chapter includes:

Concepts

- ▶ Package Administration Overview on page 462
- ▶ Package Zip File Contents and Format on page 463
- ▶ Packages for Federated CMDB Adapters on page 464

Tasks

- ▶ Create a Custom Package on page 465
- ▶ Deploy a Package on page 466
- ▶ Export a Package on page 466

Reference

- ▶ Package Resources on page 467
- ▶ Using the JMX Console to Perform Package Manager Tasks on page 469
- ▶ Package Manager User Interface on page 473

Troubleshooting and Limitations on page 488

Package Administration Overview

A package is a subset of resources grouped together by a defined criteria. For a list of the predefined resource types, see “Resource Types” on page 479.

Package Manager fulfills several functions:

- ▶ Enables the discovery of specific IT infrastructure assets. For example, HP Business Availability Center deploys the SQL_Server package to discover Microsoft SQL servers.
- ▶ Enables you to define the CI Type model through the CI types that are included in the packages. For example, some of the CI types included in the package Host_Resources_Basic are Disk, CPU, Process, and Print Queue.
- ▶ Enables you to move groups of resources from one system to another. For example, from a test to a production environment.

There are two types of packages:

- ▶ **Factory package.** Contains resources that are deployed with the installation and are used to initialize HP Business Availability Center.

By default, factory packages are located in: **<HP Business Availability Center root directory>\mam_lib\factory_packages** on the Data Processing server machine.

Note: Some of the factory packages that are deployed with the installation are not visible in the list of packages that appear in Package Manager. To display the hidden packages, right-click anywhere in the Package Manager Window and select **Show Hidden Packages**.

- ▶ **Custom package.** A package that is user created. You may want to create a custom package if the factory packages do not contain the resources needed for the tool you are developing, or if you want to export resources from system to system. For details, see “Create Custom Package/Edit Package Wizard” on page 475.

Important: If you create custom packages for the resources or tools you develop, do not place them in the <HP Business Availability Center root directory>\mam_lib\factory_packages folder on the Data Processing server machine. This folder is only for factory packages.

Export and deployment of packages from system to system is performed through the Package Manager interface.

You can:

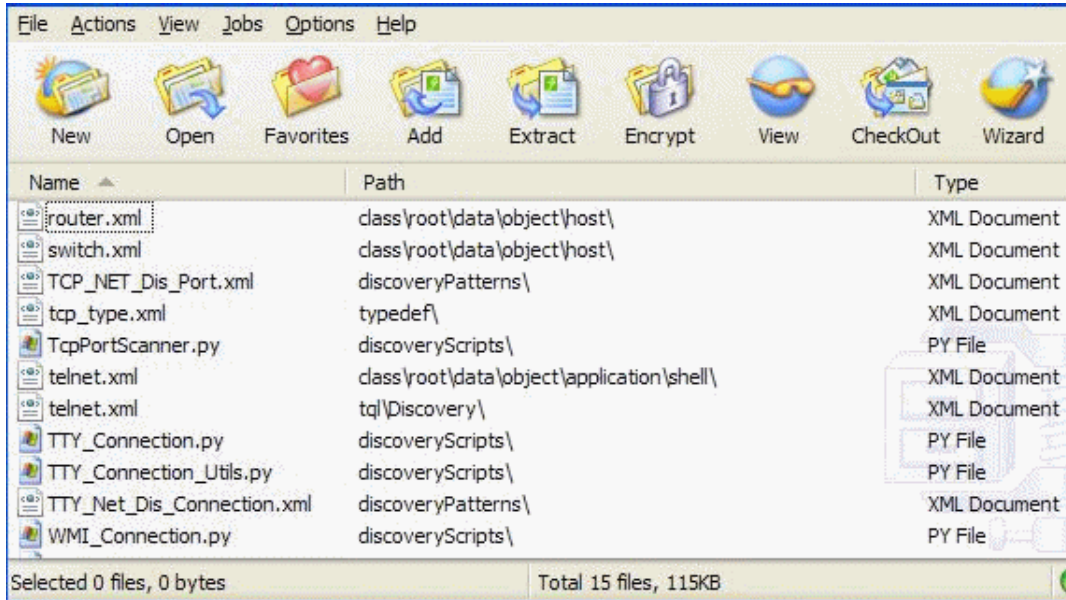
- ▶ Export some or all of a package's resources to your local directory. For details, see "Export a Package" on page 466.
- ▶ Deploy some or all of a package's resources to the CMDB from your local directory. For details, see "Deploy a Package" on page 466.

Package Zip File Contents and Format

A package's resources are stored in the CMDB. To export a package from system to system, you use the Package Manager interface (for details, see "Package Manager Window" on page 484). Package Manager creates a zip file containing the resources to enable the export of the resources.

When you export resources from the Package Manager to your local directory, the resource definitions are stored in various formats, for example, XML format.

In the sample **Network.zip** below, the **router.xml** file contains a Router CIT definition and the **Switch.xml** file contains a Switch CIT definition.



Packages for Federated CMDB Adapters

You deploy Federated CMDB adapters by creating a package and placing them in the appropriate folder. For details, see “Deploy the Adapter” on page 790.

Create a Custom Package

When you create a new package, you give the package a unique name and description, and then select the resources you want included in the package. For details, see “Create Custom Package/Edit Package Wizard” on page 475.

Example of Resources Selected to Be Included in a Package

The summary page in the Create Custom Package wizard displays the resources selected to be included in the package, as shown in the illustration below:

The package contains resources from the following resource groups:


- Relationships
- Valid Links
- Configuration Item Types

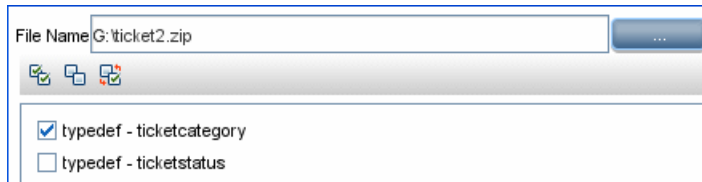
Selection Summary
View the resources to be included in the package.
Relationships: applicationLink
Valid Links: Service Desk Link: Siebel Application -> IT Incident
Configuration Item Types: Business Service View

Deploy a Package

You can deploy some or all of a package's resources to the CMDB from your local directory. For details, see "Package Manager Window" on page 484.

Example of Deploying Only Specific Resources in a Package


You want to deploy only some of the resources contained in the package called **ticket2.zip**. Click the  button. In the Deploy Specific Resources dialog box, browse to the package's location and select the resources from the package you want to deploy. See the following illustration:

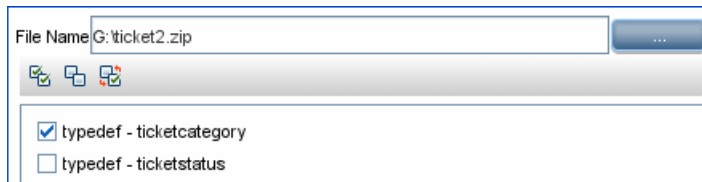


Export a Package

You can export some or all of a package's resources to your local directory. For details, see "Package Manager Window" on page 484.

Example of Exporting Only Specific Resources in a Package

You want to export only some of the resources contained in a package called **ticket2.zip** to your local directory. Click the  button. In the Export Package dialog box, select the **Export Resources** option and select the resources you want to export. See the following illustration:



Package Resources

This section contains a list of the resources a package can contain. For a list of the available resource types and their descriptions, see “Resource Types” on page 479.

- **acl.** The definition of a role such as Administrator or Guest. For details, see “User Management” in *Platform Administration*.
- **adapter.** Contains a description and the capabilities of the deployed federated adapter.
- **adapterCode.** Contains compiled classes (normally a jar), based-on *.jar files, and configuration files needed for federated adapters. Place these files in the **adapterCode\<adapter ID>** folder in the zip package. For details, see “Deploy the Adapter” in *Discovery and Dependency Mapping Guide*.
- **calculatedLinks subsystem.** Contains the calculated relationships and their triplets as defined in the CI Type Manager.
- **categories.** Contains the State definitions used by Correlation Manager. For details on States, see “State Manager” on page 505. For details on Correlation Manager, see “Correlation Manager” on page 211.
- **class.** CI type descriptions, such as host, file, switch, and so on. For details, see “CI Type Manager” on page 239.
- **correlation.** Correlation rule definitions. For details, see “Correlation Manager” on page 211.
- **datamodel.** Used to import CI instances into the system. If the CI does not exist in the CMDB, an instance of the CI is created. If a CI type already exists in the CMDB, the values of the CI from the package resource overwrites the values of the CI in the CMDB.
- **datamodelcreateonly.** Used to import CI instances into the system. If the CI does not exist in the CMDB, an instance of the CI is created. If a CI type already exists in the CMDB, the values of the CI from the package resource does not overwrite the values of the CI in the CMDB.
- **datamodelgenerateids.** Used to import CI instances into the system for CITs that require the ID to be calculated dynamically upon deployment (such as CITs with no key attributes).

- ▶ **discoveryConfigFiles.** Configuration files include properties and parameters that are needed to discover components on the system. For details, see “Manage Discovery Resources” in *Discovery and Dependency Mapping Guide*.
- ▶ **discoveryJobs.** A Discovery and Dependency Mapping (DDM) job includes configuration data, scheduling information, and TQL assignments needed to activate discovery of components. For details, see “Run Discovery” in *Discovery and Dependency Mapping Guide*.
- ▶ **discoveryModules.** A DDM module includes all the jobs needed to discover a specific component in the system. For details, see “Run Discovery” in *Discovery and Dependency Mapping Guide*.
- ▶ **discoveryPatterns.** DDM patterns define what scripts need to be run and in which order, declare the input and output CI Types and parameters to be configurable on the DDM jobs related to them. For details, see “Manage Discovery Resources” in *Discovery and Dependency Mapping Guide*.
- ▶ **discoveryResources.** External resources include all external resources that are needed in DDM, for example, a Visual Basic file, a credentials file, and so on. For details, see “Manage Discovery Resources” in *Discovery and Dependency Mapping Guide*.
- ▶ **discoveryScripts.** DDM scripts enable navigating to, and accessing, components that must be discovered. For details, see “Manage Discovery Resources” in *Discovery and Dependency Mapping Guide*.
- ▶ **discoveryWizard.** Used to define the Discovery Wizard dialog box contents. For details, see “Run Discovery” in *Discovery and Dependency Mapping Guide*.
- ▶ **enrichment.** Enrichment rule definitions. For details, see “Enrichment Manager” on page 329.
- ▶ **modelnotification.** Contains filter definitions for CMDB model notifications. The data model notification system gives notification of changes that occurred in the CMDB. For example, items in the CMDB that have been removed, updated, or added.
- ▶ **report.** Report rule definitions, as described in “Topology Report Manager” on page 277.
- ▶ **schedulerJobs.** Tasks that have been defined to run in the Scheduler. For details, see “Scheduler” on page 491.
- ▶ **tql.** TQL query definitions. For details, see “Query Manager” on page 315.

- **typedef.** Predefined Enumeration definitions that relate to attributes of type Enumeration, such as severity levels, admin states, and so on. For details, see “System Type Manager” on page 242.
- **users.** The definition of a user and the user’s role. For details, see “User Management” in *Platform Administration*.
- **validlinks.** All predefined, valid connections (relationships) between CITs.
- **view.** View Manager definitions. For details, see “View Manager” on page 157.

Using the JMX Console to Perform Package Manager Tasks

This section describes the Package Manager tasks you can perform using the JMX console.

Note: It is recommended that you use the Package Manager to perform these tasks instead of the JMX console. View Package Deployment History cannot be performed by the Package Manager.

This section includes the following tasks:

- “Deploy a Package” on page 470
- “View Package Deployment History” on page 470
- “Undeploy a Package” on page 471
- “Display Currently Deployed Packages” on page 471
- “Export Packages” on page 472
- “Package Name Rules” on page 473

Deploy a Package

Follow these steps to deploy a package using the JMX console.

- a** Launch your Web browser and enter the following address:
http://<server_name>:8080/jmx-console, where **<server_name>** is the name of the machine on which HP Business Availability Center is installed.
- b** Under **MAM**, click **service=MAM Packaging Services** to open the JMX MBEAN View page.
- c** Locate **java.lang.String deployPackages**.
- d** In the **ParamValue** box for the parameter **customerId**, enter the **<customer id>**.
- e** In the **ParamValue** box for the parameter **dir**, enter the name of the folder that contains the package's zip file. Ensure that you include the full path to the folder.

Note: To deploy the package from the **factory_packages** directory, leave this box empty.
- f** In the **ParamValue** box for the parameter **packagesNames**, enter the name of the packages. For details, see "Package Name Rules" on page 473.
- g** Select **True** to override DDM job configurations changed in the DDM user interface. For details, see the *Discovery and Dependency Mapping Guide*.
- h** Click **Invoke** to deploy the package.

View Package Deployment History

Each time you deploy packages, a report is created displaying the deployment status of those packages. Use the JMX console to view the deployment status report.

- a** Launch the Web browser and navigate to:
http://<server_name>:8080/jmx-console, where **<server_name>** is the name of the machine on which HP Business Availability Center is installed.

- b** Under **MAM**, click **service=MAM Packaging Services** to open the JMX MBEAN View page.
- c** Locate **java.lang.String displayResourcesDeploymentHistory**.
- d** In the **ParamValue** box for the parameter **customerId**, enter the <customer id>.
- e** In the **ParamValue** box for the parameter **reportNum**, enter the number of the report you want to view.
- f** Click **Invoke** to view the deployment status report of the packages.

Undeploy a Package

Follow these steps to undeploy a package using the JMX console.

- a** Launch the Web browser and navigate to:
http://<server_name>:8080/jmx-console, where <server_name> is the name of the machine on which HP Business Availability Center is installed.
- b** Under **MAM**, click **service=MAM Packaging Services** to open the JMX MBEAN View page.
- c** Locate **java.lang.String undeployPackages**.
- d** In the **ParamValue** box for the parameter **customerId**, enter the <customer id>.
- e** In the **ParamValue** box for the parameter **packagesNames**, enter the name of the package you want to remove. For details, see “Package Name Rules” on page 473.
- f** Click **Invoke** to undeploy the package.

Display Currently Deployed Packages

Follow these steps to display currently deployed packages using the JMX console.

- a** Launch the Web browser and navigate to:
http://<server_name>:8080/jmx-console, where <server_name> is the name of the machine on which HP Business Availability Center is installed.

- b** Under **MAM**, click **service=MAM Packaging Services** to open the JMX MBEAN View page.
- c** Locate **java.lang.String displayDeployedPackages**.
- d** In the **ParamValue** box for the parameter **customerId**, enter the <customer id>.
- e** In the **ParamValue** box for the parameter **packagesNames**, specify the names of the packages you want to display. For details, see “Package Name Rules” on page 473.
- f** Click **Invoke** to display the packages that are currently deployed.

Export Packages

Follow these steps to export resources from the CMDB to the server on which HP Business Availability Center is installed using the JMX console.

- a** Launch the Web browser and navigate to:
http://<server_name>:8080/jmx-console, where <server_name> is the name of the machine on which HP Business Availability Center is installed.
- b** Under **MAM**, click **service=MAM Packaging Services** to open the JMX MBEAN View page.
- c** Locate **java.lang.String exportPackages**.
- d** In the **ParamValue** box for the parameter **customerId**, enter the <customer id>.
- e** In the **ParamValue** box for the parameter **packageName**, enter the name of the package you want to export. For details, see “Package Name Rules” on page 473.
- f** In the **ParamValue** box for the parameter **outputDir**, enter the name of the folder on the HP Business Availability Center server to which you want to export the package’s zip file. Ensure that you include the full path to the folder.

- g** In the **ParamValue** box for the parameter **userOnly**, select one of the following:
- **True**. Export only the custom packages.
 - **False**. Export both custom and factory packages.
- h** Click **Invoke** to export the package.

Package Name Rules

The rules for entering a package name are as follows:

- Wildcard characters (*) are not supported.
- The package name is case sensitive.
- The package name must have a **.zip** extension.
- When deploying more than one package, separate the package names by commas.

Package Manager User Interface

This section describes:

- Choose Resources to Export Dialog Box on page 474
- Create Custom Package/Edit Package Wizard on page 475
- Export Package Dialog Box on page 481
- Filter Dialog Box on page 482
- Find Dialog Box on page 483
- Package Manager Window on page 484
- Undeploy Package Resource Wizard on page 486



 **Choose Resources to Export Dialog Box**

Description	<p>Select the resources you want to export to your local directory.</p> <p>To access: Select Export resources in the Export Package dialog box.</p>
--------------------	---

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

GUI Element (A-Z)	Description
<List of resources >	<p>Displays the list of resources contained in the package. Select the resources you want to export to your local directory.</p>

Create Custom Package/Edit Package Wizard

Description	Enables you to create a package using existing resources or edit an existing package. To access: Click the Add  button in the Package Manager window to create a new package or select a package in the Package Manager window and click the Edit  button to edit an existing package.
Included in Tasks	“Create a Custom Package” on page 465
Wizard Map	The Create Custom Package Wizard contains: Package Properties Page > Resource Selection Page > Selection Summary Page

Package Properties Page

Description	Define the properties of the package.
Wizard Map	The Create Custom Package/Edit Package Wizard contains: Package Properties Page > Resource Selection Page > Selection Summary Page

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

GUI Element (A-Z)	Description
Package Category	A free text box for any notes you want to associate with the package.
Package Description	A description of the package.
Package Name	The name of the package.

Resource Selection Page

Description	Enables you to add the required resources to the package. Select the required resources from the various resource types. Note: You can make multiple selections from each resource type.
Wizard Map	The Create Custom Package/Edit Package Wizard contains: Package Properties Page > Resource Selection Page > Selection Summary Page

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

GUI Element (A-Z)	Description
✓	Appears in the left pane. Indicates that a resource has been added to the package.
-	Appears in the left pane. Indicates that no resource has been added to the package.

GUI Element (A-Z)	Description
<Resource types in the left pane>	<p>Contains the resource types from which you can choose the required resources to add to the package.</p> <p>For details of a list of the available resource types and their descriptions, see “Resource Types” on page 479.</p> <p>Note: A green dot appears on the resource type icon when one or more of its resources are selected to be included in the package.</p>

GUI Element (A-Z)	Description
<Resources in the right pane>	<p>Select the resources you want to add to the package. You can select multiple resources.</p> <p>Notes:</p> <ul style="list-style-type: none"> ▶ A green check appears to the right of a Configuration Item Types, Relationships, or Calculated Relationships when one or more of its children in the resource tree are included in the package. ▶ A folder's check box has a <input type="checkbox"/> when only some of its resources are included in the package. (This does not apply to Configuration Item Types, Relationships, or Calculated Relationships.) ▶ A folder's check box is selected when all its resources are included in the package. (This does not apply to Configuration Item Types, Relationships, or Calculated Relationships.) <p>Important information:</p> <p>If you want to add a calculated relationship to the package, you can choose to select either the required calculated relationship together with one or more of its triplets, or the required triplets without selecting the calculated relationship itself.</p> <ul style="list-style-type: none"> ▶ If you choose to select only specified triplets and not the calculated relationship, the triplets are added only if you already have an existing calculated relationship in the system. ▶ If you select a calculated relationship together with one or more of its triplets, then the property definitions of the calculated relationship you are adding, are included in the package. If you already have a calculated relationship in the system, then the property definitions of the existing calculated relationship are updated with the properties of the calculated relationship you are adding to the package. <p>For details on calculated relationships and triplets, see "Impact Modeling" on page 439 and "Triplets Page" on page 265.</p>

Resource Types

This section contains a list of the available resource types and their descriptions. For a list of the resources a package can contain, see “Package Resources” on page 467.

- ▶ **Calculated Relationships.** Contains the calculated relationships and their triplets as defined in the CI Type Manager.
- ▶ **Configuration Item Types.** The CITs defined in the CI Type Manager. For details, see “CI Types Overview” on page 240.
- ▶ **Correlations.** The Correlation rules defined in the Correlation Manager. For details, see “Correlation Manager” on page 211.
- ▶ **Discovery Configuration Files.** Configuration files include properties and parameters that are needed to discover components on the system. For details, see “Resource Files” in the *Discovery and Dependency Mapping Guide*.
- ▶ **Discovery External Resource.** Includes resources not used by the DDM Probe directly, but rather indirectly by the DDM scripts. It can contain binary executable files or DLLs, XML configuration files, or any other essential resource needed for the discovery to function properly. For details, see “Manage Discovery Resources” in the *Discovery and Dependency Mapping Guide*.
- ▶ **Discovery Jobs.** A DDM job includes configuration data, scheduling information, and TQL assignments needed to activate discovery of components. For details, see “Run Discovery” in the *Discovery and Dependency Mapping Guide*.
- ▶ **Discovery Jython Script.** DDM Jython Scripts are Jython scripts used by the discovery process to discover and map the various network entities.
- ▶ **Discovery Modules.** A DDM module includes all the jobs needed to discover a specific component on the system. For details, see “Discovery Modules Pane” in the *Discovery and Dependency Mapping Guide*.
- ▶ **Discovery Wizard Resource.** Used to define the Discovery Wizard dialog box contents. For details, see “Basic Mode Window” in the *Discovery and Dependency Mapping Guide*.

- ▶ **Discovery Patterns.** DDM patterns define what scripts need to be run and in which order, declare the input and output CI Types and the parameters to be configurable on the DDM jobs related to them. For details, see “Manage Discovery Resources” in the *Discovery and Dependency Mapping Guide*.
- ▶ **Enrichments.** The Enrichment rules defined in the Enrichment Manager. For details, see “Enrichment Manager” on page 329.
- ▶ **Job Scheduler.** Tasks that have been defined to run in the Scheduler. For details, see “Scheduler” on page 491.
- ▶ **Relationships.** The relationships defined in the CI Type Manager. For details, see “CI Type Relationships” on page 242.
- ▶ **Reports.** Report rules definitions, as described in “Topology Report Manager” on page 277.
- ▶ **State Categories.** The states defined in the State Manager. For details, see “State Manager” on page 505.
- ▶ **TQLs.** The TQL queries defined in the Query Manager. For details, see “Query Manager” on page 315.
- ▶ **Type Definitions.** Predefined Enumeration definitions that relate to attributes of enumeration type, such as severity levels, admin states, and so on. For details, see “System Type Manager” on page 242.
- ▶ **Users.** The definition of a user and the user’s role. For details, see “User Management” in *Platform Administration*.
- ▶ **Valid Links.** All possible predefined valid connections (relationships) between the CITs that are defined in the CIT folder.
- ▶ **Views.** The views defined in the View Manager. For details, see “View Manager” on page 157.


Selection Summary Page

Description	Enables you to view the resources to be included in the package.
Wizard Map	The Create Custom Package/Edit Package Wizard contains: Package Properties Page > Resource Selection Page > Selection Summary Page

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

GUI Element (A-Z)	Description
<Selected resources>	Displays the resources that were selected to be part of the package.

Export Package Dialog Box


Description	Exports the selected package's resources to your local directory. To access: Click the Export Package to Local Directory button  in the Package Manager window.
Important Information	You can choose to export some or all the resources in the package.

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

GUI Element (A-Z)	Description
Export to directory	Select the directory to which you want to export the resources.
Export resources	Export only some of the package's resources to your local directory. Opens the Choose Resources to Export dialog box.

GUI Element (A-Z)	Description
Export whole package	Export all the resources in the package to your local directory.
File name	The name of the package. Note: The package name cannot be edited.

Filter Dialog Box


Description	<p>Enables you to display only specific packages in the Package Manage window.</p> <p>A description of the filter condition you defined appears above the table columns in the Package Manager window. For example, the following illustration shows that a filter condition was created to display a package called Network.</p> <hr/> <p>Filter: Package Name[Equal Network];</p> <p>To access: Click the Filter  button in the Package Manager window.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets):

GUI Element (A-Z)	Description
<Click a column header>	For details, see “Customizing Columns” in <i>Reference Information</i> .
<Right-click a column header>	For details, see “Customizing Columns” in <i>Reference Information</i> .
Condition	Click inside the box and select the required operator. For details, see “Attribute Operator Definitions” on page 378.

GUI Element (A-Z)	Description
Display Name	Filter the task list according to one of the following: <ul style="list-style-type: none"> ▶ Package name ▶ Package Category ▶ Package Description For details, see “Package Manager Window” on page 484.
Value	Click inside the box to open the Edit box. Enter the required value.

Find Dialog Box

Description	Find a package that contains a specified resource. For details, see “Resource Types” on page 479. To access: Click the Find  button in the Package Manager window.
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):










GUI Element (A-Z)	Description
Case sensitive	Distinguish between uppercase and lowercase characters. When you select Case Sensitive , search results find only those instances in which the capitalization matches the text you typed in the Resource name box.
Resource name	Enter a word or phrase contained in the resource for which you are looking.
Search Results	The search results. Displays the names of the resources containing the text entered in the Resource name box.
Topic	The subsystem containing the resource you want the package to contain. For details, see “Resource Types” on page 479.



Package Manager Window

Description	<p>Package Manager enables you to:</p> <p>Create a package out of existing resources or edit an existing one to suit your IT management needs.</p> <p>To access: Select Admin > Universal CMDB > Settings > Package Manager.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
	Enables you to create a package out of existing resources. Opens the Create Custom Package Wizard.
	Enables you to edit an existing package. Opens the Edit Package Wizard.
	Deletes a package from the Package Manager while the resources from the package remain in the system. The package that is deleted is removed from the list of packages in the Package Manager window.
	View the resources included in the selected package. Opens the View package resources window.
	Deletes the resources from the system and removes them from the selected package. Opens the Undeploy Package Resource Wizard.
	<p>Deploys all of a package's resources to the CMDB from your local directory. Opens the Deploy Packages to Server dialog box. Browse to the required package. The name of the package is added to the list of the packages in the Package Manager.</p> <p>Note: When deployment is finished and it is not successful, a Deploy Package window is displayed indicating which resources within the package are not successfully deployed.</p>

GUI Element (A-Z)	Description
	<p>Deploys specific resources to the CMDB from your local directory. Opens the Deploy Specific Resources dialog box. Browse to the required package and select the resources you want to deploy.</p> <p>Note: When deployment is finished and it is not successful, a Deploy Package window is displayed indicating which resources within the package are not successfully deployed.</p>
	<p>Exports some or all of the package's resources to your local directory. Opens the Export Package dialog box.</p>
	<p>Finds a package that contains a specified resource. Opens the Find dialog box.</p>
	<p>Generate a report displaying a list of the packages that are deployed in the system.</p> <p>Notes:</p> <ul style="list-style-type: none"> ▶ For information about limitations on the size of reports produced in .pdf format, see “Troubleshooting and Limitations” in <i>Reports</i>. ▶ For details on how to work with reports, see “Working in Reports - Overview” in <i>Reports</i>.
	<p>Update the contents of the table.</p>
	<p>Opens the Filter dialog box. You use the Filter dialog box to show only the packages you want displayed in the Package Manager window.</p>
	<p>Clear the filter definitions you created in the Filter dialog box. This is enabled only if filter definitions were created.</p>
	<p>Click the Customize Columns button to open the Select Columns dialog box and change the display order of the columns, hide a column, or display a hidden column.</p> <p>For details on the Select Columns dialog box, see “Select Columns Dialog Box” in <i>Reference Information</i>.</p>
	<p>Represents a factory package.</p>

GUI Element (A-Z)	Description
	Represents a hidden package.
	Represents a custom package.
Category	The free text you want to associate with the package, as displayed in the Package Properties page of the Create Custom Package Wizard.
Description	The description of the package, as displayed in the Package Properties page of the Create Custom Package Wizard.
Package Name	The name of the package.
Readme	Click to read a description of the package, as well as other relevant information.

Undeploy Package Resource Wizard

Description	Deletes the resources from the system and removes them from the selected package. To access: Click the Undeploy resources  button in the Package Manager window.
Important Information	When you undeploy a package, the resources are removed from the system, and from the other packages that contain that resource. You can restore the resources only when a package containing those resources is deployed.
Wizard Map	The Undeploy Package Resource Wizard contains: Remove Resources Page > Selection Summary Page

Remove Resources Page

Description	Select the resources you want to delete.
Important Information	If you delete all the resources from the package, the package is automatically deleted and removed from the list of packages in the Package Manager window.
Wizard Map	The Undeploy Package Resource Wizard contains: Remove Resources Page > Selection Summary Page

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

GUI Element (A-Z)	Description
<List of resources contained in the selected package>	Displays the resources contained in the selected package.

Selection Summary Page

Description	Enables you to view the resources you selected to be deleted.
Important Information	When undeployment is finished and it is not successful, an Undeploy Package window is displayed indicating which resources within the package are not successfully undeployed.
Wizard Map	The Undeploy Package Resource Wizard contains: Remove Resources Page > Selection Summary Page

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

GUI Element (A-Z)	Description
<List of deleted resources>	Displays the resources that were selected to be deleted from the package.

Troubleshooting and Limitations

This section describes some of the troubleshooting issues that might arise when deploying and undeploying packages.

This section includes the following topics:

- ▶ “Gold Master Reports Cannot be Deployed by Package Manager” on page 488
- ▶ “Datamodel Resources Cannot Be Undeployed” on page 488
- ▶ “Additional Information on Package Deployment Failure” on page 488
- ▶ “Package Creation and Deployment in a Non-English Locale” on page 489

Gold Master Reports Cannot be Deployed by Package Manager

If you export a package’s resources from Package Manager that includes a Gold Master report definition, and then export those resources again to another system, the Gold Master report definition is not deployed.

Datamodel Resources Cannot Be Undeployed

For a list of the package resources, see “Package Resources” on page 467.

Additional Information on Package Deployment Failure

If package deployment fails, you can check the following Package Manager log files for additional information on why the deployment failure occurred.

- ▶ The **mam.packaging.log** file is located in:<HP Business Availability Center root directory>\log\mam.
- ▶ The **cmdb.classmodel.log** file is located in:<HP Business Availability Center root directory>\log\cmdb.
- ▶ The **mam.log** file is located in:<HP Business Availability Center root directory>\log\mam.
- ▶ The **cmdb.log** file is located in:<HP Business Availability Center root directory>\log\cmdb.

Note: If a `log\mam` or a `log\cmdb` folder does not exist, look for the log files under `log\EJBContainer`.

Package Creation and Deployment in a Non-English Locale

This section describes the limitations when working in a non-English locale.

- ▶ You cannot deploy a package if the server locale is different than the client locale and the package name contains non-English characters.
- ▶ You cannot create a package that contains resources (for example, views and TQLs) having non-English characters in their names, if the server locale is different from the client locale.

15

Scheduler

This chapter provides information on Scheduler.

This chapter includes:

Concepts

- ▶ Scheduler Overview on page 491

Tasks

- ▶ Define Tasks that Are Activated on a Periodic Basis on page 492

Reference

- ▶ Cron Expressions on page 493
- ▶ Scheduler User Interface on page 494

Scheduler Overview

You can define tasks to run periodically. For example, you can define a schedule for taking snapshots of a specific view on a daily basis.

Define Tasks that Are Activated on a Periodic Basis

This task describes how to run jobs on a periodic basis.

This section includes the following tasks:


- ▶ “Create a Job Definition” on page 492
- ▶ “Choose an Action” on page 492
- ▶ “Schedule a Task” on page 492

1 Create a Job Definition

Define a job definition. Add actions to the job you created and define how often they run. The Job Definition dialog box displays the tasks that are defined. For details, see “Job Definitions Dialog Box” on page 497.

Example of a Job Definition

The illustration below shows that two Enrichment rules are set to run — one at a set interval and one on a daily basis.

Job Scheduler				
				
Is Active	Name	Job Definition	Schedule	Last Run Time
<input checked="" type="checkbox"/>	SiteScope Hosts and Monitors		Interval	Sun Aug 26 ;
<input checked="" type="checkbox"/>	DeleteOldSAPTransports		Daily	Sun Aug 26 ;

2 Choose an Action

Select the actions that you want the Scheduler to run. For details, see “Action Definition Dialog Box” on page 495.

3 Schedule a Task

Set the schedule for activating a task in the Scheduler pane. For details, see “Job Definitions Dialog Box” on page 497.

Example of a Scheduled Task

The illustration below shows that the Scheduler is set to take a snapshot of the View called **Host Resources** every day at 1:00 AM.

Name	Action Definition
Save a snapshot	Host Resources

Scheduler

Once
 Interval
 Daily
 Weekly
 Monthly
 Cron

Time zone:

Invocation hour:

Cron Expressions

A Cron Expression is a string composed of six or seven fields separated by white space. Six of the fields are mandatory, and one is optional.

The following table contains the fields used in a Cron Expression.

Field Name	Allowed Values	Allowed Special Characters
Seconds	0-59	, - * /
Minutes	0-59	, - * /
Hours	0-23	, - * /
Day of month	1-31	, - * ? / L W C
Month	1-12 or JAN-DEC	, - * /

Field Name	Allowed Values	Allowed Special Characters
Day of week	1-7 or SUN-SAT	, - * ? / L C #
Year (optional)	empty, 1970-2099	, - * /

The following table contains examples of how to use Cron expressions.

Cron Expression	Meaning
0 0 12 * * ?	The task runs every Wednesday at 12:00 PM.
0 15 10 ? * *	The task runs at 10:15 AM every day.
0 15 10 * * ? 2005	The task runs at 10:15 AM every day during the year 2005.
0 0/5 14 * * ?	The task runs every 5 minutes starting at 2 PM and ending at 2:55 PM, every day.
0 15 10 15 * ?	The task runs at 10:15 AM on the 15th day of every month.
0 15 10 ? * 6L	The task runs at 10:15 AM on the last Friday of every month.
0 15 10 ? * 6#3	The task run at 10:15 AM on the third Friday of every month.

For more details about Cron expressions, go to <http://quartz.sourceforge.net/javadoc/org/quartz/CronTrigger.html>.


Scheduler User Interface

This section describes:

- Action Definition Dialog Box on page 495
- Filter Dialog Box on page 496
- Job Definitions Dialog Box on page 497
- Job Scheduler Window on page 501

- Select Days Dialog Box on page 503
- Select Hours Dialog Box on page 503

Action Definition Dialog Box

Description	Enables you to select a required action in a list of actions that can be run by the Scheduler. To access: Click the Add  button in the Actions pane in the Job Definitions dialog box.
Important Information	After selecting the required action, click Next to display a list of actions. The list of action details depends on which action you choose. For example, if you select Run TQL , a list of the existing TQL queries appears. Select the required TQL query names. You can make multiple selections.
Included in Tasks	“Define Tasks that Are Activated on a Periodic Basis” on page 492

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


GUI Element (A-Z)	Description
<Click a column header>	For details, see “Customizing Columns” in <i>Reference Information</i> .
<Right-click a column header>	For details, see “Customizing Columns” in <i>Reference Information</i> .
Actions	For a list of actions that can be run by the Scheduler, see “Scheduler Actions” on page 496.

Scheduler Actions

This section contains a list of actions that can be run by the Scheduler.

- ▶ **Rerun Discovery on View.** Runs a discovery on the CIs in a selected view. This enables you to configure a general discovery for the entire infrastructure on a less frequent basis, such as once a week, while updating the CIs in important views more frequently, for example, on a daily basis.
- ▶ **Run an Enrichment rule.** Activates the selected Enrichment rule according to its set schedule. Click **Next** to display a list of the available Enrichment rules and select the required ones. For details, see “Enrichment Manager” on page 329.
- ▶ **Run a Replication job.** You can set a schedule for running a replication job. A replication job contains all the information needed to federate data from an external data source. You can use this option only if a suitable data source has been defined. Click **Next** to display a list of replication jobs and select the required ones. For details, see “Replication Jobs Tab” on page 762.
- ▶ **Run a TQL.** Run the selected TQL query according to its set schedule. Click **Next** to display a list of the available TQL queries and select the required ones. For details, see “Query Manager” on page 315.
- ▶ **Run a view.** Recalculate the selected view according to its set schedule. Click **Next** to display a list of the available views and select the required ones. For details, see “View Manager” on page 157.
- ▶ **Save a snapshot.** Save a snapshot of the selected view according to its set schedule. Click **Next** to display a list of the saved snapshots and select the required ones. For details, see “Compare Snapshots” on page 553.


Filter Dialog Box

Description	Displays only specific tasks in the Job Scheduler window. To access: Click the Filter  button in the Job Scheduler window.
Included in Tasks	“Define Tasks that Are Activated on a Periodic Basis” on page 492

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

GUI Element (A-Z)	Description
<click a column header>	For details, see “Customizing Columns” in <i>Reference Information</i> .
<right-click a column header>	For details, see “Customizing Columns” in <i>Reference Information</i> .
Condition	Click inside the box and select the required operator. For details, see “Attribute Operator Definitions” on page 378.
Display Name	Filters the task list according to one of the following: <ul style="list-style-type: none"> ▶ Active ▶ Job Definition ▶ Last Run Time ▶ Name ▶ Next Run Time ▶ Schedule For details, see the Job Scheduler window.
Value	Click inside the box and either enter or select the required value.

Job Definitions Dialog Box

Description	Enables you to add actions to the job you created and define how often they run. To access: <ul style="list-style-type: none"> ▶ Click the Add  button in the Job Scheduler window. ▶ Click the Add button in the Schedule tab in the Replication Jobs window.
Included in Tasks	“Choose an Action” on page 492 “Schedule a Task” on page 492






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

GUI Element (A-Z)	Description
Job Definition	(Optional) A description for this job.
Name	The name of the job.

Actions Pane

Description	Enables you to add the required actions to the task you created.
Included in Tasks	“Choose an Action” on page 492



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




GUI Element (A-Z)	Description
	Adds an action to the task. Opens the Action Definition dialog box.
	Edits an existing action.
	Deletes an action.
	Moves a selected row up.
	Moves a selected row down.
Action Definition	Displays the action details you selected in the Action Definition dialog box for the action added.
Name	Displays the name of the action that was added to the task.


Scheduler Pane

Description	Enables you to set the schedule for activating a task.
Included in Tasks	“Schedule a Task” on page 492
Useful Links	“Cron Expressions” on page 493

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

GUI Element (A-Z)	Description
	Opens a calendar. Select the required date and time.
<input type="button" value="Reset server time zone"/>	Automatically set the time zone to the correct one for the server.
<input type="button" value="Validate Expression"/>	Click to validate the Cron expression you entered.
Cron	Use a Cron expression to schedule a job. For a description of the fields used in Cron expressions and examples of how to use them, see “Cron Expressions” on page 493.
Cron Expression	Enter a Cron expression in the proper format. For a description of the fields used in Cron expressions and examples of how to use them, see “Cron Expressions” on page 493.
Daily	Runs a task on a daily basis.
Days of month	(Appears when you choose Monthly) Click the button  to the right of the Days of month box to choose the day of the month on which you want to run the action. Opens the Select Days dialog box.
Days of the week (Sunday - Saturday)	(Appears when you choose Weekly). Select the day or days on which you want the action to run.



GUI Element (A-Z)	Description
End by	<p>(Does not appear when you select Once) Choose the date and time when you want the action to stop running by selecting the End by check box and then clicking the Open Calendar  button to the right.</p> <p>Note: This step is optional. If you do not want to specify an ending date, leave the End by check box unselected.</p>
Interval	Activates the action at a set time interval.
Invocation Hour	<p>Choose the time to activate the action. Click the button  to the right of the Invocation Hour box to open the Select hours dialog box. For details, see the Select Hours dialog box.</p> <p>Note: You can enter the time manually in the Invocation hour box once you have chosen a time using the Select hours dialog box. You can assign more than one time. Each time is separated by a comma.</p> <p>The manually entered action times are not restricted to the hour and half hour only; they can be assigned any hour and minute combination. Use the 24:00 format.</p> <p>For example:</p> <p>11:15 AM is 11:15</p> <p>11:15 PM is 23:15</p> <p>Note: This box is only available when you want to schedule a task to run on a daily, weekly, or monthly basis.</p>
Invocation Time	(Appears when you choose Once) Choose the date and time you want the action to begin running by clicking the Open Calendar  button to the right.
Monthly	Runs a task on a monthly basis.
Months of the year (January - December)	(Appears when you choose Monthly). Select the month or months in which you want the action to run.
Once	Activates the task only once.





GUI Element (A-Z)	Description
Repeat every	(Appears only when you select Interval) Type a value for the interval between successive runs and then choose the required unit of time measurement (seconds, minutes, hours, or days).
Start at	(Does not appear when you select Once) Choose the date and time when you want the action to begin running by selecting the Start at check box and then clicking the Open Calendar  button to the right. Note: This step is optional. If you do not want to specify a beginning time, leave the Start at check box unselected.
Time Zone	Set the required time zone.
Weekly	Runs a task on a weekly basis.

Job Scheduler Window


Description	Enables you to define tasks that are activated on a periodic basis. For example, you can define a task that generates a Topology report on a daily basis at 3:00 PM. To access: Click Admin > Universal CMDB > Settings > Scheduler .
Included in Tasks	“Define Tasks that Are Activated on a Periodic Basis” on page 492

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

GUI Element (A-Z)	Description
	Creates and schedules a task. Opens the Job definitions dialog box.
	Edits a task. Opens the Job definitions dialog box.

GUI Element (A-Z)	Description
	Deletes a task.
	Opens the Filter dialog box. You use the Filter dialog box to show only the scheduled jobs you want displayed in the Job Scheduler window.
	Clears the filter definitions you created in the Filter dialog box.
	Changes the display order of the columns, hide a column, or displays a hidden column. Opens the Columns dialog box. For details, see “Select Columns Dialog Box” in <i>Reference Information</i> .
<Click a column header>	For details, see “Customizing Columns” in <i>Reference Information</i> .
<Right-click a column header>	For details, see “Customizing Columns” in <i>Reference Information</i> .
Active	Select the check box to activate the scheduled job.
Job Definition	A description of the scheduled job as defined in the Definitions box in the Job definitions dialog box.
Last Run Time	The last time the job was run.
Name	The name of the scheduled job.
Next Run Time	The next time the job is scheduled to run.
Schedule	How often the job is scheduled to run. For details, see the “Scheduler Pane” on page 499.


Select Days Dialog Box

Description	Enables you to choose the day on which to activate the action. To access: Click Monthly in the Job definitions dialog box, and then click the  button to the right of the Days of month box.
Included in Tasks	“Define Tasks that Are Activated on a Periodic Basis” on page 492

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

GUI Element (A-Z)	Description
<List of days from 1-31>	Choose the required days by selecting the required check boxes. You can select multiple days. The selected days appear in the Days of month box. For details, see Scheduler pane in the Job Definitions dialog box.

Select Hours Dialog Box

Description	Enables you to choose the time at which to activate the action. To access: Click Daily, Weekly, or Monthly , and then click the button  to the right of the Invocation hour box in the Job definitions dialog box.
Included in Tasks	“Define Tasks that Are Activated on a Periodic Basis” on page 492

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

GUI Element (A-Z)	Description
List of times by the hour and half hour	Choose all the required times by selecting the required check box. You can select multiple times. The selected hours appear in the Invocation hour box. For details, see “Invocation Hour” on page 500.

16

State Manager

This chapter provides information on State Manager.

This chapter includes:

Concepts

- ▶ State Manager Overview on page 505

Tasks

- ▶ Define an Attribute State on page 506

Reference

- ▶ State Manager User Interface on page 506

State Manager Overview

A state is based on an Enumeration definition. An Enumeration definition is a severity list, which is designed to be used in defining states.

State Manager contains two default states — Change and Operation. Each one is based on its own severity list. States are necessary for retrieving Correlation results in Topology View Application. For details, see “Topology View Application” on page 511.

To retrieve Correlation results, you must create a Correlation rule in Correlation Manager. A Correlation rule is based on a state that exists in State Manager. For details, see “Correlation Manager” on page 211.

You can use a default state, or if required, create one based on a severity list (Enumeration definition) that is more relevant to your needs. For details on creating Enumeration definitions, see “Create/Update List/Enumeration Definition Dialog Box” on page 273.

Note: It is not recommended to define states without first consulting HP Software Support.

Define an Attribute State

Enter a unique name and description for the state. Then select an Enumeration definition that can be used to define an attribute type. The Type Definition list displays the Enumeration definitions that are defined in System Type Manager. For details, see “System Type Manager Dialog Box” on page 276.

You can also click the **New Enumeration** button to create a new Enumeration definition. For details, see “State Manager Dialog Box” on page 507.

Alternatively, you can create an Enumeration definition in System Type Manager. The Enumeration definition you create in System Type Manager appears in State Manager.

State Manager User Interface




This section describes:

- ▶ State Manager Dialog Box on page 507

State Manager Dialog Box

Description	Enables you to create a state based on a severity list (Enumeration definition). To access: Admin > Universal CMDB > Settings > State Manager.
Important Information	<ul style="list-style-type: none"> ▶ The Change and Operation states are default states that cannot be edited. ▶ It is recommended to consult with HP Software Support before defining a state.
Included in Tasks	“Define an Attribute State” on page 506
Useful Links	“Enumeration Definition – Workflow” on page 248

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

GUI Element (A-Z)	Description
	Add an attribute state.
	Delete an attribute state.
	Creates an Enumeration definition. Opens the Create Enumeration Definition dialog box. For details, see “Create/Update List/Enumeration Definition Dialog Box” on page 273. The Enumeration definition you have created appears in the System Type Manager dialog box, where you can edit it if required (for details, see “System Type Manager” on page 242).
Description	(Optional) Click in the row and enter a description of the state.

GUI Element (A-Z)	Description
Name	Click in the row and enter a unique name for the state.
Type Definition	<p>Click in the box to display a list of the Enumeration definitions that can be used to define an attribute type. Select the required Enumeration definition or create one that is more relevant to your needs.</p> <p>Note: The Type Definition list only displays the Enumeration definitions (and not List definitions) that are defined in the System Type Manager.</p>

Part III

Application

17

Topology View Application

This chapter provides information on the Topology View application.

This chapter includes:

Concepts

- ▶ Topology View Overview on page 512

Tasks

- ▶ Retrieve Correlation Results – Scenario on page 512
- ▶ Take a Snapshot of a View on page 521
- ▶ Print and Save a Topology Map to File on page 522

Reference

- ▶ Topology View Application User Interface on page 522

Topology View Overview

Topology View displays the CIs of the currently selected view in graphical format. Topology View includes the same functionality as IT Universe Manager, however their context menu options differ. For information on the Topology Map, see “Working with Topology Map” on page 705.

The following tasks represent the basic functionality of the Topology View application:

- ▶ **Get Correlation results.** Topology View enables you to run the Correlation rules you defined for that view to simulate how certain defined changes impact your system, and to discover the root causes of the changes. For more information about Correlation rules, see “Correlation Manager Overview” on page 211. You can run the Correlation rule you defined in the Correlation Manager. For details, see “Retrieve Correlation Results – Scenario” on page 512.
- ▶ **Take a snapshot of a view.** HP Business Availability Center enables you to display the status of a view in one snapshot by comparison with its status taken at a different time. For details on how to take snapshots, see “Take a Snapshot of a View” on page 521.

Retrieve Correlation Results – Scenario

Correlation Manager enables you to create a Correlation rule that allows you to simulate the impact certain infrastructure changes have on your system. The results of the Correlation rule are displayed in the Topology View application. The Correlation results in this task describes how a change in CPU usage affects the Host node to which it is connected.

Note: To retrieve the required Correlation results, you must follow the steps in this task.

This task includes the following steps:

- “Create an Enumeration Definition” on page 513
- “Define a State” on page 514
- “Define a Correlation TQL Query” on page 515
- “Define a Correlation Rule” on page 516
- “Create a TQL of the Type View in Query Manager” on page 518
- “Create a View in View Manager” on page 518
- “Get Correlation Results” on page 518

1 Create an Enumeration Definition

To retrieve Correlation results, you must create a Correlation rule in the Correlation Manager. A Correlation rule is based on a state that exists in the State Manager (for details, see “State Manager” on page 505).

Note: This step is optional. You can use the default Enumeration definitions that appear in the System Type Manager.

A state is based on an Enumeration definition. Enumerations are designed to be used as severity value lists by states. You can either base a state on an existing Enumeration definition in the State Manager or, if required, create one by clicking the **New Enumeration** button. For details on creating Enumeration definitions, see “Create/Update List/Enumeration Definition Dialog Box” on page 273.

Note: Alternatively, you can create an Enumeration definition in the System Type Manager. For details, see “System Type Manager” on page 242. The Enumeration definition you create appears in the State Manager.

Example of an Enumeration Definition

Select **Admin > Universal CMDB > Settings > State Manager** to open the State Manager. In the bottom-right corner, click the **New Enumeration** button to open the Create Enumeration Definition dialog box.

The following Enumeration definition creates a severity list that represents CPU usage of 10%, 20%, and 50%.

The screenshot shows a dialog box for creating an enumeration definition. At the top, there are two text input fields: 'Name' and 'Display Name', both containing the text 'cpu_usage'. Below these are two radio buttons: 'List' (unselected) and 'Enumeration' (selected). A section titled 'Enumeration Definition' contains a list of items on the left and configuration fields on the right. The list includes '10% load' (with a plus icon), '20% load' (with a minus icon), and '50% load' (with a plus icon). The 'Value' field is set to '50% load' and the 'Key' field is set to '2'. A 'Color' dropdown menu is open, showing options: Green (checked), Light Olive, Yellow, Orange, Red (selected), and Gray.

2 Define a State

When you create a Correlation Rule, you select the state on which the Correlation condition is based. The State Manager contains two default states — Change and Operation. Each one is based on its own severity list. You can use a default state, or if required, create one based on a severity list (Enumeration definition) that is more relevant to your needs.

Note: This step is optional. You can use the default State that appear in the State Manager.

To define a new state, select **Admin > Universal CMDB > Settings > State Manager** to open the State Manager. For details on defining a new state, see “State Manager Dialog Box” on page 507.

Example of a New State Definition

A new state called **cpu_usage** is defined in the State Manager. Its Type Definition is based on the Enumeration definition called **cpu_usage** defined in the previous task.

Name	Description	Type Definition
change	Change State	Change States
operation	Operation State	Operation States
cpu_usage	CPU usage	<div style="border: 1px solid gray; padding: 2px;"> Admin States Test States Operation States concrete_synch_config_status synch_unit_state Status Accounting Identification Type cpu_usage </div>

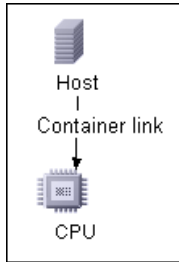
3 Define a Correlation TQL Query

To define a Correlation TQL query, you need to create a Correlation rule and then add then add the TQL nodes and relationships that define the query.

To create a Correlation TQL query, select **Admin > Universal CMDB > Modeling > Correlation Manager**. For details about how to add nodes and relationships to a query, see “Add Nodes and Relationships to a TQL Query” on page 362.

Example of a Correlation TQL Query

In this Correlation TQL query, a CPU and a Host node are linked by a Container Link relationship.



4 Define a Correlation Rule

When you define a Correlation rule, you must specify the required causal relationship between the nodes. Define one node as the trigger, or the node that represents the changes you want to make to the system, and another node as the one that is affected.

Right-click the node you want to define as the trigger node and select **Define Affected** to open the Affected Nodes dialog box. In the Affected Nodes dialog box, select the node you want the trigger node to affect. Then click the **Add** button to open the Correlation Definition dialog box to set conditions for defining affected nodes. For details about how to define a Correlation rule, see “Correlation Definition Dialog Box” on page 221.

Example of a Correlation Rule

The Conditions area in the Correlation Definition dialog box defines the conditions under which the simulated change in the system is triggered. The Affected Severity area defines the severity of the Correlation impact on the affected node.

The Correlation rule in this example states that when the CPU usage of the Host node to which the CPU node is connected does not equal 10%, the Host node is automatically assigned the 50% load status, which in this case, is the color red according to the severity list.

Description:

Conditions

State:

Operator:

Value comparison:

Scope

Any

All

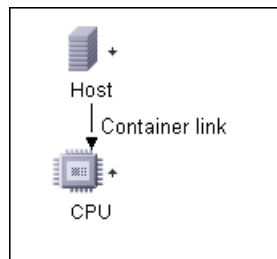
Range % - %

Affected Severity

Fixed severity:

Severity relative to trigger severity (%):

In the resulting TQL query, an upward arrow appears next to the node defined as the trigger node and a downward arrow appears next to the node defined as the affected node.



5 Create a TQL of the Type View in Query Manager

The Correlation TQL query created in the Correlation Manager appears in Query Manager as the type Correlation.

In Query Manager (select **Admin > Universal CMDB > Modeling > Query Manager**), right-click the query in the TQLs pane and save it as the type View. For details, see “Query Manager Window” on page 320.

6 Create a View in View Manager

Create a view in View Manager (select **Admin > Universal CMDB > Modeling > View Manager**) based on the TQL query of the type View you created in Query Manager in the previous task. For details, see “New View/View Properties/Save As View Wizard” on page 188.

7 Get Correlation Results

Select **Application > Universal CMDB > Topology View** and select the required view in View Explorer. To get Correlation results, you need to run the Correlation rule on a CI instance in the topology map that is a trigger. Right-click a trigger CI and select **Run Correlation** to open the Run Correlation dialog box. For details on how to run a Correlation rule, see “Run Correlation Dialog Box” on page 524.

Important: In the **State** box, you must select the state you used to define the Correlation rule in the Correlation Definition dialog box. In the **Triggers Severity** box, you must choose a severity that is other than what you selected in the **Value Comparison** box in the Correlation Definition dialog box. For details, see “Correlation Definition Dialog Box” on page 221.

Example for Getting Correlation Results

A TQL Correlation query is created containing a CPU and Host node connected by a Container Link relationship. The CPU node is defined as the trigger node and the Host node is defined as the affected node.

The following Correlation rule is defined for the query.

The screenshot shows a configuration dialog for a correlation rule. It is titled "Description: CPU usage". The "Conditions" section has three dropdown menus: "State" set to "cpu_usage", "Operator" set to "Not equal", and "Value comparison" set to "10% load". The "Scope" section has three radio buttons: "Any" (selected), "All", and "Range" (with input fields for "0" and "100" and a "%" sign). The "Affected Severity" section has two radio buttons: "Fixed severity" (selected) with a dropdown menu set to "50% load", and "Severity relative to trigger severity (%)" with an input field set to "100".

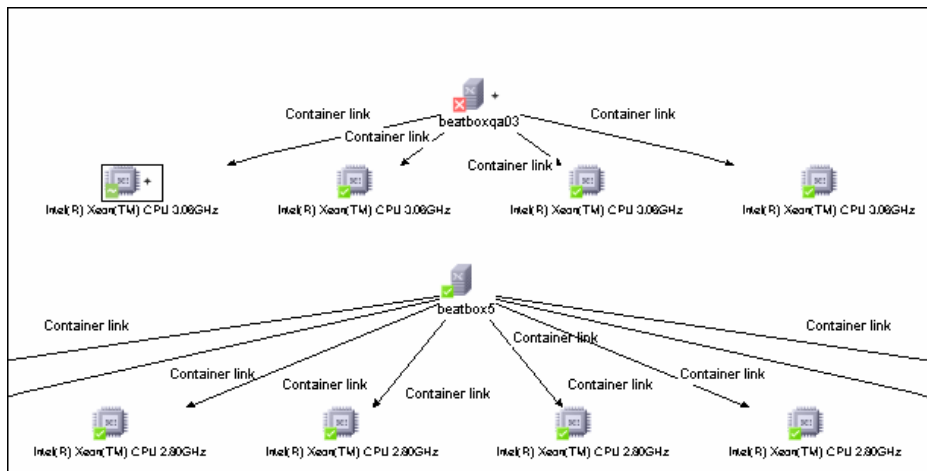
In Topology View, select the required view, right-click a CPU CI, and select **Run Correlation** to open the Run Correlation dialog box. In the **State** box, select **cpu_usage**, as this was the state on which the Correlation rule was based. The trigger severity selected is other than the one assigned to the trigger node in the **Value Comparison** box.

The screenshot shows the "Run Correlation" dialog box. It has two dropdown menus: "State" set to "cpu_usage" and "Triggers Severity" set to "20% load". At the bottom, there are four buttons: "Show in Views", "Show Map", "Generate Report", and "Cancel".

To see results, click one of the following:

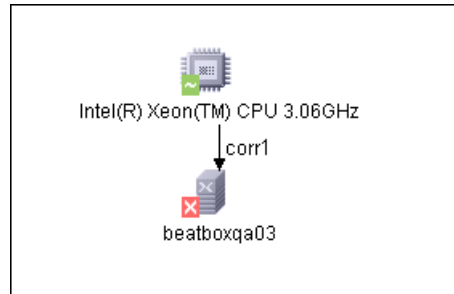
- **Show in Views.** This assigns a status to all the CIs in the view. Only the Host CI connected to the CPU CI (whose severity was changed), becomes affected and turns red because CPU usage of the Host node no longer equals 10%. According to the Correlation rule, the Host node is automatically assigned the 50% load status, which in this case, is the color red according to the severity list. If the other CIs were not affected, so they remain green (10% load according to the Enumeration definition).

The trigger CPU CI turns light olive because 20% load was assigned the color light olive in the Enumeration definition.



- **Show Map.** A map appears in a separate window containing only the trigger CPU CI and the Host CI it affected. The relationship connecting the two CIs contains the name of the Correlation rule defined in the Correlation Manager.

Note: Optionally, you can create a URL that enables you to embed the map. For details, see “Direct Link Parameters – Show Impact Map Page” in *Platform Administration*.



- **Generate Map.** Generates an Impact Analysis report that displays a list of CIs that are impacted in the system as a result of the simulated changes. For details, see “Run Correlation Dialog Box” on page 524.

Take a Snapshot of a View

You can take a snapshot of a view in Topology View application, save it, and then compare snapshots of the same view taken at different times using Compare Snapshots in **Application > Universal CMDB > Compliance > Compare Snapshots**. For details on how to take a snapshot of a view, see “Save Snapshot Dialog Box” on page 527. For details on how to view actual differences in the compared views, see “Compare Snapshots Window” on page 555.

Print and Save a Topology Map to File


You can print the content of any topology map and then save it to file. Before printing, it is recommended to define your print settings and arrange the contents of the topology map according to your requirements. For details on how to define print settings, see “Print Setup Dialog Box” on page 731. For details on how to preview the content of the topology map before printing, see “Print Preview Dialog Box” on page 731. For details on how to print the content of a topology map, see “Print Dialog Box” on page 730. For details on how to save a topology map to file, see “Run Correlation Dialog Box” on page 524.

Topology View Application User Interface

This section describes:

- ▶ Correlation Rules Window on page 523
- ▶ Run Correlation Dialog Box on page 524
- ▶ Save Snapshot Dialog Box on page 527
- ▶ Topology View Window on page 528

Correlation Rules Window

Description	<p>Opens a window that displays the statuses of the trigger CI as well as all statuses of the CIs that are affected by it. The relationships in the map represent the Correlation rules. The name of the relationship is the name of the Correlation rule you defined in the Correlation Manager.</p> <div data-bbox="612 413 762 626" style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;">  </div> <p>To access: In the Run Correlation Dialog box, click Show Map.</p>
Important Information	<ul style="list-style-type: none"> ▶ You can only see Correlation results if you defined a Correlation rule for that view in Correlation Manager. For details, see “Correlation Manager” on page 211. ▶ To view information about specific CIs that are triggered or affected by the Correlation rule, double-click the relationship connecting the CIs. A map is displayed.
Included in Tasks	“Retrieve Correlation Results – Scenario” on page 512

The Correlation Rules window includes the following elements (listed alphabetically):




GUI Element (A-Z)	Description
<Relationship>	The relationships represent the Correlation rule you defined in the Correlation Manager. For details, see “Correlation Definition Dialog Box” on page 221.
<The statuses and the colors that represent each one>	The statuses that appear and the colors that represent each status are the ones that are defined in the severity list for that state in the System Type Manager. For details, see “Create/Update List/Enumeration Definition Dialog Box” on page 273.



Run Correlation Dialog Box


<p>Description</p>	<p>Enables you to run the Correlation rule you defined in Correlation Manager for that view.</p> <p>You can:</p> <ul style="list-style-type: none"> ▶ Display in a new window all the CIs that are affected by the trigger CI. The relationships in the map represent the Correlation rules. The name of the relationship is the name of the Correlation rule you defined in the Correlation Manager. For details, see “Show Map” on page 526. ▶ Simulate how the statuses of the affected CIs are impacted. For details, see “Show in Views” on page 525. ▶ Generate a report that displays a list of CIs that are impacted in the system as a result of the simulated changes. For details, see “Generate Report” on page 525. <p>To access: Select Application > Universal CMDB > Topology View. Right-click a trigger node in the Topology Map and select Run Correlation.</p>
<p>Important Information</p>	<p>This dialog only appears if a Correlation rule is defined for that view. For details, see “Correlation Manager” on page 211.</p>
<p>Included in Tasks</p>	<p>“Retrieve Correlation Results – Scenario” on page 512</p>

The Run Correlation dialog box includes the following elements (listed alphabetically):

GUI Element (A-Z)	Description
Generate Report	<p>Generates an Impact Analysis report, which displays information that is divided as follows:</p> <ul style="list-style-type: none"> ▶ Impacted CIs by CIT. All the impacted CIs (the CIs that are impacted in the system as a result of the simulated changes), sorted by CIT. ▶ Impacted CIs by Application. All the impacted CIs that belong to a specific business service. For details, see “Link Nodes to Application CI” on page 165. ▶ Trigger CIs. The CIs that represent the changes you want to make to the system. <p>Notes:</p> <ul style="list-style-type: none"> ▶ For information about limitations on the size of reports produced in .pdf format, see “Troubleshooting and Limitations” in <i>Reports</i>. (If the default values do not suit your needs, and must be modified, contact Customer Support.) ▶ For details on how to work with reports, see “Working in Reports - Overview” in <i>Reports</i>.
Show in Views	<p>Simulates how the statuses of the affected CIs are impacted for the selected state. The Topology Map displays the statuses of the trigger CIs as well as all statuses of the CIs that are affected by it.</p> <p>The Topology Map also displays the Correlation indicators:</p> <ul style="list-style-type: none"> ▶ A trigger CI is marked by this  indicator. ▶ A CI that is both an affected and a trigger CI is marked by this  indicator. ▶ An affected CI is marked by this  indicator. <p>Note: The statuses that appear here and the colors that represent each status are defined in the severity list for that state in the System Type Manager. For details, see “Create/Update List/Enumeration Definition Dialog Box” on page 273.</p>

GUI Element (A-Z)	Description
Show Map	<p>Enables you to select a Correlation rule, and then display in a new window, a simulation of all the CIs that are affected by the trigger CI for the selected state. If only one Correlation rule is defined for this CI, the Correlation Rules window is displayed directly. For more details, see “Correlation Rules Window” on page 523.</p> <p>The relationships in the map represent the Correlation rules and the name of the relationship is the name of the Correlation rule you defined in the Correlation Manager.</p> <p>Note: Show Map enables you to view the results of multiple triggers.</p>
State	<p>Select the required State. For details about States, see “State Manager” on page 505.</p>
Trigger’s Severity	<p>Select the required severity.</p> <p>Note: The severity list was defined for the state in the System Type Manager. For details, see “System Type Manager” on page 242.</p> <p>For example, you can create a Correlation rule in the Correlation Manager (see the “Correlation Definition Dialog Box” on page 221), that defines the severity of the trigger node as other than No Change. If you select a severity other than No Change, for example, Plan, the condition is met and the simulated changes in the system are triggered.</p>

Save Snapshot Dialog Box

Description	Enables you to take a snapshot of a view and save it. To access: Go to Application > Universal CMDB > Topology View and click the Save Snapshot button  in View Explorer.
Important Information	You can compare snapshots of the same view taken at different times using Compare Snapshots in Application > Universal CMDB > Compliance > Compare Snapshots . For details, see “Compare Snapshots Window” on page 555.
Included in Tasks	“Take a Snapshot of a View” on page 521

The Save Snapshot dialog box includes the following elements (listed alphabetically):

GUI Element (A-Z)	Description
Description	A description of the snapshot (optional).
Note	A note about the snapshot (optional).
View Name	The name of the view as it appears in View Explorer. This field cannot be edited.

Topology View Window

Description	<p>Displays the CIs of the currently selected view in graphical format and enables you to run the Correlation rule you defined in the Correlation Manager.</p> <p>To access: Select Application > Universal CMDB > Topology View.</p>
Important Information	<p>The Topology View window contains the following panes:</p> <ul style="list-style-type: none"> ▶ View Explorer (CI Selector). Displays the CIs of a selected view. You can select the view from a drop-down list. For details, see “View Explorer” on page 689. ▶ Topology Map. Displays the CIs of a selected view in Map mode or text mode. For details, see “IT Universe Manager Window” on page 70. ▶ Advanced Pane. Displays properties and history for the selected CI. For details, see “Advanced Pane” on page 77. <p>Note: The Topology View window shares the same functionality as the IT Universe Manager topology map. The Topology View application includes some additional context menu options and toolbar options. For details on the IT Universe Manager topology map, see “Topology Map” on page 71.</p>
Included in Tasks	<p>“Retrieve Correlation Results – Scenario” on page 512</p> <p>“Take a Snapshot of a View” on page 521</p>
Useful Links	<p>“Save Snapshot Dialog Box” on page 527</p> <p>“Set View Parameters/Set View Element Parameters Dialog Box” on page 198</p>

Context Menu

The Topology View window includes the following elements (listed alphabetically) available by right-clicking a CI in the View Explorer pane or the Topology Map:

GUI Element (A-Z)	Description
<IT Universe Manager context menu options>	The context menu options from IT Universe Manager are also available in the Topology View application. For details, see “IT Universe Manager Window” on page 70.
Run Correlation	<p>Enables you to run the Correlation rule you defined in the Correlation Manager. Displays the Run Correlation dialog box. For details, see “Correlation Manager” on page 211.</p> <p>Note: You can only see Correlation results if you defined a Correlation rule for that view in Correlation Manager.</p>
Show Impact	<p>Enables you to select a CI, which is defined by a Correlation rule as a root cause CI, and to display all the CIs that are affected by it, and their statuses, in a separate window.</p> <p>This option appears only after the following has occurred:</p> <ul style="list-style-type: none"> ▶ You defined a Correlation rule for the selected view in the Correlation Manager (for details, see “Correlation Manager” on page 211). ▶ You clicked Show in Views in the Run Correlation dialog box. ▶ Correlation results appear in the Topology Map. <p>For example, suppose a Correlation rule is defined for an IP CI, which specifies that the rule affects hosts, ports, and client-servers that are linked to the IP.</p> <p>By using the Show Impact option, you can display all CIs that are affected by the IP CI.</p>

GUI Element (A-Z)	Description
<p>Show Root Cause</p>	<p>This option enables you to retrieve root cause information for CIs that are affected by a chain of Correlation rules. The output of Show Root Cause displays a logical map that describes a chain of trigger/affected CITs that affect the CI.</p> <p>The root cause CI is displayed in a separate window. If only one Correlation rule is defined for this CI, the Correlation window is directly displayed.</p> <p>This option appears only after the following has occurred:</p> <ul style="list-style-type: none"> ▶ You defined a Correlation rule for the selected view in the Correlation Manager (for details see, “Correlation Manager” on page 211). ▶ You clicked Show in Views in the Run Correlation dialog box. ▶ Correlation results appear in the Topology Map. <p>A window, as illustrated below, is displayed containing the root cause CI and all the other CITs in the Correlation rule chain.</p> <div data-bbox="576 913 725 1124" data-label="Diagram"> <pre> graph TD agents[agents] -- Cor1 --> A[A] </pre> </div> <p>Use the Show Root Cause option on the A CI to view, in one step, that the source of the failure is the agents CI. The CI that the arrow points to is the affected CI.</p> <p>To view the information about specific CIs that are triggered or affected by the Correlation rule, double-click the relationship connecting the CIs. A map is displayed.</p>

18

CI Lifecycle and the Aging Mechanism

This chapter provides information on the CI Lifecycle application that enables you to manage the aging mechanism.

This chapter includes:

Concepts

- ▶ The Aging Mechanism – Overview on page 532
- ▶ CI Lifecycle – Overview on page 533

Tasks

- ▶ Enable and Run the Aging Mechanism on page 534
- ▶ Generate CI Lifecycle Data and Filter the Results on page 536

Reference

- ▶ CI Lifecycle User Interface on page 537
- ▶ Aging Parameters on page 546

The Aging Mechanism – Overview

After your system has been running for some time, previously discovered CIs may no longer exist. Such CIs should be removed from UCMDB to keep it up to date.

Discovery and Dependency Mapping (DDM) runs periodically and updates the last access time for all CIs and relationships that it discovers. This process is known as "touching," and prevents CIs and relationships that represent active components in the system from becoming deletion candidates. If DDM does not discover a CI that exists in the CMDB, the last access time is not updated, so after some predefined time (by default, 20 days) the CI becomes a deletion candidate.

Deletion candidates are reviewed and managed in the CI Lifecycle module.

If the CI remains untouched for a longer period of time (by default, 40 days), the aging mechanism deletes the CI from the system. In other words, aging deletes CIs and relationships that are no longer relevant, that is, have not been accessed for a specified period of time (by default, 40 days).

The deletion of large quantities of CIs and relationships creates a significant load for the UCMDB and database servers and can impact overall UCMDB performance. To reduce this performance impact, the aging mechanism divides the objects to be deleted into chunks. A delay between chunks lowers the database load and enables other tasks to continue working. For faster work, you can shorten the delay, but the default delay value is the recommended delay. For details, see "Aging Parameters" on page 546.

Note:

- ▶ The aging mechanism is disabled by default.
 - ▶ Aging operations are run only on CIs and relationships that have **Enable Aging** set to **true**. By default, CIs and relationships added by out-of-the-box DDM patterns are created with **Enable Aging** set to **true**. (For details, see “Enable Aging” in the “Configuration Item Properties Dialog Box” on page 57.) This behavior can be changed in the **Enable aging** check box in DDM in the Pattern Management tab. For details, see “Enable aging” in *Discovery and Dependency Mapping Guide*.
-

CI Lifecycle – Overview

The CI Lifecycle application enables you to view a list of CIs and relationships that are candidates for deletion by the aging mechanism, and to initiate the aging procedure. You can also select specific CIs or relationships and postpone their deletion or mark them as deletion-proof.

For each CIT, you can set the time period before a specific CI becomes a candidate for deletion or before it is actually deleted. For details, see “Actual Deletion Period,” “Deletion Candidate Period,” and “Enable Aging” in the “Configuration Item Properties Dialog Box” on page 57.

Enable and Run the Aging Mechanism

This task describes how to enable aging and run the aging mechanism.

This task includes the following steps:

- ▶ “Enable Aging” on page 534
- ▶ “First Aging Run” on page 534

1 Enable Aging

Access the Aging Status tab in the CI Lifecycle window (**Application > Universal CMDB > CI Lifecycle**). Select the **Enable Aging** check box. For details, see “Aging Status Tab” on page 538.

Note: When aging is turned on or off (that is, enabled or disabled), you must restart the server for the changed setting to take effect.

2 First Aging Run

After your system has been running for some time, there are probably many CIs that need deleting. You should perform this step in the procedure to keep UCMDB and the database up to date.

If the number of CIs to be deleted is greater than 10,000, a confirmation message is displayed. Choose between the following options:

- ▶ UCMDB divides the number of CIs and/or relationships that must be deleted into chunks (to avoid overloading the database), deletes them, and adds the information to the History database. Chunk size is determined by the value in the **Aging Chunk Size** field in the Infrastructure Settings Manager.

This is the preferred method of deletion because the History database is updated with the information and there is no server downtime.

- You run the database aging tool, located at **<UCMDB installation folder>\UCMDBServer\j2f\cmdb\dbscripts\dbtool.bat**. If you choose this option, you must stop the UCMDB server service.

You would choose this second option if you needed a fast system of deletion: the database aging tool is an order of magnitude faster than the aging mechanism.

Important: Before running this option, be aware of the following:

- You must completely shut down the server before running the tool, that is, there will be server downtime.
- No information is written to the History database.
- After running the database aging tool, **delCollectors.bat** should be run on every DDM Probe. For details, see “The delCollectors.bat Script: Usage” in *Discovery and Dependency Mapping Guide*.

To run the database aging tool:

- a** Back up the UCMDB database schemas. This step is mandatory.
- b** Run the tool in a testing environment before running it in a production environment. This step is recommended.
- c** Stop the UCMDB server.
- d** Run the **dbtool.bat** file from the file system with the **aging** parameter (dbtool aging).
- e** Restart the UCMDB server.
- f** Return to the Aging Status tab and enable aging.
- g** Invoke **delCollectors.bat** on every DDM Probe connected to the UCMDB Server.

Note: You may need to run the index maintenance tool after running the aging tool. For details on running the index tool, see “Index Maintenance Utility” in the *HP Business Availability Center Database Guide* PDF.

Generate CI Lifecycle Data and Filter the Results

This task describes how to generate a list of CIs that are candidates for deletion, and to filter the results.

This task includes the following steps:

- ▶ “Generate CI Lifecycle Data” on page 536
- ▶ “Filter the CI Lifecycle Results” on page 536

1 Generate CI Lifecycle Data

To generate CI Lifecycle results for CIs or relationships, select either the **CIs** tab or the **Relationship** tab. Select the time period in which to search, using the drop-down calendars in the **From** and **To** fields, and click **Generate**. For details, see “CI Lifecycle Window” on page 544.

UCMDB displays a list of CITs that are candidates for deletion.

Tip: If no results are generated, try extending the time period further into the future.

2 Filter the CI Lifecycle Results



To filter the CI Lifecycle data, click the **Filter** button to open the Filter dialog box. For each column by which you want to filter, select a condition from the drop-down list and fill in the value column, either by entering a value, selecting from a drop-down list, or using the calendar. Click **OK** to apply your filter.




To clear the filter and restore the original results, click the **Clear** button. For details, see “Filter Dialog Box” on page 545.

CI Lifecycle User Interface

This section describes:

- Aging Run Statistics Dialog Box on page 537
- Aging Status Tab on page 538
- CI Lifecycle Report on page 539
- CI Lifecycle and Relationship Tabs on page 541
- CI Lifecycle Window on page 544
- Filter Dialog Box on page 545

Aging Run Statistics Dialog Box

Description	Enables you to view statistics for the five previous runs of the aging mechanism. To access: Click the Statistics button  in the CI Lifecycle window.
Included in Tasks	“Enable and Run the Aging Mechanism” on page 534

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

GUI Element (A-Z)	Description
Aging Runs	Run at. The start and finish time of the run. Deleted. The number of CIs that have been deleted. Failed. The number of CIs that have not been deleted.
Errors	ID. The IDs of the failed CIs, that is , of the CIs that could not be deleted. Error message. A message describing the cause of failure.

Aging Status Tab

Description	<p>Enables you to enable the aging mechanism and to run the mechanism for the first time.</p> <p>To access: Select Application > Universal CMDB > CI Lifecycle.</p>
Important Information	<p>This tab displays information about the number of CIs that are candidates for deletion, and functions as follows, if you select the Enable Aging check box:</p> <ul style="list-style-type: none"> ▶ If the number of CIs for deletion is larger than 10,000, you can choose to use the aging mechanism to delete the CIs in chunks, or to use the database aging tool. For details on which procedure to use, see “First Aging Run” on page 534. ▶ If the number of CIs for deletion is smaller than 10,000, the estimated time for deletion is displayed and the CIs are immediately deleted. A progress bar shows the stage of the deletion.
Included in Tasks	<p>“Enable and Run the Aging Mechanism” on page 534</p>



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

GUI Element (A-Z)	Description
Enable Aging	<ul style="list-style-type: none"> ▶ To enable aging, select the check box. The frequency and size of the chunks that are marked as candidates for deletion are determined in the Infrastructure Settings Manager. For details, see “Aging Parameters” on page 546. ▶ To disable aging, clear the check box.
Run results	<p>Total CIs to delete. The number of CIs or relationships that are delete candidates and that are being deleted by the aging mechanism.</p> <p>Deleted. The number of CIs or relationships that have been deleted.</p> <p>Failed. CIs or relationships that could not be deleted. If any failures exist, click the Failed link to view their details.</p>

CI Lifecycle Report

Description	<p>Enables you to present filtered CI Lifecycle results in report format and to print or export them, or to send them by email.</p> <p>To access: Click Report Export from the CI Lifecycle window.</p>
Important Information	<p>The CI Lifecycle report is generated for the period selected in the CI Lifecycle window. From the CI Lifecycle report dialog box, you can adjust the period and regenerate the results within the dialog box.</p>
Useful Links	<p>For details on working with reports, see “Working in Reports” in <i>Reports</i></p> <p>For details on the View pane, see “Common Report Elements” in <i>Reports</i></p>









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



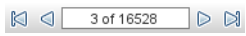


GUI Element (A-Z)	Description
	Click to reset the width of the columns to the default setting.
	Click to open the Select Columns dialog box, which enables you to change the display order of the columns, hide a column, or display a hidden column. For details, see “Working with Tables” in <i>Reports</i> .
Actual Delete Time	The date and time when the CI or relationship is deleted.
Configuration Item Type	The type of CI or relationship.
End1	The node at one end of the relationship (relevant only for relationships).
End2	The node at the second end of the relationship (relevant only for relationships).
From	Indicates the beginning of the period for the generation of the report. Click on the link to open a calendar which enables you to change the date and time.
Generate	Click Generate to generate the data for the selected period.
Label	The name of the CI or relationship as it appears in the Topology Map.
Last Access Time	The last time the CI or relationship was accessed, whether it was updated or discovered by DDM.
To	Indicates the end of the period for the generation of the report. Click the link to open a calendar that enables you to change the date and time.
Updated By	The administrator or process that updated the CI or relationship.
View	Sets the time period of the report from the beginning time. Select a time period from the drop-down list.

CI Lifecycle and Relationship Tabs

Description	Enable you to display a list of CIs and relationships that are candidates for deletion, and to manage the list (for example, to delete or prevent or postpone deletion of specific CIs, to view statistics, and to filter the list). To access: Select Application > Universal CMDB > CI Lifecycle .
Included in Tasks	“Generate CI Lifecycle Data and Filter the Results” on page 536
Useful Links	“Working with CIs” on page 41

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

GUI Element (A-Z)	Description
	Click to delay the deletion of a CI. It disappears from the list of candidates for deletion.
	Click to prevent a CI or relationship from being deleted. It disappears from the list of candidates for deletion.
	Click to delete a selected CI or relationship.
	Click to view statistics (such as the start and finish time of each run and the number of deleted CIs), for the previous five runs of the aging mechanism. For details, see “Aging Status Tab” on page 538.
	Click to select or clear all rows of data on the current page.
	Click to update the data displayed.
	Click to open the Filter dialog box, which enables you to customize the filter. For details, see “Filter Dialog Box” on page 545.
	Click to clear the filter and display the full results.

GUI Element (A-Z)	Description
	<p>Click to open the Select Columns dialog box, which enables you to change the display order of the columns, hide a column, or display a hidden column. For details, see “Select Columns Dialog Box” in <i>Reference Information</i>.</p>
	<p>Click the arrow to define the number of rows that should appear on each display page.</p>
	<p>Click to navigate through the results page by page or to jump to the first or last page.</p>
	<p>Generates data for a selected period. Tip: If no results are generated, try extending the time period further into the future (the To field).</p>
	<p>Opens the CI Lifecycle Report dialog box, which presents the data in the format of a report. For details, see “CI Lifecycle Report” on page 539.</p>
<p><Right-click a CI></p>	<p>For details on the menu options, see “IT Universe Manager Context Menu” on page 75.</p>
<p><Right-click a column header></p>	<p>For details, see “Customizing Columns” in <i>Reference Information</i>.</p>

GUI Element (A-Z)	Description
CIs/Relationships tabs	<p>Select to see a list of CIs or relationships that are candidates for deletion:</p> <p>Select. Select the check box to select a CI or relationship before performing an operation on it (such as Delete or Postpone Deletion).</p> <p>End1. The node at one end of the relationship (relevant only for relationships).</p> <p>Display Label. The name of the CI or relationship as it appears in the Topology Map.</p> <p>End2. The node at the second end of the relationship (relevant only for relationships).</p> <p>CI Type. The type of the CI or relationship.</p> <p>Last Access Time. The last time that the CI or relationship was accessed, whether it was updated or discovered by the DDM process.</p> <p>Updated by. The administrator or process that updated the CI or relationship.</p> <p>Actual Delete Time. The date and time when the CI or relationship is deleted.</p>
From	Click the arrow and use the calendar to select the beginning date and time for the CI Lifecycle report.
Relationships tab	Select to see lifecycle results for relationships.
Set Rows per Page	Select the number of rows per page from the drop-down list.
To	Click the arrow and use the calendar to select the end date and time for the CI Lifecycle report.


CI Lifecycle Window

<p>Description</p>	<p>Enables you to enable and run the aging mechanism. Also, enables you to display a list of CIs and relationships that are candidates for deletion, and to manage the list (for example, to delete or prevent or postpone deletion of specific CIs, to view statistics, and to filter the list).</p> <p>To access: Select Application > Universal CMDB > CI Lifecycle.</p>
<p>Important Information</p>	<p>The CI Lifecycle window includes the following tabs:</p> <ul style="list-style-type: none"> ➤ Aging Status. Use this tab to enable the aging mechanism and to run aging. For details, see “Aging Status Tab” on page 538. ➤ CIs. Use this tab to display a list of CIs that are candidates for deletion. For details, see “CI Lifecycle and Relationship Tabs” on page 541. ➤ Relationships. Displays the same information as the CIs tab, with the addition of the End1 and End2 columns. <p>The tab that is displayed by default depends on whether aging is enabled or disabled:</p> <ul style="list-style-type: none"> ➤ If aging is enabled, the CIs tab is displayed. ➤ If aging is disabled, the Aging Status tab is displayed.
<p>Included in Tasks</p>	<ul style="list-style-type: none"> ➤ “Enable and Run the Aging Mechanism” on page 534 ➤ “Generate CI Lifecycle Data and Filter the Results” on page 536
<p>Useful Links</p>	<p>“Working with CIs” on page 41</p>

Filter Dialog Box

Description	Enables you to filter the list of CIs that are candidates for deletion. To access: Click Filter in the CI Lifecycle window.
Included in Tasks	“Generate CI Lifecycle Data and Filter the Results” on page 536

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

GUI Element (A-Z)	Description
Condition	Click in the Condition column and select an option.
Display Name	The columns displayed for the CIs or relationships in the CI Lifecycle window.
Value	Click in the Value column to set a value for the selected condition. Depending on the condition selected, you can select a value from a drop-down list, select a date and time from the calendar, or click the ellipsis button  to open an editing dialog box where you can enter a value. When the conditions Like or Like ignore case are selected in the Condition column, you can use a wildcard (%) before and after the string you are searching for. Note: You must select a condition before entering a value.

Aging Parameters

Aging parameters are defined in the Infrastructure Settings Manager (**Admin** > **Platform** > **Setup and Maintenance** > **Infrastructure Settings**):

- ▶ **Aging Chunk Size.** The number of CIs or relationships that are sent to the aging mechanism at one time. The default is 1,000.
- ▶ **Aging Scheduler Hour of the First Run.** Defines at what time aging first runs after server startup (for example, 02=2:00 AM).
- ▶ **Aging Scheduler Interval.** Defines the interval between runs. If Aging Time Unit = days, the interval value is days; if Aging Time Unit = hours, the interval value is hours.
- ▶ **Aging Time Unit.** The default is days. (The hours option is provided to enable convenient verification checks of specific CIs.)
- ▶ **Delay Between Chunks in Milliseconds.** The period between one chunk being deleted by the aging mechanism and the next chunk being sent to the aging mechanism to be deleted. The default is 30 seconds, that is, 30,000 milliseconds.
- ▶ **Threshold for running storage optimization.** The threshold for running storage optimization during the aging operations (for example, each N deleted CIs). As database operations could take considerable time (several minutes), this option enables the technical organization of the schema to reduce this time.

19

Gold Master Report

This chapter provides information on Gold Master reports.

This chapter includes:

Concepts

- ▶ Gold Master Report Overview on page 547

Reference

- ▶ Gold Master Report User Interface on page 547

Gold Master Report Overview

A Gold Master report compares the configuration of a Gold Master CI to other CIs of the same CI type, or a descendant of the CI type. The report contains the results of the Gold Master report definition defined in Topology Report Manager. For details, see “Gold Master Report Pane” on page 293.

Gold Master Report User Interface

This section describes:

- ▶ Gold Master Report Page on page 548

Gold Master Report Page

Description	Specifies which of the selected CIs are configured differently from the Gold Master CI. To access: Select Applications > Universal CMDB > Compliance > Gold Master .
Important Information	<ul style="list-style-type: none"> ▶ Verify that popups are not blocked in your browser. ▶ For details on how to work with reports, see “Working in Reports” in <i>Reports</i>.

Left Pane

Description	Select the required Gold Master report definition you want to generate.
--------------------	---

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

GUI Element (A-Z)	Description
Definitions tab	Displays a hierarchical tree structure of the Gold Master reports defined in Topology Report Manager. For details, see “Gold Master Report Pane” on page 293.

GUI Element (A-Z)	Description																					
Results tab	<p>The Gold Master report you select in the Definitions pane is automatically selected in the Results pane.</p> <p>If you have defined a task in the Scheduler that generates and saves a Gold Master report on a periodic basis, you can produce a Gold Master report that was generated at a specific time or a by a specific user. For details on how to schedule a task, see “Scheduler” on page 491.</p> <table border="1" data-bbox="621 482 888 737"><thead><tr><th>Report</th><th>Date</th><th>User</th></tr></thead><tbody><tr><td>gold1</td><td></td><td></td></tr><tr><td>gold1</td><td>Sun Jul</td><td>admin</td></tr><tr><td>gold1</td><td>Sun Jul</td><td>admin</td></tr><tr><td>gold1</td><td>Sun Jul</td><td>admin</td></tr><tr><td>gold1</td><td>Sun Jul</td><td>admin</td></tr><tr><td>gold1</td><td>Mon Jul</td><td>admin</td></tr></tbody></table> <p>From the:</p> <ul style="list-style-type: none">➤ Report list, select the required Gold Master report.➤ Date list, select the required time.➤ User list, select the required user. <p>Note: For details on how to customize columns and divide a table of data or a list of reports into pages, see “Working in Reports” in <i>Reports</i>.</p>	Report	Date	User	gold1			gold1	Sun Jul	admin	gold1	Sun Jul	admin	gold1	Sun Jul	admin	gold1	Sun Jul	admin	gold1	Mon Jul	admin
Report	Date	User																				
gold1																						
gold1	Sun Jul	admin																				
gold1	Sun Jul	admin																				
gold1	Sun Jul	admin																				
gold1	Sun Jul	admin																				
gold1	Mon Jul	admin																				

Right Pane

<p>Description</p>	<p>Compares the attribute values of the CIs in the Gold Master CI subgraph to the attribute values of the CIs in the subgraph of the Compared CI in the CMDB.</p> <p>Note: Only attributes that have been assigned the Comparable qualifier in the CIT Manager (for details, see “CI Type Manager” on page 239), can be compared.</p> <p>Each section of the report contains a table comparing the attribute values of the Gold Master CIs to the attribute values of the Compared CI of the same CIT.</p> <p>Note: The Gold Master report only displays a CI attribute comparison if the values are different.</p> <p>If a section is empty, it means that all attribute values of the Gold Master CIs and the Compared CIs for that CIT are identical. In such a case, the attributes in the next layer in the subgraph are compared, and the next one, and so on.</p> <p>Once the compared CIs in a layer are found to have different attributes, the Gold Master report does not continue to compare the layers in the subgraph for differences.</p> <p>For a sample of a Gold Master report, see “Sample Gold Master Report” on page 551.</p>
<p>Important Information</p>	<p>For details on how to work with reports, see “Working in Reports” in <i>Reports</i>.</p>

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

GUI Element (A-Z)	Description
# in Compared CI	The number of CIs for that element type (CIT) the Compared CI subgraph contains.
# in Gold Master	The number of CIs for that element type (CIT) the Gold Master CI subgraph contains.
Attributes	The CI attribute.

GUI Element (A-Z)	Description
Compared CI	The display name of the Compared CI.
Element Type	The CIT of the CI.
Label	The display label of the Gold Master CI.
Report Date	The time and date the report was generated.
Value in Compared CI	The value of the attribute in the Compared CI.
Value in Gold Master CI	The value of the attribute in the Gold Master CI.

Sample Gold Master Report

Gold Master CI

Gold Master CI - labm1ccm14
Report Date - Sun May 4, 2008 10:13 AM

Compared CI - labm1mam13

Element Type - Windows, # in Gold Master - 1, # in Compared CI - 1

1 / 1 Pages

Label	Attributes	Value in Gold Master CI	Value in Compared CI
labm1ccm14 Vs labm1mam13	Host Operating System Installation type	Server Enterprise Edition	Server Enterprise Edition
labm1ccm14 Vs labm1mam13	Host Operating System	Windows 2003	Windows 2003
labm1ccm14 Vs labm1mam13	Host Vendor	Microsoft	Microsoft
labm1ccm14 Vs labm1mam13	Host Operating System accuracy	none	none
labm1ccm14 Vs labm1mam13	Host Model	ProLiant DL140 G2	ProLiant BL460c G1
labm1ccm14 Vs labm1mam13	Host Operating System Release	3790	3790
labm1ccm14 Vs labm1mam13	Host Operating System Version	5.2.3790	5.2.3790

The sample Gold Master report shows the following:

- ▶ The Gold Master CI **labm1ccm14** is being compared to the Compared CI **labm1mam13**.
- ▶ **Windows** attribute values in the Gold Master subgraph are being compared with the **Windows** attribute values in the Compared CI subgraph.
- ▶ There is one **Windows** CI in the Gold Master subgraph and one **Windows** CI in the Compared CI subgraph.

20

Compare Snapshots

This chapter provides information on Compare Snapshots.

This chapter includes:

Concepts

- ▶ Snapshot Comparison Overview on page 553

Tasks

- ▶ Snapshot Comparison on page 553

Reference

- ▶ Compare Snapshots User Interface on page 555

Snapshot Comparison Overview

Compare Snapshots displays the status of a view in one snapshot by comparison with its status taken at a different time. You can compare a current snapshot to a previous snapshot or two snapshots both taken in the past. For details, see “Compare Snapshots Window” on page 555.

Snapshot Comparison

This task describes how to take a snapshot of a view, and then compare two snapshots of a specific view taken at different times.

This section includes the following tasks:

- “Take a Snapshot of a View” on page 554
- “Save Snapshots on a Periodic Basis” on page 554
- “Compare Snapshots” on page 554

1 Take a Snapshot of a View

Select **Applications > Universal CMDB > Topology View**. In View Explorer, right-click the required view and select **Save Snapshot** to take a snapshot of a view and save it. For details, see “Save Snapshot Dialog Box” on page 527.

2 Save Snapshots on a Periodic Basis

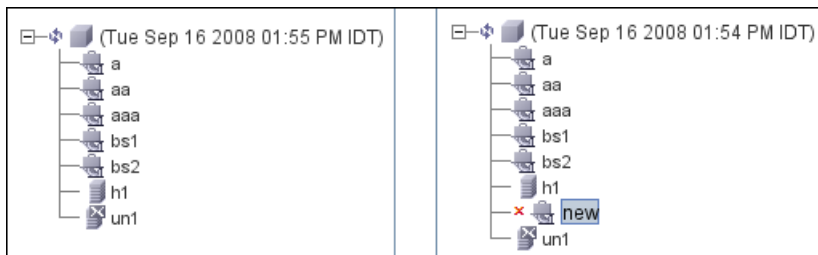
Optionally, you can schedule snapshots to be taken of a certain view at specific times by defining a task. For details, see “Job Scheduler Window” on page 501.

3 Compare Snapshots

Compare the snapshots of a view taken at different times. Select **Applications > Universal CMDB > Compliance > Compare Snapshots** to open the Compare Snapshots dialog box. For details on how to compare snapshots taken at different times, see “Compare Snapshots Window” on page 555.

Example of Snapshots of a View Taken at Different Times

In the following example, the **Deleted Item** icon next to the CI **new** in the right pane, indicates that the CI has been deleted in the newer view.



Compare Snapshots User Interface









This section describes:


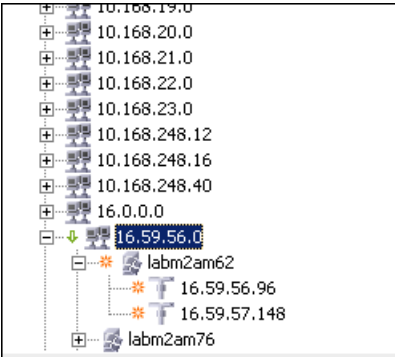

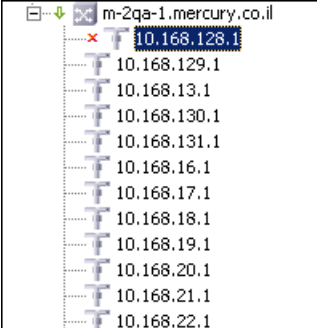
- Compare Snapshots Window on page 555
- Find CI by Label Dialog Box on page 560
- Snapshots of <View> Dialog Box on page 561


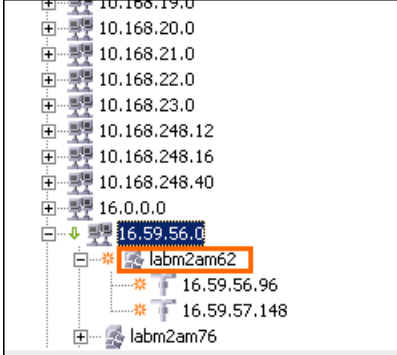

Compare Snapshots Window

Description	<p>Enables you to compare two snapshots of a specific view taken at different times. This feature enables you to visualize the differences between the views by comparing the statuses of the view at the times the snapshots were taken.</p> <p>You can compare a current snapshot to a previous snapshot or two snapshots both taken in the past.</p> <p>To access:</p> <ul style="list-style-type: none"> ➤ Select Applications > Universal CMDB > Compliance > Compare Snapshots. or ➤ Click View Snapshot in a Change report if a snapshot was taken of that view. For details, see “View Snapshot” on page 585. Only views with changes that reflect the differences between two snapshots, one taken before the From date and another snapshot taken before the To date in Change Report (for details, see “Change Report” on page 581), appear in the report.
Important Information	<ul style="list-style-type: none"> ➤ You can also define a schedule that takes snapshots of a specific view and saves them on a periodic basis. For details, see “Scheduler” on page 491. ➤ Snapshots of views that are marked as Track Changes (for details, see “Track Changes” on page 192), are created on a daily basis.
Included in Tasks	“Snapshot Comparison” on page 553

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

GUI Element (A-Z)	Description
	Expand the entire hierarchical tree structure of the CIs you selected.
	Collapse the hierarchical tree structure of the CIs you selected.
	Search for a CI within the selected view whose label contains the searched text. Opens the Find CI by label dialog box.
	Find the next occurrence of an item marked as changed.
	Find the previous occurrence of an item marked as changed.
	<p>Show the difference between two configuration files. Compare what the configuration file looked like at the time each snapshot was taken.</p> <p>Click Select Snapshots to compare and select a view that contains a CI of the CIT configfile. Select a CI of the CIT Configuration File. A window opens displaying the differences in the configuration files, which are marked in blue.</p>
	<p>Select a view that contains a CI of the CIT Configuration File and click Select Snapshots to compare. Select two snapshots and click Compare. Select a CI of the CIT Configuration File.</p> <p>Note: This button is only enabled if you selected a CI of the CIT Configuration File from the tree.</p>
	<p>Display the selected CI's attributes. For details, see "Configuration Item Properties Dialog Box" on page 57.</p> <p>Note: The Properties functionality is sometimes displayed in a window and not in a tab.</p>

GUI Element (A-Z)	Description
	<p>The Contains an Updated Item icon indicates that either a new child CI was created for a CI or an existing child CI was updated or deleted.</p> <p>For example, the 16.59.56.0 CI in the figure below has a Contains an Updated Item icon due to the child CIs that were added to it.</p> 
	<p>The Deleted Item icon indicates that a CI has been deleted from the view. For example, the figure below shows that the CI 10.168.128.1 has been deleted from the view.</p> 

GUI Element (A-Z)	Description
	<p>The New Item icon indicates that a new CI has been added to the view. The example below shows that a Host and two IP CIs were added to the 16.59.56.0 Network CI.</p> 
	<p>The Updated Item icon indicates that the attribute value of a CI has changed. For more information, see the Example of an Attribute Value of a CI that Has Changed on page 559.</p>
<p><At top of panes></p>	<p>The Compare Snapshots window is divided into two panes. Each side displays an hierarchical tree structure of all the CIs in the Topology Map for that snapshot version. The left side always represents the newer of the two versions. When you select a CI on one side, the corresponding CI on the other side is automatically selected (provided the Synchronize Selection check box is selected).</p>
<p>CIT</p>	<p>The name of the CIT to which the CI belongs as defined in the CI Type Manager, as described in “CI Type Manager” on page 239.</p>
<p>Name</p>	<p>The name of the CI as defined in the CI’s label.</p>
<p>Properties pane</p>	<p>Displays the attributes of the selected CI.</p> <p>The Properties pane contains the following fields:</p> <ul style="list-style-type: none"> ➤ Property. Displays the attributes for the selected CI. ➤ Value. Displays the attribute value for the currently selected CI.

GUI Element (A-Z)	Description
Select Snapshots to compare	Select the two snapshots you want to compare. Opens the Snapshots of <view> dialog box.
Select View Name	Displays the name of the view whose snapshots you want to compare. Note: Only views for which snapshots have been taken are available.
Synchronize Selection	Enables you to select a CI on one side and have its corresponding CI automatically selected on the other side. The default for the Synchronize Selection check box is selected. Clearing this check box allows you to select two different CIs from each of the two trees. This allows you to compare two different CIs and see their different properties.


Example of an Attribute Value of a CI that Has Changed

The **Updated Item** icon indicates that the attribute value of a CI has changed. For example, the figure below shows that the CI **labm2am09.devlab.ad** has the **Updated Item** icon because it was updated with a new **Host DNS Name** value (see the **Property** and **Value** columns in the bottom panes underneath the tree structure).

Property	Value
Host DNS Name	labm2am09.devlab.ad
Host Name	labm2am09

Property	Value
Host DNS Name	labm2am09
Host Name	labm2am09

Find CI by Label Dialog Box

Description	<p>Search for a CI within the selected view whose label contains the searched text. You can specify a whole word or part of it. If a match is found, it selects the CI in the hierarchical tree structure in the Compare Snapshots window.</p> <p>To access: Click the Find  button in the Compare Snapshots window.</p>
Included in Tasks	“Snapshot Comparison” on page 553

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

GUI Element (A-Z)	Description
Backward	Do a backward search.
Case Sensitive	Distinguish between uppercase and lowercase characters. When you select Case Sensitive , search results only find those instances in which the capitalization matches the text you typed in the Text to find box.
Forward	Do a forward search.
Text to find	Enter the text of the CI you want to find. You can specify a whole word or part of it.

Snapshots of <View> Dialog Box

Description	This dialog box contains a list of all the different snapshots taken of the selected view. To access: Click Select Snapshots to compare in Compare Snapshots window.
Important Information	This dialog box opens only if you have taken snapshots of the view in the “Save Snapshot Dialog Box” on page 527.
Included in Tasks	“Snapshot Comparison” on page 553

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

GUI Element (A-Z)	Description
Description	The description you wrote for the snapshot in “Save Snapshot Dialog Box” on page 527.
Note	The note you wrote for the view in “Save Snapshot Dialog Box” on page 527.
Owner	The name of the user who took the snapshot.
Size	The number of CIs that were in the view when the snapshot was taken.
Time	The time at which the snapshot was saved.

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Compare CIs

This chapter provides information on Compare CIs.

This chapter includes:

Concepts

- ▶ CI Comparison Overview on page 563

Tasks

- ▶ CI Comparison on page 564

Reference

- ▶ Compare CIs User Interface on page 565

CI Comparison Overview

Compare CIs enables you to compare the hierarchies of two compound CIs. A compound CI is a CI that is linked to another CI by a **Container link** relationship.

You can display the compared CIs and their child CIs that appear in a selected view or in the CMDB.

Change indicators in the Compare CIs window denote:

- ▶ A CI in one pane does not match any corresponding CI in the other pane.
- ▶ A CI has a match but one of its children does not have a match.

You can only see differences in the attributes of the CI whose values have been defined as **Comparable** in the CI Type Manager. For information, see “Add/Edit Attribute Dialog Box” on page 251. For example, a comparison might show a difference in the operating system or disk capacity. For details on how to compare CIs, see “Compare CIs Window” on page 566.

CI Comparison

This task explains how to compare the hierarchies of two compound CIs, view a CI’s configuration file, and show the difference between two configuration files.

This section includes the following tasks:

- “Select the Required CIs” on page 564
- “View a CI’s Configuration File” on page 565
- “Show the Difference Between Two Configuration Files” on page 565

1 Select the Required CIs

Select the two CIs you want to compare. The hierarchies of the two compound CIs are compared in the Compare CIs window. You can choose to compare two CIs that appear in a selected view or in the CMDB. For details, see “Select CI Dialog Box” on page 569.

Example of Nonmatching CIs

The following example displays the **No Matching CI** icon next to the CIs **doc** and **doc1** because the CI on one side does not match the corresponding CI on the other side. The reason they do not match is the difference in document size. The value for **Document Size** for the **doc** CI on the left side is **10** while the **Document Size** for the **doc** CI on the right side is **20**.

<p>2096670 KB (Document) doc</p> <p>CIT: Document Name: doc</p> <table border="1"> <thead> <tr> <th>Property</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Document Checksum</td> <td></td> </tr> <tr> <td>Document Data</td> <td></td> </tr> <tr> <td>Document Extension</td> <td>txt</td> </tr> <tr> <td>Document Path</td> <td></td> </tr> <tr> <td>Document Size</td> <td>10</td> </tr> </tbody> </table>	Property	Value	Document Checksum		Document Data		Document Extension	txt	Document Path		Document Size	10	<p>2096660 KB (Document) doc1</p> <p>CIT: Document Name: doc1</p> <table border="1"> <thead> <tr> <th>Property</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Document Checksum</td> <td></td> </tr> <tr> <td>Document Data</td> <td></td> </tr> <tr> <td>Document Extension</td> <td>txt</td> </tr> <tr> <td>Document Path</td> <td></td> </tr> <tr> <td>Document Size</td> <td>20</td> </tr> </tbody> </table>	Property	Value	Document Checksum		Document Data		Document Extension	txt	Document Path		Document Size	20
Property	Value																								
Document Checksum																									
Document Data																									
Document Extension	txt																								
Document Path																									
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Property	Value																								
Document Checksum																									
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Document Extension	txt																								
Document Path																									
Document Size	20																								

This example also illustrates that the **Document** group CI has a **Has a Non-Matching Child** icon because they have different child CIs.

2 View a CI's Configuration File

Select a CI of the CIT **Configuration File** and view the configuration file. For details, see “Compare CIs Window” on page 566.

3 Show the Difference Between Two Configuration Files

Select two CIs of the CIT **Configuration File** and view the difference between the two configuration files. For details, see “Compare CIs Window” on page 566.

Compare CIs User Interface

This section describes:





- Compare CIs Window on page 566
- Find CI by Label Dialog Box on page 568







► Select CI Dialog Box on page 569

Compare CIs Window

Description	<p>Compare the hierarchies of two compound CIs. A compound CI is a CI that is linked to another CI by a Container link relationship.</p> <p>The Compare CIs window is divided into two panes. Each side displays a hierarchical tree structure of the CIs you selected. When you select a CI on one side, the corresponding CI on the other side is automatically selected, provided the Synchronize Selection check box is selected.</p> <p>To access: Select Applications > Universal CMDB > Compliance > Compare CIs.</p>
Important Information	You can compare only two CIs of the same CIT or one of the CIT's descendants in the hierarchy.
Included in Tasks	"CI Comparison" on page 564


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

GUI Element (A-Z)	Description
	Expand the entire hierarchical tree structure of the CIs you selected.
	Collapse the hierarchical tree structure of the CIs you selected.
	Search for a CI within the selected view whose label contains the searched text. Opens the Find CI by label dialog box.
	Find the next occurrence of an item marked as changed. For information on the change indicators, see "No Matching CI" on page 567 and "Has a Non-Matching Child" on page 567.

GUI Element (A-Z)	Description
	Find the previous occurrence of an item marked as changed. For information on the change indicators, see “No Matching CI” on page 567 and “Has a Non-Matching Child” on page 567.
	Show the difference between the content of the two configuration files. Configuration files use the .xml , .txt or .ini extensions. Select a CI of the CIT Configuration File in both panes and click the Show Differences button. A window opens displaying the differences in the configuration files, which are marked in blue.
	View the content of a Configuration File CI. Select a CI of the Configuration File CI and click the Open button. Note: This button is only enabled if you selected a CI of the CIT Configuration File from the tree.
	Display the selected CI’s properties. For details, see “Configuration Item Properties Dialog Box” on page 57.
 No Matching CI	Indicates that a CI in one pane does not match any corresponding CI in the other pane.
 Has a Non-Matching Child	Indicates that the child of the CI does not have a matching child in the other pane.
<At top of panes>	Displays the CIs you selected in the Select CI dialog box.
<Left and right panes>	Displays a tree of the compared CIs and their child CIs that appear in the selected view or in the CMDB, depending on whether you selected the View or the CMDB options.
CIT	The CIT (as defined in the CI Type Manager) of the selected CI at the top of the pane. For details, on CI Type Manager, see “CI Type Manager” on page 239.
CMDB	Display the selected CIs and their child CIs that appear in the entire CMDB.
Name	The name of the selected CI as defined in the CI’s label.

GUI Element (A-Z)	Description
Property	Displays the attribute name for the selected CI, which was marked as Comparable in the CI Type Manager. For details, see “Create Configuration Item Type/Relationship/Calculated Relationship Wizard” on page 259.
Select	Select the two CIs you want to compare. Opens the Select CI dialog box. The CI you select from the Select option on the left is displayed in the left pane and the CI you select from the Select option on the right is displayed in the right pane.
Synchronize Selection	Enables you to select a CI on one side and have its corresponding CI automatically selected on the other side. The default for the Synchronize Selection check box is selected. Clearing this check box allows you to select two different CIs from each of the two trees. This enables you to compare two different CIs and see their different properties.
Value	Displays the attribute value for the currently selected CI.
View	Display the selected CIs and their child CIs that appear in a specific view.

Find CI by Label Dialog Box

Description	Search for a CI within the selected view whose label contains the searched text. You can specify a whole word or part of it. If a match is found, it selects the CI in the hierarchical tree structure in the Compare CIs window. To access: Click the Find  button in the Compare CIs window.
Included in Tasks	“CI Comparison” on page 564

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

GUI Element (A-Z)	Description
Backward	Do a backward search.
Case Sensitive	Distinguish between uppercase and lowercase characters. When you select Case Sensitive , the search results only include those instances in which the capitalization matches the text you typed in the Text to find box.
Forward	Do a forward search.
Text to find	Enter the text of the CI you want to find. You can specify a whole word or part of it.

Select CI Dialog Box

Description	Select the required CI for comparison from the hierarchical tree or search for a CI for comparison. To access: Click Select CI in the Compare CIs window.
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The following elements are included (unlabeled GUI elements are shown in angle brackets):

GUI Element (A-Z)	Description
Browse tab	Select the required CI for comparison from a hierarchical tree. For details, see “Browse Tab” on page 570 below.
Search tab	Search for a CI for comparison. For details, see “Search Tab” on page 570.

Browse Tab

Description	<p>Search for and display a view, and browse through the view to locate a particular CI.</p> <p>To access: Click Select CI to open the Select CI dialog box and click the Select CI tab.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
	Refresh the list of CIs (if new CIs have been added to a view).
	Refresh the View list (if views have been newly defined).
	Click to open the Select View dialog box. Select the view from which you want to select a CI.
	Enables you to move to the next or previous result of the search for the string entered in the Find box.
<Hierarchical CI tree>	Displays the CIs from the selected view.
Find	Enter a CI name or a portion of a CI name in the Find box to locate a CI in the CI tree.
View	Select the required view from the list.

Search Tab

Description	<p>Search for a CI either in the entire CMDB or in the current view. You can also filter the list of CIs that is displayed.</p> <p>To access: Click Select CI to open the Select CI dialog box and click the Search tab.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
	Click this to view the search results. The search results are displayed at the bottom of the Search tab.
	Filter the list of CIs that is displayed. Click the Select CIs to search in button to open the hierarchical tree structure of the CI Type model. Select the required CIT.
CI Type	Search for a CI of a specified CI type. Click the  button to the right to open the hierarchical tree structure of the CI Type model.
Search for	Enter the name of the CI (or part of the name) you want to find.

22

Asset Report

This chapter provides information on Asset reports.

This chapter includes:

Concepts

- ▶ Asset Report Overview on page 573

Reference

- ▶ Asset Report User Interface on page 573

Asset Report Overview

Asset reports display a list of all the CIs in a specified view, their attribute values, as well as their child CI's in the CMDB. You use Asset reports to view and analyze the contents of the view and focus on the data which is of interest to you. For example, an Asset report can display a list of all the servers that are part of a specific application contained in the view.

Asset Report User Interface

This section describes:

- ▶ Asset Report Page on page 574

Asset Report Page

<p>Description</p>	<p>An Asset report displays a list of all the CIs in a selected view and their attribute values, as well as their child CIs and their attribute values in the CMDB.</p> <p>The report contains only the attributes whose Asset Data check box was selected in the Attributes tab in the CI Type Manager. For more details, see “Add/Edit Attribute Dialog Box” on page 251.</p> <p>You can generate a list from a specific view or from the CMDB.</p> <p>When you generate an Asset report from a specific view, the report retains the same hierarchical structure as the relevant view in the Topology Map.</p> <p>To access: Select Applications > Universal CMDB > Reports > Asset Report.</p>
<p>Important Information</p>	<ul style="list-style-type: none"> ▶ Make sure that popups are not blocked in your browser. ▶ For details on how to work with reports, see “Working in Reports - Overview” in <i>Reports</i>. ▶ For information about limitations on the size of reports produced in .pdf format, see “Publishing a Report” in <i>Reports</i>.

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

GUI Element (A-Z)	Description
CMDB	<p>Include information from the selected view as well as information about the child CIs and their attribute values in the CMDB.</p> <p>By choosing this option, the report includes CIs that are connected by the Container link relationship to the CIs in selected view. For example, the report would include the CPU and memory of a server that is contained in the view.</p>
Selected view	Select the required view.
Views	Includes only information about the CIs and their attributes contained in this view.

23

Host Dependency Report

This chapter provides information on Host Dependency reports.

This chapter includes:

Concepts

- ▶ Host Dependency Report Overview on page 577

Reference

- ▶ Host Dependency Report User Interface on page 578

Host Dependency Report Overview

Host Dependency reports are based on TQL queries created in the Enrichment Manager, which use the relationship of the type Dependency. Dependency reports list all the relationships of the type Dependency that connect between servers in the selected view, or between the servers in the CMDB and the servers within the selected view.

The report includes relationships that:

- ▶ exist between databases and clients
- ▶ exist between clients and servers
- ▶ are created as a result of an MQ connection

Host Dependency Report User Interface

This section describes:

- Host Dependency Report Page on page 578

Host Dependency Report Page

Description	<p>Enables you to generate a list of all the relationships of the type Dependency that connect between servers in the selected view, or between the servers in the CMDB and the servers within the selected view.</p> <p>To access: Select Applications > Universal CMDB > Reports > Host Dependency.</p>
Important Information	<ul style="list-style-type: none"> ► You can create new TQLs in Enrichment Manager using the Dependency relationship to describe the connection between hosts. Every new Dependency relationship that is used appears in the Dependency report. ► Make sure that popups are not blocked in your browser. ► For details on how to work with reports, see “Working in Reports” in <i>Reports</i>.

The Host Dependency report page includes the following elements (listed alphabetically):

GUI Element (A-Z)	Description
CMDB	Display all the servers in the CMDB that are dependent on the servers in the selected view.
Selected view	Select the required view.
Views	Display all the dependencies between the servers in the selected view.

The following elements are included in the generated Host Dependency report (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
Clients	The list of clients that are linked to the servers.
Counter	The number of clients to which the server is connected.
Host	The servers in the selected view.
Relationship	The display label of the relationship in the Topology Map.

24

Change Report

This chapter provides information on Change reports.

This chapter includes:

Concepts

- ▶ Change Report Overview on page 581

Reference

- ▶ Change Report User Interface on page 582

Change Report Overview

Change reports enable you to view and analyze the actual changes made to a specific CI and its children, or to a specific view. This can help with possible troubleshooting issues related to this CI. For example, seeing the changes that occurred to a CI might enable you to conclude that these changes are the cause of the problem. By the same token, the source of the troubleshooting issue could be related to expected changes which failed to occur.

Scheduling Change reports to run periodically also enables you to monitor the changes that are made to the system and verify that all the changes are in line with your organization's planning. For details, see "Create a Schedule" in *Reports*.

Change Report User Interface

This section describes:

- ▶ Change Report Page on page 583
- ▶ CI History Report Page on page 587

 **Change Report Page**

Description	<p>Displays information about the changes made to the CIs whose properties are marked as either Change Monitored or Comparable. For details, see “Add/Edit Attribute Dialog Box” on page 251.</p> <p>To access: Select Applications > Universal CMDB > Reports > Change Report.</p> <p>The report displays:</p> <ul style="list-style-type: none"> ▶ Changes that occurred in a selected CI and all its children, which are linked, by default, by an <code>impact_link</code>. The CIs in the generated report are retrieved according to the Infrastructure Settings Manager settings. Go to Admin > Universal CMDB > Platform > Setup and Maintenance > Applications > MamWeb. For details, see “Infrastructure Settings” in <i>Platform Administration</i>. ▶ Select Change Report relationship name to retrieve CIs that are linked by the selected calculated relationship. In the Value box, enter the name of the relationship as it appears in the Name box (not the Display Name box) in the Details page of the selected relationship in the CI Type Manager. For details, see “Details Page” on page 260. ▶ Select Change Report relationship qualifier to retrieve CIs that are defined with a qualifier. In the Value box, enter the name of the required qualifier. For information about qualifiers, see “Qualifiers Page” on page 263. ▶ Changes that occurred in all CIs in the selected view. In addition, this page displays any CIs that were added or deleted during the defined time frame according to snapshots taken of that view. ▶ CIs with a Container link relationship that were added to or removed from a CI. ▶ CIs whose relationship was defined with a TRACK_LINK_CHANGES qualifier, that were added to or removed from a CI. For information about qualifiers, see “Qualifiers Page” on page 263.
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Important Information	Note: You can also access Change report using the Change Rule right-click option for any CI with changed properties in relevant views in Dashboard. For details, see the “Change Rule” option in Dashboard Administration.
Useful Links	For details on how to work with reports, see “Working in Reports” in <i>Reports</i> .

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

GUI Element (A-Z)	Description
Select CI/View	Select the required CI or view. Opens the Select CI/View dialog box. For details, see “Working with View Explorer” on page 681.
Use results on CMDB	The report displays the changes that occurred to the CI and its children in the entire CMDB. Note: This option is available only if you selected a CI and not a view.
Use results on View	The report displays the changes that occurred to the CI and its children in the selected view. Note: This option is available only if you selected a CI and not a view.

The generated report includes the following elements (listed alphabetically):

GUI Element (A-Z)	Description
View Snapshot	<p>Opens the Compare Snapshots dialog box. Enables you to perform a snapshot comparison. For details about snapshots, see “Compare Snapshots” on page 553.</p> <p>Note: This option is displayed only if, for the relevant view context, a snapshot was saved before the From date and another snapshot was saved before the To date, and there was a difference between them.</p>
View Statistics	<p>The statistics include the following:</p> <ul style="list-style-type: none"> ▶ The number of CIs that were added to the view ▶ The number of CIs that were removed from the view ▶ The number of relationships that were added to the view ▶ The number of relationships that were removed from the view

CI Changes Area

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

GUI Element (A-Z)	Description
<View other pages>	To view other pages, use the left and right arrows. The number between the left and right arrows indicate which pages are currently being displayed. For example, 1 - 2 of 3 means that the 1st and 2nd pages out of 3 are being displayed.
Change Date & Time	The date and time at which the change occurred.
Changer	The name of the user that manually modified the CI's property, or the name of the Discovery and Dependency Mapping (DDM) Probe that automatically discovered a change made to the CI's property.
CI Attribute	The name of the CI attribute that was changed.

GUI Element (A-Z)	Description
CI Label	The label of the path from the root to the CI. Note: A backslash (\) in a CI name indicates a parent-child relationship with the format: <parent_CI>\<child_CI>. For example, the entry 16.59.63.0\Windows provides change information for the Windows CI which is the child of the 16.59.63.0 CI. Note: Click to view the change history of a specific CI. For details, see “CI History Report Page” on page 587.
CIT Name	The name of the CIT (internal).
New Value	The new value of the CI attribute.
Old Value	The previous value of the CI attribute (before the change).
Type	The type of change that occurred.

Relationship Changes Area

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

GUI Element (A-Z)	Description
Change Date	The date and time at which the update was performed.
Changer	The name of the user that manually modified the CI's property, or the name of the DDM probe that automatically discovered a change made to the CI's property.
Container Label	The label of the path from the root to the container CI. A backslash (\) in a CI name indicates a parent-child relationship with the format: <parent_CI>\<child_CI>. For example, the entry 16.59.63.0\Windows provides change information for the Windows CI which is the child of the dancer.hp.com CI. Note: Double-click an item to view the change history of the container CI. For details, see “CI History Report Page” on page 587.

GUI Element (A-Z)	Description
Event type	<p>You can have one of the following values:</p> <ul style="list-style-type: none"> ▶ Add related CI. A contained CI was added to the container CI using a Container link relationship. ▶ Remove related CI. A contained CI that was linked to a container CI using a Container link was removed.
Related label	<p>The label of the path from the root to the contained CI.</p> <p>Note: Double-click an item to view the change history of the related CI. For details, see “CI History Report Page” on page 587.</p>

CI History Report Page

Description	<p>Enables you to view all the changes in the properties of a specific CI or for CIs linked by a Container link relationship, from the time they were created.</p> <p>To access:</p> <ul style="list-style-type: none"> ▶ In the CI Changes area, click one of the links in the CI label column for the required CI. or ▶ In the Relationship Changes area, click one of the links in the Container label or Related label columns for the required CI.
Important Information	<p>Make sure that popups are not blocked in your browser.</p>

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

GUI Element (A-Z)	Description
Change Date	The date and time when the update was performed.
Changer	The name of the user that manually modified the CI's property, or the name of the DDM probe that automatically discovered a change made to the CI's attribute.
CI Attribute	The name of the CI attribute that was updated.
New Value	The new value of the CI attribute.

25

Topology Report

This chapter provides information on Topology reports.

This chapter includes:

Concepts

- ▶ Topology Report Overview on page 589

Tasks

- ▶ Generate and Send a Topology Report at Defined Intervals on page 590

Reference

- ▶ Topology Report User Interface on page 591

Topology Report Overview

A Topology report is based on a specific Report TQL query, defined in Topology Report Manager. It gives you information about the selected Report nodes in the TQL on which it is based.

Topology Report Manager enables you to customize the way the report is displayed. The information that appears in the report, including the order in which Report nodes are listed and their placement relative to other Report nodes, and how the information within each Report node is sorted, is defined in Topology Report Manager. For details, see “Topology Report Manager” on page 277.

You can generate a report and save it. The results of the generated report are saved in the History Results tab in the Topology Report page. For details, see “Topology Report Page” on page 592.

You can optionally schedule the Topology report to run on a periodic basis, For details, see “Generate and Send a Topology Report at Defined Intervals” on page 590.

Generate and Send a Topology Report at Defined Intervals

This section explains how to schedule a Topology report to be generated and sent to specific recipients, through email, at regularly defined intervals. The results of the scheduled reports are displayed in the History Results tab in the Topology Report page.

This task includes the following steps:


- ▶ “Configure a Favorite Filter” on page 590
- ▶ “Edit the Favorite Filter in Report Manager” on page 590
- ▶ “Send a Report at Specific Intervals” on page 591

1 Configure a Favorite Filter

Configure a Favorite Filter for the required Topology report. The filter is uploaded to the Report Manager. For details, see “Save Filter to Favorites Dialog Box” in *Reports*.

2 Edit the Favorite Filter in Report Manager

Edit the Favorite Filter in Report Manager to enable you to create a schedule to send the Favorite Filter to specified individuals at specific intervals.

In Report Manager, select the required Favorite Filter and then click the Edit  button to open the Favorite Filters wizard. In the Filter Setting page, select the **Save to History DB** option. For details, see “Favorite Filters Wizard” in *Reports*.

3 Send a Report at Specific Intervals

In Report Manager, create a schedule to send the Favorite Filter to specified individuals at specific intervals. The results of the scheduled reports are saved in the History Results tab in the Topology Report page.

For details on how to create a schedule, see “Create New Schedule Dialog Box” in *Reports*.

For details about the History Results tab, see “Topology Report Page” on page 592.

Topology Report User Interface

This section describes:

- Set Parameter Values Dialog Box on page 591
- Topology Report Page on page 592

Set Parameter Values Dialog Box

<p>Description</p>	<p>Enables you to edit the predefined parameterized values of node conditions defined for the selected Report definition in Topology Report Manager.</p> <p>The dialog box displays all the conditions for the selected report definition. For each element, every condition appears on a separate line.</p> <p>To access: Click the Set parameter values link in the Topology Report page.</p>
<p>Important Information</p>	<p>The Set parameter values link appears only if you defined a node condition using parameterized values in the Attribute tab in the Node Condition dialog box in Topology Report Manager. For details, see “Attribute Tab” on page 409.</p>

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

GUI Element (A-Z)	Description
<Attribute>	The attribute used for the attribute condition definition.
<Operator>	The operator used for the attribute condition definition.
Element name	The node for which the condition was defined using parameterized values.
Value	The required value.

Topology Report Page

Description	<p>A Topology report is based on a specific Report TQL query defined in Topology Report Manager. Each report is customized to display specific information, as defined in the relevant Report TQL. For details, see “Topology Report Manager” on page 277.</p> <p>To access: Select Applications > Universal CMDB > Reports > Topology Report.</p>
Important Information	<ul style="list-style-type: none"> ➤ For details on how to work with reports, see “Working in Reports” in <i>Reports</i>. ➤ For information about limitations on the size of reports produced in .pdf format, see “Publishing a Report” in <i>Reports</i>.
Included in Tasks	“Generate and Send a Topology Report at Defined Intervals” on page 590

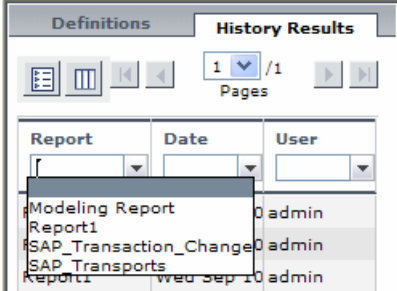
The Topology Report page includes the following panes:

- “Left pane” on page 593
- “Right pane” on page 594

Left pane

Description	Select the required Topology report definition you want to generate.
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
Definitions tab	Displays the hierarchical tree structure of the Topology reports defined in Topology Report Manager. For details, see “Topology Report Manager” on page 277.
History Results tab	<p>Displays the history of the Topology reports that were generated and saved using the Save to History DB option. This enables you to produce a Topology report that was generated at a specific time or a by a specific user.</p> <p>The Topology report you select in the Definitions tab is automatically selected in the History Results tab.</p>  <p>From the:</p> <ul style="list-style-type: none"> ➤ Report list, select the required Topology report. ➤ Date list, select the required time. ➤ User list, select the required user. <p>Note: For details on how to customize columns and divide a table of data or a list of reports into pages, see “Working in Reports” in <i>Reports</i>.</p>

Right pane

Description	Contains the information that was defined in Topology Report Manager to be included in the report. This includes which Report nodes should appear in the report, the parameter defined for each Report node, and the function you want to use to calculate the results on the report's columns. For details, see "Topology Report Manager" on page 277.
Important Information	For details on how to work with reports, see "Working in Reports" in <i>Reports</i> .

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

GUI Element (A-Z)	Description
Save to History DB	Enables you to generate and save a Topology report. The report results are stored in the History Results tab.
Set parameter values	(Optional) A link that opens the Set parameters values dialog box. Enables you to edit the predefined values of node conditions. Note: This link appears only if you defined a node condition using parameterized values in the Attribute tab in the Node Condition dialog box in Topology Report Manager. For details, see "Attribute Tab" on page 409.
Set view-specific report	(Optional) Enables you to generate a report of the selected Report TQL query based on a certain view rather than the entire CMDB. Select the view on which you want to base the report. Note: Click Clear to run the report based on the entire CMDB.

26

Overview Reports

This chapter provides information on Overview reports.

This chapter includes:

Concepts

- ▶ Overview Reports Overview on page 595

Reference

- ▶ Overview Reports User Interface on page 596

Overview Reports Overview

Overview reports consist of charts and tables that help you track and analyze the health of your monitored environment.

Overview reports enable you to view and assess performance data collected by HP Business Availability Center and stored in the CMDB. When generating reports, you can specify various report settings, such as time range or location, as well as drill down to see further information.

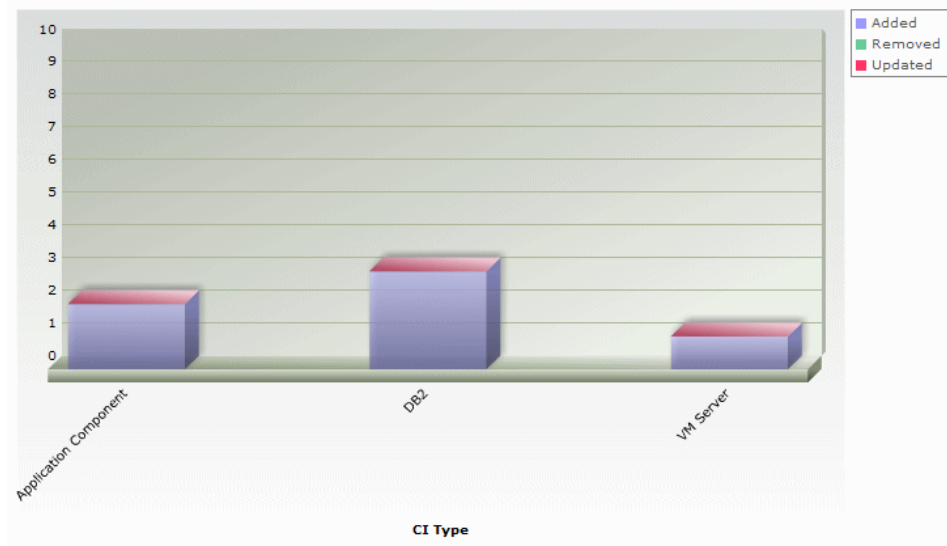
Note: You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see “Viewing Reports with Adobe Flash Player” in *Reports*.

Overview Reports User Interface

This section describes:

- ▶ Changed Applications Report on page 597
- ▶ Changed Views Report on page 599
- ▶ CMDB Utilization Report on page 601
- ▶ Database Breakdown Report on page 602
- ▶ Delete Candidates Overview Report on page 604
- ▶ Generic Breakdown Report on page 606
- ▶ Host OS Breakdown Report on page 609
- ▶ Major Application Type Breakdown Report on page 610
- ▶ Network Device Breakdown Report on page 612
- ▶ Number of Changes Report on page 613

Changed Applications Report



Description

This report displays a bar graph showing the number of detected changes in applications within a defined period.

Each bar represents a different application type. The colors in each bar represent the different types of changes that occurred in the application. Each color in the legend at the right of the bar graph represents a different type of change. The CI type of each application is displayed under the bar.

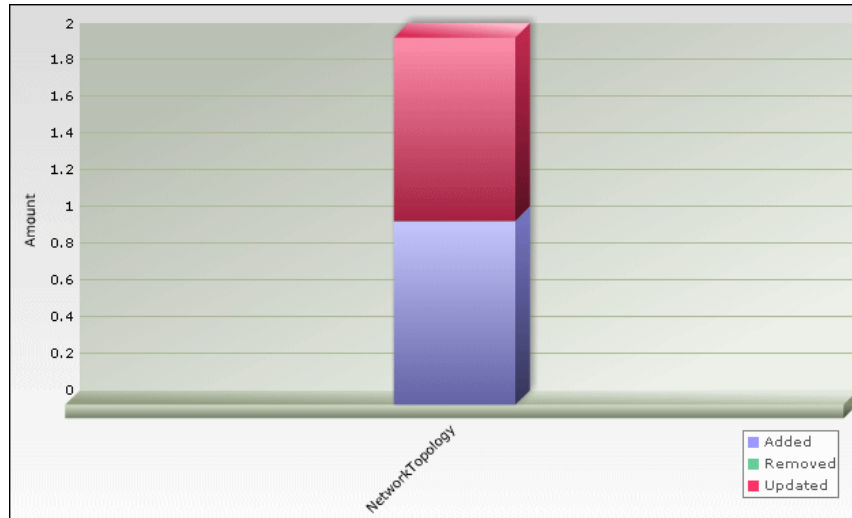
You can display the number of each type of change that occurred by moving the cursor over the related color. The tooltip that appears displays the relevant number of changes that occurred.

Click the relevant color in the bar to drill down to see a Show CI Instances report displaying the application instances that represent the changes.

To access: Select **Applications > Universal CMDB > Overview Reports > Changed Applications**.

Important Information	<ul style="list-style-type: none">▶ You can add this report as a portlet in My BSM. For details, see “Add Portlets to <page_name>/Add Portlets Dialog Box” in <i>My BSM</i>.▶ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see “Viewing Reports with Adobe Flash Player” in <i>Reports</i>.▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reports</i>.
Useful Links	For details on how to work with reports, see “Working in Reports” in <i>Reports</i> .

Changed Views Report



Description

This report displays a bar graph showing the number of changes that occurred in a specific view within a defined period.

Note: Only views with changes that reflect the differences between two snapshots, one taken before the **From** date and another snapshot taken before the **To** date in Change Report appear in the report.

Each bar represents a different view. The bar graph displays up to ten views with the largest number of changes. The view name is displayed under the bar. The legend at the right side of the bar graph shows which color represents the type of change that occurred. You can display the number of each type of change by moving the cursor over the relevant color. The tooltip that appears displays the name of the view and the number of changes that occurred.

To access: Select **Applications > Universal CMDB > Overview Reports > Changed Views**.

Important Information	<ul style="list-style-type: none">➤ You can add this report as a portlet in My BSM. For details, see “Add Portlets to <page_name>/Add Portlets Dialog Box” in <i>My BSM</i>.➤ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see “Viewing Reports with Adobe Flash Player” in <i>Reports</i>.➤ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reports</i>.
Useful Links	<ul style="list-style-type: none">➤ For details on how to work with reports, see “Working in Reports” in <i>Reports</i>.➤ For details on Change reports, see “Change Report” on page 581.

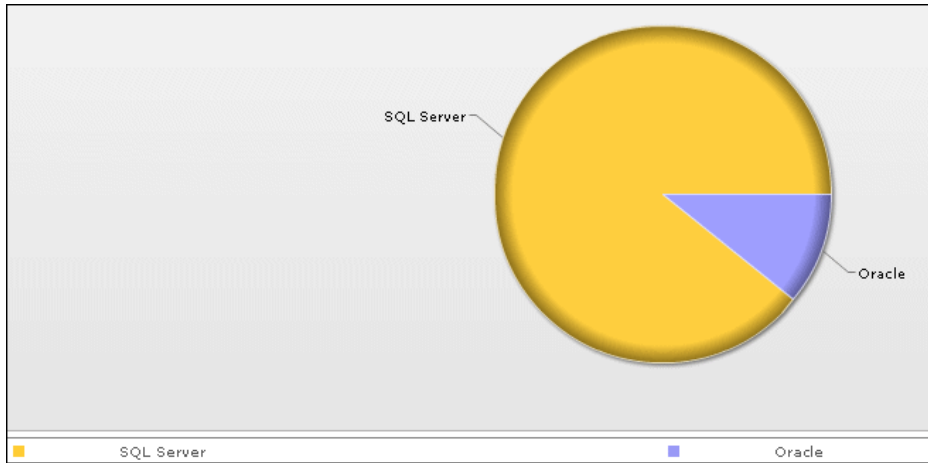


CMDB Utilization Report

Type	Amount
CIs and Relationships	203,050
Correlation Rules	2
Enrichment Rules	18
Reports	2
Running Discovery Jobs	34
Snapshots	0
Views	44

Description	<p>This report displays general CMDB statistics.</p> <p>For example, the statistics can contain the number of Correlation rules created, how many CIs there are in the CMDB, or how many snapshots have been taken.</p> <p>To access: Select Applications > Universal CMDB > Overview Reports > CMDB Utilization.</p>
Important Information	<p>You can add this report as a portlet in My BSM. For details, see “Add Portlets to <page_name>/Add Portlets Dialog Box” in <i>My BSM</i>.</p>
Useful Links	<p>For details on how to work with reports, see “Working in Reports” in <i>Reports</i>.</p>

Database Breakdown Report



Description

This report displays a pie chart showing the breakdown of database types and versions. You can view all databases deployed in the system or databases at a certain location.

To view the available databases at a specific location, select the required country, state, and city in which the hosts that the databases are connected to are located.

To verify the database types, use the legend below the pie chart.

Click a segment to view a specific database type sorted by version.

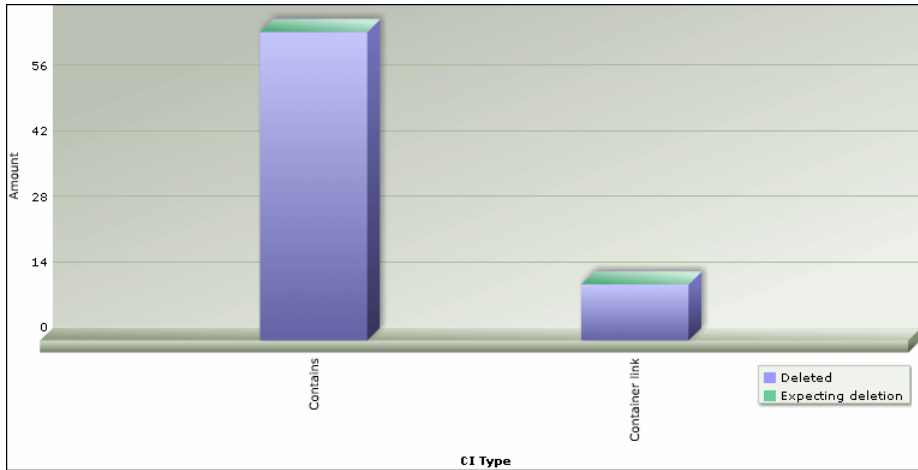
You can display the number of each database version by moving the cursor over the related color. The tooltip that appears displays the relevant number.

Click a pie slice to drill down to see a Show CI Instances report for each database version.

To access: Select **Applications > Universal CMDB > Overview Reports > Database Breakdown**.

Important Information	<ul style="list-style-type: none">▶ You can add this report as a portlet in My BSM. For details, see “Add Portlets to <page_name>/Add Portlets Dialog Box” in <i>My BSM</i>.▶ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see “Viewing Reports with Adobe Flash Player” in <i>Reports</i>.▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reports</i>.
Useful Links	For details on how to work with reports, see “Working in Reports” in <i>Reports</i> .

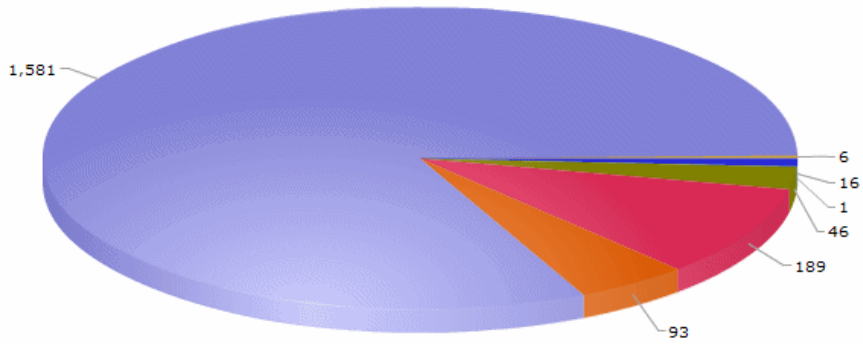
Delete Candidates Overview Report



<p>Description</p>	<p>This report displays a bar graph showing the CITs and relationships that were deleted within a defined period, and the ones that are about to be deleted.</p> <p>Each bar represents the CIT of a CI or a relationship. The legend at the right side of the bar graph shows which color represents the CIs and relationships that were deleted and which color represents those that are about to be deleted. The CI type of each CI or relationship is displayed under the bar.</p> <p>You can display the number of CIs and relationships that were deleted and the ones that are about to be deleted by moving the cursor over the related color in the bar. The tooltip that appears displays the relevant number.</p> <p>Click a bar to drill down to see a Show CI Instances report displaying the CITs and relationships that were deleted.</p> <p>To access: Select Applications > Universal CMDB > Overview Reports > Delete Candidates Overview.</p>
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Important Information	<ul style="list-style-type: none">▶ You can add this report as a portlet in My BSM. For details, see “Add Portlets to <page_name>/Add Portlets Dialog Box” in <i>My BSM</i>.▶ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see “Viewing Reports with Adobe Flash Player” in <i>Reports</i>.▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reports</i>.
Useful Links	For details on how to work with reports, see “Working in Reports” in <i>Reports</i> .

Generic Breakdown Report

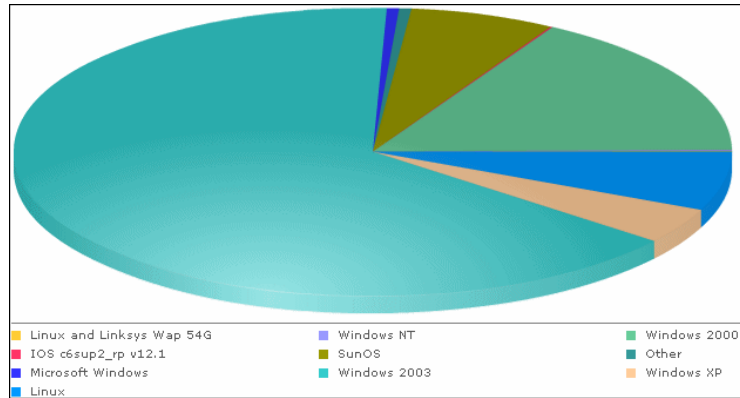


Device	Windows	Host	Unix	Net Printer	Load Balancer
tch					

<p>Description</p>	<p>This report displays a pie chart showing the breakdown of CI types by:</p> <ul style="list-style-type: none"> ▶ The CITs grouped under the selected CI type in the CI type tree ▶ A CI type attribute <p>For details, see “CI Type Manager” on page 239.</p> <p>To view the breakdown by CI types:</p> <ol style="list-style-type: none"> 1 Select the required CI type in the Choose Initial CI Type box. 2 Select CI Type in the Break Down by box. <p>To view the breakdown by CI type attributes:</p> <ol style="list-style-type: none"> 1 Select the required CI type in the Choose Initial CI Type box. 2 Select the required CI type attribute in the Break Down by box. <p>Notes:</p> <ul style="list-style-type: none"> ▶ The Break down by box that is marked in blue is the current breakdown of the report. ▶ The current drilldown selection is marked below the breakdown’s filter. <p>You can display the number of each CI type or attribute by moving the cursor over the related color. The tooltip that appears displays the relevant number. To verify the CI types and attributes, use the legend below the pie chart.</p> <p>Click a pie segment to drill down to see a Show CI Instances report.</p> <p>Note: In the Show CI Instances report, click the link in the Display Label column to see the related CIs in a topology map.</p> <p>You can generate a report that has up to four different levels. If the pie chart has more than one level, use the links of the breadcrumbs at the top of the report to navigate through the various levels.</p> <p>To access: Select Applications > Universal CMDB > Overview Reports > Generic Breakdown.</p>
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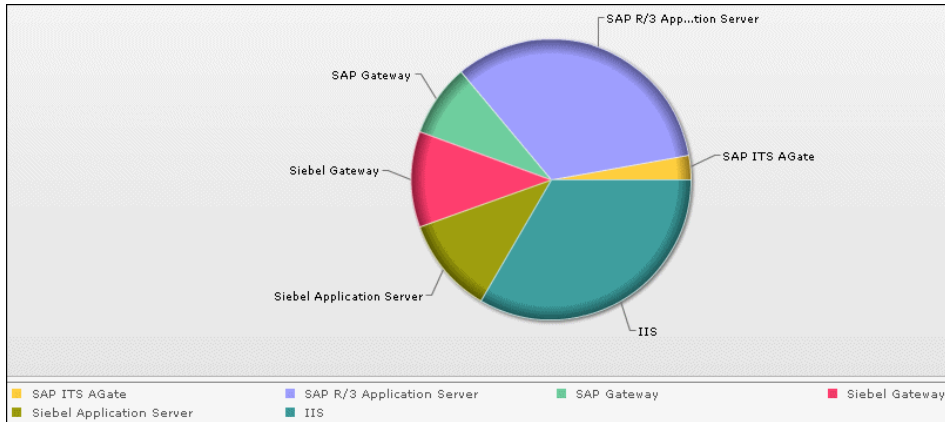
Important Information	<ul style="list-style-type: none">▶ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see “Viewing Reports with Adobe Flash Player” in <i>Reports</i>.▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reports</i>.
Useful Links	For details on how to work with reports, see “Working in Reports” in <i>Reports</i> .

Host OS Breakdown Report



<p>Description</p>	<p>This report displays a breakdown of operating systems. You can view all deployed operating systems or you can view data for operating systems at a certain location or running on a certain subnet.</p> <p>You can display the number of operating systems of each type by moving the cursor over the related color. The tooltip that appears displays the relevant number.</p> <p>Click a pie slice to drill down to see a Show CI Instances report for each operating system.</p> <p>To access: Select Applications > Universal CMDB > Overview Reports > Host OS Breakdown.</p>
<p>Important Information</p>	<ul style="list-style-type: none"> ▶ You can add this report as a portlet in My BSM. For details, see “Add Portlets to <page_name>/Add Portlets Dialog Box” in <i>My BSM</i>. ▶ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see “Viewing Reports with Adobe Flash Player” in <i>Reports</i>. ▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reports</i>.
<p>Useful Links</p>	<p>For details on how to work with reports, see “Working in Reports” in <i>Reports</i>.</p>

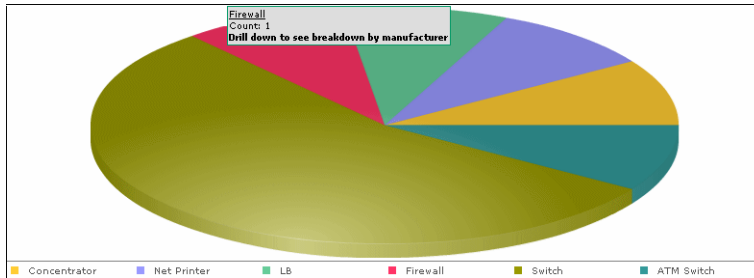
Major Application Type Breakdown Report



Description	
	<p>This report displays a breakdown of major applications and their versions. Major applications are CITs that have been assigned the MAJOR_APP class qualifier. For details, see “Qualifiers Page” on page 263.</p> <p>You can view data for all applications deployed in the system, or only those at a specific location. Choose the country, state, and city for which you want to view application breakdown data, or select All to show the entire application breakdown.</p> <p>Use the legend below the pie chart to verify an application and the versions.</p> <p>Click a segment to view a specific application sorted by version.</p> <p>Click a pie segment to drill down to see a Show CI Instances report for each application version.</p> <p>To access: Select Applications > Universal CMDDB > Overview Reports > Application Breakdown.</p>

Important Information	<ul style="list-style-type: none">▶ You can add this report as a portlet in My BSM. For details, see “Add Portlets to <page_name>/Add Portlets Dialog Box” in <i>My BSM</i>.▶ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see “Viewing Reports with Adobe Flash Player” in <i>Reports</i>.▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reports</i>.
Useful Links	For details on how to work with reports, see “Working in Reports” in <i>Reports</i> .

Network Device Breakdown Report



Description

Displays a breakdown of network devices. Only the network devices that meet the following conditions appear in the report:

- ▶ The CIT of the network device has been assigned the qualifier **NETWORK_DEVICES**. For details, see “Qualifiers Page” on page 263.
- ▶ The network device is connected to an **IP CI**.
- ▶ The network device is defined with the following attribute condition: **Host is complete = True**. For details, see “Attribute Tab” on page 409.

You can view all network devices deployed in the system or at a certain location. Choose the country, state, and city for which you want to view network device breakdown data, or select **All** to show the entire network device breakdown.

Each color in the pie chart represents a different network device. The legend underneath shows which network device each color represents. You can display the name and number of each network device by moving the cursor over the related color. The tooltip that appears displays the relevant information.

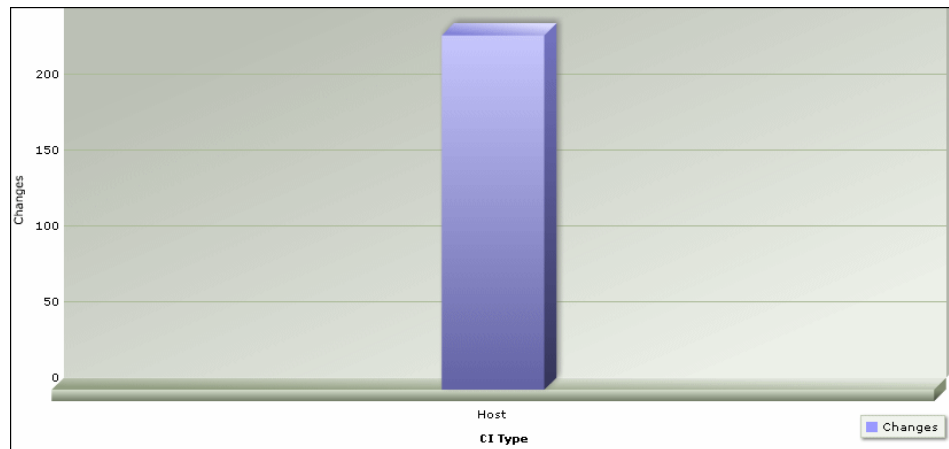
Click a segment to view a specific network device sorted by manufacturer.

Click a segment to generate a Show CI Instances report, displaying the details of the CI instances of that network device for that manufacturer.

To access: Select **Applications > Universal CMDB > Overview Reports > Network Device Breakdown**.

Important Information	<ul style="list-style-type: none"> ▶ You can add this report as a portlet in My BSM. For details, see “Add Portlets to <page_name>/Add Portlets Dialog Box” in <i>My BSM</i>. ▶ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see “Viewing Reports with Adobe Flash Player” in <i>Reports</i>. ▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reports</i>.
Useful Links	For details on how to work with reports, see “Working in Reports” in <i>Reports</i> .

Number of Changes Report

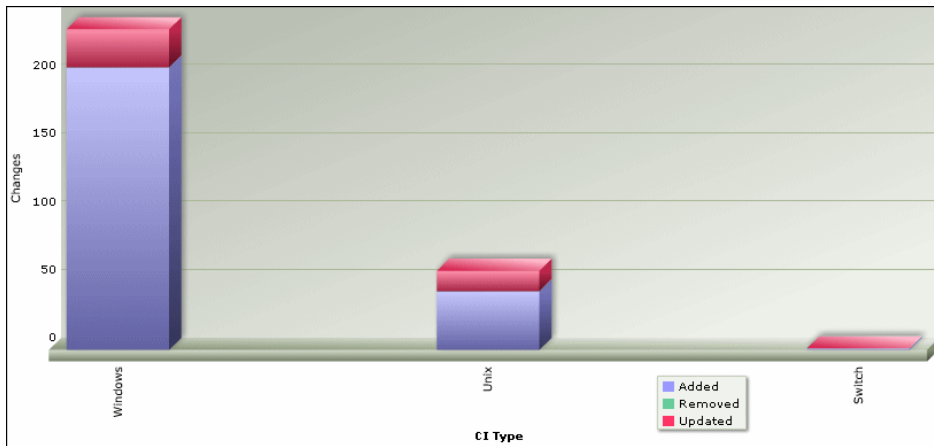


Description	<p>This report displays a bar graph showing the number of detected changes in a CIT within a defined period.</p> <p>Click the bar to view the breakdown of the types of changes that occurred for the CIT and its child CITs.</p> <p>To access: Select Applications > Universal CMDB > Overview Reports > Number of Changes.</p>
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<p>Important Information</p>	<ul style="list-style-type: none"> ▶ You can add this report as a portlet in My BSM. For details, see “Add Portlets to <page_name>/Add Portlets Dialog Box” in <i>My BSM</i>. ▶ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see “Viewing Reports with Adobe Flash Player” in <i>Reports</i>. ▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reports</i>.
<p>Useful Links</p>	<p>For details on how to work with reports, see “Working in Reports” in <i>Reports</i>.</p>

Sample Change Type Breakdown Report

This example displays the breakdown of the types of changes that occurred for a CIT and its children.



Each bar represents a different CI type. The CI type is displayed under the bar. Each color in the legend at the right of the bar graph represents a different type of change. You can display the number of each type of change by moving the cursor over the related color. The tooltip that appears displays the relevant number of changes that occurred.

Part IV

Source Manager

27

Working with Source Manager

This chapter provides information on Source Manager.

This chapter includes:

Concepts

- ▶ Source Manager Overview on page 618
- ▶ Source Adapter Activities on page 619
- ▶ Source Adapter Templates on page 619
- ▶ Dynamic Node Factory Resource on page 620
- ▶ Relationships on page 620
- ▶ Predefined Monitoring Views on page 621
- ▶ Customize the Source Adapters on page 621
- ▶ Using Generic EMS on page 622
- ▶ Using the XML File Source Adapter on page 623
- ▶ Business Process Monitoring Source Adapter Details on page 623
- ▶ Real User Monitor Source Adapter Details on page 625
- ▶ SiteScope Source Adapter Details on page 628
- ▶ Generic EMS Source Adapter Details on page 630
- ▶ XML File Source Adapter Details on page 632

Tasks

- ▶ Configure a Source Adapter – Workflow on page 634
- ▶ Work with the SiteScope Source Adapter – Workflow on page 637

- ▶ Modify an Adapter Template on page 642
- ▶ Modify Relationships on page 652
- ▶ Define Selectors on page 654
- ▶ Customize Dynamic Node Factory Definitions on page 656
- ▶ Change the Decay Timeout Value on page 657

Reference

- ▶ Source Manager User Interface on page 658

Source Manager Overview

Source Manager enables you to define and manage the source adapters used by HP Business Availability Center.

Source Manager predefined definitions provide all the tools required to harness data from the data sources used by HP Business Availability Center. You use the received information to build views for the HP Business Availability Center applications.

The source adapters format the data arriving from the external data sources (collected by HP Business Availability Center data collectors, or supplied by other external resources) using predefined templates.

Each source adapter template defines the information needed for creating configuration item (CI) in the configuration management database (CMDB), and defines the relationships to be created between the CIs in order to build the CI hierarchies. The CI definitions include the KPIs, business rules, selectors, and so on, that are needed to present the real-time monitoring data received from the data sources in a meaningful way in Dashboard and Service Level Management.

The templates define the mapping between the external source objects and the HP Business Availability Center CIs, so that the incoming data samples are mapped to the appropriate CIs.

Source Manager contains default source adapters that are preconfigured to work immediately with the data collected by the HP Business Availability Center data collectors (Business Process Monitoring, Real User Monitor, Diagnostics, and SiteScope) and generic source adapters (Generic EMS Source Adapter Details or XML File Source Adapter Details).

Default source adapters that are automatically preconfigured and activated when HP Business Availability Center starts, using a default template for each source adapter.

Source Adapter Activities

A source adapter performs the following steps:

- ▶ Imports system hierarchy information from System Availability Management, and, if applicable, from an external system. An external system can be, for example, the data source's database, a file system, or an API.
- ▶ Maps components from the hierarchy to predefined CIs in HP Business Availability Center.
- ▶ Creates CIs and relationships for the imported information and stores them in the CMDB.

Source Adapter Templates

The source adapter templates define all necessary information needed to present aggregated data from the various data sources.

Each source adapter uses a template that maps the entities in the data source to the CIs stored in the CMDB and defines the resources to be used in CMDB for a CI, such as KPIs, and business rules.

Advanced Users

You can customize the source adapter templates, or you can modify the KPIs, rules, and selector definitions in the Dashboard Administration Repositories page, in order to meet your organization’s needs. To customize a source adapter template, click **Admin > Universal CMDB > Source Manager**. To access the Dashboard Repositories, click **Admin > Dashboard > Repositories**. To access the Service Level Management Repositories, click **Admin > Service Level Management > Repositories**.

HP Professional Services offers best practice consulting; it is recommended that you use this service before making any changes to the templates or repositories. For information on how to obtain this service, contact HP Software Support.

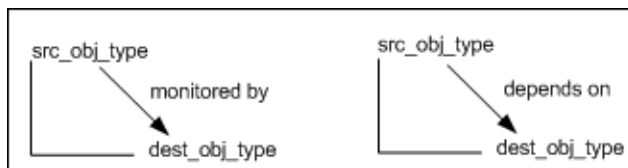
Dynamic Node Factory Resource

Some adapter templates include a Dynamic Node Factory resource. When a Dynamic Node Factory CI is included in a view, HP Business Availability Center dynamically builds a hierarchy for the source in run time, under the Dynamic Node Factory CI. For more information on the Dynamic Node Factory resource, see “Working with Dynamic Node Factory Overview” on page 93. For details on customizing a Dynamic Node Factory, see “Customize Dynamic Node Factory Definitions” on page 656.

Relationships

Attaching one CI to another CI creates a hierarchical relationship between them, so that one CI may be dependent on or influenced by the other.

In all adapter templates, except for the XML File adapter template, only the **depends on** or **monitored by** types of relationships are used; for example:



The automapping code is usually located at the end of the template file.

In the XML File template you can use all of the available types of relationships, as defined in CI Type Manager. For details, see “CI Type Manager” on page 239.

For details on how to modify a relationship, see “Modify Relationships” on page 652.

Predefined Monitoring Views

For each source adapter, predefined monitoring views display the created CI hierarchies for the monitored sources. When data is received over the bus for a defined source, you can open the relevant view in Dashboard and view status information for the CIs. You can use the configuration item (CI) hierarchies created in the predefined monitoring views as the building blocks for defining your own customized views.

Customize the Source Adapters

Source Manager provides you with the ability to modify and add to the majority of the adapter definitions, enabling you to customize the data sampling, the way the hierarchies are constructed, the parameters used for calculations, and the way the data is presented in the applications. This allows you to present the aggregated source data in a way that is relevant for your organization’s needs.

Integration with Third-Party Source

It is recommended to work with the EMS Integrations application for each new integration of the following third-party sources: BMC PATROL, CA Unicenter, Hewlett-Packard (HP) OpenView, HP OpenView Service Navigator, and Tivoli TEC. You can still edit those third-party source adapters if they were created before version 7.0.

To access the EMS Integrations application, select **Admin > Integrations**.

Using Generic EMS

It is recommended to use the Generic EMS source adapter when you want to perform an EMS integration that sends samples with the Event type. The Generic EMS source adapter is useful for demos, or to view which EMS source adapters have been enabled.

When the Generic EMS source adapter and other EMS source adapters are enabled, two or more views are created: the Generic EMS view and the views corresponding to the other EMS source adapters.

The Generic EMS view displays information about each EMS source adapter in a hierarchy where each CI above the monitor CI level is represented by an EMS Group type CI. In addition, separate views are created for each one of the other EMS source adapters using that source adapter's specific hierarchy.

The top level of the Generic EMS source adapter view displays the EMS source adapters present in the system. The hierarchy appearing below that level is specific to each EMS source adapter but each one of them has the EMS Group type except for the monitor CI level. Some additional EMS Group type CIs might be created to fill in the different levels of the Generic EMS hierarchy.

In the Generic EMS view, the rules and KPIs applied to each CI level (except the measurement CI level) are the rules and KPIs attached to the EMS Group type CI. In the other EMS source adapter views, the rules and KPIs applied to each CI level (except for the measurement CI level) are the rules and KPIs defined for the relevant CI type.

The samples that are caught by the Generic EMS DNode and by a specific EMS source adapter DNode do not create the same monitor CIs (the CIs are duplicated in the CMDB) though their values are updated from the same sample.

To check the status of a specific CI in Dashboard, it is recommended to go to the view appropriate for the EMS source adapter as the Generic EMS source adapter view might display a different status appropriate for its view but that might not represent the appropriate status. In the same way, to use one of the EMS source adapter CIs in a specific view, make sure to use the CIs from the view appropriate for the EMS source adapter and not the CIs from the Generic EMS source adapter.

Using the XML File Source Adapter

Use the XML File source adapter when you want to create a hierarchy that is different from the hierarchies offered by the other source adapters.

The user with the appropriate permissions who creates an XML File source adapter must know how the data is stored in the CMDB (using the CI Type manager).

For an example, see “Example - Create an XML File” on page 644.

Business Process Monitoring Source Adapter Details

The Business Process Monitoring source adapter sets the decay timeout and the duration of the rules according to the Business Process Monitor and rules scheduling, set in “Business Process Monitor Administration” in *Using End User Management*.

You can customize some of the source adapter parameters, as explained in “New/Edit Source Adapter Dialog Box” on page 658.

This section includes the following topics:

- “Hierarchies” on page 624
- “Template Elements” on page 624
- “Relationships” on page 625
- “Selectors” on page 625

Hierarchies

Depending on the options and parameters you selected when defining a source adapter or editing it, the following hierarchies are created in the CMDB:

Note: Business Process Step and Location CIs use the same instance of the Business Process Monitor transaction with location.

For details about the End User Monitors View and End User Locations View, see “End User Monitors View and End User Locations View” in *Using Dashboard*.

Template Elements

The template defines the mapping between the external source objects and the HP Business Availability Center CIs, so that the incoming data samples are mapped to the appropriate CIs.

For details about the elements used in the template, see “CI Definition Parameters” on page 670.

For details about the KPIs, see “List of Dashboard KPIs” in *Using Dashboard*.

For details about the business rules, see “List of Dashboard Business Rules” in *Using Dashboard*.

For details about the context menus, see “List of Context Menus” in *Using Dashboard*.

Note: When you use the Baseline auto modes to calculate thresholds, the **baselineTransaction** and the **baselineTransactionLocation** entities are used instead of the **transaction** and **transactionLocation** entities, which are used when you set up thresholds manually. For details about the Baseline feature, see “Baselines” in *Using End User Management*.

For details on how to modify the template, see “Modify an Adapter Template” on page 642.

Relationships

The template displays the relationships used by the source adapter.

For details on how to modify the relationships or add new relationships, see “Modify Relationships” on page 652.

Selectors

To modify or add selectors, see “Define Selectors” on page 654.

Real User Monitor Source Adapter Details

The Real User Monitor source adapter retrieves real-user data information from Real User Monitor engines, and hierarchy information from System Availability Management. The hierarchy includes applications, containers, pages, transactions, end-user, server, global statistic data, user sessions, and other information.

You can customize some of the source adapter parameters, as explained in “New/Edit Source Adapter Dialog Box” on page 658.

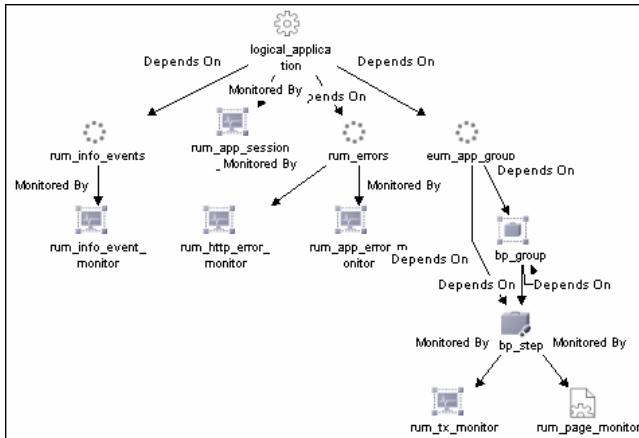
This section includes the following topics:

- “Hierarchies” on page 626
- “Template Elements” on page 627
- “Relationships” on page 628
- “Selectors” on page 628

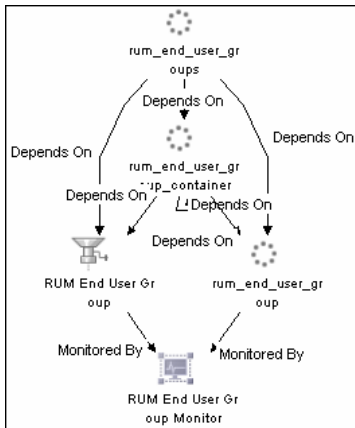
Hierarchies

The Real User Monitor adapter builds hierarchies that are displayed in the following views:

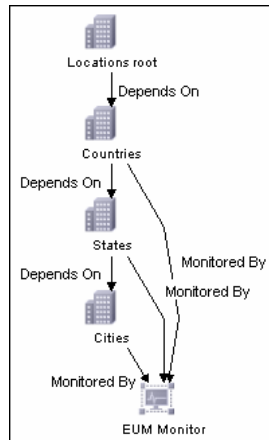
- ▶ **All RUM Monitors view.** This view includes all of the view hierarchies listed below.
- ▶ **Real User Applications view**



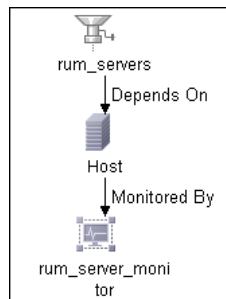
- ▶ **Real User End Users view**



► Real User Locations view



► Real User Servers View



For more details about the Real User Monitor views, see “About Real User Monitor Views” in *Using End User Management*.

Template Elements

The template defines the mapping between the external source objects and the HP Business Availability Center CIs, so that the incoming data samples are mapped to the appropriate CIs.

For details about the elements used in the template, see “CI Definition Parameters” on page 670.

For details about the KPIs, see “List of Dashboard KPIs” in *Using Dashboard*.

For details about the business rules, see “List of Dashboard Business Rules” in *Using Dashboard*.

For details about the context menus, see “List of Context Menus” in *Using Dashboard*.

For details on how to modify the template, see “Modify an Adapter Template” on page 642.

Relationships

The template displays the relationships used by the source adapter.

For details on how to modify the relationships or add new relationships, see “Modify Relationships” on page 652.

Selectors

To modify or add selectors, see “Define Selectors” on page 654.

SiteScope Source Adapter Details

Note: The SiteScope source adapter is deprecated from HP Business Availability Center version 7.50. It should be used only for backward compatibility purposes. The KPI assignment mechanism of the SiteScope assignment group is used to create the appropriate topology. For details, see “SiteScope KPI Assignment Group Overview” in *Using Dashboard*.

The SiteScope source retrieves system information from a SiteScope system, and builds a hierarchy that includes the machines, SiteScope groups, monitors, and measurements.

You can customize some of the source adapter parameters, as explained in “New/Edit Source Adapter Dialog Box” on page 658.

This section includes the following topics:

- “Hierarchies” on page 629
- “Template Elements” on page 629
- “Relationships” on page 630
- “Selectors” on page 630

Hierarchies

Depending on the parameters you selected when defining a source or editing it, the following hierarchy is displayed.



The curved arrow indicates that the hierarchy element is recursive; the CI type is the child of the level above in the hierarchy, but it can also be a child of the CI type itself. For example, a SiteScope Group CI type is the child of a SiteScope Profile CI type, but can also be the child of a SiteScope group CI type.

Template Elements

The template defines the mapping between the external source objects and the HP Business Availability Center CIs, so that the incoming data samples are mapped to the appropriate CIs.

For details about the elements used in the template, see “CI Definition Parameters” on page 670.

For details about the KPIs, see “List of Dashboard KPIs” in *Using Dashboard*.

For details about the business rules, see “List of Dashboard Business Rules” in *Using Dashboard*.

For details about the context menus, see “List of Context Menus” in *Using Dashboard*.

For details on how to modify the template, see “Modify an Adapter Template” on page 642.

Relationships

The template displays the relationships used by the source adapter.

For details on how to modify the relationships or add new relationships, see “Modify Relationships” on page 652.

Selectors

To modify or add selectors, see “Define Selectors” on page 654.

Generic EMS Source Adapter Details

The Generic EMS source adapter retrieves a generic hierarchy for enterprise management systems (EMS), through SiteScope. You use this source adapter when your site includes more than one third-party source, thus enabling you to integrate the hierarchies of all sources.

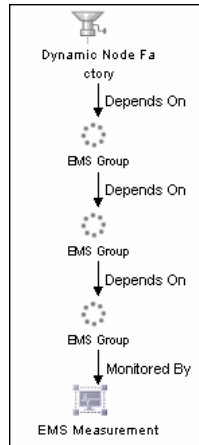
You can also use this adapter when performing an EMS integration that sends samples with the Event type.

This section includes the following topics:

- “Hierarchies” on page 631
- “Template Elements” on page 631
- “Selectors” on page 632

Hierarchies

When you select this source adapter and enable it, the relevant CIs hierarchy is created in the CMDB. You can then view the hierarchy in the Generic EMS view in View Manager in CMDB Administration.



Template Elements

The template defines the mapping between the external source objects and the HP Business Availability Center CIs, so that the incoming data samples are mapped to the appropriate CIs.

For details about the elements used in the template, see “CI Definition Parameters” on page 670.

For details about the KPIs, see “List of Dashboard KPIs” in *Using Dashboard*.

For details about the business rules, see “List of Dashboard Business Rules” in *Using Dashboard*.

For details about the context menus, see “List of Context Menus” in *Using Dashboard*.

For details on how to modify the template, see “Modify an Adapter Template” on page 642.

Selectors

To modify or add selectors, see “Define Selectors” on page 654.

XML File Source Adapter Details

The XML File source adapter retrieves topology information from an XML file produced by an external system. The XML file contains the definition of the CIs. This source includes a predefined generic adapter. You use this source adapter if you need to create a hierarchy that is different from the hierarchies of the other source adapters.

A detailed example of XML File creation is provided in “Example - Create an XML File” on page 644.

This section includes the following topics:

- “Template” on page 632
- “Template Elements” on page 633
- “Selectors” on page 633

Template

The XML File source retrieves information from an XML file produced by an external system that you define.

An XML File example is provided in

**<HP Business Availability Center Gateway server root directory>/
CMDB/adapters/templates/tivoli.config.xml**

For details on how to modify the template, see “Modify an Adapter Template” on page 642.

Template Elements

The template defines the mapping between the external source objects and the HP Business Availability Center CIs, so that the incoming data samples are mapped to the appropriate CIs.

For details about the elements used in the template, see “CI Definition Parameters” on page 670.

For details about the KPIs, see “List of Dashboard KPIs” in *Using Dashboard*.

For details about the business rules, see “List of Dashboard Business Rules” in *Using Dashboard*.

For details about the context menus, see “List of Context Menus” in *Using Dashboard*.

For details on how to modify the template, see “Modify an Adapter Template” on page 642.

Selectors

To modify or add selectors, see “Define Selectors” on page 654.

Configure a Source Adapter – Workflow

Add source adapters when you want to:

- ▶ Receive hierarchy information from a third-party source adapter (not Business Process Monitoring, Real User Monitor, or SiteScope).
- ▶ Use different hierarchies from a single data source. In such a case, you can define more than one source adapter based on a single third-party or on a default source adapter. Each new source adapter represents a different instance of the adapter used as a base, receiving hierarchy information from a single source.

Use Source Manager to add new source adapters or edit existing source adapters.

This task includes the following steps:

- ▶ “Set Up the Permissions” on page 634
- ▶ “Make a Default Source Adapter Available For Defining a Custom Source Adapter” on page 635
- ▶ “Add Third-Party Source Adapters or Default Source Adapters” on page 635
- ▶ “Modify an Adapter Template” on page 635
- ▶ “Customize Dynamic Node Factory Definitions” on page 636
- ▶ “Limitations When Working With the XML File Source Adapter” on page 636

1 Set Up the Permissions

You must have at least the **Superuser** or **Administrator** role to have access to the CMDB Administration. If you have the **Superuser** role, you have full viewing and editing rights for all of the CMDB Administration, including the sources. If you have the **Administrator** role, you can only view/edit views for which you have permission and you cannot edit, add, or view sources. To access the Permissions page, select **Admin > Platform > Users and Permissions**. For details, see “Understanding Permissions Resources” in *Platform Administration*.

Note to HP Software-as-a-Service customers: You must have at least the **Superuser, Operator, Customer Super User, or Customer Administrator** role to have access to the CMDB Administration. If you have the **Customer Administrator** role, you can only view/edit views for which you have permission, and you cannot edit the sources.

2 Make a Default Source Adapter Available For Defining a Custom Source Adapter

If required, the default source adapters are available for defining new custom source adapters when you have configured Source Manager to include them. In this case, the default source appears in the list of available custom source adapters when you create a new source adapter.

To make a default source adapter available for defining new source adapters, select **Admin > Platform > Setup and Maintenance > Infrastructure Settings**, choose **Foundations**, select **Sources Configuration**, and locate the relevant source type entry (for example, Add Business Process Monitor Sources) in the Sources Configuration - Sources table. Modify the value to **true**. The change takes effect when the server is restarted.

3 Add Third-Party Source Adapters or Default Source Adapters

You can add source adapters based on supported third-party source adapters or on default source adapters. For details on the user interface, see “New/Edit Source Adapter Dialog Box” on page 658.

4 Modify an Adapter Template

You must then customize the newly-created source adapter, by defining the parameters required by the adapter to receive data from the appropriate source. For details on how to perform this task, see “Modify an Adapter Template” on page 642.

5 Customize Dynamic Node Factory Definitions

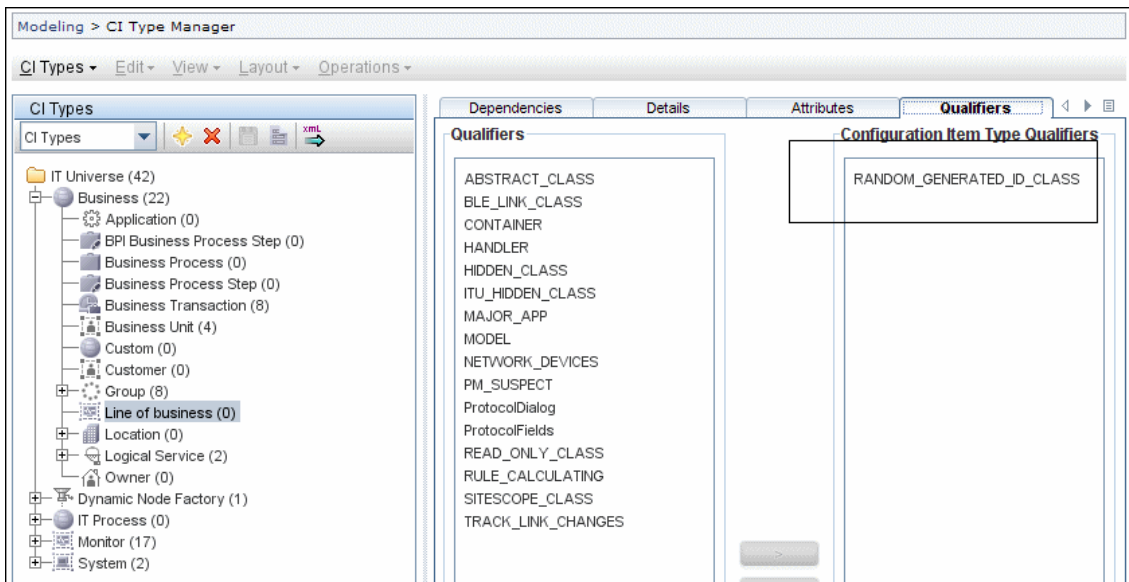
For advanced users only. Where required, you can open the default adapter template for the source, to edit the template instance according to your organization's specific needs. This may be necessary if you define a new source adapter based on one of the generic template types (Generic EMS or XML File). For details on how to perform this task, see "Customize Dynamic Node Factory Definitions" on page 656.

6 Limitations When Working With the XML File Source Adapter

Some of the CMDB configuration item type (CIT)s cannot be configured in the XML file used by the XML adapter because their ID is randomly generated, and the XML adapter cannot synchronize it. An example of such a CIT is Line of Business.

To find the internal name of a CIT, select **Admin > Universal CMDB > Modeling > CI Type Manager**, select the appropriate CIT in the CI Types pane, and click the **Details** tab, and view the name of the CIT in the **Name** box.

Click the Configuration Item Type Qualifier tab to see whether the CI ID is randomly generated as indicated in the Configuration Item Type Qualifiers.



Work with the SiteScope Source Adapter – Workflow

Note: The SiteScope source adapter is deprecated from HP Business Availability Center version 7.50. It should be used only for backward compatibility purposes when working with SiteScope versions prior to 9.50. The KPI assignment mechanism of the SiteScope assignment group is used to create the appropriate topology. For details, see “Work with the SiteScope Assignment Group” in *Using Dashboard*.

This task describes how to work with the SiteScope source adapter.

This task includes the following steps:

- ▶ “Set the SiteScope Monitor to Report to HP Business Availability Center” on page 637
- ▶ “Synchronize the SiteScope Profile” on page 638
- ▶ “Prevent CIs in Dashboard from Changing Status to Decay” on page 638
- ▶ “Backward Compatibility Workarounds” on page 639
- ▶ “SiteScope Host Discovery” on page 640
- ▶ “Enable the Creation of Relationships Between Hosts and SiteScope Monitors” on page 641
- ▶ “Select or Clear the Enable host topology reporting Option” on page 642

1 Set the SiteScope Monitor to Report to HP Business Availability Center

When you set SiteScope to report to HP Business Availability Center for the first time, and you have defined monitors for SiteScope, the status of each SiteScope monitor is automatically changed to **Disable reporting to BAC**. Use this option when you do not want the SiteScope monitor and measurements for the subject monitor to be transferred to HP Business Availability Center. Select another logging option for the monitors whose information you need. For details about this option, see “Common Monitor Settings” in *Using System Availability Management*.

2 Synchronize the SiteScope Profile

After you have defined a SiteScope profile and connected to the profile of a SiteScope monitor, in System Availability Management, the SiteScope configuration remains in the CMDB until the SiteScope profile is deleted and the next synchronization has been performed (manually or automatically, by default, every 60 minutes). To synchronize the SiteScope profile, select **Admin > System Availability Management**, select the appropriate SiteScope preferences folder, and use one of the following options located in HP Business Availability Center Preferences:

- ▶ **Re-Synchronize.** SiteScope re-sends all its configuration data to Business Availability Center. This data includes all of the group and monitor definitions.
- ▶ **Hard Re-Synchronize.** SiteScope re-sends all its configuration data to Business Availability Center. It also deletes the existing monitor and group data in Business Availability Center for this SiteScope. For details on the user interface, see “Integration Preferences User Interface” in *Using System Availability Management*.

3 Prevent CIs in Dashboard from Changing Status to Decay

When SiteScope does **not** work in Data reduction mode, and you use Dashboard to view SiteScope data, the default decay (timeout) period for a CI in Dashboard is 15 minutes. If a SiteScope monitor has a schedule longer than 15 minutes, the status of the corresponding CIs in Dashboard changes to decay status, until the SiteScope monitor runs again and updates HP Business Availability Center.

When SiteScope works in Data reduction mode, and you use Dashboard to view SiteScope data, the status of the CIs in Dashboard changes to decay status after an hour and 15 minutes, until the SiteScope monitor runs again and updates HP Business Availability Center.

To avoid this, you can do one of the following:

- ▶ Set run schedules for the monitors in SiteScope or in System Availability Management for less than 15 minutes in the Frequency parameter. For details, see **Frequency** in System Availability Management or in SiteScope. For details about this option, see “Common Monitor Settings” in *Using System Availability Management*.
- ▶ For each SiteScope item in Dashboard, change the decay timeout period parameter to a value greater than the schedule for the SiteScope monitor by modifying the **No Data Timeout** parameter for the appropriate rule. For details on how to perform this task, see “Modify Rule Parameters or Global Rule Parameters” in *Using Dashboard*.
- ▶ In the rule parameters for the SiteScope source adapter template in Dashboard, change the decay timeout parameter to a value greater than the schedules used for the SiteScope monitors. For details on how to perform this task, see “Change the Decay Timeout Value” on page 657.

You can also set the decay timeout parameter to -1 (minus 1), meaning no decay timeout. This is the required value if the SiteScope monitor is event-based (meaning that data is sent to the HP Business Availability Center bus only when the monitor reports a change in status), but is not recommended for monitors sending data according to a schedule.

4 Backward Compatibility Workarounds

When you select the **Include Measurements** and **Include Machines** options in the SiteScope source adapter definition in the previous version, these options stay selected when you upgrade to this version. The **Include Measurements** option includes the measurement level for SiteScope monitors in the hierarchy. The **Include Machines** option includes the machine level (the monitor target) in the hierarchy.

If, after the upgrade, you clear any of these options, you cannot select them again. To obtain the information that was displayed when those options were selected, the following alternatives are available:

- ▶ To get information corresponding to the **Include Measurements** option, select a view in the Console tab or in the Filters tab in Dashboard, right-click the appropriate CI, select **Go to report**, and select the Cross-Performance report.

For details on the user interface, see “Cross-Performance Report” in *Using System Availability Management*.

- ▶ The information corresponding to the **Include Machines** option is automatically available as explained below.

5 SiteScope Host Discovery

The **Enable host topology reporting** option is enabled by default for all SiteScope monitors (select **Admin > System Availability Management**, select the appropriate SiteScope preferences folder – the option is located in the HP Business Availability Center Preferences). This means that the host CIs for the monitored hosts in SiteScope are sent to the HP Business Availability Center CMDB. All the data necessary for creating a CI based on that host, including the DNS name, is then forwarded to HP Business Availability Center from the SiteScope, whenever a monitor is created or edited, or when SiteScope is restarted.

The SiteScope source adapter creates a CI for each monitor.

In addition, when performing discovery, the discovered hosts CIs are created in the CMDB. Automatic host reconciliation is performed when the discovered host CI and a SiteScope host CI represent the same host.

CMDB enrichment rules create a **Monitored by** relationship between the host CIs and the monitor CIs. These rules run every 30 minutes when the **Host DNS Name** attribute of the discovered Host CI and the **Target Host** attribute of the SiteScope Monitor CI have the same value. This process works when there is only one Host CI for every instance of an actual host. If more than one Host CI is discovered for an actual host, the Host Reconciliation process reconciles the Host CIs. For details on this topic, see “Reconciliation of Hosts” in *Solutions and Integrations*.

Note: Creating the **Monitored by** relationship between the two CIs in the CMDB may take up to 90 minutes after a SiteScope monitor has been created or modified.

You can view the host information in the Monitored Hosts view.

To access the enrichment rules, select **Admin > Universal CMDB > Modeling > Enrichment Manager**, and expand **SiteScope**. The enrichment rules are: **SiteScope Hosts and Monitors** and **Disconnect Hosts from SiteScope Monitor**. The **SiteScope Hosts and Monitors** scheduler job located in **Admin > Universal CMDB > Settings > Scheduler**, schedules when the enrichment rules are run.

6 Enable the Creation of Relationships Between Hosts and SiteScope Monitors

If you are using the **Include Measurements** option, and you want to enable the creation of relationships between hosts and SiteScope monitors (SiteScope measurement groups), perform the following procedure:

- ▶ Select **Admin > Universal CMDB > Settings > Scheduler**, edit **SiteScope Hosts and Monitors** scheduler job, edit the Run Enrichment rule, and add the **SiteScope Hosts and Measurement Groups** enrichment rule.
- ▶ Select **Admin > Universal CMDB > Modeling > Enrichment Manager**, expand **SiteScope**, and activate the **Disconnect Hosts from SiteScope MGroup** enrichment rule.

If you are using HP Business Availability Center for SAP Applications or HP Business Availability Center for Siebel Applications you cannot use the above capability.

7 Select or Clear the Enable host topology reporting Option

If you use the **Enable host topology reporting** option, you must use discovery processes that discovers the host DNS names.

To clear the **Enable host topology reporting** option, select **Admin > System Availability Management**, select the appropriate SiteScope preferences folder, select BAC Preferences, and clear the option. In this case, no host topology data is forwarded to HP Business Availability Center and the corresponding host CIs are not created in the CMDB.

Modify an Adapter Template

Most of the templates used by the source adapters follow a basic format, with variations for each adapter. The Dynamic Node Factory templates are somewhat different. For details on how to perform this task, see “Customize Dynamic Node Factory Definitions” on page 656.

Each source adapter uses a template that maps the entities in the data source to the configuration items (CIs) stored in the CMDB and defines the resources to be used in CMDB for a CI, such as KPIs, and business rules. The template is used to create the source adapter’s XML file.

You can modify an adapter template by changing the XML code used to specify:

- The mapping of source entities to CIs.
- The rules to be applied to the appropriate CIs/KPIs data before it is displayed in the views. The business rules resources are defined in the Dashboard repositories.
- The context menus to be used for the CI in the Dashboard application.
- The KPIs assigned to each CI. The KPIs are defined in the repositories. For details on this topic, see “Repositories – Overview” in *Using Dashboard*.

Note: When editing an adapter template in Source Manager, if you add a KPI definition to any CI template, the KPI is attached to all CIs generated by that template, but does not propagate up to the parents of the generated CIs. A KPI that is manually attached to a CI in the **KPIs** page located in **Admin > Dashboard > KPIs**, does propagate up to the parent CI.

- ▶ The selectors required by each business rule to identify and catch the appropriate samples that relate to the relevant CIs and KPIs.

Group CIs (groups or machines for example) have the simplest level of definitions. The monitor CIs use a higher level of definitions and require selectors to check data samples from the source and to present the data from the bus as KPI status in Dashboard.

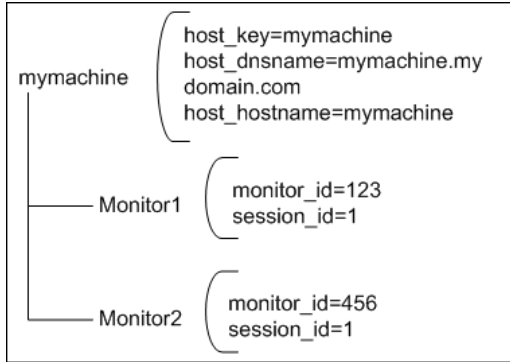
- ▶ The predefined Dynamic Node Factory CIs included in the adapter templates, that you add to your view to generate a hierarchy that fits your organization's needs. For details on this topic, see "Customize Dynamic Node Factory Definitions" on page 656.
- ▶ The new Dynamic Node Factory CIs. For details on this topic, see "IT Universe Manager – Dynamic Node Factory" on page 93.
- ▶ The relationships between CIs. For details on how to perform this task, see "Modify Relationships" on page 652.

Note: It is recommended to perform a backup of the source before you modify it as follows: access the <**HP Business Availability Center Gateway server root directory**>\CMDB\adapters\adapters directory, find the file that corresponds to the adapter you want to back up, copy that file to another directory (not under <**HP Business Availability Center Gateway server root directory**>). When you want to restore the original source, copy the original file back to the <**HP Business Availability Center Gateway server root directory**>\CMDB\adapters\adapters directory and restart HP Business Availability Center.

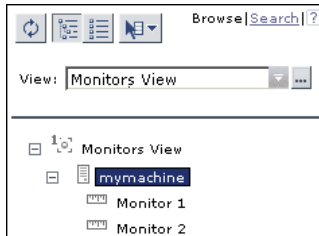
To modify an adapter template, access the Edit Source dialog box for the appropriate source adapter and click **Edit Template**. For details on the user interface, see “New/Edit Source Adapter Dialog Box” on page 658.

Example - Create an XML File

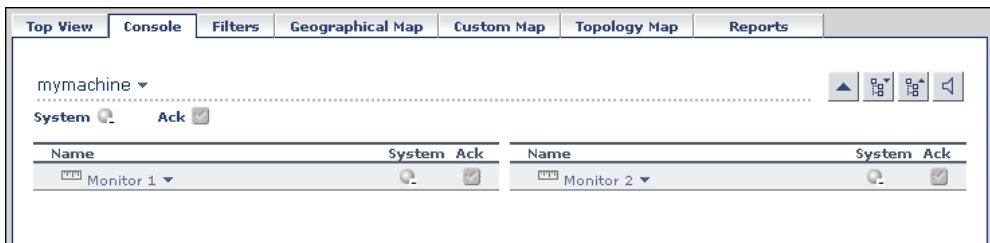
You want to create a hierarchy and a view that includes hosts and monitors as follows:



The hierarchy is as follows:



The view is as follows:



To create such a hierarchy, do the following:

1 Write the XML File template:

Use the following XML File template:

```

<adapterTemplate>
  <description>Customized XML Adapter</description>
  <type>XML File</type>
  <logicType>User Experience</logicType>
  <classPath>com.mercury.topaz.tdm.adapters.XMLFileAdapter.XMLFileAdapterImpl</classPath>
  <autoMapEntities>true</autoMapEntities>
  <autoMappingEntities>
  <entity id="monitor">
    <basicEntity>Mercury:sitescope_monitor</basicEntity>
    <contextmenu>ssMonitorMenu</contextmenu>
    <dimensions>

    <dimension id="1">
      <logics>
        <logic id="4" />
      </logics>
      <selectors type="AND">
        <selector key="sampleType" operator="EQ" value="ss_monitor_t" dataType="String"
          readOnly="true" />
        <selector key="u_iConnectionId" operator="EQ" value="" dataType="Long"
          reference="true" referencedProperty="monitor_id" />
        <selector key="u_iSessionId" operator="EQ" value="" dataType="Long"
          reference="true" referencedProperty="session_id" />
      </selectors>
    </dimension>
  </dimensions>

  </entity>
  <entity id="machine">
    <basicEntity>host</basicEntity>
    <contextmenu>groupMenu</contextmenu>
    <dimensions>
    <dimension id="1">
      <logics>
        <logic id="1" />
      </logics>
    </dimension>
  </dimensions>
  </entity>

```

```

</autoMappingEntities>
<autoMappingLinks>
  <link type="Mercury:monitored_by" src_obj_type="host" dest_obj_type=
"Mercury:sitescope_monitor" weight="1" />
</autoMappingLinks>
<displayNameMapping />
</adapterTemplate>

```

The template maps the following elements:

entity id	basicEntity	contextmenu	dimension (KPI)	logic (business rule)
monitor	Mercury: sitescope_ monitor	ssMonitorMenu – SiteScope Monitor Menu	1 – System	4 – SiteScope Monitor
machine	host	groupMenu – Group Menu	1 – System	1 – Worst Child

The monitor entity has the following selectors:

```

<selectors type="AND">
  <selector key="sampleType" operator="EQ" value="ss_monitor_t" dataType="String"
readOnly="true" />
  <selector key="u_iConnectionId" operator="EQ" value="" dataType="Long"
reference="true" referencedProperty="monitor_id" />
  <selector key="u_iSessionId" operator="EQ" value="" dataType="Long"
reference="true" referencedProperty="session_id" />
</selectors>

```

The following relationships are defined:

```

<autoMappingLinks>
  <link type="Mercury:monitored_by" src_obj_type="host"
dest_obj_type="Mercury:sitescope_monitor" weight="1" />
</autoMappingLinks>

```

2 Write the Configuration File:

Use the following **xmlFile.xml** file where one host is monitored by two monitors:

```
<?xml version="1.0" encoding="UTF-8" ?>
<extSysGraph>
<generalData>
<properties />
</generalData>
<entities>
<entity type="monitor">
<name>Monitor 1</name>
<idProperties>
<property dataType="Long" key="monitor_id" value="123" />
<property dataType="Long" key="session_id" value="1" />
</idProperties>
<children />
<parents>
<idProperties>
<property dataType="String" key="host_key" value="mymachine" />
</idProperties>
</parents>
</entity>
<entity type="monitor">
<name>Monitor 2</name>
<idProperties>
<property dataType="Long" key="monitor_id" value="456" />
<property dataType="Long" key="session_id" value="1" />
</idProperties>
```

```
<children />
<parents>
<idProperties>
<property dataType="String" key="host_key" value="mymachine" />
</idProperties>
</parents>
</entity>
<entity type="machine">
<name>mymachine</name>
<idProperties>
<property dataType="String" key="host_key" value="mymachine" />
</idProperties>
<properties>
<property dataType="String" key="host_dnsname" value="mymachine.mydo-
main.com" />
<property dataType="String" key="host_hostname" value="mymachine" />
</properties>
<children>
<idProperties>
<property dataType="Long" key="monitor_id" value="123" />
<property dataType="Long" key="session_id" value="1" />
</idProperties>
<idProperties>
<property dataType="Long" key="monitor_id" value="456" />
<property dataType="Long" key="session_id" value="1" />
</idProperties>
</children>
<parents />
</entity>
</entities>
</extSysGraph>
```


The guidelines to create a configuration file are as follows:

- You must write this file in such a way that each CI type has at least one unique property in its **idProperties** definition (so that it is unique in the CMDB). For details, see “CI Type Manager” on page 239.

For example, for Monitor1 the **idProperties** are `monitor_id=123` and `session_id=1`:

```
<entity type="monitor">
<name>Monitor 1</name>
<idProperties>
<property dataType="Long" key="monitor_id" value="123" />
<property dataType="Long" key="session_id" value="1" />
</idProperties>
```

For example, for Monitor2 the **idProperties** are `monitor_id=456` but the `session_id` is the same as for Monitor1: `session_id=1`:

```
<entity type="monitor">
<name>Monitor 1</name>
<idProperties>
<property dataType="Long" key="monitor_id" value="456" />
<property dataType="Long" key="session_id" value="1" />
</idProperties>
```

- Regular properties (between the **<properties>** and **</properties>** tags) can have similar values. For example, for the `mymachine` host, the properties are: `host key`, `host dsname`, and the name of the host, as follows:

```
<idProperties>
<property dataType="String" key="host_key" value="mymachine" />
</idProperties>
<properties>
<property dataType="String" key="host_dnsname"
value="mymachine.mydomain.com" />
<property dataType="String" key="host_hostname" value="mymachine" />
</properties>
```

- ▶ You must specify the parent for each item, if any. It is recommended to also write the reverse relation, that is, to specify the children of each item.

For example, you specify that the parent of entity Monitor1 is: mymachine (host_key=mymachine):

```
<entity type="monitor">
<name>Monitor 1</name>
...
<parents>
<idProperties>
<property dataType="String" key="host_key" value="mymachine" />
</idProperties>
</parents>
```

You must also specify that the entity machine has the following children: Monitor1 (monitor_id=123) and Monitor2 (monitor_id=456):

```
<entity type="machine">
...
<children>
<idProperties>
<property dataType="Long" key="monitor_id" value="123" />
<property dataType="Long" key="session_id" value="1" />
</idProperties>
<idProperties>
<property dataType="Long" key="monitor_id" value="456" />
<property dataType="Long" key="session_id" value="1" />
</idProperties>
</children>
```

You must do the same for entity Monitor2.

3 Create an XML File Source Adapter that monitors hosts and monitors.

To create an XML File source adapter that monitors hosts and monitors, you must modify the default source adapter template, save the configuration file in the appropriate location, and you must create a view.

To create an XML File source adapter that monitors hosts and monitors, proceed as follows:

- a Access the New Source dialog box. For details on the user interface, see “New/Edit Source Adapter Dialog Box” on page 658.
- b In the New Source dialog box, select the XML File source adapter in the **Type** box, and click **Edit Template**. The dialog box expands to display the adapter template in the **Template** box.

Note: In the **Template** box, use the dialog box scrollbar and the **Template** box scrollbar to display the areas of the template you want to modify. You can also highlight the text, copy it to a text editor, make the appropriate changes, and copy the text back into the **Template** box.

- c Copy the first part of the XML File template provided in the example above from `<autoMappingEntities>` to `</autoMappingEntities>` (tags included) and insert it in the XML File template between `<autoMappingEntities bac-version="BAC 8.0">` and `</autoMappingEntities>` and erase the rest of the file.
- d Copy the second part of the XML File template provided in the example above from `<autoMappingLinks>` to `</autoMappingLinks>` (tags included) and insert it in the XML File template after `</autoMappingEntities>` (included).
- e Save the `xmlFile.xml` file (shown above) in a specific location; for example:
`<HP Business Availability Center Gateway server root directory>\
CMDB\adapters\templates\xmlFile.xml` and enter the path in the **Path** box in the source adapter definition.

- f** Create a pattern specific for the structure that is used in the **xmlFile.xml** file. For details, see “Working with Views in IT Universe Manager” on page 37.

Modify Relationships

Attaching one CI to another CI creates a hierarchical relationship between them, so that one CI may be dependent on or influenced by the other.

In the XML File template you can use all of the available types of relationships, as defined in CI Type Manager. For details, see “CI Type Manager” on page 239.

For details about relationships, see “Relationships” on page 620.

This task includes the following steps:

- “Modify the Relationship” on page 653
- “Find the Internal Name of a CIT” on page 654

1 Modify the Relationship

In the XML template, modify the relationships between the relevant CIs.

Each relationship may include the following information:

Template Element	Description
dest_obj_type	Identifies the configuration item type (CIT) that is the higher level in a relationship; for example, a monitor. When you want to add a new relationship, you must use the CIT internal name in the code. For details on how to find out the internal name of a CIT, see below.
src_obj_type	Identifies the CIT at the lower level of the relationship; for example a group. When you want to add a new relationship, you must use the CIT internal name in the code. For details on how to find out the internal name of a CIT, see below.
type	The type of relationship. For details, see “CI Type Manager” on page 239. Type can be depends_on or monitored by .
weight	The weight assigned to the relationship. For details, see “Percentage Rule” in <i>Using Dashboard</i> .

Note: If you add or remove a relationship, you might have to modify the corresponding view in View Manager, to reflect the change. For details, see “View Manager Window” on page 199.

Example

The following example shows the relationships used in the SiteScope adapter template definition:

```
<autoMappingLinks bac-version="BAC 8.0">
  <link dest_obj_type="host" src_obj_type="sitescope_group"
    type="Mercury:depends_on" weight="1"/>
</autoMappingLinks>
```

2 Find the Internal Name of a CIT

When you define a new relationship between CITs you must specify the internal name of the CITs.

To find the internal name of a CIT, select **Admin > Universal CMDB > Modeling > CI Type Manager**, select the appropriate CIT in the CI Types pane, and click the **Details** tab, and view the name of the CIT in the **Name** box.

Define Selectors

For monitor CIs, the adapter template includes the selectors required by the business rule to identify and catch the samples in the HP Business Availability Center bus that relate to the CI and KPI.

This task includes the following steps:

- ▶ “Build Complex Logical Expressions in the Selector Definitions” on page 654
- ▶ “Define Your Own Selectors” on page 655

1 Build Complex Logical Expressions in the Selector Definitions

You can build complex logical expressions in the selector definitions using AND and OR logical operators. The principles for defining selector blocks using the logical operators are the same as described for defining selectors for individual KPIs. For details on how to perform this task, see “Define Selectors” in *Dashboard*.

The selector definitions in the adapter template contain additional information that is not viewed in the Selector areas when configuring individual KPIs.

The following example shows the selectors used in the adapter template definition for the Performance KPI of a Business Process Monitor measurement:

```
<selectors type="AND">
  <selector dataType="String" key="sampleType"
    operator="EQ" readOnly="true" reference="false"
    referencedProperty="sampleType" value="trans_t"/>
  <selector dataType="Long" key="u_iTransactionId"
    operator="EQ" readOnly="false" reference="true"
    referencedProperty="tx_id"/>
  <selector dataType="Long" key="u_iSessionId"
    operator="EQ" readOnly="false" reference="true"
    referencedProperty="session_id"/>
</selectors>
```

For details about the parameters, see “Selector Parameters” on page 673.

2 Define Your Own Selectors

To define your own selectors in an adapter template, you should first use the default definitions to create the hierarchy; you can then use the properties from the samples caught in the bus as a reference for the new selectors. Note that all selector fields and values are case sensitive and must be defined exactly as they are used in the samples, or the selector fails. The recommended method is to open the samples log and take the fields and values from there. The samples log is located in

<HP Business Availability Data Processing Gateway server root directory>
\log\mercury_online_engine\TrinitySamples.log.

Note that the samples are written to this log at the **debug** log level, while the default log level is **error**, meaning that only log entries of level error and above are displayed. Therefore, to view the sample entries you must change the log level, as described in the following procedure.

To change the samples log level:

- 1 Open the file:
<HP Business Availability Data Processing Gateway server root directory>\conf\core\Tools\log4j\mercury_online_engine\bleOnline.properties
- 2 Look for the following line:
log4j.category.Trinity.BLE_SAMPLES=\${loglevel}, trinity.samples.appender
- 3 Change the line to:
log4j.category.Trinity.BLE_SAMPLES = DEBUG, trinity.samples.appender
- 4 Save and close the file. The change takes effect after about one minute.



Customize Dynamic Node Factory Definitions

This task describes how to customize a Dynamic Node Factory (DNode) definition.

For details about Dynamic Node Factory resources, see “Dynamic Node Factory Resource” on page 620.

This task includes the following steps:

- ▶ “Customize DNode Definitions in Adapter Templates” on page 656
- ▶ “Customize DNode Definitions in Sample Mapping” on page 656

1 Customize DNode Definitions in Adapter Templates

Advanced users can customize the Dynamic Node Factory (DNode) definitions included in some adapter templates, to generate a hierarchy that fits your organization’s needs. You can also add and customize Dynamic Node Factory CIs directly in your views. For details on this topic, see “IT Universe Manager – Dynamic Node Factory” on page 93.

2 Customize DNode Definitions in Sample Mapping

A Dynamic Node Factory source does not have a fixed topology; its topology is built from the samples themselves. The template defines the way the samples are matched to each CI created by the Dynamic Node Factory.

You can modify the mapping to the samples that create the hierarchy, the rules, and logic used to import the data, and present it in Dashboard. For details on how to perform this task, see “DNode Definition Key Property” on page 98.

Change the Decay Timeout Value

When using HP Business Availability Center Dashboard to view SiteScope data, the default decay (timeout) period for a CI in Dashboard is 15 minutes. If you have a SiteScope monitor with a schedule longer than 15 minutes, the corresponding CIs in Dashboard has time to change to decay status until the SiteScope monitor runs again and updates HP Business Availability Center.

To change the Decay Timeout Value:

In the rule parameters for the SiteScope source adapter template in Dashboard, change the **No data timeout** parameter to a value greater than the schedules used for the SiteScope monitors. To modify the decay timeout value in the template, add the following in the relevant <logic> section after the logic ID (the value is in seconds, 900 is the default):

```
<parameters>
  <param key="No data timeout" value="777"
    dataType="Long" reference="false"/>
</parameters>
```

Example:

```
<logic>
  <id>4</id>
  <parameters>
    <param key="No data timeout" value="777"
      dataType="Long" reference="false"/>
  </parameters>
</logic>
```

Source Manager User Interface

This section describes:

- ▶ New/Edit Source Adapter Dialog Box on page 658
- ▶ Source Manager Page on page 674

New/Edit Source Adapter Dialog Box

Description	<p>Enables you to define a new adapter or edit an existing adapter. You must customize the newly-created source adapter, by defining the parameters required by the adapter to receive data from the appropriate source.</p> <p>Edit a source adapter to customize the view adapter to change the path to a template file, to modify the corresponding view's hierarchy in the application where the view appears, and so on.</p> <p>To Access: Click New Source in the Source Manager window or click the Edit button for an existing adapter.</p>
Important Information	The dialog box displays different fields depending on the selected source adapter.
Included in Tasks	"Configure a Source Adapter – Workflow" on page 634
Useful Links	"Source Manager Overview" on page 618

Business Process Monitoring Source Adapter

The following elements are included (unlabeled GUI elements are shown in angle brackets).

GUI Element (A-Z)	Description
Edit Template	<p>Click the Edit Template button to open the Template box.</p> <p>The template enables you to edit the template instance according to your organization's specific needs, for example, when defining a new source adapter based on one of the generic template types (Generic EMS or XML File). The template:</p> <ul style="list-style-type: none"> ▶ maps the entities in the data source to the configuration items (CIs) stored in the CMDB. For details about the CI parameters used in the template definition, see "CI Definition Parameters" on page 670. ▶ defines the resources to be used in the CMDB for a CI, such as KPIs and business rules. ▶ creates the source adapter's XML file.
Enable	Enables communication between the adapter and the external system.

GUI Element (A-Z)	Description
Hierarchy Structure	<p>Select one of the options to create different hierarchies:</p> <ul style="list-style-type: none"> ▶ Regular. (Default) The hierarchy structure excludes the location breakdown information from the transaction with location CIs. You can view business process profile locations in the Triage report. For details, see “Triage Report” in <i>Using End User Management</i>. ▶ Transactions/locations. The hierarchy structure includes the transaction with location CIs. Use this option to view hierarchies organized by Business Process profile location. Use this option with caution as it creates additional CIs in the CMDB, which may cause capacity and performance issues. <p>If you change the hierarchy structure from Transaction/Location to Regular after attaching BPM transaction from location CIs to other views (not to End User Locations View, or End User Monitors View), the following occurs:</p> <ul style="list-style-type: none"> ▶ The Location CIs are deleted from the CMDB. ▶ The BPM Transaction from location CIs attached to parent CIs are deleted and then recreated. They still appear in the views where you attached them under their parent CIs but no longer include location information. ▶ The BPM Transaction from location CIs attached to Location CIs are removed together with the Location CIs. <p>Note: When Business Process Monitor is working in Transaction/Location hierarchy structure, Location CIs are added to the Business Process Monitor hierarchy displayed in the End User Locations view. If you require the same geographical location for all transactions from a location, set the geographical location for the Location CI; the location is automatically propagated to all BPM Transaction from Location CIs in all profiles that fall under the Location CI. Set the geographical location in the Configuration Item Properties dialog box on the Admin > Universal CMDB > Modeling > IT Universe Manager page.</p> <p>Note: Displayed only when you select Business Process Monitor in the Type box.</p>

GUI Element (A-Z)	Description
Name	<p>The name of the new source. By default it is Generic EMS for the Generic EMS source adapter and XML File for the XML File source adapter.</p> <p>Note: The name must be unique.</p>
Server URL	<p>The URL of the Gateway Server.</p> <p>Note: Displayed only when you select Business Process Monitor in the Type box.</p>
Sync Interval	<p>The interval (in minutes) between each automatic synchronization of the adapter with the external system. The default value is 60 minutes.</p>
Type	<p>To create a new source adapter, select one of the following:</p> <ul style="list-style-type: none"> ▶ Generic EMS ▶ XML File <p>Hold the cursor over the query icon to view the description of the source adapter in a tooltip.</p> <p>When you edit one of the default source managers, its type is listed in the box.</p> <p>Note: Business Process Monitor, HP Diagnostics, Real User Monitor, or SiteScope source adapters are listed when you have configured them to be custom source adapters. For details, see “Work with the SiteScope Source Adapter – Workflow” on page 637.</p>

Real User Monitor Source Adapter

The following elements are included (unlabeled GUI elements are shown in angle brackets).

GUI Element (A-Z)	Description
Edit Template	<p>Click the Edit Template button to open the Template box.</p> <p>The template enables you to edit the template instance according to your organization's specific needs, for example, when defining a new source adapter based on one of the generic template types (Generic EMS or XML File). The template:</p> <ul style="list-style-type: none"> ▶ maps the entities in the data source to the configuration items (CIs) stored in the CMDB. For details about the CI parameters used in the template definition, see "CI Definition Parameters" on page 670. ▶ defines the resources to be used in the CMDB for a CI, such as KPIs and business rules. ▶ creates the source adapter's XML file.
Enable	Enables communication between the adapter and the external system.
Enable breakdown of location to end users subrange monitors	<p>Select this option to view data collected for all end users (configured and non-configured) accessing the servers being monitored. The data is broken down by location. It can be drilled down to the end users subrange monitors.</p> <p>Select this option only when Show unconfigured users on the dashboard and Enable end users breakdown to subrange monitor are also selected.</p> <p>Note: Displayed only when you select Real User Monitor in the Type box.</p>

GUI Element (A-Z)	Description
Enable end users breakdown to subrange monitor	<p>Select this option to view data collected for configured end users accessing the servers being monitored. By default, only this parameter is set.</p> <p>Note: Configured end users are the users belonging to End User Groups. For details about End User Groups, see “New/Edit End-User Group Page” in <i>Using End User Management</i>.</p> <p>Note: Displayed only when you select Real User Monitor in the Type box.</p>
Name	<p>The name of the new source. By default it is Generic EMS for the Generic EMS source adapter and XML File for the XML File source adapter.</p> <p>Note: The name must be unique.</p>
Show unconfigured users on the dashboard	<p>Select this option to view data collected for all end users (configured and non-configured) accessing the servers being monitored.</p> <p>If Enable end users breakdown to subrange monitor is not selected the single monitor for all non-configured end users is displayed.</p> <p>Note: Selecting the Show unconfigured users on the dashboard option greatly increases the number of CIs included in the views using the Real User Monitor source. This can mean delays while a view hierarchy is rebuilt after a change is made to the configuration in Real User Monitor, and may cause other performance issues in HP Business Availability Center.</p> <p>Note: Displayed only when you select Real User Monitor in the Type box.</p>

GUI Element (A-Z)	Description
Sync Interval	The interval (in minutes) between each automatic synchronization of the adapter with the external system. The default value is 60 minutes.
Type	<p>To create a new source adapter, select one of the following:</p> <ul style="list-style-type: none"> ➤ Generic EMS ➤ XML File <p>Hold the cursor over the query icon to view the description of the source adapter in a tooltip.</p> <p>When you edit one of the default source managers, its type is listed in the box.</p> <p>Note: Business Process Monitor, HP Diagnostics, Real User Monitor, or SiteScope source adapters are listed when you have configured them to be custom source adapters. For details, see “Work with the SiteScope Source Adapter – Workflow” on page 637.</p>

SiteScope Source Adapter

The following elements are included (unlabeled GUI elements are shown in angle brackets).

GUI Element (A-Z)	Description
Edit Template	<p>Click the Edit Template button to open the Template box.</p> <p>The template enables you to edit the template instance according to your organization's specific needs, for example, when defining a new source adapter based on one of the generic template types (Generic EMS or XML File). The template:</p> <ul style="list-style-type: none"> ▶ maps the entities in the data source to the configuration items (CIs) stored in the CMDB. For details about the CI parameters used in the template definition, see "CI Definition Parameters" on page 670. ▶ defines the resources to be used in the CMDB for a CI, such as KPIs and business rules. ▶ creates the source adapter's XML file.
Enable	<p>Enables communication between the adapter and the external system.</p>
Exclude profiles	<p>Enter the list of SiteScope profiles you want to exclude from display in the CMDB. Use commas as delimiters.</p> <p>Because the CMDB may include a large number of SiteScope profiles, you can restrict the display by excluding some of those profiles.</p> <p>Note: You cannot exclude a SiteScope profile whose name includes a comma (,).</p> <p>Note: Displayed only when you select SiteScope in the Type box.</p>
Name	<p>The name of the new source. By default it is Generic EMS for the Generic EMS source adapter and XML File for the XML File source adapter.</p> <p>Note: The name must be unique.</p>

GUI Element (A-Z)	Description
Server URL	<p>The URL of the Gateway Server.</p> <p>Note: Displayed only when you select Business Process Monitor in the Type box.</p>
Sync Interval	<p>The interval (in minutes) between each automatic synchronization of the adapter with the external system. The default value is 60 minutes.</p>
Type	<p>To create a new source adapter, select one of the following:</p> <ul style="list-style-type: none"> ➤ Generic EMS ➤ XML File <p>Hold the cursor over the query icon to view the description of the source adapter in a tooltip.</p> <p>When you edit one of the default source managers, its type is listed in the box.</p> <p>Note: Business Process Monitor, HP Diagnostics, Real User Monitor, or SiteScope source adapters are listed when you have configured them to be custom source adapters. For details, see “Work with the SiteScope Source Adapter – Workflow” on page 637.</p>

Generic EMS Source Adapter

The following elements are included (unlabeled GUI elements are shown in angle brackets).

GUI Element (A-Z)	Description
Edit Template	<p>Click the Edit Template button to open the Template box. The template enables you to edit the template instance according to your organization's specific needs, for example, when defining a new source adapter based on one of the generic template types (Generic EMS or XML File). The template:</p> <ul style="list-style-type: none"> ▶ maps the entities in the data source to the configuration items (CIs) stored in the CMDB. For details about the CI parameters used in the template definition, see "CI Definition Parameters" on page 670. ▶ defines the resources to be used in the CMDB for a CI, such as KPIs and business rules. ▶ creates the source adapter's XML file.
Enable	Enables communication between the adapter and the external system.
Name	<p>The name of the new source. By default it is Generic EMS for the Generic EMS source adapter and XML File for the XML File source adapter.</p> <p>Note: The name must be unique.</p>
Path	<p>Generic EMS. The path to the location of the Generic EMS XML file. Do not change the default path: <Business Availability Center Gateway server root directory>\CMDB\adapters\Dnodes.</p> <p>For example, for this adapter, the path can be: D:\<Business Availability Center Gateway server root directory>\CMDB\adapters\Dnodes\Generic_EMS.xml</p> <p>XML File. The path to the location of the user-defined XML file. The file describes the data topology.</p>

GUI Element (A-Z)	Description
Sync Interval	The interval (in minutes) between each automatic synchronization of the adapter with the external system. The default value is 60 minutes.
Type	<p>To create a new source adapter, select one of the following:</p> <ul style="list-style-type: none"> ▶ Generic EMS ▶ XML File <p>Hold the cursor over the query icon to view the description of the source adapter in a tooltip.</p> <p>When you edit one of the default source managers, its type is listed in the box.</p> <p>Note: Business Process Monitor, HP Diagnostics, Real User Monitor, or SiteScope source adapters are listed when you have configured them to be custom source adapters. For details, see “Work with the SiteScope Source Adapter – Workflow” on page 637.</p>

XML File Source Adapter

The following elements are included (unlabeled GUI elements are shown in angle brackets).

GUI Element (A-Z)	Description
Edit Template	<p>Click the Edit Template button to open the Template box. The template enables you to edit the template instance according to your organization's specific needs, for example, when defining a new source adapter based on one of the generic template types (Generic EMS or XML File). The template:</p> <ul style="list-style-type: none"> ▶ maps the entities in the data source to the configuration items (CIs) stored in the CMDB. For details about the CI parameters used in the template definition, see "CI Definition Parameters" on page 670. ▶ defines the resources to be used in the CMDB for a CI, such as KPIs and business rules. ▶ creates the source adapter's XML file.
Enable	Enables communication between the adapter and the external system.
Name	<p>The name of the new source. By default it is Generic EMS for the Generic EMS source adapter and XML File for the XML File source adapter.</p> <p>Note: The name must be unique.</p>
Path	<p>Generic EMS. The path to the location of the Generic EMS XML file. Do not change the default path: <Business Availability Center Gateway server root directory>\CMDB\adapters\Dnodes.</p> <p>For example, for this adapter, the path can be: D:\<Business Availability Center Gateway server root directory>\CMDB\adapters\Dnodes\Generic_EMS.xml</p> <p>XML File. The path to the location of the user-defined XML file. The file describes the data topology.</p>

GUI Element (A-Z)	Description
Sync Interval	The interval (in minutes) between each automatic synchronization of the adapter with the external system. The default value is 60 minutes.
Type	<p>To create a new source adapter, select one of the following:</p> <ul style="list-style-type: none"> ➤ Generic EMS ➤ XML File <p>Hold the cursor over the query icon to view the description of the source adapter in a tooltip.</p> <p>When you edit one of the default source managers, its type is listed in the box.</p> <p>Note: Business Process Monitor, HP Diagnostics, Real User Monitor, or SiteScope source adapters are listed when you have configured them to be custom source adapters. For details, see “Work with the SiteScope Source Adapter – Workflow” on page 637.</p>

 **CI Definition Parameters**

An adapter mapping definition includes some of the following information:

Element	Description
basicEntity	The name of the configuration item (CI) in HP Business Availability Center. The CIs are defined in IT Universe Manager in the CMDB Administration, described in “IT Universe Manager Overview” on page 36.
contextmenu	The internal name of the context menu to be used for the item in the Dashboard application. To list the context menu names and their internal name, select Admin > Dashboard > Repositories > Context Menus .
dimension	The ID of a KPI to be used for the CI. If you change the KPI, check that the KPI is applicable for the item class. To list the KPI ID numbers, select Admin > Dashboard > Repositories > KPIs .

Element	Description
dnodeAwareDimension	Set to false for definitions not using the Dynamic Node Factory. For details, see “Customize Dynamic Node Factory Definitions” on page 656.
entity id	The name of the source item.
logic	<p>The ID of a business rule to be used with the KPI. If you change the rule, you should ensure that the rule is applicable for the KPI. To list the business rule IDs, select Admin > Dashboard > Repositories > Business Rules.</p> <p>Note: In a source adapter, you can assign to a KPI only a monitor rule and not a group rule. You can assign a group rule to a KPI only in the repositories. For details, see “KPI Repository page” in <i>Using Dashboard</i>.</p>
parameters	Additional parameters for the CI’s KPI, or parameter values to override the parameter values defined for the business rule.
removeDimensionIf Obsolete	Set to true so that KPIs for the CI are removed from the view if they are no longer in use. Do not modify the value of this parameter (it should remain set to true).
selectors	(For monitor CIs only) use the selectors to build complex logical expressions using AND and OR logical operators. Those logical expressions are used to catch the appropriate samples brought in by the adapter, for the item. For more details, see “Define Selectors” on page 654.

Example

The example shows the mapping of an entity named measurement to a CIT named Mercury:sitescope_measurement in the CMDB.

```
<entity id="measurement">
  <basicEntity>Mercury:sitescope_measurement</basicEntity>
  <contextmenu>ssMeasurementMenu</contextmenu>
  <dimensions>
    <dimension>
      <id>1</id>
      <logics>
        <logic>
          <id>3</id>
        </logic>
      </logics>
      <selectors type="AND">
        <selector dataType="String" key="sampleType"
          operator="EQ" readOnly="true" reference="false"
          referencedProperty="sampleType" value="ss_t"/>
        <selector dataType="Long" key="u_iMeasurementId"
          operator="EQ" readOnly="false" reference="true" referencedProperty="measurement_id"/>
        <selector dataType="Long" key="u_iSessionId"
          operator="EQ" readOnly="false" reference="true" referencedProperty="session_id"/>
      </selectors>
      <removeDimensionIfObsolete>true</removeDimensionIfObsolete>
      <dnodeAwareDimension>false</dnodeAwareDimension>
    </dimension>
  </dimensions>
</entity>
```


 **Selector Parameters**

Note: To modify selectors, contact HP Software Support.

Each selector may include the following information:

Parameter	Description
dataType	The type of data can be: Long, Integer, Boolean, String.
key	The field to be checked in the sample from the data source.
operator	The relational operator used by the selector expression when checking the value in the key field, for example, EQ or IN .
readOnly	This flag is set to true if the value for this selector is fixed (defined in the selector value field), false if the value can change.
reference	Indicates whether the selector should use the referenced property or not. The selector uses the referenced property if the reference flag is set to true , and ignores the referenced property if the reference flag is set to false .
referencedProperty	The value of the entity specified for this parameter is compared with the value of the field specified in the key parameter. This parameter is used only when the reference parameter is set to true .
value	The fixed value to be used by the selector.

 **Source Manager Page**

Description	Enables you to configure the source adapters that map source data to objects used by HP Business Availability Center. To Access: Select Admin > Universal CMDB > Source Manager .
Important Information	To perform actions on two or more source adapters at once, select the check box to the left of each source adapter and click the buttons that appear under the source adapters area.
Included in Tasks	“Configure a Source Adapter – Workflow” on page 634
Useful Links	“Source Manager Overview” on page 618




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




GUI Element (A-Z)	Description
Custom Source Adapters	Select the appropriate custom source adapter. For details, see “Generic EMS Source Adapter Details” on page 630.
Default Source Adapters	Lists the preconfigured source adapters for HP Business Availability Center tools. They are automatically activated as soon as you start HP Business Availability Center. For details, see “Template Elements” on page 624.

GUI Element (A-Z)	Description
New Source	<p>Click the New Source button to open the New Source Adapter dialog box that you can use to add custom source adapters For details, see “New/Edit Source Adapter Dialog Box” on page 658.</p> <p>To make a default source adapter available for defining new source adapters, select Admin > Platform > Setup and Maintenance > Infrastructure Settings, choose Foundations and select the Sources Configuration, and locate the appropriate entry in the Sources Configuration - Sources area. Modify the setting for the relevant source type. For example, change Add Business Process Monitor Sources to true.</p> <p>The change takes effect when the server is restarted.</p>

Default and Custom Source Adapters Sections

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

GUI Element (A-Z)	Description
	<p>Opens the Edit Source dialog box where you can edit the source adapter.</p> <p>Note: You cannot edit a source while its status is Synchronizing.</p>
	<p>Deletes the source adapters from the list of source adapters in the Source Manager and deletes all the CIs (that were created by the source adapter) from the CMDB.</p> <p>Note: You cannot delete default source adapters.</p>
 Disable	<p>Disables communication between the CMDB sources and the external system, so that hierarchy data is not updated.</p> <p>Note: When the button is pressed, the icon toggles to Enable.</p>

GUI Element (A-Z)	Description
 Enable	<p>Enables communication between the CMDB sources and the external system, so that hierarchy data is updated.</p> <p>Note: When you click the button, the icon toggles to Disable.</p>
 Sync Now	<p>Sync now prompts the Source Manager to poll the appropriate system for updated hierarchy data. Use this button after making changes to the external source or to the source information in System Availability Management, in order to synchronize the information in the CMDB with the information in the external system. You can also wait for the automatic synchronization to take place.</p>
 Hard Sync	<p>Hard sync prompts the Source Manager to re-import the complete hierarchy data. Use this button if you suspect other changes have been made since clicking the Sync Now button or since the last automatic synchronization.</p> <p>Note: The Hard Sync replaces only those CIs that have changed since the last Hard Sync.</p>
CI Count	<p>The number of CIs in the hierarchical tree for the source (groups, monitors, and so forth), as received from the external system.</p> <p>Note: A Dynamic Node Factory CI is counted as a single CI.</p>
Last Update	<p>The start date and time of the last update (synchronization) to the source CIs in the CMDB from the data sources.</p>
Name	<p>Name defined for the source adapter.</p>
Next Update	<p>The scheduled date and time for the next update to the source CIs in the CMDB from the data sources.</p>

GUI Element (A-Z)	Description
Status	<p>Current status of the communication link with the external system. Possible statuses include:</p> <ul style="list-style-type: none"> ▶ Enabled. Communication between the HP Business Availability Center and the external system is enabled, so that Source Manager retrieves updates to the hierarchy data. ▶ Disabled. Communication between the CMDB and the external system is disabled and no new hierarchy data is retrieved. ▶ Synchronizing. Polling the external system for configuration data. While this status holds, the entry cannot be edited or deleted. ▶ Failed. Synchronization with the external system failed and the configuration data is not updated.
Sync Duration	The time taken to perform the update.
Type	The type of adapter used for the source.

Part V

View Explorer

28

Working with View Explorer

This chapter provides information on View Explorer.

Note: In IT Universe Manager, the Topology View Application, and the Modeling Studio, View Explorer is called CI Selector.

This chapter includes:

Concepts

- ▶ View Explorer Overview on page 682

Tasks

- ▶ Display a View in Browse Mode on page 683
- ▶ Search for CIs in Search Mode on page 684
- ▶ Modify View Explorer Display Options on page 687

Reference

- ▶ View Explorer User Interface on page 688

Troubleshooting and Limitations on page 700

View Explorer Overview

View Explorer presents the elements of the IT universe model in HP Business Availability Center through the medium of views. HP Business Availability Center displays View Explorer in the left pane of applications and pages, for example, Dashboard, Service Level Management, and IT Universe Manager.

When you select a view in View Explorer, the configuration items (CIs) contained in the view are displayed in a hierarchical tree format according to the relationships defined between the CIs. A view may be empty if no CIs were found matching the TQL query. For details on views, see “View Formats” on page 159.

You can use View Explorer to select views and to locate CIs. You can select a view and browse through the list of CIs, or you can search for a CI if you do not know in which view the CI is included.

The interaction between the View Explorer pane and the information presented in the right pane varies, according to the context. For example, in IT Universe Manager, information is presented for the CI selected in View Explorer; in Dashboard, information is presented for the view selected in View Explorer; in Service Level Management, and in other dialog boxes, CIs can be selected in View Explorer and added to the right pane. The context menu options also vary with the context.

Note: The functionality available for searching and browsing in View Explorer in IT Universe Manager and Topology View is different from the functionality in other applications.

For information on the components of View Explorer, see “View Explorer User Interface” on page 688.

Display a View in Browse Mode

When View Explorer is set to **Browse** mode, you can display the contents of a selected view. For details on the View Explorer user interface in Browse mode, see “Browse Mode” on page 690.

This task includes the following steps:

- “Prerequisites” on page 683
- “Select a View to Display” on page 683
- “Modify the CI Tree Structure” on page 683

1 Prerequisites

In the View Explorer pane, select **Browse** mode. (In IT Universe Manager or Topology View, select **View Browser**.)

2 Select a View to Display



Click the ellipsis button to open the Select view dialog box and select the view you want to display. The name of the selected view is shown in the **View** box. The CIs in the view appear in the CI tree in the lower part of the View Explorer pane. The view remains selected when you move to other applications in HP Business Availability Center.

3 Modify the CI Tree Structure

View Explorer enables you to customize the structure of the CI tree of the view (this option is not available in IT Universe Manager or Topology View):



- Select **Related CIs tree structure** to display the CI tree by layers within the view.



- Select **CI type tree structure** to display the CI tree by CI type.

Search for CIs in Search Mode

The View Explorer search tool enables you to find the CI you need, so that you can shift the focus, in the application in which you are working, to that CI. You can set up searches based on any combination of the filter criteria described in the task. For details on the View Explorer search tool user interface, see “Search Mode” on page 694.

Note: The search is always run on the entire CMDB.

This task includes the following steps:

- “Prerequisites” on page 684
- “Search by CI Name” on page 684
- “Search by Related Configuration Item” on page 685
- “Search by Configuration Item Type” on page 686
- “Run the Search and Sort the Results” on page 686

1 Prerequisites

In the View Explorer pane, select **Search CIs** mode. (In IT Universe Manager or Topology View, select **CMDB Search**.)

2 Search by CI Name

To search for CIs by name, enter a string in the **CI Name** box, representing the name of the CI, or part of the name. The search returns all CIs that contain the entered string somewhere in the name (within the boundaries of the other search criteria that you define).

Note: The search by CI name option is not case sensitive.

3 Search by Related Configuration Item

You can search for CIs using the **Related to** box (this option is not available in IT Universe Manager, Topology View, or the Modeling Studio). This search returns CIs that have defined relationships to the CI specified in the **Related to** box. You can perform the same search by selecting the **Show Related CIs** option from the context menu when working in Browse mode. For details, see the context menu options under “Browse Mode” on page 690.



Click the ellipsis button to open the Select Configuration Item dialog box and select the required CI. You cannot manually enter a CI in the **Related to** box.

Note: The results list includes only those relationships that exist in the CMDB and are included in a view.

After defining a CI in the **Related to** box, HP Business Availability Center remembers your selection until you move to a different application, or until you define a different value. The selection is shown as inactive; you activate it again for a search by selecting the check box.

4 Search by Configuration Item Type

You can search for CIs using the **CI type** box. This search returns CIs that are of the type specified in the **CI type** box.



Click the ellipsis button to open the Select Configuration Item Type dialog box and select the required CI type. You cannot enter a CIT in the **CI type** box manually.

After defining a CI in the **CI type** box, HP Business Availability Center remembers your selection until you move to a different application, or until you define a different value.

5 Run the Search and Sort the Results



Click the **Search** button to run the search. The results are listed in the lower part of the View Explorer pane, showing the CI name and the name of the view that the CI appears in, for each entry. In IT Universe Manager and Topology View, the results display the CI name and the CI type. You can sort the search results by clicking the appropriate heading.

When you select the required CI from the results list, the right pane displays details for the CI you selected, in the context in which you are working. To see a CI in the context of its view, right-click the CI and select **Locate CI in View**. View Explorer reverts to Browse mode and displays the view that contains the CI, with the CI selected in the view tree.

In IT Universe Manager and Topology View, when you select a CI in the search results, the CI appears in the topology map with its related CIs in the CMDB.

Modify View Explorer Display Options

You can modify the display options for View Explorer. These options are configured in the Infrastructure Settings Manager.

Important: Modifying certain settings in the Infrastructure Settings Manager can adversely affect the performance of HP Business Availability Center. Do not modify settings without first consulting HP Software Support or your HP Professional Services representative.

This task includes the following steps:

- “Prerequisites” on page 687
- “Modify Selected Settings” on page 687

1 Prerequisites

Access the Infrastructure Settings Manager by selecting **Admin > Platform > Setup and Maintenance > Infrastructure Settings**. Select the **Foundations** context and choose **View Explorer** from the list.

2 Modify Selected Settings

The following settings can be modified:

- **Immediate Children Count.** Number of children immediately displayed when expanding their parent’s node in View Explorer.
- **Maximal Children Count.** Maximum number of children displayed under their parent’s node in View Explorer.

- ▶ **Maximal search results size.** Maximum number of CMDB instances that can be returned in one search operation.
- ▶ **Recently Used Views List size.** Maximal number of recently used views to store per user.

Note: Some of the settings are not relevant in IT Universe Manager and Topology View.

View Explorer User Interface

This section describes:

- ▶ CI Instances Dialog Box on page 688
- ▶ View Explorer on page 689

CI Instances Dialog Box








Description	Enables you to view the CIs in your search results in a separate window. To access: In the CI Selector in IT Universe Manager, in CMDB Search mode, click Show CIs in table .
Important Information	The CI Instances dialog box displays the results of your CMDB search in tabular form. You can select the columns you want to appear in the table. The functionality of the CI Instances dialog box is the same as that for the Element Instances dialog box, which is available in the other managers. For details, see “Element Instances Dialog Box” on page 400.




 **View Explorer**






Description	<p>Enables you to select views and to locate CIs.</p> <p>To access: Appears in the left pane of the window, for example, the left pane of the IT Universe Manager window, the left pane of Dashboard, and the left pane of Service Level Management.</p> <p>Note: In IT Universe Manager, Topology View, and the Modeling Studio, View Explorer is called CI Selector.</p>
Important Information	<p>The interaction between the View Explorer pane and the information presented in the right pane varies, according to the context. For example, in IT Universe Manager, information is presented for the CI selected in View Explorer; in Dashboard, information is presented for the view selected in View Explorer; in Service Level Management, and in other dialog boxes, CIs can be selected in View Explorer and added to the right pane.</p> <p>View Explorer consists of two functional formats: Browse mode and Search mode.</p> <ul style="list-style-type: none"> ▶ In Browse mode you can search for and display a view, and browse through the view to locate a particular CI. You can also perform operations for the CI from a context menu. In IT Universe Manager, you access this mode by selecting View Browser from the drop-down window. ▶ In Search mode you can search for one or more CIs in the views or the CMDB, search for all occurrences of a CI, or filter the list of CIs that is displayed. In IT Universe Manager, you access this mode by selecting CMDB Search from the drop-down window.
Included in Tasks	<p>“Display a View in Browse Mode” on page 683</p> <p>“Search for CIs in Search Mode” on page 684</p>





Browse Mode

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

GUI Element (A-Z)	Description
 	<p>Click to refresh the CI tree of the view.</p> <p>In IT Universe Manager and Topology View, the following options are available:</p> <ul style="list-style-type: none"> ▶ Refresh the data content of the hierarchical tree structure that may have been modified by other users. ▶ Rebuild the view by performing a full recalculation. <p>Note: The recalculation may take a long time.</p>
	<p>Click Add selected CIs to model/view to add the selected CIs to the current model or view.</p> <p>Note: This button only appears in the Modeling Studio.</p>
	<p>Click Add as related CI to add the selected CI to the model as a related CI.</p> <p>Note: This button is only active in the Model Editor of the Modeling Studio.</p>
	<p>Click Open selected model in a new tab to open the selected model in the Model Editor.</p> <p>Note: This button is only active when a model is selected in the Modeling Studio.</p>
	<p>Click Generate view for selected model to open the Creating New View dialog box which enables you to build a view based on the selected model.</p> <p>Note: This button is only active when a model is selected in the Modeling Studio.</p>
	<p>Click Show View Definition to go directly to View Manager or the Modeling Studio for the current view.</p> <p>Note: This button only appears in IT Universe Manager.</p>

GUI Element (A-Z)	Description
	<p>Click Show Discovery and Changes Summary to rediscover all the CIs in a selected view by manually starting the DDM jobs that originally discovered them. For details, see “Discovery and Changes Summary Dialog Box” on page 63.</p> <p>Note: This button only appears in IT Universe Manager.</p>
	<p>Click Generate Direct Link to View to create a direct link to the view using the Direct Links wizard.</p> <p>Note: This button only appears in IT Universe Manager and Topology View.</p>
	<p>Choose the export format for the table data. The available options are:</p> <ul style="list-style-type: none"> ▶ Excel. The table data is formatted as an .xls (Excel) file that can be displayed in a spreadsheet. ▶ PDF. The table data is exported in PDF format. ▶ RTF. The table data is exported in Rich Text Format. ▶ CSV. The table data is formatted as a comma-separated values (CSV) text file that can be displayed in a spreadsheet. <p>Note: For the CSV formatted table data to display correctly, the comma (,) must be defined as the list separator. In Windows, to verify or modify the list separator value, open Regional Options from the Control Panel, and on the Numbers tab ensure that the comma is defined as the List Separator value. In Solaris, you can specify the list separator in the application that opens the CSV file.</p> <ul style="list-style-type: none"> ▶ XML. The table data is formatted as an XML file that can be opened in a text or XML editor. <p>Tip: To extract HTML code from the report:</p> <ul style="list-style-type: none"> ▶ Save the file as HTML ▶ Open the file in an HTML editor ▶ Copy the relevant table into the target file



GUI Element (A-Z)	Description
	<p>Opens the Save Snapshot dialog box, which enables you to save a snapshot of the view. For details, see “Save Snapshot Dialog Box” on page 527.</p> <p>Note: This button only appears in IT Universe Manager and Topology View.</p>
	<p>Click Asset Report to open the Asset report for the selected view. For details, see “Asset Report Overview” on page 573.</p> <p>Note: This button only appears in IT Universe Manager and Topology View.</p>
	<p>In IT Universe Manager and Topology View, this icon represents the Set View Parameters button. The Set View Parameters button is only active if at least one node in the selected view has a parameterized node condition. Displays the Set View Parameters dialog box where you can edit the parameter of each condition. For details, see “Set View Parameters/Set View Element Parameters Dialog Box” on page 198.</p> <p>In the Modeling Studio, this icon represents Open Selected View in Editor area. Click Open Selected View in Editor area to open the current view in a separate tab in the View Editor.</p>
	<p>The Related CIs tree structure button displays the CI tree by layers within the view.</p> <p>Note: This button does not appear in IT Universe Manager, Topology View, or the Modeling Studio.</p>
	<p>The CI type tree structure button displays the CI tree by CI type.</p> <p>Note: This button does not appear in IT Universe Manager, Topology View, or the Modeling Studio.</p>




GUI Element (A-Z)	Description
	<p>Click the Menu option button to display a context-sensitive menu containing the options you can perform on a selected CI. You can also display the menu by right-clicking a CI.</p> <p>Note: This button does not appear in IT Universe Manager, Topology View, or the Modeling Studio.</p>
	<p>Click the Close/Open button to hide or display the View Explorer pane.</p> <p>Note: This button does not appear in IT Universe Manager, Topology View, or the Modeling Studio.</p>
	<p>Click the Select view from the folder tree button to the right of the View box, to open the Select View dialog box. You can browse through the folder tree to locate the view you want to display.</p>
	<p>Enables you to move to the next or previous result of the search for the string entered in the Find</p> <p>Note: This feature only appears in IT Universe Manager, Topology View, and the Modeling Studio.</p>
<CIs>	The CIs contained in the currently selected view.
<Tooltip>	Hold the cursor over a CI to display a tooltip with the relevant CI type.




GUI Element (A-Z)	Description
Find	<p>Enter a CI name or a portion of a CI name in the Find box to locate a CI in the CI tree. The search only works for layers that have previously been expanded. CIs in sublayers that have not been expanded in the tree are not included in the search.</p> <p>Note: This feature only appears in IT Universe Manager, Topology View, and the Modeling Studio.</p>
View	<p>The View box displays the currently selected view. To select a view to display, click the down arrow on the right side of the View box; this displays an abridged list of views, containing the most recently accessed views. Click the arrow at the bottom of the list to scroll through the entire list. (In IT Universe Manager, the recently accessed views appear at the top of the drop-down, above the dividing line. The complete list of views appears below the line.)</p> <p>Alternatively, place the cursor in the list and begin typing the view name. HP Business Availability Center completes the view name, if the first few letters that you type match an existing entry. If the names of several views begin with those letters, all matching views are displayed in the list.</p>

Search Mode


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

GUI Element (A-Z)	Description
	<p>Click Show CIs in Table to open a separate window with a table of the CIs in the search results.</p> <p>Note: This button only appears in IT Universe Manager and Topology View.</p>
	<p>Click Add selected CIs to model/view to add the selected CIs to the current model or view.</p> <p>Note: This button only appears in the Modeling Studio.</p>

GUI Element (A-Z)	Description
	<p>Click Add as related CI to add the selected CI to the model as a related CI.</p> <p>Note: This button is only active in the Model Editor of the Modeling Studio.</p>
	<p>Click Open selected model in a new tab to open the selected model in the Model Editor.</p> <p>Note: This button is only active when a model is selected in the Modeling Studio.</p>
	<p>Click Generate View for Selected Model to open the Creating New View dialog box which enables you to build a view based on the selected model.</p> <p>Note: This button is only active when a model is selected in the Modeling Studio.</p>

GUI Element (A-Z)	Description
	<p>Choose the export format for the table data. The available options are:</p> <ul style="list-style-type: none"> ▶ Excel. The table data is formatted as an .xls (Excel) file that can be displayed in a spreadsheet. ▶ PDF. The table data is exported in PDF format. ▶ RTF. The table data is exported in Rich Text Format. ▶ CSV. The table data is formatted as a comma-separated values (CSV) text file that can be displayed in a spreadsheet. <p>Note: For the CSV formatted table data to display correctly, the comma (,) must be defined as the list separator. In Windows, to verify or modify the list separator value, open Regional Options from the Control Panel, and on the Numbers tab ensure that the comma is defined as the List Separator value. In Solaris, you can specify the list separator in the application that opens the CSV file.</p> <ul style="list-style-type: none"> ▶ XML. The table data is formatted as an XML file that can be opened in a text or XML editor. <p>Tip: To extract HTML code from the report:</p> <ul style="list-style-type: none"> ▶ Save the file as HTML ▶ Open the file in an HTML editor ▶ Copy the relevant table into the target file
	<p>In the Related to window, click to open the Select Configuration Item dialog box, where you select the required CI.</p> <p>In the CI type window, click to open the Select Configuration Item Type dialog box, where you select the required CIT to search for.</p> <p>Note: This is not relevant in IT Universe Manager, Topology View, or the Modeling Studio.</p>
	<p>Enables you to move to the next or previous result of the search for the string entered in the Find field.</p> <p>Note: This feature only appears in IT Universe Manager, Topology View, and the Modeling Studio.</p>

GUI Element (A-Z)	Description
<Search results>	<p>After you run the search, the results are listed in the lower part of the View Explorer pane. The results are shown in two columns:</p> <ul style="list-style-type: none"> ▶ Name. Contains the name of the CI. ▶ View. Contains the name of the view in which the CI appears. <p>(In IT Universe Manager, the search results columns shown are Name and CI Type.)</p> <p>If the CI or view name is abbreviated, hold the pointer over the entry to see the full name. You can sort the search results by clicking the appropriate heading.</p>
CI type	<p>To search for CIs related to a specified CI type, click the ellipsis button to select a CI from the Select Configuration Item Type dialog box and select the CI Type check box (the check box is not relevant in IT Universe Manager).</p> <p>In IT Universe Manager, you can search incrementally by typing the first few letters of the required CI type.</p>
Find	<p>Enter a CI name or a portion of a CI name in the Find box to locate a CI in the search results.</p> <p>Note: This feature only appears in IT Universe Manager, Topology View, and the Modeling Studio.</p>
Name filter box	<p>Enter a CI name or part of a name in the filter box under the Name column of the results and press Enter to filter the results by name.</p> <p>Note: This is not relevant in IT Universe Manager, Topology View, or the Modeling Studio.</p>
Related to	<p>To search for CIs of a specified CI, select the Related to check box and click the ellipsis button to select a CI from the Select Configuration Item dialog box.</p> <p>Note: This is not relevant in IT Universe Manager, Topology View, or the Modeling Studio.</p>

GUI Element (A-Z)	Description
<p>Search</p> 	<p>Click to run the search. The search results are displayed in the lower part of the View Explorer pane.</p>
<p>Search for</p>	<p>In the Search for box, enter the name of the CI (or part of the name). For more information, see “Filter the Scope of the Search” on page 685.</p>
<p>Search in</p>	<p>Specify the scope of your search. You can limit your search to the current view, or search in the most recently accessed views (by selecting All views). In Change Report, you also have an option to search the entire CMDB. The default option is Current view. Select the required option.</p> <p>For more information, see “Filter the Scope of the Search” on page 685.</p> <p>Note: This is not relevant in IT Universe Manager, Topology View, or the Modeling Studio.</p>
<p>Search results count</p>	<p>The Search results count below the Find box displays the total number of CIs found in the search.</p> <p>Note: This feature only appears in IT Universe Manager, Topology View, and the Modeling Studio.</p>
<p>View filter box</p>	<p>Enter a view name or part of a name in the filter box under the View column of the results and press Enter to filter the results by view.</p> <p>Note: This is not relevant in IT Universe Manager, Topology View, or the Modeling Studio.</p>

Context Menu Options

Menu Item	Description
<Context sensitive menu options>	<p>The View Explorer context menu contains different options in each of the windows in which it appears. For example, in Dashboard you can open reports for the CI, and in IT Universe Manager you can attach new CIs to the CI.</p> <p>For details on the context menu options specific to a particular application, see the User Interface Help for that application.</p>
Add	<p>Adds the selected CI to the current model or view.</p> <p>Note: This feature only appears in the Modeling Studio.</p>
Add as related CI	<p>Adds the selected CI as a related CI to the current model.</p> <p>Note: This feature only appears in the Modeling Studio.</p>
Generate View from Model	<p>Select to create a view based on the current model. The Creating New View dialog box opens which enables you to select a perspective to apply.</p> <p>Note: This feature only appears in the Modeling Studio.</p>
Get Related CIs	<p>Select to view a related CIs map for the selected CI. For details, see “IT Universe Manager Context Menu” on page 75.</p> <p>Note: This feature only appears in the Modeling Studio.</p>
Locate CI in View	<p>When this is selected for a CI, View Explorer reverts to Browse mode and displays the view that contains the CI, with the CI selected in the view tree.</p> <p>Note:</p> <ul style="list-style-type: none"> ➤ This option is only available in Search mode. ➤ This option is not available in IT Universe Manager.
Open Selected Model	<p>Opens the selected model in the Model Editor.</p> <p>Note: This feature only appears in the Modeling Studio.</p>

Menu Item	Description
Properties	Opens the Properties page for the selected CI. For details, see “Configuration Item Properties Dialog Box” on page 57.
Show Related CIs	When this option is selected, View Explorer changes to Search mode and displays a list of the CIs that have a relationship to the original CI. This is the same as defining the original CI in the Related to box when performing a search in all views. Note: This option is not available in IT Universe Manager.

Troubleshooting and Limitations

This section includes the following topics:

Unavailable Views and CIs

The View list in View Explorer may not display all views in the CMDB, or it may not display the contents of a view, for any of the following reasons:

- ▶ The View list includes only the views for which you have the necessary permissions. To set permissions, select **Admin > Platform > Users and Permissions**, select a user or a group and select **Permissions**. For more information, see “Assign Permissions” in *Platform Administration*.
- ▶ When using View Explorer in IT Universe Manager, Dashboard, or Service Level Management, the View list includes only those views that are assigned to that application.
- ▶ Views that are currently inactive appear in red in the View list, but they cannot be selected. In IT Universe Manager, inactive views appear in faded text.
- ▶ Out-of-the-box views for which you do not have a license may appear in the View list, but these views do not contain CIs. For information on the out-of-the-box views, see “Predefined Folders and Views” on page 161.

Note: After deleting one or more nodes from a TQL, it can take time for changes to be updated to the view; meanwhile, the removed CIs appear in the view. If you select one of these CIs before it is updated, an error message is displayed. Click the **Refresh** button to update the view.

Part VI

Topology Map

29

Working with Topology Map

This chapter provides information on Topology Map.

This chapter includes:

Concepts

- ▶ Topology Map Overview on page 705
- ▶ Handling Large Views on page 706

Reference

- ▶ Topology Map User Interface on page 706

Topology Map Overview

The Topology Map provides a graphical display of a view. All the CIs in a given layer of the view are represented by icons and the connecting lines represent relationships. You can select a CI in the Topology Map or in View Explorer in the left pane. You can also drill down in View Explorer to display different layers of the view in the Topology Map.



If an icon appears with a downward arrow in the Topology Map, there is an additional CI layer beneath it, created by a parent or child folding rule.

The toolbar and Main Menu above the Topology Map enable you to zoom in, change the layout of the Topology Map, and print the Topology Map. Additional functionality is available from the context menu by right-clicking a CI in the Topology Map or in View Explorer.

Handling Large Views

The Topology Map cannot display a view with more than 900 CIs in a single layer. When you select a view which contains a layer with more than this number of CIs, the Topology Map appears empty.

To handle large views, use one of the following methods:

- ▶ Reduce the TQL query results by redefining the view in View Manager. For details, see “Refine Node Type Dialog Box” on page 418.
- ▶ Define different folding rules or Group By rules for the view to redistribute the CIs among the view’s layers. For details on defining folding rules, see “Add Folding Rules to Relationships” on page 177.
- ▶ Reset the maximum number of CIs allowed in the configuration parameters. Select the **Foundations** context in Infrastructure Settings Manager. Select the **Max Object Count GUI for TS** parameter under **UCMDB common – Viewing Settings**. However, be aware that increasing the maximum number of CIs per layer may significantly slow down the redrawing of the Topology Map.

For details regarding Infrastructure Settings Manager, see “Infrastructure Settings Manager - Overview” in *Platform Administration*.

Topology Map User Interface


This section describes:

- ▶ Export Map to Image Dialog Box on page 707
- ▶ Layout Properties Dialog Box on page 708
- ▶ Main Menu on page 729
- ▶ Print Dialog Box on page 730
- ▶ Print Preview Dialog Box on page 731
- ▶ Print Setup Dialog Box on page 731
- ▶ Toolbar Options on page 733

Export Map to Image Dialog Box

Description	Enables you to save a topology map to a file. To access: From a topology map, select Operations > Export Map to Image .
Included in Tasks	“Print and Save a Topology Map to File” on page 522

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

GUI Element (A–Z)	Description
	Move the indicator left or right to set the required quality of the printed map on the scale. 100 means that the quality is excellent.
Actual Size	Save the view so that the node sizes are at maximum.
Current Zoom Level	Save the view as you see it on the topology map. For example, if you have used the Interactive Zoom mode to decrease the view magnification, the nodes also appear smaller in the saved view. For details, see “Interactive Zoom” on page 736.
Custom	Specify the size of the view you want to save in the Width and Height boxes.
Draw Grid	Draw a grid in the graph.
File Name	Specify the required file name and location (or click Browse to search for the file and location).
Fit in Canvas	Expand or shrink the view so that it fits in the window.
Image Quality (0-100)	Enter a value to set the required quality of the printed map on the scale. 100 means that the quality is excellent.
Selected Objects Only	Saves only the nodes/CIs and their relationships that you selected in the map.
Type	Select the required file format.
Visible Window Only	Saves only the part of the graph that appears in the window.

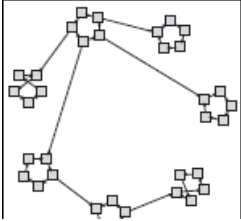

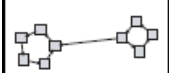
Layout Properties Dialog Box



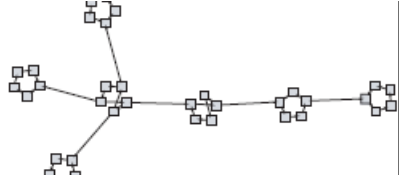
Description	<p>Enables you to customize the layout of a specific layer in a view, to achieve the clearest presentation possible and to better understand and monitor the managed data.</p> <p>You define the layout of a view's layers by assigning logical positions for the nodes and relationships that appear in a layer. You customize the layer layouts by modifying the default values.</p> <p>Note: You set layout definitions for a specific layer only. The definitions cannot be saved for a different layer or a different view.</p> <p>To access: Select Layout > Layout Properties.</p>
Important Information	Parameter values are in pixels.

Circular Tab

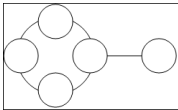
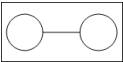

Description	<p>Enables you to group a graph's nodes into groups or clusters based on the grouping options you select. It is particularly suited for visualizing ring and star network topologies, and for link analysis.</p> <p>The Circular tab has the following areas:</p> <ul style="list-style-type: none"> ▶ Clustering area. Specifies the ratio between the average cluster size and the number of clusters as well as the minimum and maximum number of clusters in a layer. ▶ Cluster Layout Style area. Displays clusters either in a symmetric or circular layout style. ▶ Layout Quality area. Adjusts the quality of the layout produced to fit your application's needs. The quality reflects the number of steps or the method used to produce the layout. For example, high quality is sharper but takes more time to set the layout. ▶ Spacing area. Sets the spacing around each node within the same cluster and between clusters. <p>To access: Click the Circular tab in the Layout Properties dialog box.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A–Z)	Description
Circular	<p>Displays clusters in a circular layout style.</p> 
Cluster Spacing	<p>Sets the spacing between clusters.</p> <p>Default value: 50</p> <p>This illustration shows smaller cluster spacing.</p>  <p>This illustration shows larger cluster spacing.</p> 
Cluster Size Multiplier	<p>Specifies the ratio between the average cluster size and the number of clusters. The size of a cluster is defined as the sum of the weights of all nodes in the cluster. You can assign a weight value to each node.</p>
Draft	<p>Sets the layout to draft quality.</p>
Default	<p>Sets the layout to default quality.</p>
Max Number of Clusters	<p>The maximum number of clusters in a layer.</p>
Min Number Of Clusters	<p>The minimum number of clusters in a layer.</p>

GUI Element (A-Z)	Description
<p>Node Spacing</p>	<p>Sets the spacing around each node within the same cluster. The larger the spacing, the more nodes there are on the cluster boundary.</p> <p>Default value: 10</p> <p>This illustration shows smaller node spacing.</p>  <p>This illustration shows larger node spacing.</p> 
<p>Proof</p>	<p>Sets the layout to proof quality.</p>
<p>Symmetric</p>	<p>Displays clusters in a symmetric layout style.</p> 

Disconnected Tab

<p>Description</p>	<p>Enables you to define general layout parameters for disconnected nodes and connected components.</p> <ul style="list-style-type: none"> ▶ A disconnected node is a node that is not connected to any other node. ▶ A disconnected component is a component that is not connected to any other component. It contains a set of nodes that can be connected to each other. <p>This illustrates a connected component with five nodes:</p>  <p>This illustrates a connected component with two nodes:</p>  <p>This illustrates four disconnected components, each made up of a single, disconnected node:</p>  <p>The Disconnected tab has the following areas:</p> <ul style="list-style-type: none"> ▶ Aspect Ratio area. This setting affects the placement of components with respect to each other only, and not the layout of each individual component. The setting has no effect if the graph is connected. ▶ Components area. The spacing between the components in a disconnected graph consists of both a constant value and a proportional value based on the sizes of the components. ▶ Disconnected Nodes. The spacing between the nodes in a disconnected graph consists of both a constant value and a proportional value based on the sizes of the nodes. <p>To access: Click the Disconnected tab in the Layout Properties dialog box.</p>
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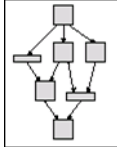
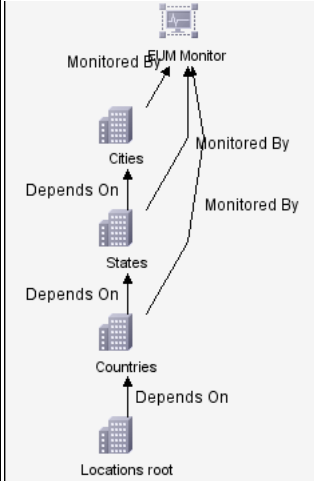
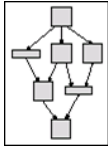
The following elements are included (unlabeled GUI elements are shown in angle brackets>):

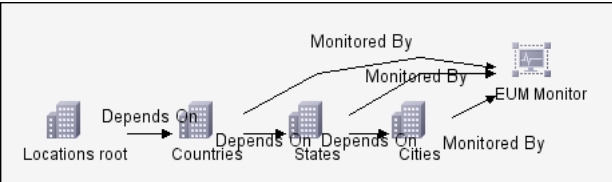
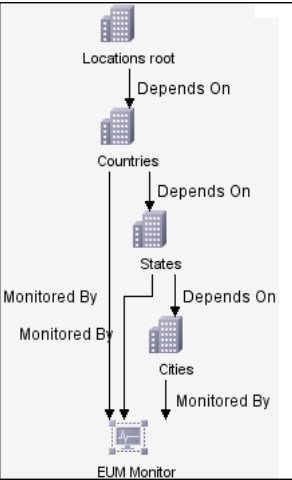
GUI Element (A–Z)	Description
Automatic	The layout is performed automatically.
Constant Spacing	Set constant spacing (horizontal and vertical) around each disconnected component. Default value: 20
Custom	Sets a specific aspect ratio. Default value: 1.0
Detect Components	Select this option to view the disconnected components. You can specify that all components be laid out together or individually, regardless of the other components. If the grouping for components is selected, each component is laid out, and the resulting components are packed together.
Detect Disconnected Nodes	Select this option to view the disconnected nodes. You can specify that disconnected nodes be grouped into one component or laid out individually.
Proportional Spacing	Set spacing (horizontal and vertical) that is proportional to the size of the component around each disconnected component. Default value: 0.05

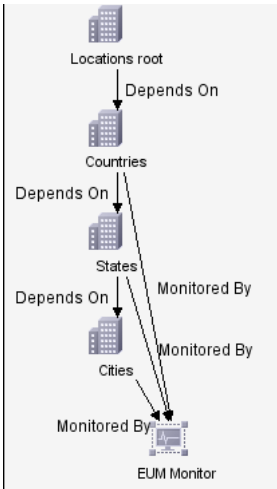
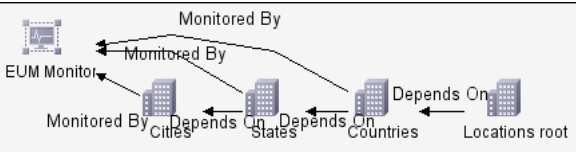
Hierarchical Tab

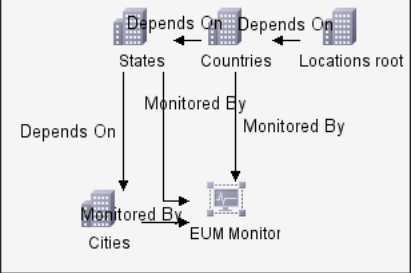
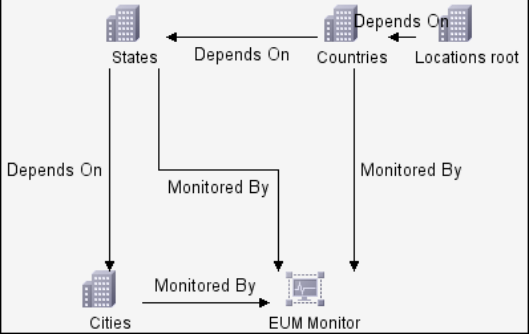
<p>Description</p>	<p>Shows the precedence relationships that can represent organizational or information management system dependencies, as well as process models, software call graphs, and work flows. The hierarchical layout emphasizes dependencies by placing the nodes at different levels.</p> <p>The Hierarchical tab has the following areas:</p> <ul style="list-style-type: none"> ▶ Backward Edges area. Specifies how backward relationships are displayed in the hierarchical layout. ▶ Horizontal Spacing area. Enables you to set the minimum horizontal distance between two neighboring nodes at each level. ▶ Layout Quality area. Enables you to adjust the quality of the layout produced to fit your application's needs. The quality reflects the number of steps or the method used to produce the layout. For example, high quality is sharper but takes more time to set the layout. ▶ Level Alignment area. Enables you to set the way nodes are vertically aligned. ▶ Orientation. Enables you to set the orientation of the hierarchy. ▶ Orthogonal Routing area. Enables you to set the type of relationship between CIs. This option is useful when layers have nodes with a very large number of connecting relationships. ▶ Polyline Routing area. Routes edges as one or more straight line segments with arbitrary angles. Polyline routed edges are prevented from overlapping by adding extra segments. ▶ Vertical Spacing area. Enables you to set the minimum vertical distance between two neighboring nodes on different levels. <p>To access: Click the Hierarchical tab in the Layout Properties dialog box.</p>
<p>Important Information</p>	<p>Orthogonal Routing is currently not supported.</p>

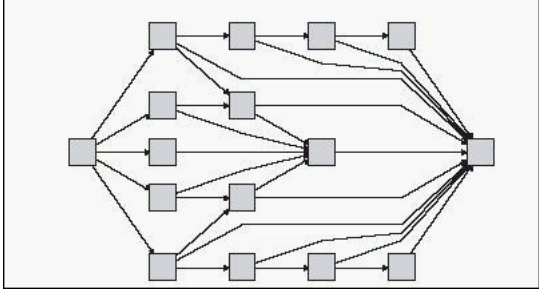
The following elements are included (unlabeled GUI elements are shown in angle brackets>):

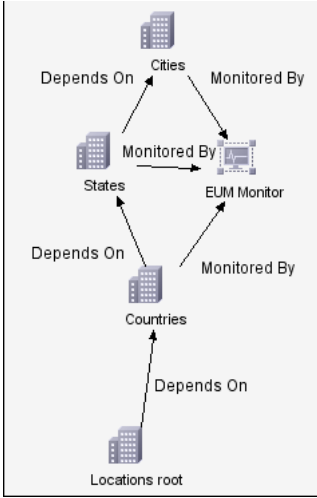
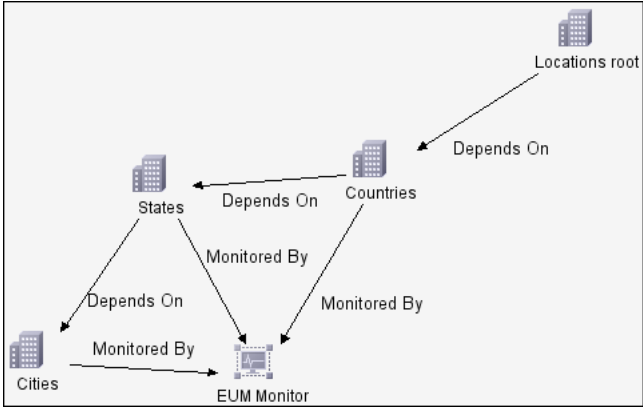
GUI Element (A-Z)	Description
Bottom	<p>This illustration shows that the bottom of the nodes at the same level of the hierarchy are aligned.</p> 
Bottom To Top	<p>The children are located below the parent (in the example, Alignment = Center).</p> 
Center	<p>This illustration shows that the center of the nodes at the same level of the hierarchy are aligned.</p> 
Default	Sets the layout to default quality.

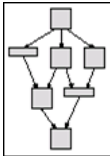
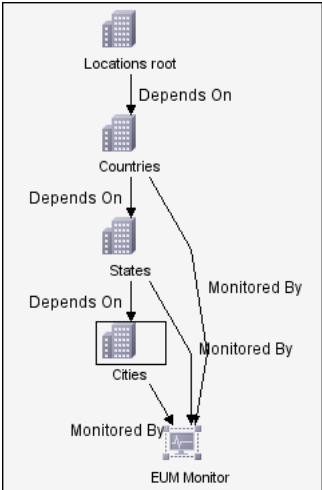
GUI Element (A-Z)	Description
Draft	Sets the layout to draft quality.
Left To Right	<p>The children are located to the left of the parent (in the example, Alignment = Center).</p>  <p>The diagram illustrates a hierarchical structure. At the top is 'Locations root'. Below it are 'Countries', 'States', and 'Cities'. Arrows labeled 'Depends On' point from 'Locations root' to 'Countries', from 'Countries' to 'States', and from 'States' to 'Cities'. Arrows labeled 'Monitored By' point from 'Locations root', 'Countries', 'States', and 'Cities' to an 'EUM Monitor' icon on the right.</p>
Minimum Backward Edges	Sets the number of number of backward relationships displayed in a layer to a minimum.
Optimize For Feedback Flow	Sets the number of number of backward relationships displayed in a layer to a maximum. This mode is more appropriate for flow charts.
Orthogonal	<p>For orthogonal lines between nodes/CIs.</p>  <p>The diagram illustrates a hierarchical structure with orthogonal lines. At the top is 'Locations root'. Below it are 'Countries', 'States', and 'Cities'. Arrows labeled 'Depends On' point from 'Locations root' to 'Countries', from 'Countries' to 'States', and from 'States' to 'Cities'. Arrows labeled 'Monitored By' point from 'Locations root', 'Countries', 'States', and 'Cities' to an 'EUM Monitor' icon at the bottom.</p>

GUI Element (A-Z)	Description
<p>Polyline</p>	<p>For straight lines between nodes/CIs.</p>  <pre> graph TD LR[Locations root] -- Depends On --> C[Countries] C -- Depends On --> S[States] S -- Depends On --> CI[Cities] LR -- Monitored By --> EM[EUM Monitor] C -- Monitored By --> EM S -- Monitored By --> EM CI -- Monitored By --> EM </pre>
<p>Proof</p>	<p>Sets the layout to proof quality.</p>
<p>Right To Left</p>	<p>The children are located to the right of the parent (in the example, Alignment = Center).</p>  <pre> graph RL LR[Locations root] -- Depends On --> C[Countries] C -- Depends On --> S[States] S -- Depends On --> CI[Cities] LR -- Monitored By --> EM[EUM Monitor] C -- Monitored By --> EM S -- Monitored By --> EM CI -- Monitored By --> EM </pre>

GUI Element (A–Z)	Description
<p>Spacing Between Edges (in the Horizontal Spacing area)</p>	<p>This setting is available only when you select Routing > Orthogonal. It sets a horizontal space between edges in the graph.</p> <p>Default value: 12</p> <p>This illustration shows smaller edge spacing.</p>  <p>This illustration shows larger edge spacing.</p> 

GUI Element (A–Z)	Description
<p>Spacing Between Bends</p>	<p>This setting is available only when you select Routing > Polyline. Polyline routing routes edges (connecting lines) as one or more straight line segments with arbitrary angles. Path nodes are added automatically to prevent the edges (connecting lines) from overlapping.</p> <p>Default Value: 12</p> 
<p>Spacing Between Edges (in the Vertical Spacing area)</p>	<p>This setting is available only when you select Routing > Orthogonal. It sets a vertical space between edges in the graph.</p> <p>Default value: 12</p>
<p>Spacing Between Nodes (in the Vertical Spacing area)</p>	<p>Sets a vertical space around each node in the level.</p> <p>Default value: 28</p>

GUI Element (A-Z)	Description
<p>Spacing Between Nodes (in the Horizontal Spacing area)</p>	<p>Sets a space around each node horizontally in the layer. Default value: 20</p> <p>This illustration shows smaller node spacing.</p>  <p>This illustration shows larger node spacing.</p> 

GUI Element (A-Z)	Description
<p>Top</p>	<p>This illustration shows that the top of the nodes at the same level of the hierarchy are aligned.</p> 
<p>Top To Bottom</p>	<p>The children are located above the parent (in the example, Alignment = Center).</p> 

GUI Element (A–Z)	Description
Undirected Layout	Edge direction is not used to build the levels of the hierarchical drawing.
Variable Level Spacing	<p>Variable level spacing adjusts the spacing between pairs of neighboring levels according to the density of edges between the levels.</p> <p>If the drawing's edges are orthogonally routed, this ensures the desired vertical spacing between horizontal edges (in a top-to-bottom or bottom-to-top layout) routed between levels.</p> <p>If the routing is polyline, variable level spacing makes it easier to distinguish among edges in very dense drawings.</p>

Orthogonal Tab

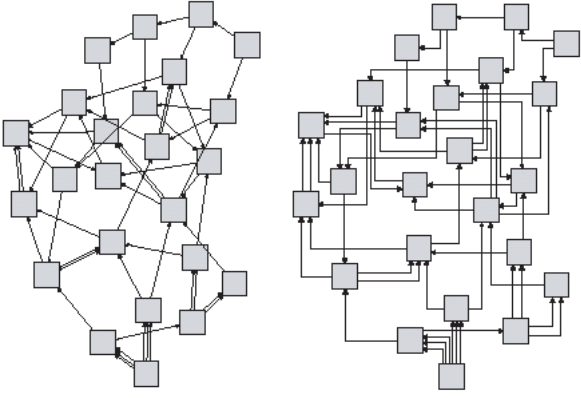
Description	<p>Enables you to set orthogonal layout route relationships horizontally and vertically. This results in relationships bending at 90-degree angles only.</p> <p>The Orthogonal tab has the following areas:</p> <ul style="list-style-type: none"> ▶ Aspect Ratio area. Enables you to set the layout's proportions. This only affects the placement of components with respect to each other, not the layout of each individual component. The layout's proportions have no effect if the graph is connected. ▶ Horizontal Spacing area. Enables you to set the minimum horizontal distance between nodes. ▶ Layout Quality area. Enables you to adjust the quality of the layout produced to fit your application's needs. The quality reflects the number of steps or the method used to produce the layout. For example, high quality is sharper but takes more time to set the layout. ▶ Vertical Spacing area. Enables you to set the minimum vertical distance between nodes. <p>To access: Click the Orthogonal tab in the Layout Properties dialog box.</p>
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Important Information	The Fix Node Sizes option is currently not supported.
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

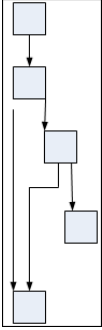
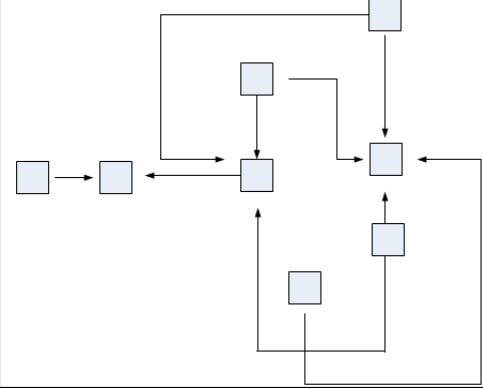
GUI Element (A–Z)	Description
Automatic	The layout is performed automatically.
Custom	Specify the aspect ratio. Default value: 1.0
Default	Set the layout to default quality.
Disabled	Disables the aspect ratio.
Draft	Set the layout to draft quality.
Proof	Set the layout to proof quality.
Spacing Between Edges (in the Horizontal Spacing area)	Set a space between elements in the layer. Default value: 12
Spacing Between Nodes (in the Horizontal Spacing area)	Set a space around each node in the layer. Default value: 20
Spacing Between Edges (in the Vertical Spacing area)	Set a space between elements in the layer. Default value: 12
Spacing Between Nodes (in the Vertical Spacing area)	Sets a space around each node in the layer. Default value: 20

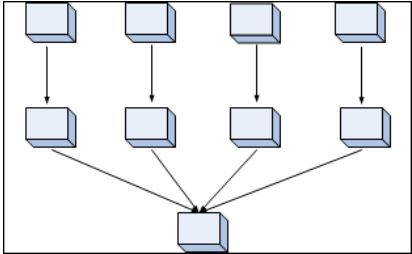
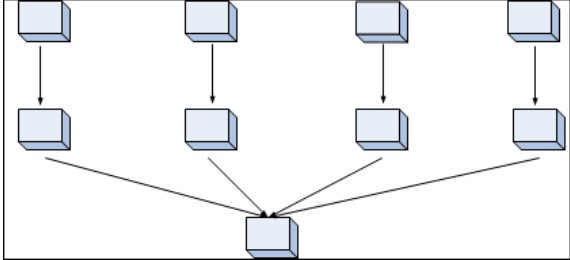
Routing Tab

<p>Description</p>	<p>Enables you to produce drawings that leave nodes essentially where they are, and reroute the lines orthogonally.</p> <div data-bbox="611 336 1206 795" style="border: 1px solid black; padding: 10px;">  <p style="text-align: center;">Before After</p> </div> <p>The Routing tab has the following areas:</p> <ul style="list-style-type: none"> ▶ Horizontal Spacing area. Enables you to set the horizontal space around each node. ▶ Vertical Spacing area. Enables you to set the vertical space around each node. <p>To access: Click the Routing tab in the Layout Properties dialog box.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
Fix Node Positions	Maintain the position of all the nodes in the display. Clear this option for the layout to move the nodes if it is necessary to improve the layout. The movement is minimal, avoids overlaps, and minimizes bend points.
Fix Node Sizes	Maintain the size of a node. Clear this option if you want the layout to increase the size of a node if it is necessary to maintain the specified relationship spacing when more than one relationship is attached to the same node side.

GUI Element (A–Z)	Description
<p>Spacing Between Edges (in the Horizontal Spacing area)</p>	<p>Sets the horizontal space between any two neighboring parallel lines. Line spacing can also affect the size of a node to which many lines are attached, unless the node is set to remain fixed at its current size. The settings for line spacing are constant values.</p> <p>Default value: 12</p> <p>The following illustrates smaller line spacing:</p>  <p>The following illustrates larger line spacing:</p> 
<p>Spacing Between Edges (in the Vertical Spacing area)</p>	<p>Set the vertical space between any two neighboring parallel lines. Spacing between lines can also affect the size of a node to which many edges are attached, unless the node is set to remain fixed at its current size. The settings for edge spacing are constant values.</p> <p>Default value: 12</p>

GUI Element (A-Z)	Description
<p>Spacing Between Nodes (in the Horizontal Spacing area)</p>	<p>Sets the horizontal space around each node in the layer. Default value: 20</p> <p>The following illustrates smaller node spacing:</p>  <p>The following illustrates larger node spacing:</p> 
<p>Spacing Between Nodes (in the Vertical Spacing area)</p>	<p>Set the vertical space around each node in the layer. Default value: 20</p>

Symmetric Tab

Description	<p>Displays a clear representation of complex networks. The symmetric layout emphasizes the symmetries that may occur in a graph.</p> <p>This tab consists of the following areas:</p> <ul style="list-style-type: none"> ▶ Layout Quality area. Adjusts the quality of the layout produced to fit your application's needs. The quality reflects the number of steps or the method used to produce the layout. For example, high quality is sharper but takes more time to set the layout. ▶ Spacing Options area. Enables you to adjust the spacing around each node in the layer. <p>To access: Click the Symmetric tab in the Layout Properties dialog box.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
Default	Set the layout to default quality.
Draft	Set the layout to draft quality.

GUI Element (A–Z)	Description
<p>Node Spacing</p>	<p>Allows you to set constant horizontal and vertical spacing around each node in the layer. The value you specify is a guideline for the layout, so that it is possible that the spacing for a particular pair of nodes might be different from the one you specified. The larger the node spacing, the farther apart the nodes are spaced in the final layout.</p> <p>Default value: 10</p> <p>The following figure illustrates smaller and larger spacing.</p> <div data-bbox="578 591 1139 852" style="border: 1px solid black; padding: 5px;"> </div>
<p>Proof</p>	<p>Set the layout to proof quality.</p>

 **Main Menu**

Description	Contains the options for working with the topology map.
Important Information	The specific options contained within the Main Menu drop-downs are detailed in “Toolbar Options” on page 733.

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

GUI Element (A–Z)	Description
Edit	Contains selection options for the topology map.
Layout	Contains options for changing the layout of the topology map.
Map Item	Contains the topology map context menu options for the current manager.
Operations	Contains options for printing or exporting the topology map.
Resources	Contains the left pane context menu options for the current manager. Note: In IT Universe Manager, this drop-down is called Configuration Items and in CI Type Manager it is called CI Types .
View	Enables you to hide or display the different panes of the topology map.

 **Print Dialog Box**

Description	Enables you to print the contents of the topology map. To access: Select Operations > Print .
Important Information	The results of printing a topology map is similar to a screen capture. Therefore, before printing, it is recommended to: <ul style="list-style-type: none"> ▶ Define your print settings and arrange the contents of the topology map according to your requirements. For details, see “Print Setup Dialog Box” on page 731. ▶ Arrange the contents of the topology map for print. You can use the Layout option and Layout Properties. For details about the layout options, see “Layout” on page 737. For details about layout properties, see “Layout Properties Dialog Box” on page 708.
Included in Tasks	“Print and Save a Topology Map to File” on page 522

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

GUI Element (A–Z)	Description
Number of copies	Enter the number of copies you want to print.
Properties	Define document properties as required.

Print Preview Dialog Box

Description	Enables you to preview the content of the topology map before printing. To access: Select Operations > Print Preview .
Included in Tasks	“Print and Save a Topology Map to File” on page 522

The Print Preview dialog box includes the following menu options (listed alphabetically):

Menu Item	Description
Fit in Canvas	Fit the complete view in the window.
Print	Print the map. For details, see “Print Dialog Box” on page 730.
Print Setup	Define the print settings for the map. For details, see “Print Setup Dialog Box” on page 731.
Zoom	Focus on specific details of the map. For details, see “Interactive Zoom” on page 736.

Print Setup Dialog Box

Description	Enables you to define the print settings for a topology map. To access: Select Operations > Print Setup .
Included in Tasks	“Print and Save a Topology Map to File” on page 522

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


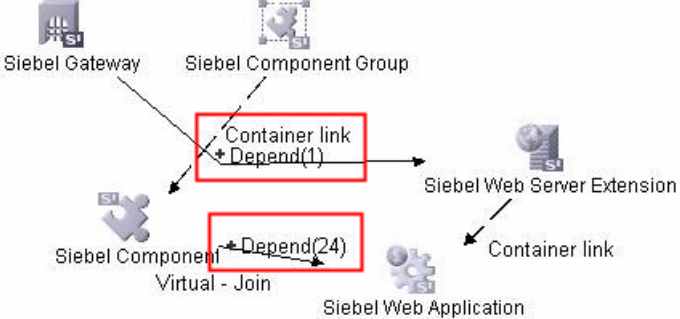

GUI Element (A–Z)	Description
Actual Size	Print the view as it really is.
Color	Set the text color.







GUI Element (A–Z)	Description
Font	Set the required font.
Page Setup	Set the printer settings.
Pages	Divide the map into rows and columns and print each section separately. Enter the number of columns and rows in the Page Columns and Page Rows boxes.
Position	Select the position of the caption from the Position list.
Print Background	Print the background behind the view.
Print Border	Print the map with a border. Click Color to select the required border color.
Print Caption	Enter the caption in the text area and click Font to select the required custom font.
Print Crop Marks	Print the crop marks.
Print Current Selection	Print the selected nodes and their relationships.
Print Current Window	Print the part of the view that appears in the window.
Print Entire Drawing	Print the complete view.
Print Page Numbers	Print the page numbers.
Zoom Level	Print the view at the current zoom level.





Toolbar Options



The following table contains a description of each Topology Map toolbar option, organized alphabetically.


Note: These toolbar options are relevant for Universal CMDB applications.




Button	Option Name	Use This Option to...
	Add Background Image	<p>Add a background image to a view. For details, see “Add Background Image Dialog Box” on page 53.</p> <p>To access: Select Layout > Add Background Image.</p> <p>Note: This option is only active in IT Universe Manager and Topology View application.</p>
	Additions Count	<p>Calculate the number of instances that are created as a result of an Enrichment Rule. The number of TQL node instances and relationships that are created appear next to the Enrichment nodes/relationships, as seen in the figure below.</p>  <p>Note: This option appears in the toolbar in Enrichment Manager only.</p>
	Calculate TQL Result Count	<p>Calculate the number of instances found for each TQL node/relationship.</p>








Button	Option Name	Use This Option to...
	Candidates for Deletion	<p>Identify the CIs in the current view which are candidates for deletion with the following icon  .</p> <p>Note: This option appears in the toolbar in the Topology View application only.</p>
	Change Label Length	<p>Enter the maximum number of characters that the labels should contain.</p> <p>To access: Select Layout > Change label length.</p>
	Change Timeframe	<p>Open the Change Timeframe dialog box, which enables you to set the period for the display of added or changed CI indicators.</p> <p>Note: This option appears in the toolbar in Topology View application only.</p>
	CI Types Tree	<p>Toggle between hiding and displaying the CI Type Selector at the right of the screen.</p> <p>To access: Select View > CI Types Tree.</p>
	Clear Correlation	<p>Clear the Topology View of the statuses of the trigger and affected CIs for the state Change. CI statuses appear only after using the Run Correlation dialog box to run an Impact Analysis report on a set of existing Correlation rules. For details, see “Run Correlation Dialog Box” on page 524. For details on Correlation rules, see “Correlation Manager User Interface” on page 219.</p> <p>Note: This option appears in the toolbar in the Topology Map in the Topology View application only.</p>
	Create Relationship	<p>In most managers, create a relationship between two existing TQL nodes. For details, see “Add Nodes and Relationships to a TQL Query” on page 362.</p> <p>In IT Universe Manager, create a relationship between existing CIs. For details, see “Attaching Existing CIs” on page 47.</p>
	Delete Selected Item(s)	<p>Delete a CI from IT Universe Manager, a node from View Manager, a TQL node from Query Manager, Correlation Manager, Report Manager, or Enrichment Manager.</p>
	Direct Links Wizard	<p>Open the Direct Links wizard, which enables you to create a direct link to a specific CI or view. For details, see “Generate Direct Link User Interface” on page 42.</p>

Button	Option Name	Use This Option to...
	Drag Map	<p>Drag the view.</p> <p>To access: Open the drop-down menu in the Mode box or select View > Drag Map.</p>
	Drill Down One Layer	<p>Move down one level in the topology map. This option is enabled only if there is an additional CI layer below it, created by a parent or child folding rule as defined in View Manager. For details on folding rules, see “Adding Folding Rules to Relationships” on page 47.</p> <p>Note: This option appears only in IT Universe Manager and Topology View application.</p>
	Entities Tree	<p>Toggle between hiding and displaying the manager specific entities tree at the left of the screen.</p> <p>To access: Select View > Entities Tree.</p>
	Export Map to Image	<p>Save the topology map to a file. For details, see “Export Map to Image Dialog Box” on page 707.</p> <p>To access: Select Operations > Export Map to Image.</p>
	Filter DB Results	<p>Open a dialog box which displays the number of related CIs by type. Select the CI type you want to appear in the Topology Map results.</p> <p>Note: This option appears only in IT Universe Manager and the Topology View application.</p>
	Fit to Window	<p>Fit the complete map in the window.</p>
	Generate Related CIs Report	<p>Display the Get Related CIs Report for the selected CI. For details, see “Get Related CIs Report” on page 64.</p> <p>Note: This option appears only in IT Universe Manager and Topology View application.</p>

Button	Option Name	Use This Option to...
	Go Up One Layer	<p>Move up one level in the topology map. This option is enabled only if there is an additional CI layer above it, created by a parent or child folding rule as defined in View Manager. For details on folding rules, see “Adding Folding Rules to Relationships” on page 47.</p> <p>Note: This option appears only in IT Universe Manager and the Topology View application.</p>
	Hide All Inheritance From Map	<p>Toggle between showing and hiding Inheritance_f relationships and their connecting node.</p> <p>To access: Select Layout > Hide All Inheritance From Map.</p> <p>Note: This option is only active in the toolbar in CI Type Manager.</p>
	Hide All Node Labels	<p>Toggle between showing or hiding the CI/CIT/node/pattern labels.</p> <p>To access: Select Layout > Hide All Node Labels.</p>
	Hide All Relationship Labels	<p>Toggle between showing or hiding the relationship labels.</p> <p>To access: Select Layout > Hide All Relationship Labels.</p>
	Hide All Relationships	<p>Toggle between showing and hiding the relationships in the displayed map.</p> <p>To access: Select Layout > Hide All Relationships.</p>
	Hide Panes/Restore Panes	<p>Toggle between the regular display and a full-screen display of the topology map.</p>
	Information Pane	<p>Toggle between hiding and displaying the Information Pane at the bottom center of the screen.</p> <p>To access: Select View > Information Pane.</p>
	Interactive Zoom	<ul style="list-style-type: none"> ▶ Decrease the view magnification by clicking and pushing the pointer upwards. ▶ Magnify the view by clicking and pulling the pointer downwards. <p>To access: Open the drop-down menu in the Mode box or select View > Interactive Zoom.</p>

Button	Option Name	Use This Option to...
	Layout Properties	<p>Define the view's layer layout, by assigning positions for the nodes and relationships of the view. For details, see "Layout Properties Dialog Box" on page 708.</p> <p>To access: Select Layout > Layout Properties.</p>
	Layout	<p>Select the layout display from the list. The options are:</p> <ul style="list-style-type: none"> ▶ Hierarchical. Enables you to display the precedence relations in the topology map. ▶ Symmetric. Enables you to display clear representations of complex networks. ▶ Circular. Groups a graph's nodes into groups or clusters. ▶ Manual. Enables you to display the changes you have made manually to the topology map. ▶ Orthogonal. Enables you to display views of outstanding clarity that are achieved by employing only horizontal and vertical edge routing. <p>Note: Select Layout > Save Layout to save the selected layout.</p> <p>For further details about each of the options, see "Layout Properties Dialog Box" on page 708.</p>
	Map overview	<p>Open a small window with a copy of the topology map. This is useful in large views when zooming in.</p> <p>To access: Select Layout > Map Overview.</p>
	Navigation	<p>Take the pointer to the next connected CI/CIT/TQL node in a clockwise direction.</p> <ul style="list-style-type: none"> ▶ Left-click to move in a clockwise direction. ▶ Right-click to point to the next CI/CIT/node/pattern in a clockwise direction. <p>To access: Open the drop-down menu in the Mode box or select View > Navigation.</p> <p>Note: You can use this option only on CI/CIT/nodes/patterns that are connected by relationships.</p>
	New CI	<p>Define a new unrelated CI. For details, see "Working with CIs" on page 41.</p> <p>Note: This option appears in the toolbar in IT Universe Manager only.</p>

Button	Option Name	Use This Option to...
	New Related CI	Define a new related CI. For details, see “Working with CIs” on page 41. Note: This option appears in the toolbar in IT Universe Manager only.
	Place in Center	Place the selected CI/node/CIT/pattern in the center of the map. To access: Select Layout > Place in Center .
	Print	Print the contents of the topology map. For details, see “Print Dialog Box” on page 730. To access: Select Operations > Print...
	Print Preview	Preview the contents of the map before printing. To access: Select Operations > Print Preview .
	Print Setup	Define print settings for printing the topology map. For details, see “Print Setup Dialog Box” on page 731. To access: Select Operations > Print Setup...
	Remove Enrichment Results	Remove the instances created from an Enrichment rule from the CMDB. Note: This option appears in the toolbar in Enrichment Manager only.
	Save Layout	Save changes to the layout. To retrieve the layout you have saved, select Manual Layout . To access: Select Layout > Save Layout . Note: This option appears in the toolbar in IT Universe Manager and Topology View application only.
	Select	Select a CI/CIT/TQL node or multiple CIs/CITs/TQL nodes. To access: Open the drop-down menu in the Mode box or select View > Select .
	Select All	Select all the CIs and relationships in a selected layer. To access: Select Edit > Select All .
	Select All Nodes	Select all the nodes in a selected layer. To access: Select Edit > Select All Nodes .

Button	Option Name	Use This Option to...
	Select Columns	Enables you to select the columns to be displayed. For details, see, “Select Columns Dialog Box” in <i>Reference Information</i> . Note: This option is displayed in Text mode of IT Universe Manager only.
	Set Number of Hops	Open a dialog box which enables you to set the degree of separation of the related CIs to appear in the Related in DB selection. Note: This option appears in the toolbar in IT Universe Manager and Topology View application only.
	Show Changes in Map	Display an indicator next to each CI that was added or changed within the selected period as follows: <ul style="list-style-type: none"> ▶  Indicator for an added CI ▶  Indicator for a changed CI <p>You can toggle between hiding and displaying the indicators by clicking the button. When the indicators are displayed, you can double-click on the indicator to open the CI History dialog box, which displays the history for the CI over the selected period.</p> <p>For details on selecting the period, see “Change Timeframe” on page 734.</p> Note: This option appears in the toolbar in Topology View application only.
	Show Schedule Info	Display the scheduling information for the selected job. For details, see “Discovery Scheduler Dialog Box” in <i>Discovery and Dependency Mapping Guide</i> . Note: This option appears in the toolbar in the Dependency Map tab of DDM. For details, see “Dependency Map Tab” in <i>Discovery and Dependency Mapping Guide</i> .
	Sort Order	Enables you to set the order of the visible columns. For details, see, “Sort Column Content Dialog Box” in <i>Reference Information</i> . Note: This option is displayed in Text mode of IT Universe Manager and the Topology View application only.

Button	Option Name	Use This Option to...
	Straighten	<p>Straightens any selected relationship between two nodes that has angles.</p> <p>To access: Select Layout > Straighten.</p>
	User Preferences	<p>Opens the User Preferences dialog box which enables you to reset warning message preferences. For details, see “User Preferences Dialog Box” on page 432.</p> <p>To access: Select Edit > User Preferences.</p>
	Zoom	<p>Zoom in on a specific section of the topology map by clicking and drawing a selection rectangle around the part to magnify. The area you select is displayed at the highest percentage that fits in the topology map.</p> <p>To access: Open the drop-down menu in the Mode box or select View > Zoom.</p>

Part VII

Federation and Reconciliation

30

Introduction to Federated CMDB

This chapter provides information on the Federated CMDB functionality.

This chapter includes:

Concepts

- ▶ Federated CMDB – Overview on page 744
- ▶ Adapters on page 744
- ▶ Retrieving Data from Multiple Data Stores on page 745
- ▶ Retrieving Attributes from an External Data Store on page 746
- ▶ Mapping Information on page 748

Tasks

- ▶ Work with Federated Data – Workflow on page 748
- ▶ Change the Encrypted Password of a Federated Adapter on page 749

Reference

- ▶ Federated CMDB User Interface on page 751

Federated CMDB – Overview

CMDB implementations often involve federation, which is the inclusion of data in the CMDB from other sources, in such a way that the source of the data retains control of the data.

You use federated CMDB to answer the following types of questions:

- ▶ Which hosts in a specific application (for example, SAP) have changed more than a certain number of times in a certain time period?
- ▶ Which application names have changed more than a certain number of times in a certain time period?
- ▶ Which hosts in the model have changed more than a certain number of times in a certain time period?

Adapters

You set up adapters to work with data that is federated from different CMDB sources, using the HP Business Availability Center API. For details, see “The HP Universal CMDB Web Service API” in *Solutions and Integrations*.

You can use the following, predefined adapters to federate different CMDB sources:

- ▶ **BACKPIsAdapter.** Select to define an adapter that enables a user to create a FTQL to retrieve, in an external application, the status and values of KPIs that are connected to CIs. For details on the task, see Chapter 35, “Viewing KPIs in External Applications.”
- ▶ **CmdbChangesAdapter.** Select to define a source adapter that queries the UCMDB for changes. The adapter runs on federated TQLs and the UCMDB History database/schema. (For details on limitations, see “The CmdbChanges Adapter” on page 922.)
- ▶ **CmdbHistoryAdapter.** Select to define an adapter that retrieves data from a UCMDB History database. Note: the History Adapter does not support replication, that is, you cannot use this adapter to define a replication job (to copy data from one data store to another one).

- ▶ **CmdbRmiAdapter.** Select to define an adapter that uses an RMI API to retrieve data from an external CMDB data store. Note: This adapter supports federated replication only by default. To support federated queries, contact HP Software Support (<http://www.hp.com/go/hpsoftwaresupport>).
- ▶ **CmdbSoapAdapter.** Select to define an adapter that uses a SOAP API to retrieve data from an external CMDB data store. Note: This adapter does not support federated queries and can be used only as a target in federated replication.
- ▶ **ServiceDeskAdapter.** Select to define an adapter that supports the retrieval of data from HP ServiceCenter and HP Service Manager. This adapter connects to, and receives data from, ServiceCenter/Service Manager using the Web Service API. For details on working with this adapter, see Chapter 33, “The HP ServiceCenter/Service Manager Adapter.”
- ▶ **GenericDBAdapter.** Platform for configuring a database adapter that integrates with any type of relational database and enables running federated TQLs against the databases. For details on working with this adapter, see Chapter 32, “The Generic Database Adapter.”

The **Federation Framework SDK** acts as a mediator between HP Business Availability Center and the adapters, and as a container for the federated adapters. For details, see “The Federation Framework SDK” on page 765.

For details on choosing an adapter when creating a data store, see “Data Stores Tab” on page 751.

Retrieving Data from Multiple Data Stores

During FTQL calculation, you can retrieve data for the same CIT from several data stores. The data can be retrieved from the local UCMDB and from an external data store, or from several external data stores.

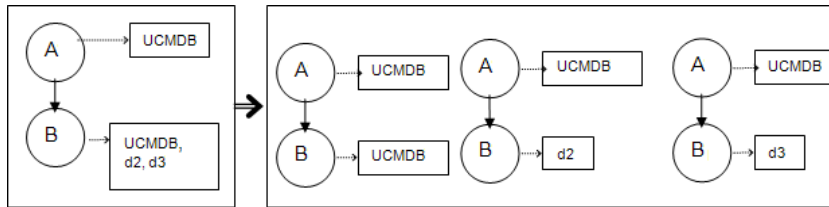
The data can be retrieved by the same adapter from several locations or by several adapters from several locations.

Each CI that is retrieved from an external data store includes an attribute (Created By) to show from which data store the CI has been retrieved.

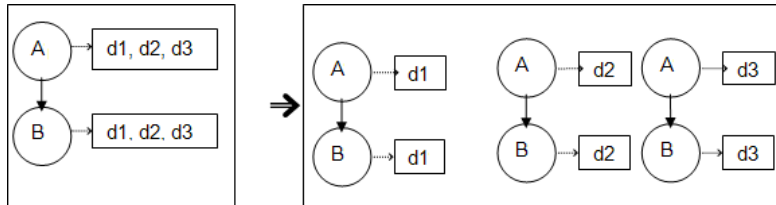
For details on mapping information, see “Mapping Information” on page 748.

Limitations

- ▶ When a virtual link exists between two data stores, HP Universal CMDB supports mapping in the following cases only:
 - ▶ The UCMDB data store lies at one end of the link and multiple data stores lie at the other end. The Cartesian product is calculated for A’s data store (UCMDB) and B’s data stores (UCMDB, d2, d3).



- ▶ The same data stores lie at both ends of the link. The link is an internal link of each data store and no mapping is required.



- ▶ Data that is retrieved from several data stores is not reconciled. If two data stores include the same CIT, the CIT appears twice in HP Universal CMDB. If two data stores include the same attribute, only one of the attributes is federated with the UCMDB.

Retrieving Attributes from an External Data Store

- ▶ You can retrieve the attributes of a CI from an external data store, when the core CI data is stored in the UCMDB.
- ▶ The core data store must be the UCMDB.

- ▶ The CIT must be located in a data store for its attributes to be defined.
- ▶ The same attributes can be retrieved from multiple data stores.

For details on retrieval options, see the CI Type Retrieval Mode field in the “Supported CI Types Tab” on page 756.

- ▶ You cannot map a CIT to an external CIT and to the external CIT's attributes.
- ▶ A CIT can support external attributes if the adapter (that is federating the CIT data) supports mapping information (reconciliation) for this CIT.

Use Cases

- ▶ You need to discover the SMS or Altiris desktops in your system. The desktop CIT is a core CIT and is already synchronized with the UCMDB. However, you do not want to store all the desktop data in the UCMDB as this is inefficient and unnecessary. It is enough to store core attributes such as name and MAC address in the UCMDB, and to define the other details of the desktops as external attributes in two data stores: SMS and Altiris.
- ▶ VMware creates virtual machines that contain a virtual machine monitor (hypervisor) that allocates hardware resources dynamically and transparently. Multiple operating systems can run concurrently on a single physical computer. Since the allocation resources (for example, memory) are dynamic, DDM cannot discover these resources (DDM runs once every 24 hours and the resource data can change hourly). To enable HP Universal CMDB to always be updated with real-time data, the solution is to divide the data into two: the core data of the virtual hosts should be discovered and placed in the UCMDB; the resource attributes should be retrieved from the external source. In this use case, the data for these attributes is retrieved from two data stores: UCDMB and VMware.

Mapping Information

Federated queries should use the Mapping Engine to unify the shallow CIs (the core attributes of a CI) from the core data store with the attributes from the external data store.

For details on the Mapping Engine, see “Federation Framework Flow for FTQL” on page 770.

For details on selecting attributes to be included in the federation, see “Supported CI Types Tab” on page 756.

Work with Federated Data – Workflow

This section explains how to set up and work with data that is federated from different CMDB sources, using the HP Business Availability Center application.

This section includes the following topics:

- “Prerequisites” on page 748
- “Create a Data Store” on page 749
- “Replicate the Data Store” on page 749
- “Build a View” on page 749
- “View Instances in IT Universe Manager” on page 749
- “View Reports” on page 749

1 Prerequisites

Set up the adapter. For details, see “Add an Adapter for a New External Data Store” on page 785. For details on existing adapters, see “Adapters” on page 744.

2 Create a Data Store



Access **Admin > Universal CMDB > Settings > Federated CMDB**. Click the **Add** button to open the New Data Store dialog box. For details, see “New Data Store Wizard” on page 753.

3 Replicate the Data Store

Use the data store for replication. Access **Admin > Universal CMDB > Settings > Federated CMDB > Replication Jobs** tab. Click the **Add** button to open the Replication Job dialog box. For details, see “Replication Job Dialog Box” on page 759.

4 Build a View

For details, see “View Manager Overview” on page 158.

5 View Instances in IT Universe Manager

For details, see “IT Universe Manager Overview” on page 36.

6 View Reports

For details, see “Topology Report Manager Overview” on page 278.



Change the Encrypted Password of a Federated Adapter

When defining a new data store adapter, a user must enter a password. This password is encrypted by default and encryption is entirely transparent to the user.

The following procedures explain how to generate a new key file and change an existing key file. HP Business Availability Center includes a default key so that these procedures are optional.

Note: During the upgrade process from a version with unencrypted passwords, the passwords are encrypted.

The encryption key is located at **C:\hp\UCMDB\UCMDBServer\j2f\fcmdb\fkey.bin**.

To generate a new key file:

- 1 Launch the Web browser and enter the following address:

```
http://<machine name or IP address>.<domain_name>:8080/jmx-console
```

where **<machine name or IP address>** is the machine on which HP Business Availability Center is installed. You may have to log in with the user name and password.

- 2 Click the **Topaz > service=FCmdb Config Services** link.
- 3 In the JMX MBEAN View page, locate the following operation:
java.lang.String generateNewKeyFile().
- 4 In the **customer id** field, enter **1**.
- 5 Click **Invoke**. A message is displayed informing you that a new key file is generated and has been loaded into the application.

To change the key file:

- 1 Prepare a key file and note the location.
- 2 In the JMX MBEAN View page, locate the following operation:
java.lang.String importKeyFile().
- 3 In the **customerId** field, enter **1**; in the **newKeyFileLocation** field, enter the full path to the new key.
- 4 Click **Invoke**. A message is displayed.

Federated CMDB User Interface






This section describes:

- Data Stores Tab on page 751
- Federated CMDB Window on page 752
- New Data Store Wizard on page 753
- Replication Job Dialog Box on page 759
- Replication Job Statistics Window on page 760
- Replication Jobs Tab on page 762

Data Stores Tab

Description	<p>Enables you to edit existing data stores or to create new stores.</p> <p>To access: Admin > Universal CMDB > Settings > Federated CMDB > Data Stores tab.</p>
Important Information	<p>Data Stores includes the following tabs:</p> <ul style="list-style-type: none"> ➤ Properties. Enables you to configure an adapter that accesses external data sources. For details, see “Properties Tab” on page 754. ➤ Supported CI Types. Enables you to choose which CITs are to be supported by the data store. For example, if a federated TQL (FTQL) includes a node that represents a specific CIT, the instances of this CIT are accepted from this external data store. For details, see “Supported CI Types Tab” on page 756. ➤ Supported Queries. Enables you to choose which queries should be supported by this data store for data replication. For details, see “Supported Queries Tab” on page 758.

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

GUI Element (A-Z)	Description
	Add a data store. For details, see “New Data Store Wizard” on page 753.
	Delete a data store.
	Click to save changes.
 Refresh	Click to refresh the page.
	Click to reload, if changes have been made to the adapter.
<List of Defined Adapters>	Name. The name you give to the data store. Adapter. The type of adapter for this data store.
View	For details, see: <ul style="list-style-type: none"> ➤ “Data Stores Tab” on page 751 ➤ “Supported CI Types Tab” on page 756

Federated CMDB Window

Description	Enables you to define external data stores and create replication jobs. To access: Admin > Universal CMDB > Settings > Federated CMDB.
Important Information	You create a data store with the New Data Store wizard. For details, see “New Data Store Wizard” on page 753.
Included in Tasks	“Work with Federated Data – Workflow” on page 748
Useful Links	<ul style="list-style-type: none"> ➤ “Data Stores Tab” on page 751 ➤ “Replication Jobs Tab” on page 762 ➤ “Adapters” on page 744

 **New Data Store Wizard**

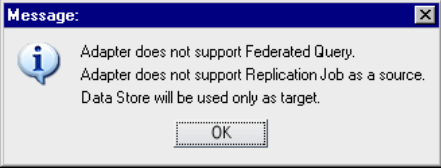
Description	<p>Enables you to define a data store that uses an adapter to access external data sources.</p> <p>To access: Admin > Universal CMDB > Settings > Federated CMDB > Data Stores tab > click the Add button.</p>
Important Information	<p>Depending on the adapter's function, use one of the following adapters to define a data store:</p> <ul style="list-style-type: none"> ▶ CmdbChangesAdapter. The adapter supports federated replication only and can be used as a source, therefore, you must fill in the Properties tab and the Supported Queries tab. ▶ CmdbHistoryAdapter. The adapter supports federated TQL queries only, therefore you must fill in the Properties tab and the Supported CI Types tab. ▶ CmdbRmiAdapter. The adapter supports both federated replication and federated queries, therefore you must fill in the Properties tab, the Supported CI Types tab, and the Supported Queries tab. (By default, this adapter supports replication only.) ▶ CmdbSoapAdapter. The adapter supports federated replication only and can be used as a target, therefore you must fill in the Properties tab. ▶ ServiceDeskAdapter. The adapter supports federated TQL queries only, therefore you must fill in the Properties tab and the Supported CI Types tab. ▶ GenericDBAdapter.
Included in Tasks	<p>"Work with Federated Data – Workflow" on page 748</p>
Useful Links	<ul style="list-style-type: none"> ▶ "Retrieving Data from Multiple Data Stores" on page 745 ▶ "Retrieving Attributes from an External Data Store" on page 746 ▶ "Adapters" on page 744

Properties Tab

Description	<p>Enables you to select the type of adapter, and to define the connection information for the external data store you are defining.</p> <p>To access: Admin > Universal CMDB > Settings > Federated CMDB > Data Stores tab. Click the New Data Store button.</p>
Important Information	All enabled fields are mandatory.
Useful Links	“Adapters” on page 744

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



GUI Element (A–Z)	Description
Adapter	Choose the adapter to retrieve the external data from an external data store.
Customer ID	For Business Availability Center, enter 1 . For HP Software-as-a-Service, enter the customer ID number.
Host	<p>Enter the name of the machine to which the adapter must connect.</p> <p>For the BACKPIsAdapter, enter the name of the Business Availability Center Gateway server.</p>
Name	Enter a name to identify the data store. The name must be unique in the Business Availability Center version.

GUI Element (A–Z)	Description
Next button	<p>Click to continue defining the adapter.</p> <p>Note: If you did not test the connection, it is automatically tested when you click Next.</p> <p>If the adapter does not support a federated query and replication as a source (that is, the adapter supports replication only as a target, for example, the SOAP adapter), the following message is displayed:</p>  <p>Click OK, then click Finish.</p>
Password	<p>Enter the password needed to access the external data store to which you want to connect. If you set up the system to accept an encrypted password, the password you enter in this field is encrypted and saved to the database.</p> <p>For details on encrypted passwords, see “Change the Encrypted Password of a Federated Adapter” on page 749.</p>
Port	<p>Enter the port through which you are accessing the external data store (if required).</p> <p>For the BACKPisAdapter, enter the number of the RMI port. The default is 29601.</p>
Test connection button	<p>Click to test that you have entered valid information.</p>
URL	<p>Use this field to define a specific URL to connect to the external data store.</p>
User	<p>Enter the user name needed to access the external data store to which you want to connect.</p>

Supported CI Types Tab

Description	Enables you to choose which CITs or attributes are to be supported by the data store. For example, if a federated TQL (FTQL) includes a node that represents a specific CIT, the instances of this CIT are accepted from this external data store. To access: Admin > Universal CMDB > Settings > Federated CMDB > Data Stores tab. Click the Supported CI Types tab.
Important Information	This page is displayed when the selected adapter supports federated queries.
Included in Tasks	“Work with Federated Data – Workflow” on page 748
Useful Links	“Retrieving Attributes from an External Data Store” on page 746

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


GUI Element (A-Z)	Description
	Represents instance federation, that is, CITs are federated.
	Represents attribute federation, that is, federation is run at the level of the attributes of a CIT.
<List of CITs>	This list includes all CITs that are supported by the adapter. When queried by an FTQL, the CITs you select here are configured to retrieve the data from this external data store. Select the CITs to be supported by this data store. For BACKPIsAdapter , select Real Time KPI .

GUI Element (A-Z)	Description
CI Type Retrieval Mode	<ul style="list-style-type: none"> ▶ Retrieve CIs of selected CI Type. All a CI's data, including all its attributes, are retrieved from the data store. Retrieve CIs of the <CI Type name> CI Type from the UCMDB too. The CI can be federated as well as physically retrieved from the UCMDB (if any CI instances exist in the database). ▶ Retrieve selected attributes. The selected attributes are retrieved from the data store. The CIs must already exist in the UCMDB. Retrieve the attribute from the UCMDB too. The attribute can be federated as well as physically retrieved from the UCMDB (if any attributes of CI instances exist in the database). <p>Note:</p> <ul style="list-style-type: none"> ▶ All CITs (and their child CITs) included in a data store definition must use the same retrieval mode. ▶ You cannot select both CITs and attributes for the same data store.
CI Types	<p>The CIT hierarchy.</p> <p>Right-click the CIT to define a new data store of the same data store type.</p>
Select Attributes	<p>You can define which attributes of an external CIT are to be included in the federation:</p> <ul style="list-style-type: none"> ▶ In the CI Type Retrieval Mode pane, select Retrieve selected attributes. ▶ In the Select Attributes list, select the attributes that are to be included in the federation. ▶ Save the changes. <p>Note: Attributes are defined in the CIT Manager. For details, see "Add/Edit Attribute Dialog Box" on page 251.</p>

Supported Queries Tab

Description	<p>Displays a list of queries that are supported by the adapter. Enables you to choose which queries should be supported by this data store for data replication.</p> <p>To access: Admin > Universal CMDB > Settings > Federated CMDB > Data Stores tab. Click the Supported Queries tab.</p>
Important Information	<p>This page is displayed when an adapter is selected that supports federated replication and can be used as a source.</p>
Included in Tasks	<p>“Work with Federated Data – Workflow” on page 748</p>

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

GUI Element (A-Z)	Description
	<ul style="list-style-type: none"> ▶ Select/Unselect All. Click to select all queries in the list and click again to clear all queries. ▶ Switch Selection. Click to select all non-selected queries or to clear all selected queries. ▶ Show Selected Queries. Click to view a list of all selected queries.
<List of query names>	<p>This list includes all queries that are supported by the adapter. During replication job configuration, queries you select here are visible.</p> <p>Select the queries to be included in the configured data store.</p> <p>Visible. The query is visible in the Replication Job dialog box for the current data store.</p>

 **Replication Job Dialog Box**

Description	Enables you to replicate data between two data stores. To access: Admin > Universal CMDB > Settings > Federated CMDB > Replication Jobs. Click the Add button.
Important Information	<ul style="list-style-type: none"> ▶ For successful replication, if you use CMDB adapters for replication (SOAP or RMI), the CIT class model in the target (the machine to which the data is imported, to be federated) must be identical to the class model in the source (the machine from which the data is exported). ▶ To add specific CIs only from a TQL during a replication job, you must configure the required condition on those CIs. Then, you must configure the same conditions for the relationship TQLs that are linked to the CIs.
Included in Tasks	“Work with Federated Data – Workflow” on page 748

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

GUI Element (A-Z)	Description
Name	Enter a name to identify the replication job.
Replication Job Queries	<ul style="list-style-type: none"> ▶ Active. Select to use this query in the replication job. ▶ Name. The query name. ▶ Description. The description of the query. ▶ Permit Deletion in Target. Permits deletion of CIs and relationships on the target machine if they have been deleted in the source query result.

GUI Element (A-Z)	Description
Source Data Store	<p>The data store for the data that is to be brought over and replicated to the data on the target machine.</p> <p>Only data stores that have adapters that support replication and can be used as a source are displayed here.</p> <p>Click Details to view information about the data store.</p>
Target Data Store	<p>The data store to which the data that is brought in from the source machine should be replicated.</p> <p>Only data stores that have adapters that support replication and can be used as a target are displayed here.</p>

Replication Job Statistics Window

Description	<p>Enables you to view statistics for a selected replication job to verify whether replication is successful.</p> <p>To access: Admin > Universal CMDB > Settings > Federated CMDB > Replication Jobs tab. Select a replication job and click the Statistics icon in the toolbar.</p>
Important Information	<p>Click a row to view error messages for a specific replication job.</p>

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







GUI Element (A-Z)	Description
Ad hoc	Yes. The replication job was run by Scheduler or by the user clicking the Ad hoc icon in the Replication Jobs tab.
Full replication	Yes. The user chose to retrieve all appropriate data in the source to the target, without taking the last run of the replication job into consideration.
Job Name	Name given to the replication job.


GUI Element (A-Z)	Description
Replication Job Statistics per Query	<ul style="list-style-type: none"> ▶ Query Name. The name of the query that is used for replication. ▶ Status. Can be SUCCEEDED or FAILED. If the status is FAILED, click the query to display the Replication Job Error dialog box that contains the reason for the failure. For more detailed information, look at the fcmbd.synchronizer.log file, located in the following folder: <HP Business Availability Center root directory \fcmbd\ ▶ Replication Start Time. The time the replication job started running replication for the current query. ▶ Replication Stop Time. The time the replication job stopped running replication for the current query. ▶ Updated. The number of CIs and relationships that were updated in the target data store during the last replication job. ▶ Added. The number of CIs and relationships that were added in the target data store during the last replication job. ▶ Removed. The number of CIs and relationships that were removed in the target data store during the last replication job. Note: The CIs and relationships are removed from the target only if Permit Deletion in Target is selected in the Replication Job definition. ▶ Has Error. Yes. Click to open the Replication Error dialog box that displays the reason for the failure.
Source Data Store	The ID of the source data store.
Status	Can be SUCCEEDED or FAILED.
Target Data Store	The ID of the target data store.

Replication Jobs Tab

Description	Enables you to define the replication jobs that contain the source data store, target data store, and queries, whose results should be replicated. To access: Admin > Universal CMDB > Settings > Federated CMDB > Replication Jobs tab.
Important Information	You can set up a schedule to run a replication job. For details, see “Scheduler Actions” on page 496.

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

GUI Element (A-Z)	Description
 New Replication Job	Click to add a replication job. For details, see “Replication Job Dialog Box” on page 759.
 Delete Selected Items	Click to delete a replication job.
 New Data Store	Click to open the New Data Store dialog box. For details, see “New Data Store Wizard” on page 753.
 Save	Click to save the changes.
 Refresh	Click to refresh the page.
	Click to test that replication is successful: <ul style="list-style-type: none"> ▶ Ad hoc diff replication. The result from the source data store is compared to the result from the last run of the replication job; only changes are sent to the target data store. ▶ Ad hoc full replication. All appropriate data in the source is brought to the target, without taking the last run of the replication job into consideration. <p>Note: This feature is useful when testing a replication job as you are developing it. During production, you should use the Scheduler to run the replication job. For details, see “Schedule Tab” on page 763.</p>

GUI Element (A-Z)	Description
 Statistics	Click to view replication job statistics about the selected replication job. For details, see “Replication Job Statistics Window” on page 760.
Filter <input type="text" value="<Show All>"/>	To filter the list of tasks, choose from the list and type in the first letters in the by box.
<right-click menu>	For details, see the explanations for the buttons in this table. Duplicate Replication Job. Enter a name for the duplicate job and make changes to it as necessary. Save the job.
Tasks Table	Name. The name you give to the replication job. Source Data Store. The ID of the source data store. Target Data Store. The ID of the target data store. Queries. The queries that are used for replication in this replication job.




Properties Tab

Description	Enables you to edit a replication job. To access: Admin > Universal CMDB > Settings > Federated CMDB > Replication Jobs tab. Click the Properties tab.
Important Information	For details, see “Replication Job Dialog Box” on page 759.

Schedule Tab

Description	Enables you to set a schedule to run replication jobs. To access: Admin > Universal CMDB > Settings > Federated CMDB > Replication Jobs tab. Click the Schedule tab.
Useful Links	Chapter 15, “Scheduler”

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

GUI Element (A-Z)	Description
	Click to add a schedule. For details, see “Job Definitions Dialog Box” on page 497. For details on setting a replication job action, see “Action Definition Dialog Box” on page 495.
	Click to edit an existing schedule. For details, see “Job Definitions Dialog Box” on page 497.
	Delete a schedule.
Active	The schedule runs at the defined time.
Job Definition	A description of the job.
Last Run Time	The previous time that the schedule ran.
Name	The name of the schedule.
Next Run Time	The date and time that the schedule will next run.
Schedule	The description of the schedule.

31

The Federation Framework SDK

This chapter provides information on the Federation Framework functionality, which uses an API to retrieve information from federated sources.

This chapter includes:

Concepts

- ▶ Federation Framework – Overview on page 766
- ▶ Adapter and Mapping Interaction with the Federation Framework on page 769
- ▶ Federation Framework Flow for FTQL on page 770
- ▶ Federation Framework Flow for Replication on page 782
- ▶ Adapter Interfaces on page 783

Tasks

- ▶ Add an Adapter for a New External Data Store on page 785
- ▶ Implement the Default Mapping Engine on page 792
- ▶ Add a New Adapter – Scenario on page 794

Reference

- ▶ Adapter Capabilities on page 800

Federation Framework – Overview

Note:

- ▶ The term **relationship** is equivalent to the term **link**.
 - ▶ The term **CI** is equivalent to the term **object**.
 - ▶ A graph is a collection of nodes and links.
 - ▶ The term **UCMDB** refers to the configuration management database used by BAC.
 - ▶ For a glossary of definitions and terms, see “Glossary.”
-

The Federation Framework provides two main capabilities:

- ▶ **Federation on the fly.** All queries are run over original data stores and results are built on the fly in UCMDB.
- ▶ **Data Replication.** Replicates data (topological data and CI properties) from one data store to another.

Both action types require an adapter for each data store, which can provide the specific capabilities of the data store and retrieve and/or update the required data. Every request to the data store is made through its adapter.

This section includes the following topics:

- ▶ “Federation on the Fly” on page 766
- ▶ “Data Replication” on page 768

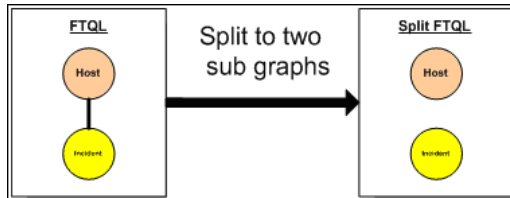
Federation on the Fly

Federated TQL enables data retrieval from any external data store without replicating its data.

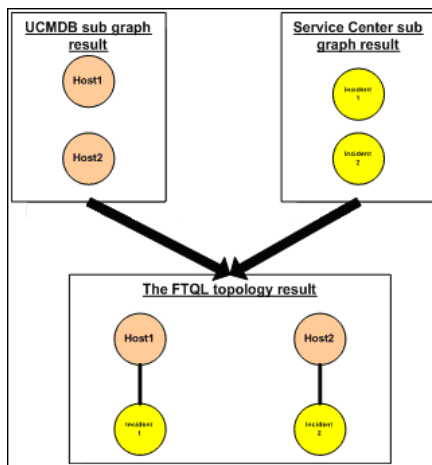
A federated TQL query uses adapters that represent external data stores, to create appropriate external relationships between different external data store CIs and the UCMDB CIs.

Example of Federation on the Fly Flow

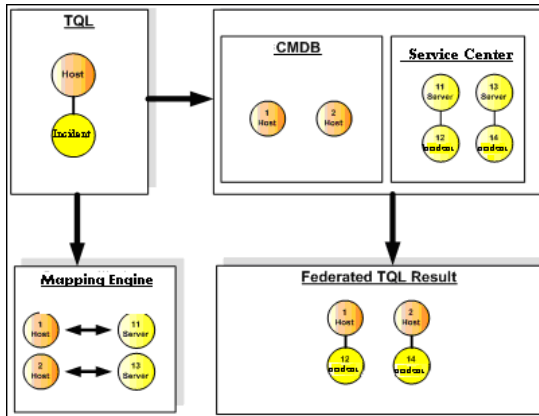
- 1 The Federation Framework splits a Federated TQL (FTQL) into several subgraphs, where all nodes in a subgraph refer to the same data store. Each subgraph is connected to the other subgraphs by a virtual relationship (but itself contains no virtual relationships).



- 2 After the FTQL is split into subgraphs, the Federation Framework calculates each subgraph's topology and connects two appropriate subgraphs by creating virtual relationships between the appropriate nodes.



- 3 After the FTQL topology is calculated, the Federation Framework retrieves a layout for the topology result.



Data Replication

You replicate data if you have several data stores with a large amount of data, and another data store that uses a view with data from these data stores.

In data replication, data stores are divided into two categories: source and target. Data is retrieved from the source data store and updated to the target data store. The replication is based on query names, that is, data is synchronized between the source data store and target data store and is retrieved by a query name in the source data store. For example, in the UCMDB, the query name is the name of the TQL. However, in another data store the query name can be a code name that returns data. The adapter is designed to correctly handle the query name.

Each query name in the source data store can be defined as an exclusive query. This means that the CIs and relationships in the query results are unique in the target data store, and no other query can bring them to the target. The adapter of the source data store supports specific queries, and can retrieve the data from this data store. The adapter of the target data store enables the update of retrieved data on this data store.

The replication process flow includes the following steps:

- 1 Retrieves the topology result with signatures from the source data store.
- 2 Compares the new results with the previous results.
- 3 Retrieves a full layout (that is, all CI properties) of CIs and relationships, for changed results only.
- 4 Updates the target data store with the received full layout of CIs and relationships. If any CIs or relationships are deleted in the source data store and the query is exclusive, the replication process removes the CIs or relationships in the target data store as well.

Adapter and Mapping Interaction with the Federation Framework

An adapter is an entity in the UCMDDB that represents external data (data that is not saved in the UCMDDB). In federated flows, all interactions with external data sources are performed through adapters. The Federation Framework interaction flow and adapter interfaces are different for replication and for FTQL.

This section includes the following topics:

- “Adapter Lifecycle” on page 769
- “Adapter assist Methods” on page 770

Adapter Lifecycle

An adapter instance is created for each external data store. The adapter begins its lifecycle with the first action applied to it (such as, `calculate TQL` or `retrieve/update data`). When the **start** method is called, the adapter receives environmental information, such as the data store configuration, logger, and so on. The adapter lifecycle ends when the data store is removed from the configuration, and the **shutdown** method is called. This means that the adapter is stateful and can contain the connection to the external data store if it is required.

Adapter assist Methods

The adapter has several **assist** methods that can add external data store configurations. These methods are not part of the adapter lifecycle and create a new adapter each time they are called.

- ▶ The first method tests the connection to the external data store for a given configuration.
- ▶ The second method is relevant only for the source adapter and returns the supported queries for replication.
- ▶ The third method is relevant only for FTQL and returns supported external classes by the external data store.

All these methods are used when you create new data store configurations.

Federation Framework Flow for FTQL

This section includes the following topics:

- ▶ “Definitions and Terms” on page 770
- ▶ “Mapping Engine” on page 771
- ▶ “FTQL Adapter” on page 771
- ▶ “Flow Diagrams” on page 772

Definitions and Terms

Reconciliation data. The rule for matching CIs of the specified type that are received from UCMDB and the external data store. The reconciliation rule can be of three types:

- ▶ **ID reconciliation.** This can be used only if the external data store contains the UCMDB ID of reconciliation objects.
- ▶ **Property reconciliation.** This is used when the matching can be done by properties of the reconciliation CI type only.

- **Topology reconciliation.** This is used when you need the properties of additional CITs (not only of the reconciliation CIT) to perform a match on reconciliation CIs. For example, you can perform reconciliation of the host type by the `ip_address` property that belongs to the ip CIT.

Reconciliation object. The object is created by the adapter according to received reconciliation data. This object should refer to an external CI and is used by the Mapping Engine to connect between the external CIs and the UCMDB CIs.

Reconciliation CI type. The type of CIs that represent reconciliation objects. These CIs must be stored in both UCMDB and in the external data stores.

Mapping engine. A component that identifies relations between CIs from different data stores that have a virtual relationship between them. The identification is performed by reconciling UCMDB reconciliation objects and external CI reconciliation objects.

Mapping Engine

Federation Framework uses the Mapping Engine to calculate the FTQL. The Mapping Engine connects between CIs that are received from different data stores and are connected by virtual relationships. The Mapping Engine also provides reconciliation data for the virtual relationship. One end of the virtual relationship must refer to UCMDB. This end is a **reconciliation type**. For the calculation of the two subgraphs, a virtual relationship can start from any end node.

FTQL Adapter

The FTQL adapter brings two kinds of data from external data stores: external CI data and reconciliation objects that belong to external CIs.

External CI data. The external data that does not exist in UCMDB. It is the target data of the external data store.

Reconciliation object data. The auxiliary data that is used by the federation framework to connect between UCMDB CIs and external data. Each reconciliation object should refer to an External CI. The type of reconciliation object is the type (or subtype) of one of the virtual relationship ends whose data is retrieved from UCMDB. Reconciliation objects should fit the adapter received to reconciliation data. The reconciliation object can be one of three types: `IdReconciliationObject`, `PropertyReconciliationObject`, or `TopologyReconciliationObject`.

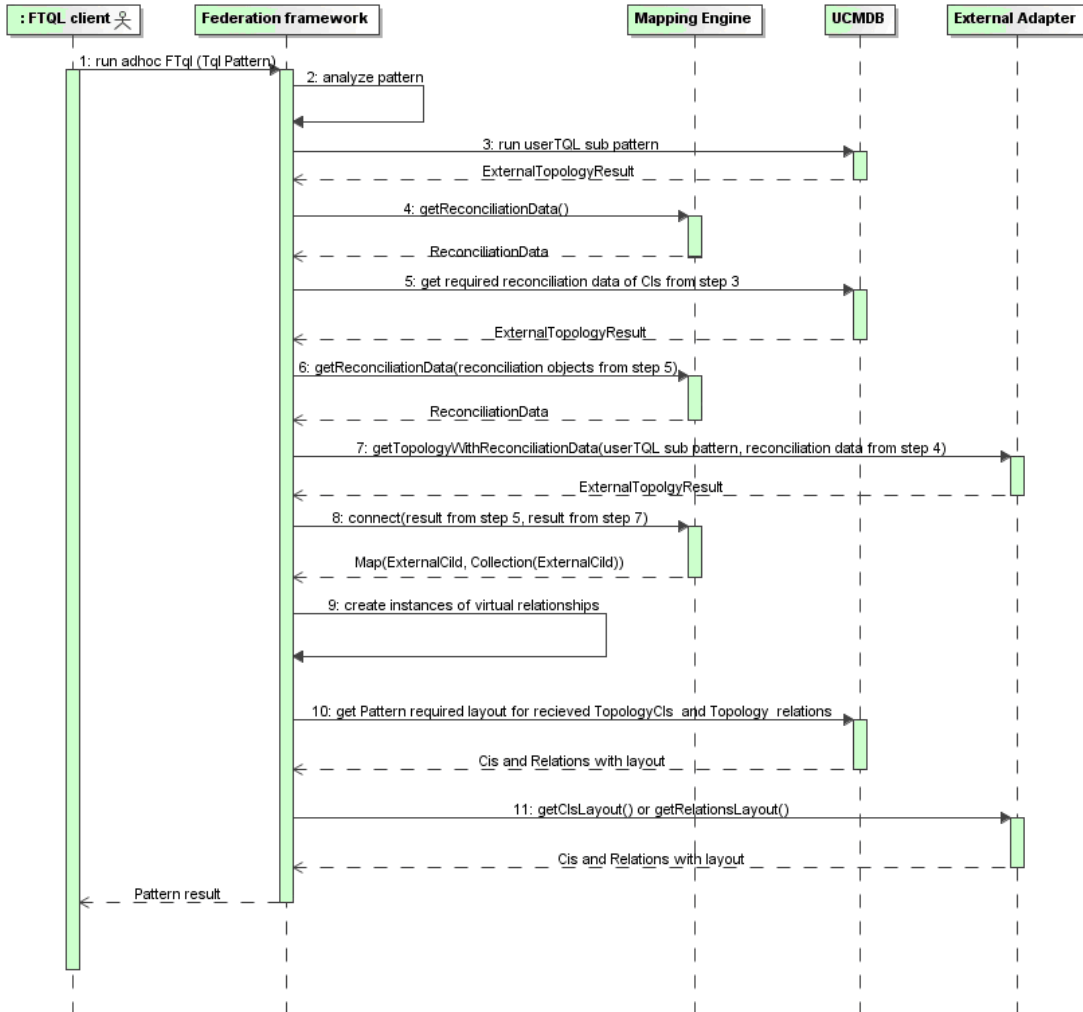
Flow Diagrams

The following diagrams illustrate the interactions between the Federation Framework, UCMDB, the adapter, and the Mapping Engine. The FTQL in the example diagrams has only one virtual relationship, so that only UCMDB and one external data store are involved in the FTQL.

In the first diagram the calculation begins in UCMDB and in the second diagram in the external adapter. Each step in the diagram includes references to the appropriate method call of the adapter or mapping engine interface.

The Calculation Starts at the HP Universal CMDB End

The following sequence diagram illustrates the interaction between the Federation Framework, UCMDB, the adapter, and the Mapping Engine. The FTQL in the example diagram has only one virtual relationship, so that only UCMDB and one external data store are involved in the FTQL.

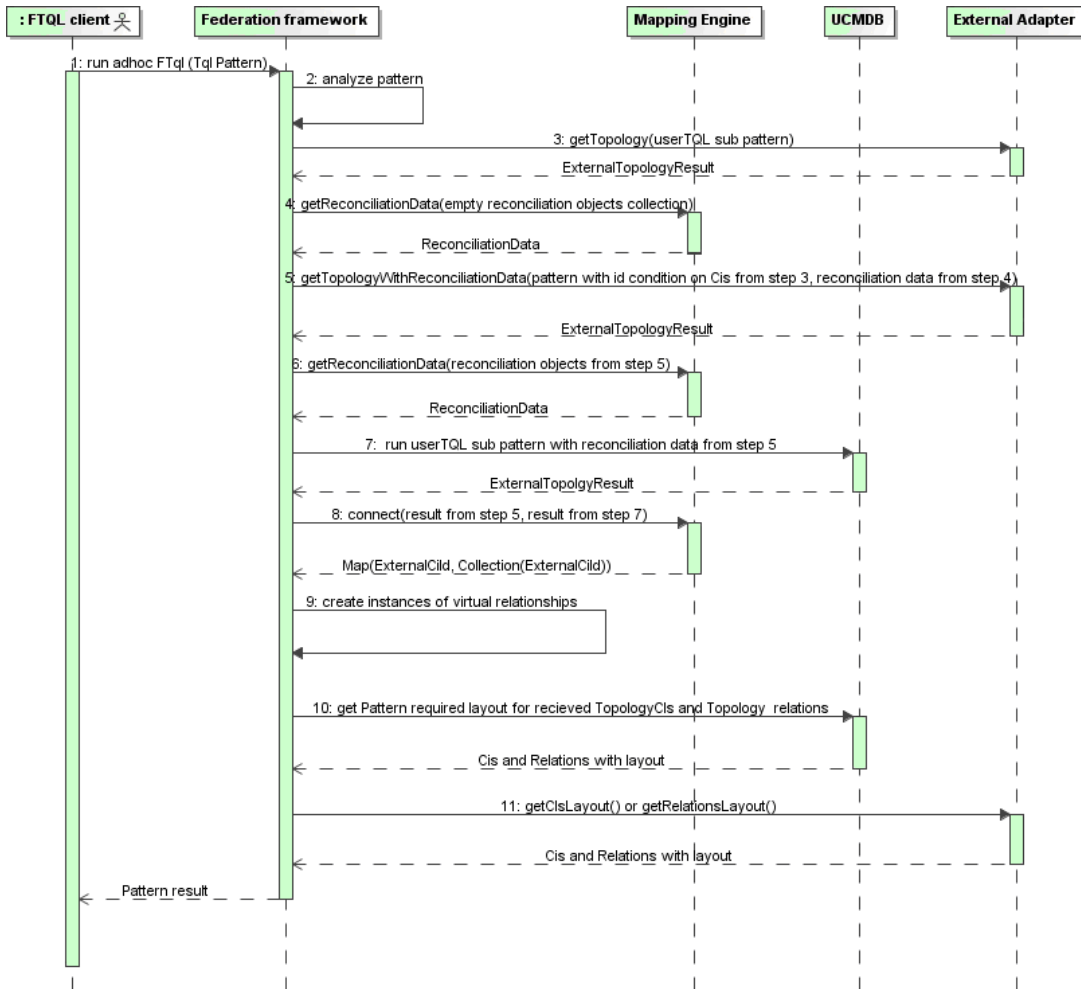


The numbers in this image are explained below:

- 1** The Federation Framework receives a call for a FTQL calculation.
- 2** The Federation Framework analyzes the pattern, finds the virtual relationship, and divides the original TQL into two sub-patterns—one for UCMDB and one for the external data store.
- 3** The Federation Framework requests the topology of the sub-TQL from UCMDB.
- 4** After receiving the topology results, the Federation Framework calls the appropriate Mapping Engine for the current virtual relationship and requests reconciliation data. The `reconciliationObject` parameter is empty at this stage, that is, no condition is added to reconciliation data in this call. The returned reconciliation data defines which data is needed to match the reconciliation CIs in UCMDB to the external data store. The reconciliation data can be one of the following types:
 - **IdReconciliationData.** CIs are reconciled according to their ID.
 - **PropertyReconciliationData.** CIs are reconciled according to the properties of one of the CIs.
 - **TopologyReconciliationData.** CIs are reconciled according to the topology (for example, to reconcile host CIs, the IP address of **IP** is required too).
- 5** The Federation Framework requests reconciliation data for the CIs of the virtual relationship ends that were received in step 3 from UCMDB.
- 6** The Federation Framework calls the Mapping Engine to retrieve the reconciliation data. In this state (by contrast with step 3), the Mapping Engine receives the reconciliation objects from step 5 as parameters. The Mapping Engine translates the received reconciliation object to the condition on the reconciliation data.
- 7** The Federation Framework requests the topology of the sub-TQL from the external data store. The external adapter receives the reconciliation data from step 6 as a parameter.

- 8** The Federation Framework calls the Mapping Engine to connect between the received results. The `firstResult` parameter is the external topology result received from UCMDB in step 5 and the `secondResult` parameter is the external topology result received from the External Adapter in step 7. The Mapping Engine returns a map where External CI ID from the first data store (UCMDB in this case) is mapped to the External CI IDs from the second (external) data store.
- 9** For each mapping, the Federation Framework creates a virtual relationship.
- 10** After the calculation of the FTQL results (only at the topology stage), the Federation Framework retrieves the original TQL layout for the resulting CIs and relationships from the appropriate data stores.

The Calculation Starts at the External Adapter End



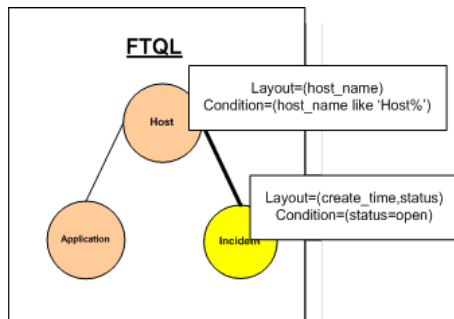
- 1 The Federation Framework receives a call for an FTQL calculation.
- 2 The Federation Framework analyzes the pattern, finds the virtual relationship, and divides the original TQL into two sub-patterns – one for UCMDB and one for the external data store.

- 3** The Federation Framework requests the topology of the sub-TQL from the External Adapter. The returned `ExternalTopologyResult` is not supposed to contain any reconciliation object, since the reconciliation data is not part of the request.
- 4** After receiving the topology results, the Federation Framework calls the appropriate Mapping Engine with the current virtual relationship and requests reconciliation data. The `reconciliationObjects` parameter is empty at this state, that is, no condition is added to the reconciliation data in this call. The returned reconciliation data defines what data is needed to match the reconciliation CIs in UCMDB to the external data store. The reconciliation data can be one of three following types:
 - ▶ **IdReconciliationData.** CIs are reconciled according to their ID.
 - ▶ **PropertyReconciliationData.** CIs are reconciled according to the properties of one of the CIs.
 - ▶ **TopologyReconciliationData.** CIs are reconciled according to the topology (for example, to reconcile host CIs, the IP address of **IP** is required too).
- 5** The Federation Framework requests reconciliation objects for the CIs that were received in step 3 from the external data store. The Federation Framework calls the `getTopologyWithReconciliationData()` method in the External Adapter, where the requested topology is a one-node topology with CIs received in step 3 as the ID condition and reconciliation data from step 4.
- 6** The Federation Framework calls the Mapping Engine to retrieve the reconciliation data. In this state (by contrast with step 3), the Mapping Engine receives the reconciliation objects from step 5 as parameters. The Mapping Engine translates the received reconciliation object to the condition on the reconciliation data.
- 7** The Federation Framework requests the topology of the sub-TQL with reconciliation data from step 6 from UCMDB.

- 8 The Federation Framework calls the Mapping Engine to connect between the received results. The `firstResult` parameter is the external topology result received from the External Adapter at step 5 and the `secondResult` parameter is the external topology result received from UCMDB at step 7. The Mapping Engine returns a map where the External CI ID from the first data store (the external data store in this case) is mapped to the External CI IDs from the second data store (UCMDB).
- 9 For each mapping, the Federation Framework creates a virtual relationship.
- 10 After the calculation of the FTQL results (only at the topology stage), the Federation Framework retrieves the original TQL layout for the resulting CIs and relationships from the appropriate data stores.

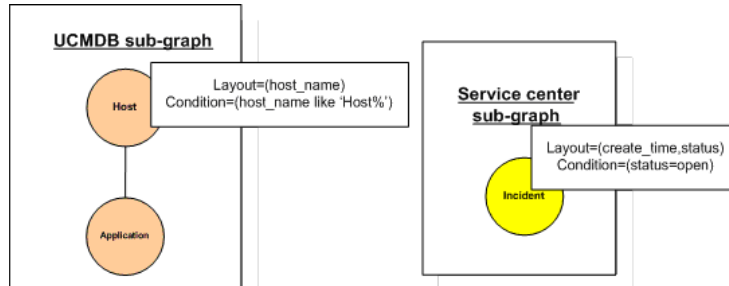
Example of Federation Framework Flow for FTQL

This example explains how to view all open incidents on specific hosts. The ServiceCenter data store is the external data store. The host instances are stored in UCMDB, and the incident instances are stored in ServiceCenter. It is assumed that to connect the incident instances to the appropriate host, the `host_name` and `ip_address` properties of the host and IP are needed. These are reconciliation properties that identify the hosts from ServiceCenter in UCMDB.

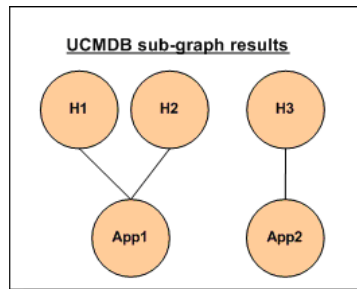


Note: For attribute federation, the adapter's `getTopology` method is called. The reconciliation data is adapted in the user TQL (in this case, the CI element).

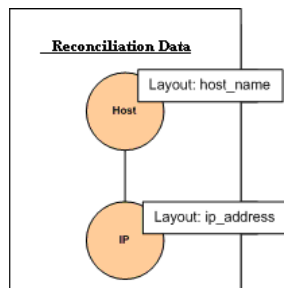
- 1 After analyzing the pattern, the Federation Framework recognizes the virtual relationship between Host and Incident and splits the FTQL into two subgraphs:



- 2 The Federation Framework runs the the UCMDB subgraph to request the topology, and receives the following results:

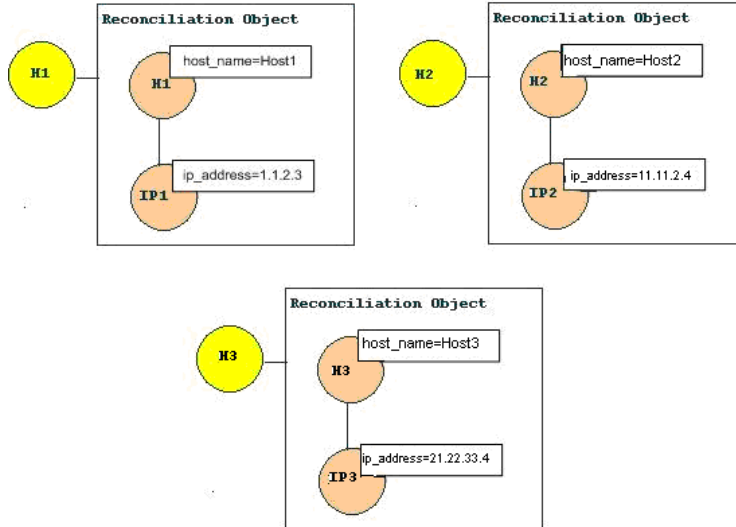


- 3 The Federation Framework requests, from the appropriate Mapping Engine, the reconciliation data for the first data store (UCMDB) that contains the information to connect between received data from two data stores. The reconciliation data in this case is:

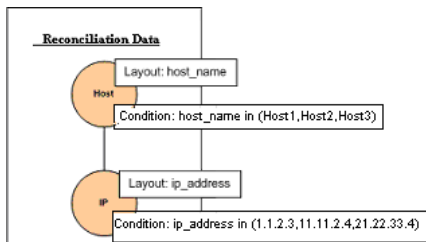


- The Federation Framework creates a one-node topology query with Host node and ID conditions on it from the previous result (host_id in H1, H2, H3), and runs this query with the required reconciliation data on UCMDB. The result includes Host CIs that are relevant to the ID condition and the appropriate reconciliation object for each CI:

result of getTopology with ReconciliationData

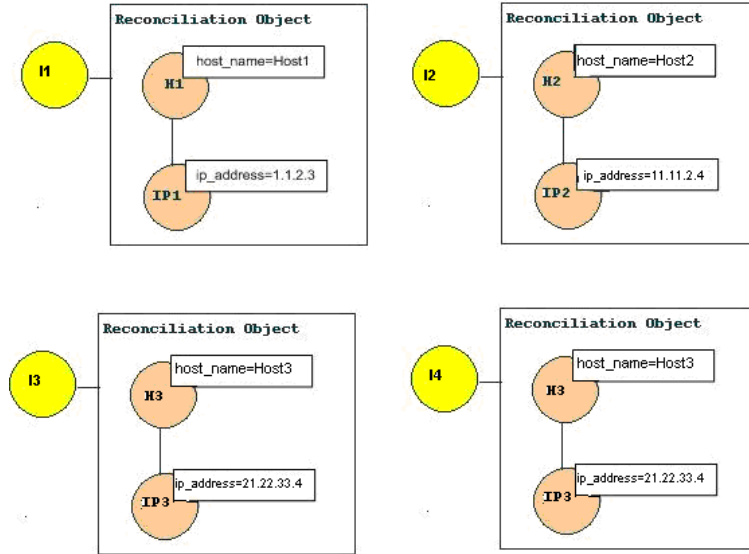


- The reconciliation data for ServiceCenter should contain a condition for host_name and ip_address that is derived from the reconciliation objects received from UCMDB:

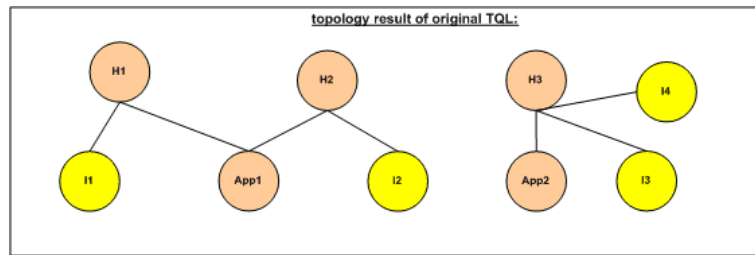


- 6 The Federation Framework runs the ServiceCenter subgraph with the reconciliation data to request the topology and appropriate reconciliation objects, and receives the following results:

ServiceCenter Result of getTopology with Reconciliation Data



- 7 The result after connection in Mapping Engine and creating virtual relationships is:



- 8 The Federation Framework requests the original TQL layout for received instances from UCMDB and ServiceCenter.

Federation Framework Flow for Replication

This section includes the following topics:

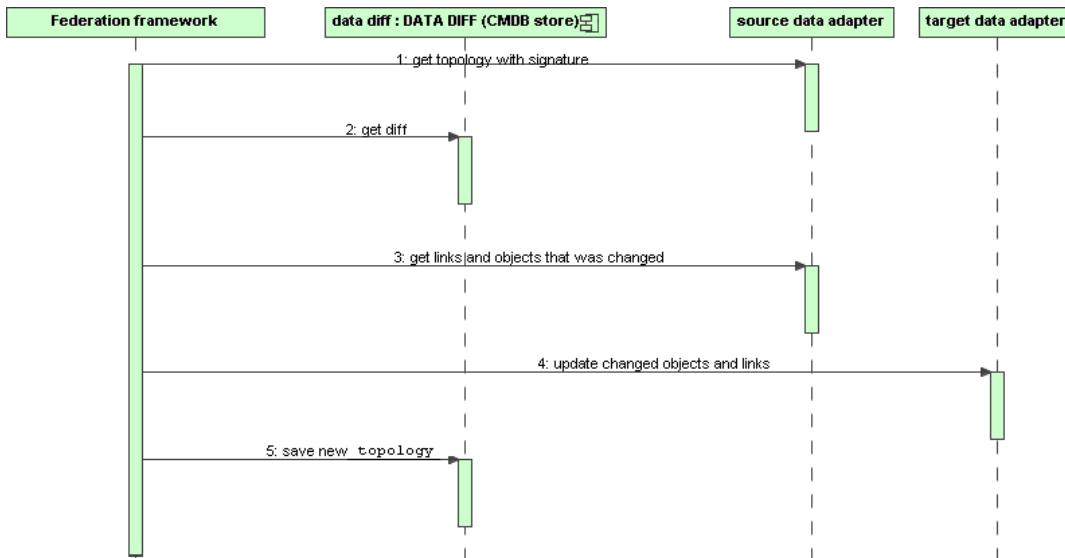
- “Definitions and Terms” on page 782
- “Flow Diagram” on page 782

Definitions and Terms

Signature. Denotes the state of properties in the CI. If changes are made to property values in a CI, the CI signature must also be changed. The CI signature helps to detect whether a CI has changed without retrieving and comparing all CI properties. Both the CI and the CI signature are provided by the appropriate adapter. The adapter is responsible for changing the CI signature when the CI properties are altered.

Flow Diagram

The following sequence diagram illustrates the interaction between the Federation Framework and the source and target adapters in a replication flow:



- 1** The Federation Framework receives the topology for the query result from the source adapter. The adapter recognizes the query by its name and runs it on the external data store. The topology result contains the ID and signature for each CI and relationship in the result. The ID is the logical ID that defines the CI as unique in the external data store. The signature should be modified if the CI or relationship is modified.
- 2** The Federation Framework uses signatures to compare the newly received topology query results with the saved ones, and to determine which CIs have changed.
- 3** After the Federation Framework finds the CIs and relationships that have changed, it calls the source adapter with the IDs of the changed CIs and relationships as a parameter to retrieve their full layout.
- 4** The Federation Framework sends the update to the target adapter. The target adapter updates the external data source with the received data.
- 5** After the update, the Federation Framework saves the last query result.

Adapter Interfaces

This section includes the following topics:

- ▶ “Definitions and Terms” on page 783
- ▶ “Adapter Interfaces for FTQL” on page 783

Definitions and Terms

The external relation. The relation between two external CI types that are supported by the same adapter.

Adapter Interfaces for FTQL

Use the appropriate adapter interface for each adapter, as follows.

A **oneNode topology interface** is used when the adapter does not support any external relations. That is, the adapter is never meant to receive a request with more than one external CI. All OneNode interfaces are created to simplify the workflow; for those cases where you need to use a more extensive query, use the **PatternTopology** interface.

A **Pattern topology interface** is used when the adapter supports more than one external CI type and supports at least one relation type between supported external CI types. That is, the adapter should implement the Pattern Topology interface if it intends receiving queries for external data with relations.

OneNode Interfaces

The following interfaces have different types of reconciliation data:

- **OneNodeTopologyIdReconciliationDataAdapter**. Use if the adapter supports a **single-node TQL** and the reconciliation between data stores is calculated by the ID.
- **OneNodeTopologyPropertyReconciliationDataAdapter**. Use if the adapter supports a **single-node TQL** and the reconciliation between data stores is done by the properties of one CI.
- **OneNodeTopologyDataAdapter**. Use if the adapter supports a **single-node TQL** and the reconciliation between data stores is done by topology.

Pattern Topology Interfaces

The following interfaces have different types of reconciliation data:

- **PatternTopologyIdReconciliationDataAdapter**. Use if the adapter supports a **complex TQL** and the reconciliation between data stores is done by the ID.
- **PatternTopologyPropertyReconciliationDataAdapter**. Use if the adapter supports a **complex TQL** and the reconciliation between data stores is done by single-node properties.
- **PatternTopologyDataAdapter**. Use if the adapter supports a **complex TQL** and the reconciliation between data stores is done by topology.

Additional Interfaces

- **SortResultDataAdapter**. Use if you can sort the resulting CIs in the external data store.
- **FunctionalLayoutDataAdapter**. Use if you can calculate the functional layout in the external data store.

Adapter Interfaces for Replication

- **SourceDataAdapter.** Use for source adapters in replication jobs.
- **TargetDataAdapter.** Use for target adapters in replication jobs.

Add an Adapter for a New External Data Store

This task explains how to define an adapter to support a new external data source.

This task includes the following steps:

- “Model Supported Adapter Classes for CIs and Relationships in the UCMDB Class Model” on page 785
- “Define Valid Relationships for Virtual Relationships” on page 787
- “Define an Adapter Configuration” on page 788
- “Implement the Adapter” on page 789
- “Define Reconciliation Rules or Implement the Mapping Engine” on page 790
- “Add Jars Required for Implementation to the Class Path” on page 790
- “Deploy the Adapter” on page 790
- “Redeploy the Adapter” on page 791

1 Model Supported Adapter Classes for CIs and Relationships in the UCMDB Class Model

As an adapter developer, you should:

- have knowledge of the hierarchy of the UCMDB CI types to understand how external CITs are related to the UCMDB CITs
- model the external CITs in the UCMDB class model
- add the definitions for new CI types and their relationships

- ▶ define valid relationships in the UCMDDB class model for the valid relationships between adapter inner classes. (The CITs can be placed at any level of the UCMDDB class model tree.)

Modeling should be the same regardless of federation type (on the fly or replication). For details on adding new CIT definitions to the UCMDDB class model, see “CI Type Manager” on page 239.

For the adapter to support federated attributes on CITs, add this CIT to the supported classes with supported attributes and the reconciliation rule for this CIT.

2 Define Valid Relationships for Virtual Relationships

Note: This section is relevant only for the FTQL adapter.

Determine the relationship between your data and the UCMDB data, that is, define your virtual relationships. You can do this by adding a valid relationship, where one end of the relationship does not refer to your adapter supported classes. A valid relationship for a virtual relationship is different from a regular valid relationship only in that it has a qualifier that defines a Mapping Engine class implementation.

Example of Valid Relationship Definition

In the following example of a valid relationship definition, the relation of type `history_link` between instances of type `it_world` to instances of type `HistoryChange` is valid. To connect between instances of these types the Federation Framework should use the `HistoryMappingEngine` implementation class:

```
<Valid-Link>
  <Class-Ref class-name="history_link" />
  <End1 class-name="it_world" />
  <End2 class-name="HistoryChange" />
  <Valid-Link-Qualifiers>
    <Valid-Link-Qualifier name="EXTENDED_VALID_LINK">
      <Data-Items>
        <Data-Item name="mapping_engine_class" type="string">
com.mercury.topaz.adapters.CmdbHistoryAdapter.HistoryMappingEngine
        </Data-Item>
      </Data-Items>
    </Valid-Link-Qualifier>
  </Valid-Link-Qualifiers>
</Valid-Link>
```

If you have only one Mapping Engine implementation for all virtual relationships, you can define it in the adapter configuration and not as a qualifier in the valid relationship.

3 Define an Adapter Configuration

Add an XML adapter configuration file that contains the following details:

- **Adapter ID.** A unique ID for the adapter.
- **Adapter name.** A fully-qualified Java implementation class name for the adapter.
- **Adapter capabilities.** Defines the capabilities the adapter supports. For details, see “Adapter Capabilities” on page 800.
- **Fields to connect.** Defines the fields that the user must supply to connect to the external data store.
- **Default mapping engine.** Defines the default mapping engine for virtual relationships. Relevant only for FTQL-supported adapters.

See the schema folder for the schema of the adapter configuration.

Example of Adapter Configuration Definition

Example of an adapter configuration definition:

```

<adapter-config adapter-id="CmdbRmiAdapter">
  <class-name>com.mercury.topaz.adapters.cmdb.CmdbRmiAdapter</class-
name>
  <adapter-capabilities>
    <support-federated-query>
      <supported-classes>
        <supported-class is-derived="true" all-attributes-supported="true"
name="hostresource"/>
      </supported-classes>
      <topology>
        <pattern-topology>
          <functional-layout/>
        </pattern-topology>
        <advanced-capabilities>
          <calculated-attribute></calculated-attribute>
        </advanced-capabilities>
      </topology>
    </support-federated-query>
    <support-replication-data>
      <source/>
      <target/>
    </support-replication-data>
  </adapter-capabilities>
  <fields-to-connect>
    <field>host</field>
    <field>customerId</field>
  </fields-to-connect>
  <default-mapping-
engine>com.mercury.topaz.adapters.cmdb.CmdbMappingEngine</default-mapping-
engine>
</adapter-config>

```

4 Implement the Adapter

Select the correct adapter implementation class according to its defined capabilities. The adapter implementation class implements the appropriate interfaces according to defined capabilities.

5 Define Reconciliation Rules or Implement the Mapping Engine

If your adapter supports a federated query (FTQL), you should define the default Mapping Engine to use for reconciliation. (From version 8.00, the default mapping engine implementation is supported.)

You can use this implementation to define reconciliation rules only in the configuration file. For details, see “Create the reconciliation_rules.txt File” on page 799. For a special implementation, you should use the implementation class that implements the Mapping Engine interface.

6 Add Jars Required for Implementation to the Class Path

To implement your classes, add the following jars to your class path:

- ▶ federation_api.jar

7 Deploy the Adapter

- a Deploy the adapter package. For general details on deploying a package, see “Deploy a Package” on page 466.

The package should contain the following entities:

- ▶ New CIT definition (optional):

Used only if the adapter supports new CI types that do not yet exist in UCMDB.

The new CIT definitions are located in the class folder in the package.

- ▶ New data type definition (optional):

Used only if the new CITs require new data types.

The new data type definitions are located in the typedef folder in the package.

- ▶ New valid relationships definition (optional):

Used only if the adapter supports the federated TQL.

The new valid relationships definitions are located in the validlinks folder in the package.

The virtual relationship is defined as a valid relationship and can include a data item named `mapping_engine_class`, which defines the mapping engine fully-qualified class name.

- The adapter configuration definition XML file should be located in the adapter folder in the package.
- **Descriptor.** Defines the package definitions.

b Deploy your code:

- Create a class that implements all required adapter interfaces.
- Implement a mapping engine (if you are writing a federated query adapter).
- Place your compiled classes (normally a jar file) together with all your based-on *.jar files in the **<HP Business Availability Center root directory>\fcmdb\CodeBase\<adapter id>** folder.

Note: The `adapter id` folder name has the same value as in the adapter configuration.

- If you create your own configuration file, you should also use the **<HP Business Availability Center root directory>\fcmdb\CodeBase\<adapter id>** folder as your root folder.

8 Redeploy the Adapter

The adapter definitions and implementation may become altered as a result of external class definitions, changes in adapter capabilities, or changes in implementation. If this happens, redeploy the definitions or implementations.

a Redeploy an adapter package.

If your external classes definition or adapter definition was altered, create an updated adapter package and redeploy it using the package mechanism. For details, see “Deploy a Package” on page 466.

b Redeploy your code.

If your implementation code or private configuration altered, do the following:

- Create updated *.jar or configuration files, and place them in the <HP Business Availability Center root directory>\fcmdb\CodeBase \<adapter id> folder.
- Call the next JMX method with the appropriate customer ID and adapter ID:
FCmdb Config Services > loadOrReloadCodeBaseForAdapterId.

Implement the Default Mapping Engine

To use the default Mapping Engine implementation you should define it as the default Mapping Engine in the `adapter_config.xml` file and create a `reconciliation_rules.txt` file in the <adapter-id>/META-INF folder.

This task includes the following steps:

- “Add the Default Implementation to the Configuration File” on page 792
- “Configure the reconciliation_rules.txt File” on page 792

1 Add the Default Implementation to the Configuration File

To add the default Mapping Engine implementation to the `adapter_config.xml` file, add the following element:

```
<default-mappingengine>
com.mercury.topaz.cmdb.shared.fcmdb.ftql.mappingEngine.AdapterMappingEngine
</default-mappingengine>
```

2 Configure the reconciliation_rules.txt File

This file is used to configure the reconciliation rules. Each row in the file represents a rule. For example:

```
reconciliation_type[host] expression[^host.host_hostname OR ip.ip_address]
end1_type[host] end2_type[ip] link_type[contained]
```


The **reconciliation_type** parameter is filled with the type of CI on which the reconciliation is performed (the UCMDB class name that is connected to the federated class in the TQL).

The **expression** parameter is the logic that decides whether two reconciliation objects are equal (one reconciliation object from the UCMDB side and the other from the federated adapter side).

The expression is composed of ORs and ANDs.

The convention regarding attributes names in the expression part is **[className].[attributeName]**. For example, the attribute **ip_address** in the **ip** class is written **ip.ip_address**.

You can define ordered matches. The ordered match checks the first OR sub expression. If two reconciliation objects have the value on the attributes of the sub expression and it returns that false (the reconciliation objects are not equal) then the second OR sub expression is not compared.

For an ordered match, use **ordered expression** instead of **expression**.

The circumflex sign (^) is used to ignore case during comparisons.

The other parameters (**end1_type**, **end2_type**, and **link_type**) are used only if the reconciliation data contains two nodes and not just the node of the reconciliation type (the topological reconciliation data). In this case, the reconciliation data is **end1_type -(link_type)> end2_type**.

There is no need to add the relevant layout as it is retrieved from the expression.

To perform reconciliation by UCMDB ID, use **cmdb_id** as the attribute name in expression.

Add a New Adapter – Scenario

This example illustrates how to add an adapter for ServiceCenter.

This task includes the following steps:

- “Create a CIT Definition” on page 794
- “Relate the CITs to the ServiceCenter Entity” on page 794
- “Define the Adapter Configuration XML File” on page 795
- “Create the reconciliation_rules.txt File” on page 799
- “Write Implementations for the ServiceCenter Adapter and Mapping Engine” on page 800

1 Create a CIT Definition

The relevant ServiceCenter entities are Incident, Problem, and RFC. For each entity, create the CIT definition. Decide where to place these definitions in the UCMDDB class model hierarchy. The entities refer to IT processes, so it makes sense to put them under the IT Process CIT. RFC refers to IT change, so put the RFC class definition under the IT Change CIT. There is no relationship between Incident, Problem, and RFC CITs, so do not add definitions for such relationships.

2 Relate the CITs to the ServiceCenter Entity

Determine to which CITs in the UCMDDB you want to relate the ServiceCenter entities. For the purpose of this example, the only relevant entity is Host. Add a valid relationship for each of the following pairs: [Host, Incident], [Host, Problem], [Host, RFC]. Each valid relationship should have a qualifier with the Mapping Engine implementation class name that supports connection between the ends of this relationship. It can be the same Java class for all three cases or three different classes, depending on your implementation.

3 Define the Adapter Configuration XML File

- a Define the adapter ID.** For this example, assume the ID is ServiceCenterAdapter and the class implementation is adapter.ServiceCenterAdapterImpl. The beginning of the configuration adapter file is:

```
<adapter-config adapter-id=" ServiceCenterAdapter ">  
  <class-name> adapter.ServiceCenterAdapterImpl </class-name>
```

b Define adapter capabilities.

- ▶ In this example, the adapter supports a federation query but not replication data. Therefore, its capabilities XML should contain the support-federated-query element but not support-replication-data.
- ▶ Add the supported classes with supported attribute conditions. Suppose all three classes have property status and the system supports only the equal condition for this attribute. The supported_classes element has the following definition:

```

<supported-classes>
  <supported-class is-derived="true" all-attributes-supported="false"
  name="incident">
    <supported-conditions>
      <attribute-operators attribute-name="status">
        <operator> EQUEL </operator>
      </attribute-operators>
    </supported-conditions>
  </supported-class>
  <supported-class is-derived="true" all-attributes-supported="false"
  name="change">
    <supported-conditions>
      <attribute-operators attribute-name="status">
        <operator> EQUEL </operator>
      </attribute-operators>
    </supported-conditions>
  </supported-class>
  <supported-class is-derived="true" all-attributes-supported="false"
  name="problem">
    <supported-conditions>
      <attribute-operators attribute-name="status">
        <operator>EQUEL</operator>
      </attribute-operators>
    </supported-conditions>
  </supported-class>
</supported-classes>

```

- Define the topology that the ServiceCenter adapter supports. Because there are no relationships between the ServiceCenter entities, it is sufficient that the ServiceCenter adapter support single-node topology. For simplicity's sake, assume that the ServiceCenter adapter has no advanced capabilities and cannot calculate the value of calculated attributes. The topology element definition is as follows:

```
<topology>
  <one-node-topology/ >
</topology>
```

- For simplicity's sake, assume that ServiceCenter does not support sorting. Therefore, the capability should not contain the element result.

- c Add the element that defines the information required for the ServiceCenter adapter to connect to ServiceCenter.** Assume this includes host, port, and user. Because the password for ServiceCenter can be empty, do not define this field as required. However, the ServiceCenter adapter checks this field, and if a value exists, it uses the password value to connect. The fields-to-connect element has the following definition:

```
<fields-to-connect>
  <field>host</field>
  <field>port</field>
  <field>user</field>
</fields-to-connect>
```

- d Add the default Mapping Engine element.** The following example uses the default implementation Mapping Engine, which takes the following definition:

```
<default-mappingengine>
  com.mercury.topaz.cmdb.shared.fcldb.ftql.mappingEngine.
  AdapterMappingEngine
</default-mappingengine>
```

The configuration XML definition of the Service Desk adapter is complete. The following is the finished definition:

```

<adapter-config adapter-id=" ServiceCenterAdapter ">
  <class-name> adapter.ServiceCenterAdapterImpl </class-name>
  <adapter-capabilities>
    <support-federated-query>
      <supported-classes>
        <supported-class is-derived="true" all-attributesupported="false"
name="incident">
          <supported-conditions>
            <attribute-operators attribute-name="status">
              <operator> EQUAL </operator>
            </attribute-operators>
          </supported-conditions>
        </supported-class>
        <supported-class is-derived="true" all-attributesupported="false"
name=" change ">
          <supported-conditions>
            <attribute-operators attribute-name="status">
              <operator> EQUAL </operator>
            </attribute-operators>
          </supported-conditions>
        </supported-class>
        <supported-class is-derived="true" all-attributesupported="false"
name=" problem ">
          <supported-conditions>
            <attribute-operators attribute-name="status">
              <operator> EQUAL </operator>
            </attribute-operators>
          </supported-conditions>
        </supported-class>
      </supported-classes>
    <topology>
      <one-node-topolgy/>
    </topology>
  </support-federated-query>
</adapter-capabilities>

```

```

    <fields-to-connect>
      <field>host</field>
      <field>port</field>
      <field>user</field>
      <field>password</field>
    </fields-to-connect>
    <default-mappingengine>
      com.mercury.topaz.cmdb.shared.fcmdb.ftql.mappingEngine.
AdapterMappingEngine
    </default-mappingengine>
  </adapter-config>

```

4 Create the reconciliation_rules.txt File

You can add a reconciliation rule for a host CIT only. This is because only host CITs have valid relationships with external CITs. For example, a host CI in UCMDB is matched to a host CI in ServiceCenter through the host.host_hostname attribute or through the ip.ip_address attribute.

The reconciliation rule in this case is a topology rule and the expression is ordered. The rule performs the following checks on the CIs under comparison:

- If the host.host_hostname attribute is equal, the rule matches the hosts.
- If the host.host_hostname attribute is not equal, the rule does not match the hosts.
- If the host.host_hostname attribute is null in one of the compared CIs, the rule checks the ip.ip_address attribute. If the ip.ip_address attribute is equal, the rule matches the hosts.

The rule definition in the reconciliation_rules.txt file is as follows:

```

reconciliation_type[host] ordered expression[host.host_hostname or ip.ip_address]
end1_type[host] end2_type[ip] link_type[contained]

```

5 Write Implementations for the ServiceCenter Adapter and Mapping Engine

The Mapping Engine implementation should implement the MappingEngine interface. The ServiceCenter adapter should implement the OneNodeTopologyDataAdapter interface according to its capabilities and the fact that reconciliation is performed by a topology rule.

Adapter Capabilities

This section describes adapter capabilities:

- ▶ **Support federated query.** Included in adapter capabilities if the adapter implementation supports FTQL. Federated query capabilities include:
 - ▶ **Supported classes.** Defines the supported classes in the federated query. The supported class definition includes supported class name, whether derived classes of this class are also supported, and the possible condition operations for class attributes. The possible values for condition operators are:
 - ▶ IS_NULL
 - ▶ EQUALS
 - ▶ NOT_EQUALS
 - ▶ GREATER
 - ▶ GREATER_OR_EQUAL
 - ▶ LESS
 - ▶ LESS_OR_EQUAL
 - ▶ IN
 - ▶ EQUALS_CASE_INSENSITIVE
 - ▶ LIKE
 - ▶ LIKE_CASE_INSENSITIVE
 - ▶ CHANGED_DURING
 - ▶ UNCHANGED_DURING

If derived classes are supported, the condition operation for class attributes is also derived. You can ignore definition of supported classes in adapter capabilities configuration by implementing the **getSupportedClasses** method of the `FTqlDataAdapter` interface. This might be useful if your supported classes or supported attribute condition operators can be changed dynamically.

- **Topology.** Defines whether pattern topology or single-node topology is supported, and the federated TQL advanced capabilities.
- **Result.** Defines whether the adapter can sort the resulting CIs.
- **Support replication data.** Included in adapter capabilities if the adapter implementation supports data replication. Next capabilities are part of replication capabilities:
- **Source.** Defines that the adapter can be used in a replication job as source.
- **Target.** Defines that the adapter can be used in a replication job as target.

32

The Generic Database Adapter

This chapter describes the generic database adapter functionality, usages, and deployment in HP Universal CMDB.

This chapter includes:

Concepts

- ▶ Database Adapter – Overview on page 804
- ▶ Replicating Data using the Generic DB Adapter on page 805
- ▶ Non-supported TQL Queries on page 805
- ▶ Reconciliation on page 806
- ▶ Hibernate as JPA Provider on page 809

Tasks

- ▶ Deploy a Database Adapter – Minimal Method on page 811
- ▶ Deploy a Database Adapter – Advanced Method on page 818

Reference

- ▶ The Federated Database Configuration Files on page 844
- ▶ The adapter.conf File on page 845
- ▶ The simplifiedConfiguration.xml File on page 846
- ▶ The orm.xml File on page 853
- ▶ The reconciliation_rules.txt File on page 858
- ▶ The transformations.txt File on page 859
- ▶ The persistence.xml File on page 860
- ▶ The discriminator.properties File on page 861

- ▶ The replication_config.txt File on page 862
- ▶ The fixed_values.txt File on page 862
- ▶ Out-of-the-Box Converters on page 862
- ▶ Plug-ins on page 866
- ▶ Configuration Examples on page 866
- ▶ Federated Database Log Files on page 879
- ▶ External References on page 881
- ▶ **Troubleshooting and Limitations** on page 882

Database Adapter – Overview

The purpose of the generic database adapter is to enable integration with relational database management systems (RDBMS) and to run a federated TQL query and replication jobs against the database. The RDBMS supported by the generic database adapter are Oracle, Microsoft SQL Server, and MySQL.

This version of the database adapter implementation is based on a JPA (Java Persistence API) standard with the Hibernate ORM library as a persistence provider.

Replicating Data using the Generic DB Adapter

Out of the box, the Generic DB Adapter supports only federated data, in which the source data store retains control of the information. To perform full replication (differential and scheduled replication are not supported by default), the following capability should be added to the `<adapter-capabilities>` element in the `db_adapter.xml` file:

```
<support-replicatioin-data>
  <source>
    <changes-source/>
  </source>
</support-replicatioin-data>
```

For complete information about using the `db_adapter.xml` file, see “Extract the Database Adapter Configuration File” on page 822.

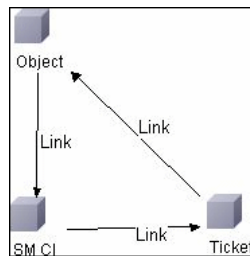
To enable additional replication functionality, implement the synchronization plug-ins listed in “Plug-ins” on page 866.

Non-supported TQL Queries

The following limitations exist on the federated CMDB only:

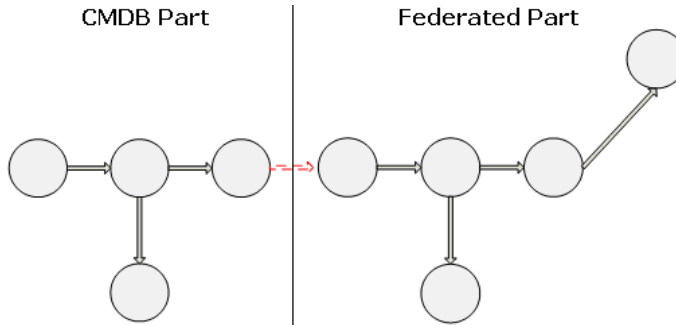
- subgraphs are not supported
- compound relationships are not supported
- cycles or cycle parts are not supported

The following TQL is an example of a cycle:



- Function layout is not supported.

- 0..0 cardinality is not supported.
- The Joinf relationship is not supported.
- Qualifier conditions are not supported.
- To connect between two CIs, a relationship in the form of a table or foreign key must exist in the external database source.



Reconciliation

Reconciliation is carried out as part of the TQL calculation on the adapter side. For reconciliation to occur, the CMDB side is mapped to a federated entity called multinode.

Mapping. Each attribute in the UCMDB is mapped to a column in the data source.

Although mapping is done directly, transformation functions on the mapping data are also supported. You can add new functions through the Java code (for example, lowercase, uppercase). The purpose of these functions is to enable value conversions (values that are stored in the CMDB in one format and in the federated database in another format).

Note:

- ▶ To connect the UCMDB and external database source, an appropriate association must exist in the database. For details, see “Prerequisites” on page 819.
 - ▶ Reconciliation with CMDB id is also supported.
-

Reconciliation rules take the form of OR and AND conditions. You can define these rules on several different nodes (for example, host is identified by `host_name` from `host` AND/OR `ip_address` from `ip`).

The following options find a match:

- ▶ **Ordered match.** The reconciliation expression is read from left to right. Two OR sub-expressions are considered equal if they have values and they are equal. Two OR sub-expressions are considered not equal if both have values and they are not equal. For any other case there is no decision, and the next OR sub-expression is tested for equality.

host_name OR ip_address. If both the UCMDB and the data source include `host_name` and they are equal, the hosts are considered as equal. If both have `host_name` but they are not equal, the hosts are considered not equal without testing the `ip_address`. If either the UCMDB or the data source is missing `host_name`, the `ip_address` is checked.

- ▶ **Regular match.** If there is equality in one of the OR sub-expressions, the UCMDB and the data source are considered equal.

host_name OR ip_address. If there is no match on `host_name`, `ip_address` is checked for equality.

For complex reconciliations, where the reconciliation entity is modeled in the class model as several CITs with relationships (such as `host`), the mapping of a superset node includes all relevant attributes from all modeled CITs.

Note: As a result, there is a limitation that all reconciliation attributes in the data source should reside in tables that share the same primary key.

Another limitation states that the reconciliation TQL should have no more than two nodes. For example, the `host > ticket` TQL has a `host` in the UCMDB and a `ticket` in the data source.

To reconcile the results, `host_name` must be retrieved from the `host` and/or `ip_address` must be retrieved from the IP address. A new mapping is made from this federated multinode `host` towards the database `host` table and from the `ticket` to the database `ticket`. In this case, the multinode is the superset of all attributes needed for reconciliation (`host_name` + `ip_address`).

If the `host_name` in the CMDB is in the format of `*.m.com`, a converter can be used from CMDB to the federated database, and vice versa, to convert these values.

The `host_id` column in the database `ticket` table is used to connect between the two entities (the defined association can also be made in a `host` table):

DB Host	
PK	<u>host_id</u>
	ex_host_name ex_ip_address

DB Ticket	
PK	<u>ticket_id</u>
	host_id

Note: Both tables must be part of the federated RDBMS source and not the CMDB database.

Hibernate as JPA Provider

Hibernate is an object-relational (OR) mapping tool, which enables mapping Java classes to tables over several types of relational databases (for example, Oracle and Microsoft SQL Server). For details, see “Functional Limitations” on page 882.

In an elementary mapping, each Java class is mapped to a single table. More advanced mapping enables inheritance mapping (as can occur in the CMDB database).

Other supported features include mapping a class to several tables, support for collections, and associations of types one-to-one, one-to-many, and many-to-one. For details, see “Associations” on page 810.

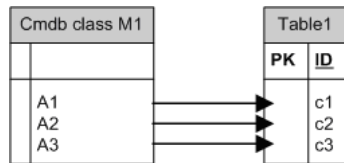
For our purposes, there is no need to create Java classes. The mapping is defined from the CMDB class model CITs to the database tables.

Examples of Object-Relational Mapping

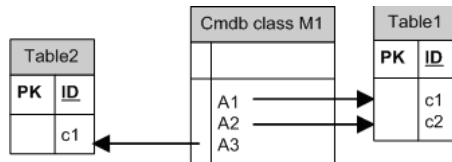
The following examples describe object-relational mapping:

Example of 1 CMDB class mapped to 1 database table

Class M1, with attributes A1, A2, and A3, is mapped to table 1 columns c1, c2, and c3. This means that any M1 instance has a matching row in table 1.

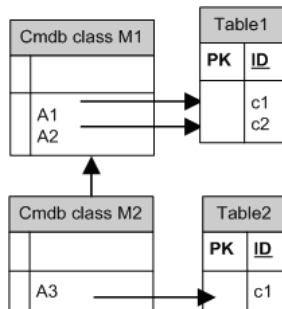


Example of 1 CMDB class mapped to 2 database tables



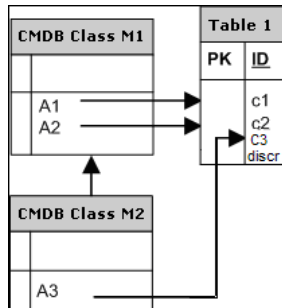
Example of inheritance

This case is used in the CMDB, where each class has its own database table.



Example of single table inheritance with discriminator

An entire hierarchy of classes is mapped to a single database table, whose columns comprise a super-set of all attributes of the mapped classes. The table also contains an additional column (Discriminator), whose value indicates which specific class should be mapped to this entry.



Associations

There are three types of associations: one-to-many, many-to-one and many-to-many. To connect between the different database objects, one of these associations must be defined by using a foreign key column (for the one-to-many case) or a mapping table (for the many-to-many case).

Usability

As the JPA schema is very extensive, a streamlined XML file is provided to ease definitions.

The use case for using this XML file is as follows: Federated data is modeled into one federated class. This class has many-to-one relations to a non-federated CMDB class. In addition, there is only one possible relation type between the federated class and the non-federated class.

Deploy a Database Adapter – Minimal Method

Note: When building an adapter for the first time, you should use this method. The `orm.xml` file that is automatically generated as a result of running this method is a good example that you can use when working later with the advanced method.

The following procedure describes a method of mapping the class model in the UCMDB to an RDBMS. You would use this minimal method when you need to:

- Federate a single node such as a host attribute.
- Demonstrate the Generic Database Adapter capabilities.

This method:

- supports one-node federation only
- supports many-to-one relationships only

This task includes the following steps:

- “Prerequisites” on page 812
- “Extract the Database Adapter Configuration File” on page 812
- “Deploy the Adapter Package” on page 812
- “Deploy the Adapter” on page 812
- “Create a CI Type” on page 812
- “Create the Relationships” on page 812
- “Configure the adapter.conf File” on page 813
- “Configure the simplifiedConfiguration.xml File” on page 813
- “Continue with the Procedure” on page 817

1 Prerequisites

For details, see Prerequisites in “Deploy a Database Adapter – Advanced Method” on page 818.

2 Extract the Database Adapter Configuration File

For details, see “Extract the Database Adapter Configuration File” on page 822.

3 Deploy the Adapter Package

For details, see “Deploy the Adapter Package” on page 826.

4 Deploy the Adapter

For details, see “Deploy the Adapter” on page 827.

5 Create a CI Type

For details, see “Create a CI Type” on page 829.

6 Create the Relationships

For details, see “Create the Relationships” on page 831.

7 Configure the adapter.conf File

In this step, you change the settings in the adapter.conf file so that the data is federated automatically.

- a** Open the following file in a text editor: <HP Business Availability Center root directory>\fcmdb\Codebase\MyAdapter\META-INF\adapter.conf.
- b** Locate the following line: `use.simplified.xml.config=<true/false>`.
- c** Change to `use.simplified.xml.config=true`.

8 Configure the simplifiedConfiguration.xml File

In this step you configure the simplifiedConfiguration.xml file by mapping between the CIT in the UCMDB and the fields in the RDBMS table.

- a** Open the following file in a text editor: <HP Business Availability Center root directory>\fcmdb\Codebase\MyAdapter\META-INF\simplifiedConfiguration.xml.

- b** This file includes a template that you use for each entity to be mapped:

```
<cmdb-class cmdb-class-name="host" default-table-name="[table_name]">
  <primary-key column-name="[column_name]"/>
  <reconciliation-by-two-nodes connected-node-cmdb-class-name="ip" cmdb-
link-type="contained">
    <or is-ordered="true">
      <attribute cmdb-attribute-name="host_hostname" column-
name="[column_name]" ignore-case="true"/>
      <connected-node-attribute cmdb-attribute-name="ip_address"
column-name="[column_name]"/>
    </or>
  </reconciliation-by-two-nodes>
</cmdb-class>

<class cmdb-class-name="[cmdb_class_name]" default-table-
name="[default_table_name]" connected-cmdb-class-name="host" link-class-
name="container_f">
  <foreign-primary-key column-name="[column_name]" cmdb-class-primary-key-
column="[column_name]"/>
  <primary-key column-name="[column_name]"/>
  <attribute cmdb-attribute-name="[cmdb_attribute_name]" column-
name="[column_name]" from-cmdb-
converter="com.mercury.topaz.fcmbd.adapters.dbAdapter.dal.transform.impl.Generi
cEnumTransformer(generic-enum-transformer-example.xml)" to-cmdb-
converter="com.mercury.topaz.fcmbd.adapters.dbAdapter.dal.transform.impl.Generi
cEnumTransformer(generic-enum-transformer-example.xml)"/>
  <attribute cmdb-attribute-name="[cmdb_attribute_name]" column-
name="[column_name]"/>
  <attribute cmdb-attribute-name="[cmdb_attribute_name]" column-
name="[column_name]"/>
</class>
```

- c** Make changes to the attributes as follows:

- The CIT name in Universal CMDB (cmdb-class-name) and the corresponding table name in the RDBMS (default-table-name):

```
<cmdb-class cmdb-class-name="host" default-table-name="Device">
```

The cmdb-class-name attribute is taken from the host CIT:



The default-table-name attribute is taken from the Device table:

	Column Name	Data Type	Length	Allow Nulls
1	Device_ID	int		<input type="checkbox"/>
2	Device_Discovered	enum		<input type="checkbox"/>
3	Device_ManagedCategory	enum		<input type="checkbox"/>
4	Device_PreferredMACAddress	varchar	12	<input checked="" type="checkbox"/>
5	Device_PreferredIPAddress	varchar	15	<input checked="" type="checkbox"/>
6	Device_LogicalSubNet	varchar	50	<input checked="" type="checkbox"/>
7	Device_Tag	text		<input checked="" type="checkbox"/>
8	Device_Label	varchar	255	<input checked="" type="checkbox"/>
9	DeviceCategory_ID	int		<input checked="" type="checkbox"/>
10	DeviceIcon_ID	int		<input checked="" type="checkbox"/>
11	Device_Description	text		<input checked="" type="checkbox"/>
12	Device_ObjectID	text		<input checked="" type="checkbox"/>
13	Device_Contact	text		<input checked="" type="checkbox"/>
14	Device_Name	text		<input checked="" type="checkbox"/>
15	Device_Location	text		<input checked="" type="checkbox"/>
16	Device_NetBIOS	varchar	255	<input checked="" type="checkbox"/>

- The unique identifier in the RDBMS:

```
<primary-key column-name="Device_ID"/>
```

- The reconciliation rule (reconciliation-by-two-nodes):

```
<reconciliation-by-two-nodes connected-node-cmdb-class-name="ip" cmdb-link-type="contained">
```

- The reconciliation attribute in Universal CMDB (cmdb-attribute-name) and in the RDBMS (column-name):

```
<connected-node-attribute cmdb-attribute-name="ip_address" column-name="[column_name]"/>
```

- ▶ The name of the CIT (`cmdb-class-name`) and the name of the corresponding table in the RDBMS (`default-table-name`). Also the CMDB relationship (`connected-cmdb-class-name`) and the CIT relationship (`link-class-name`):

```
<class cmdb-class-name="sw_sub_component" default-table-name="SWSubComponent" connected-cmdb-class-name="host" link-class-name="container_f">
```

- ▶ The primary key and the foreign key:

```
<foreign-primary-key column-name="Device_ID" cmdb-class-primary-key-column="Device_ID"/>
```

- ▶ The unique identifier in the RDBMS:

```
<primary-key column-name="Device_ID"/>
```

- ▶ The mapping between the Universal CMDB attribute (`cmdb-attribute-name`) and the column name in the RDBMS (`column-name`):

```
<attribute cmdb-attribute-name="last_access_time" column-name="SWSubComponent_LastAccess TimeStamp"/>
```

- d** Save the file.

9 Continue with the Procedure

For the rest of the procedure, see the following sections:

- “Load the Adapter” on page 839
- “Create a Data Store” on page 839
- “Create a View” on page 840
- “Calculate the Results” on page 841
- “View Results” on page 841
- “View Reports” on page 843
- “Enable Log Files” on page 843

Deploy a Database Adapter – Advanced Method

The following procedure describes the complete method of mapping the class model in the UCMDB to tables in an RDBMS.

This task includes the following steps:

- “Prerequisites” on page 819
- “Extract the Database Adapter Configuration File” on page 822
- “Deploy the Adapter Package” on page 826
- “Deploy the Adapter” on page 827
- “Create a CI Type” on page 829
- “Create the Relationships” on page 831
- “Configure the orm.xml File” on page 833
- “Map the Relationships” on page 835
- “Configure the reconciliation_rules.txt File” on page 838
- “Load the Adapter” on page 839
- “Create a Data Store” on page 839
- “Create a View” on page 840
- “Calculate the Results” on page 841
- “View Results” on page 841
- “View Reports” on page 843
- “Enable Log Files” on page 843

1 Prerequisites

To validate that you can use the database adapter with your database, check the following:

- The reconciliation classes and their attributes (also known as multinodes) exist in the database. For example, if the reconciliation is run by host name, verify that there is a table that contains a column with host names. If the reconciliation is run according to host `cmdb_id`, verify that there is a column with CMDB IDs that matches the CMDB IDs of the hosts in the CMDB. For details on reconciliation, see “Reconciliation” on page 806.

ID	HOST_NAME	IP_ADDRESS
31	BABA	16.59.33.60
33	ext3.devlab.ad	16.59.59.116
46	LABM1MAM15	16.59.58.188
72	cert-3-j2ee	16.59.57.100
102	labm1sun03.devlab.ad	16.59.58.45
114	LABM2PCOE73	16.59.66.79
116	CUT	16.59.41.214
117	labm1hp4.devlab.ad	16.59.60.182

- To correlate two CITs with a relationship, there must be correlation data between the CIT tables. The correlation can be either by a foreign key column or by a mapping table. For example, to correlate between host and ticket, there must be a column in the ticket table that contains the host ID, a column in the host table with the ticket ID that is connected to it, or a mapping table whose `end1` is the host ID and `end2` is the ticket ID. For details on correlation data, see “Hibernate as JPA Provider” on page 809.

The following table shows the foreign key HOST_ID column:

HOST_ID	CARD_ID	CARD_TYPE	CARD_NAME
2015	1	Serial Bus Controller	Intel ® 82801EB USB Universal Host Controller
3581	2	System	Intel ® 631xESB/6321ESB/3100 Chipset LPC
3581	3	Display	ATI ES1000
3581	4	Base System Peripheral	HP ProLiant iLO 2 Legacy Support Function

- Each CIT can be mapped to one or more tables. To map one CIT to more than one table, check that there is a primary table whose primary key exists in the other tables, and is a unique value column.

For example, a ticket is mapped to two tables: `ticket1` and `ticket2`. The first table has columns `c1` and `c2` and the second table has columns `c3` and `c4`. To enable them to be considered as one table, both must have the same primary key. Alternatively, the first table primary key can be a column in the second table.

In the following example, the tables share the same primary key called **CARD_ID**:

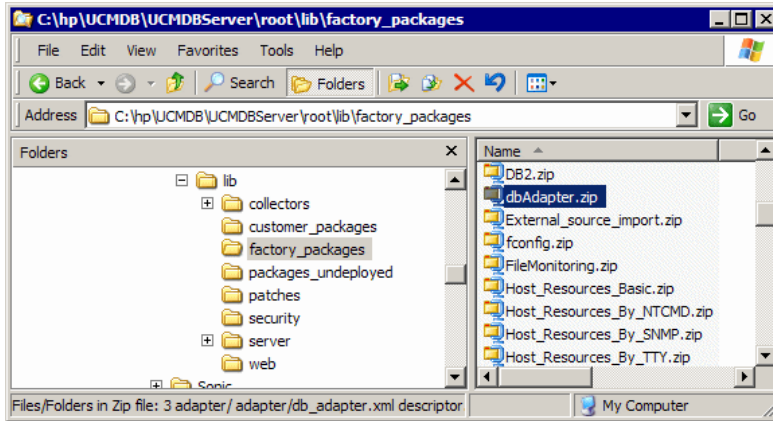
CARD_ID	CARD_TYPE	CARD_NAME
1	Serial Bus Controller	Intel ® 82801EB USB Universal Host Controller
2	System	Intel ® 631xESB/6321ESB/3100 Chipset LPC
3	Display	ATI ES1000
4	Base System Peripheral	HP ProLiant iLO 2 Legacy Support Function

CARD_ID	CARD_VENDOR
1	Hewlett-Packard Company
2	(Standard USB Host Controller)
3	Hewlett-Packard Company
4	(Standard system devices)
5	Hewlett-Packard Company

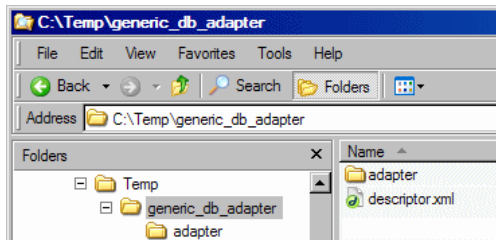
2 Extract the Database Adapter Configuration File

In this step, you locate the generic database adapter package and make a copy of it.

- a Locate the **dbAdapter** package in **<HP Business Availability Center root directory>\mam_lib\factory_packages**.



- b Extract the package to a local temporary directory:



- c Open the **adapter\db_adapter.xml** file in a text editor.

This file includes the fields that are needed to connect to the data store. You can use this file as a template (recommended) or you can create a new XML file from scratch.

- d** Locate the **adapter-id** attribute and replace the name:

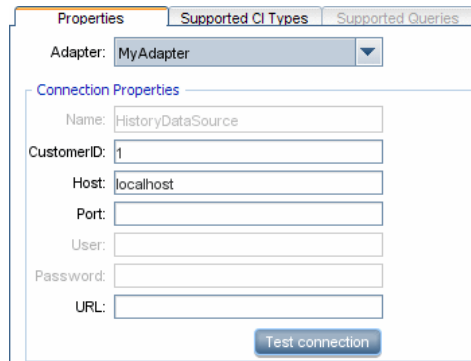
```
<adapter-config adapter-id="MyAdapter">
  <class-name>com.mercury.topaz.fcldb.adapters.dbAdapter.DBAdapter
</class-name>
  <adapter-capabilities>
    <support-federated-query>
      <supported-classes>
      </supported-classes>
      <topology>
        <pattern-topology>
        </pattern-topology>
      </topology>
    </support-federated-query>
  </adapter-capabilities>
  <fields-to-connect>
    <field>host</field>
    <field>customerId</field>
    <field>port</field>
    <field>url</field>
  </fields-to-connect>
  <default-mapping-engine>
com.mercury.topaz.fcldb.adapters.dbAdapter.reconciliation.mapping_engine.
DBMappingEngine</default-mapping-engine>
</adapter-config>
```

To enable data replication, add the following capability to the **<adapter-capabilities>** element:

```
<support-replicatioin-data>
  <source>
    <changes-source/>
  </source>
</support-replicatioin-data>
```

For additional information about using the Generic DB Adapter to replicate data, see “Replicating Data using the Generic DB Adapter” on page 805.

There are no restrictions on the name, such as case or special characters. The name you enter here appears in the list of adapters in the Data Stores pane in HP Business Availability Center:

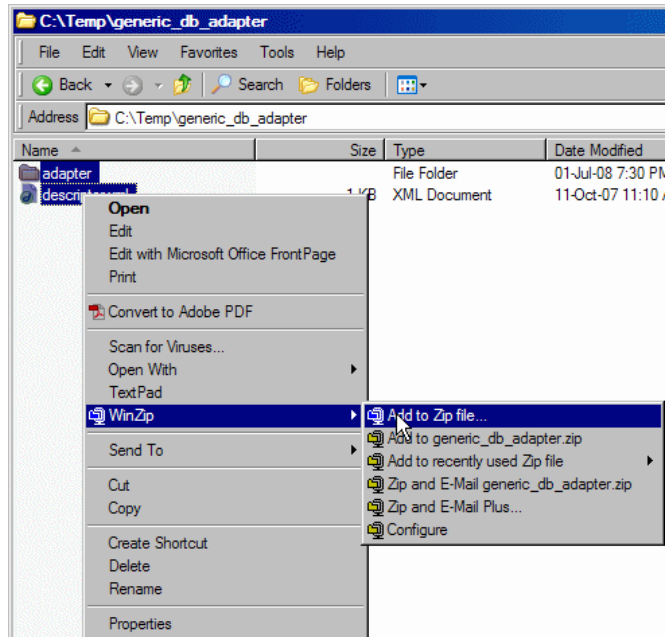


The screenshot shows a software interface with three tabs: 'Properties', 'Supported CI Types', and 'Supported Queries'. The 'Properties' tab is active. Below the tabs, there is a dropdown menu labeled 'Adapter:' with 'MyAdapter' selected. Underneath, a section titled 'Connection Properties' contains several input fields: 'Name:' with the value 'HistoryDataSource', 'CustomerID:' with the value '1', 'Host:' with the value 'localhost', 'Port:', 'User:', 'Password:', and 'URL:'. A 'Test connection' button is located at the bottom right of the form.

For details, see “Data Stores Tab” on page 751.

Important: For consistency’s sake and for ease of use, use this name when saving the file and when defining the adapter.

- e Create a *.zip file:



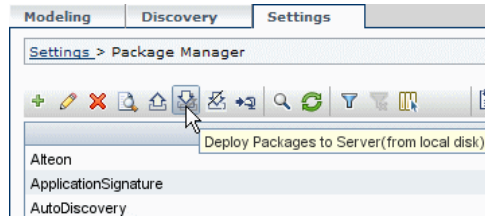
- f Give the zip file the same name as you gave to the **attribute-id** attribute, as described in step d on page 823.

Note: The descriptor.xml file is a default file that exists in every package.

3 Deploy the Adapter Package

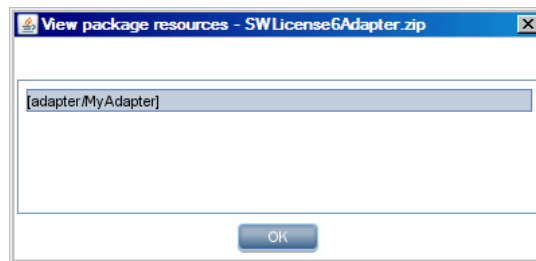
In this step you deploy the package in Package Manager.

- a** Save the new package that you created in the previous step in the following folder: <HP Business Availability Center root directory> \mam_lib\customer_packages.
- b** In HP Business Availability Center, access Package Manager. For details, see “Package Manager Window” on page 484.
- c** Deploy the adapter: click the **Deploy Packages to Server** icon:



Click **Add** and browse to your adapter package. Click **Open** then **OK** to display the package in the Package Manager.

- d** Verify that the XML file contents is recognized by Package Manager: select your package in the list and click **View package resources**.

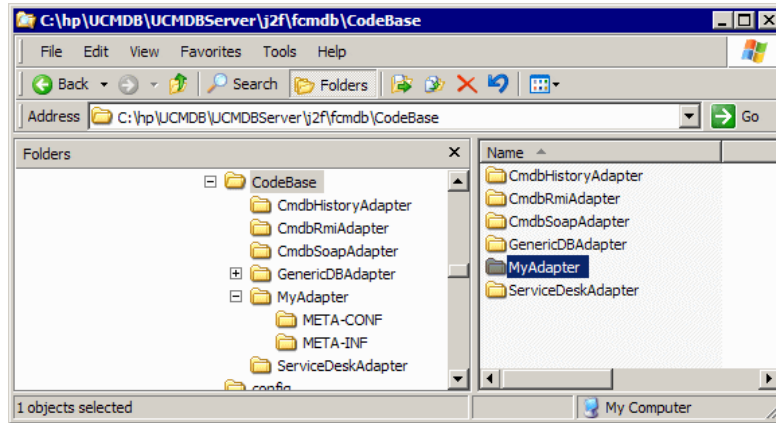


The package contains the adapter XML file only.

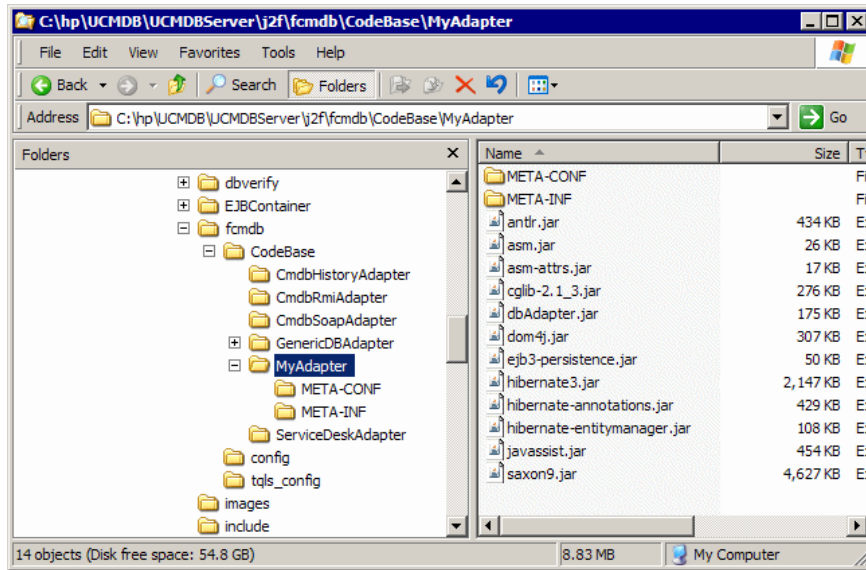
4 Deploy the Adapter

In this step, you create the connection between the logic and the definition of the adapter.

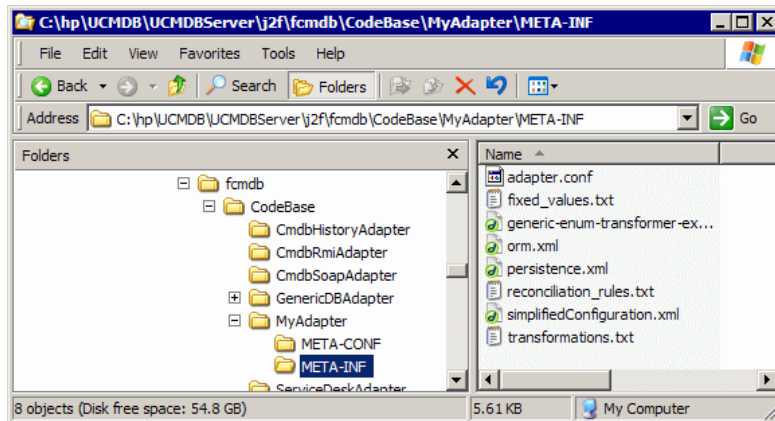
- a Copy the generic database adapter folder under the <HP Business Availability Center root directory>\fcmdb\Codebase folder and rename it to the name of your adapter (the same name that you gave to the adapter-id field you changed in step d on page 823):



This folder contains the jar files that execute the federation logic, for example, the adapter name, the queries and classes in Universal CMDB and the fields in the RDBMS that the adapter supports.



- b Open the new adapter folder and drill down to the META-INF folder:



This folder contains the files that run the adapter. The **orm.xml** file maps the Universal CMDB class model to the actual columns and tables in the RDBMS.

5 Create a CI Type

In this step you create a federated CIT that is to be mapped to data in the RDBMS (the external data source).

- a** In HP Business Availability Center, access the CI Type Manager and create a new CI Type. For details, see “Create a CI Type” on page 243.
- b** Add the necessary attributes to the CIT, such as last access time, vendor, and so on. These are the attributes that the adapter will retrieve from the external data source and bring into HP Business Availability Center views.

Example of creating a host_card CIT

```

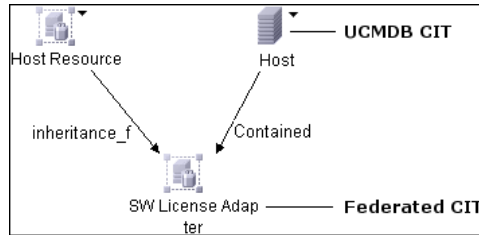
<?xml version="1.0" encoding="UTF-8"?>
<Class class-name="host_card" display-name="Host Card" description="">
  <Class-Qualifiers/>
  <Class-Type>OBJECT</Class-Type>
  <Derived-From class-name="hostresource"/>
  <Attributes>
    <Attribute name="card_class" display-name="Card Class" description=""
type="string">
      <Attribute-Qualifiers/>
    </Attribute>
    <Attribute name="card_vendor" display-name="Card Vendor" description=""
type="string">
      <Attribute-Qualifiers/>
    </Attribute>
    <Attribute name="card_name" display-name="Card Name" description=""
type="string">
      <Attribute-Qualifiers/>
    </Attribute>
  </Attributes>
  <Attribute-Overrides>
    <Attribute-Override name="display_label" is-partially-override="true">
      <Attribute-Qualifiers>
        <Attribute-Qualifier name="CALCULATED_ATTRIBUTE">
          <Data-Items>
            <Data-Item name="FUNCTION"
type="string">card_name</Data-Item>
          </Data-Items>
        </Attribute-Qualifier>
      </Attribute-Qualifiers>
    </Attribute-Override>
  </Attribute-Overrides>
</Class>

```

6 Create the Relationships

In this step you add a relationship between the HP Business Availability Center CIT and the new CIT that represents the data to be federated from the external data source.

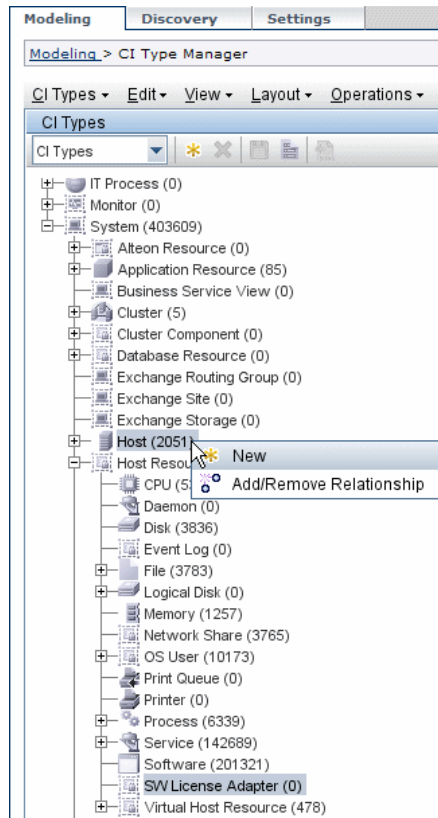
Add appropriate, valid relationships to the new CIT. For details, see “Add/Remove Relationship Dialog Box” on page 254.



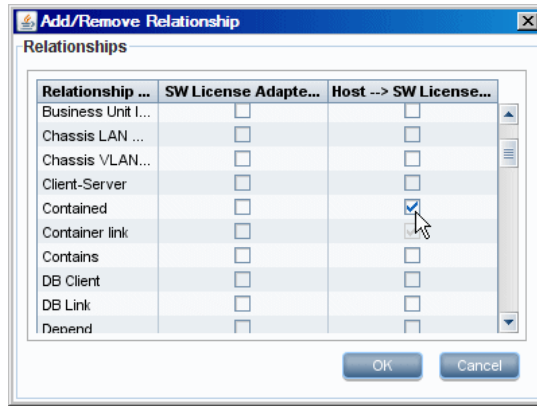
Note: At this stage, you cannot yet view the federated data, as you have not yet defined the method for bringing in the data.

Example of creating a Contained relationship

a In the CIT Manager, select the two CITs:



- b** Create a **Contained** relationship between the two CITs:



Example of Contained Relationship between host_card and host

```
<?xml version="1.0" encoding="UTF-8"?>
<Valid-Links>
  <Valid-Link>
    <Class-Ref class-name="contained"/>
    <End1 class-name="host"/>
    <End2 class-name="host_card"/>
  </Valid-Link>
</Valid-Links>
```

7 Configure the orm.xml File

In this step, you map the CITs in the Universal CMDB to the tables in the RDBMS.

Tip: We recommend that when building an adapter for the first time, you use the simplified method. The **orm.xml** file that is automatically generated as a result of running that method is a good example that you can use now when working with the advanced method. For details, see “Deploy a Database Adapter – Minimal Method” on page 811.

- a** Open **orm.xml** in an XML or text editor. This file, by default, contains a template that you use to map as many CITs and tables as needed for the federation.
- b** Make changes to the file according to the data entities to be mapped. For details, see the following example.

For details of naming conventions, see “Naming Conventions” on page 857.

Example of Entity Mapping Between the Class Model and the RDBMS

Note: Attributes that do not have to be configured are omitted from the following examples.

- The name and class of the Universal CMDB CIT.

```
<entity name="host" class="generic_db_adapter.host">
```

- The name of the table in the RDBMS.

```
<table name="Device"/>
```

- The column name of the unique identifier in the RDBMS table.

```
<column name="Device ID"/>
```

- The name of the attribute in the Universal CMDB CIT.

```
<basic name="host_hostname">
```

- The name of the table field in the external data source.

```
<column name="Device_Name"/>
```

- The name of the new CIT you created in “Create a CI Type” on page 829.

```
<entity name="MyAdapter" class="generic_db_adapter.MyAdapter">
```

- ▶ The name of the corresponding table in the RDBMS.

```
<table name="SW_License"/>
```

- ▶ The two primary key nodes.

```
<id class="generic_db_adapter.IDClass2PK_SW_Adapter">
```

- ▶ The unique identity in the RDBMS.

```
<id name="id1">
  <column updatable="false" insertable="false" name="Device_ID"/>
  <generated-value strategy="TABLE"/>
</id>
<id name="id2">
  <column updatable="false" insertable="false" name="Version_ID"/>
  <generated-value strategy="TABLE"/>
</id>
```

- ▶ The attribute name in the Universal CMDB CIT and the name of the corresponding attribute in the RDBMS:

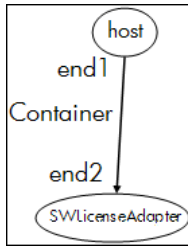
```
<basic name="license_required">
  <column updatable="false" insertable="false"
name="MyAdapter_LicenseRequired"/>
```

8 Map the Relationships

In this step you map relationships in Universal CMDB to the relationships in the RDBMS. For details on relationships, see “Example of Relationship Mapping Between the Class Model and the RDBMS” on page 837.

You make changes to the `orm.xml` file according to the relationships to be mapped. You define the same relationships in Universal CMDB as exist in the RDBMS, according to the use case. The following relationships can be mapped:

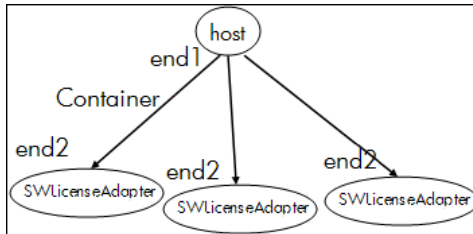
► One to one:



The code for this type of relationship is:

```
<one-to-one name="end1" target-entity="host">
  <join-column name="Device_ID" />
</one-to-one>
<one-to-one name="end2" target-entity="sw_sub_component">
  <join-column name="Device_ID" />
  <join-column name="Version_ID" />
</one-to-one>
```

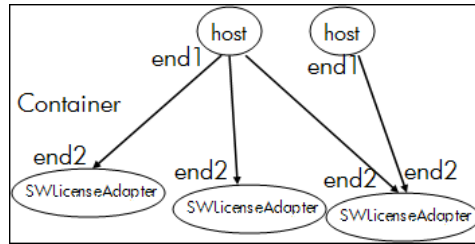
► Many to one:



The code for this type of relationship is:

```
<many-to-one name="end1" target-entity="host">
  <join-column name="Device_ID" />
</many-to-one>
<one-to-one name="end2" target-entity="sw_sub_component">
  <join-column name="Device_ID" />
  <join-column name="Version_ID" />
</one-to-one>
```

- Many to many:



The code for this type of relationship is:

```
<many-to-one name="end1" target-entity="host">
  <join-column name="Device_ID" />
</many-to-one>
<many-to-one name="end2" target-entity="sw_sub_component">
  <join-column name="Device_ID" />
  <join-column name="Version_ID" />
</many-to-one>
```

Example of Relationship Mapping Between the Class Model and the RDBMS

- The name and class of the Universal CMDB relationship:

```
<entity name="host_contained_MyAdapter"
  class="generic_db_adapter.host_contained_MyAdapter">
```

- The name of the RDBMS table where the relationship is performed.

```
<table name="MyAdapter"/>
```

- ▶ The unique ID in the RDBMS:

```
<id name="id1">  
  <column updatable="false" insertable="false" name="Device_ID"/>  
  <generated-value strategy="TABLE"/>  
</id>  
<id name="id2">  
  <column updatable="false" insertable="false" name="Version_ID"/>  
  <generated-value strategy="TABLE"/>  
</id>
```

- ▶ The relationship type and the Universal CMDB CIT:

```
<many-to-one target-entity="host" name="end1">
```

- ▶ The primary key and foreign key fields in the RDBMS:

```
<join-column updatable="false" insertable="false" referenced-column-  
name="[column_name]" name="Device_ID"/>
```

9 Configure the reconciliation_rules.txt File

In this step you define the rules by which the adapter reconciles the Universal CMDB and the RDBMS.

- Open **META-INF\reconciliation_rules.txt** in a text editor.
- Make changes to the file according to the CIT you are mapping. For example, to map a host CIT, use the following expression:

```
multinode[host] ordered expression[^host_hostname]
```

Note:

- ▶ If the data in the database is case sensitive, do not delete the control character (^).
 - ▶ Check that each opening square bracket has a matching closing bracket.
-

10 Load the Adapter

In this step you load the adapter onto the HP Business Availability Center machine.

Note: Every time you make a change to the adapter, you must redeploy it using the JMX console.

- a** On the HP Business Availability Center server machine, launch the Web browser and enter the following address:

```
http://<machine name or IP address>.<domain_name>:8080/jmx-console
```

where **<machine name or IP address>** is the machine on which HP Business Availability Center is installed. You may have to log in with the user name and password.

- b** Click the **service=Fcmdb Config Services** link under the Topaz section.
- c** In the JMX MBEAN View page, locate the **loadOrReloadCodeBaseForAdaptorId()** operation.
- d** In the customerID field, enter **1**.
- e** In the adaptorId field, enter **MyAdapter**. (This is the name you gave to the adapter.)
- f** Click **Invoke**.

11 Create a Data Store

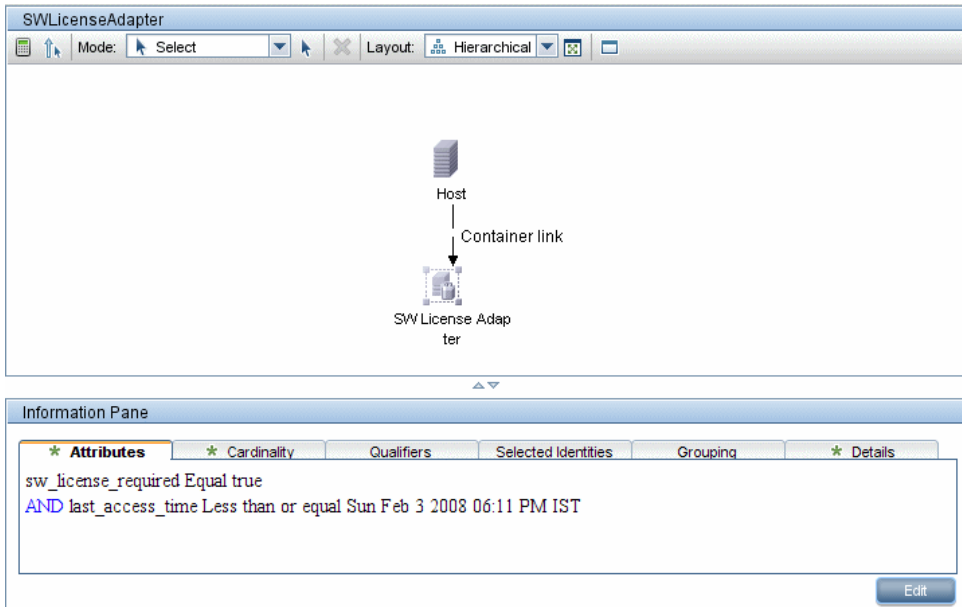
In this step you check that the federation is working, that is, that the connection is valid and that the XML file is valid. However, this check does not verify that the XML is mapping to the correct fields in the RDBMS.

- a** In HP Business Availability Center access the Federated CMDB page (**Settings > Federated CMDB**).
- b** Create a data source. For details, see “Data Stores Tab” on page 751. The Data Store dialog box displays all CITs that support federation.

12 Create a View

In this step you create a view that enables you to view instances of the CIT.

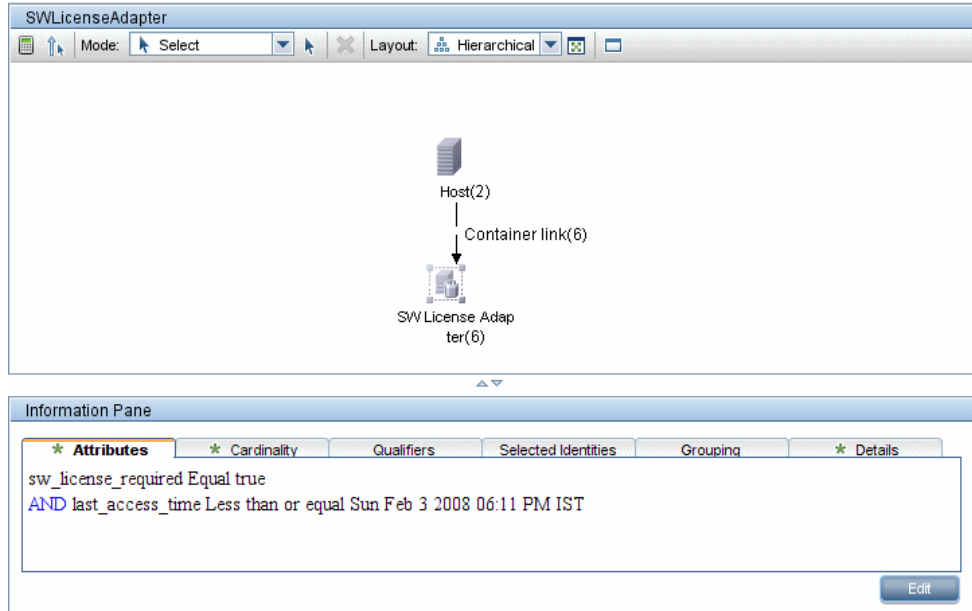
- a** In HP Business Availability Center access the View Manager (**Admin > Universal Cmdb > Modeling > View Manager**).
- b** Create a view. For details, see “Create a Template Based View” on page 174.
- c** You can add conditions to the TQL, for example, the last access time is greater than six months:



13 Calculate the Results

In this step you check the results.

- a From the View Manager calculate results: click the Calculate TQL result count button.



- b Click the **Preview** button to view the CIs in the CIT.

14 View Results

In this step you view the results and debug problems in the procedure. For example, if nothing is shown in the view, check the definitions in the orm.xml file; remove the relationship attributes and reload the adapter.

- a In HP Business Availability Center access the Topology View (**Universal CMDB > Application > Topology View**).

b The Properties tab displays the results of the federation:

The screenshot displays two windows from a software management application. The top window, titled "Topology View", shows a hierarchical diagram of components. At the top is a component labeled "sw_sub_component". Below it, a component labeled "acid" is shown, which is contained by the "sw_sub_component" above it. The "acid" component is further divided into five "sw_sub_component" nodes, each contained by "acid". The bottom window, titled "Information Pane", shows the "Properties" tab for a selected "sw_sub_component". It displays the following information:

Name: sw_sub_component ID: sw_component%0A1%0AExternal+ID0%3DSTRING%3D75%0A CI Type: sw_sub_component

User Label	
root_iconproperties	
sw_last_access_date	2007-06-12 00:00:00.0
sw_license_required	True
sw_vendor	Corel Corporation

15 View Reports

In this step you view Topology reports. For details, see Chapter 25, “Topology Report.”

sw_component_report - Required License Software Not used in 6 months null			
Set View-specific Report (Optional): [Clear]			
...			
<input type="checkbox"/> sw_sub_component (sw_sub_component) (Path: appworld (Host))			
Sw Name:	Photoshop	sw_license_required:	True
sw_last_access_date:		sw_vendor:	Adobe
<input type="checkbox"/> acid (Host)			
Host Name: acid			
<input type="checkbox"/> sw_sub_component (sw_sub_component) (Path: acid (Host))			
Sw Name:	MS Word	sw_license_required:	True
sw_last_access_date:		sw_vendor:	Microsoft
<input type="checkbox"/> sw_sub_component (sw_sub_component) (Path: acid (Host))			
Sw Name:	PcAnywhere	sw_license_required:	True
sw_last_access_date:	Sun Apr 8, 2007 12:00 AM	sw_vendor:	Symantec
<input type="checkbox"/> sw_sub_component (sw_sub_component) (Path: acid (Host))			
Sw Name:	TextPad 4	sw_license_required:	True
sw_last_access_date:	Fri May 11, 2007 12:00 AM	sw_vendor:	Helios Software Solutions
<input type="checkbox"/> sw_sub_component (sw_sub_component) (Path: acid (Host))			
Sw Name:	WinZip	sw_license_required:	True

16 Enable Log Files

To understand the calculation flows, adapter lifecycle, and to view debug information, you can consult the log files. For details, see “Federated Database Log Files” on page 879.

The Federated Database Configuration Files

The files discussed in this section are located under the <HP Business Availability Center root directory>\fcmdb\CodeBase\GenericDBAdapter\META-INF folder.

This section includes the following topics:

- “General Configuration” on page 844
- “Advanced Configuration” on page 844
- “Hibernate Configuration” on page 844
- “Simple Configuration” on page 845

General Configuration

- **adapter.conf.** The adapter configuration file. For details, see “The adapter.conf File” on page 845.

Advanced Configuration

- **orm.xml.** The object-relational mapping file in which you map between CMDB CITs and database tables. For details, see “The orm.xml File” on page 853.
- **reconciliation_rules.txt.** Contains the reconciliation rules. For details, see “The reconciliation_rules.txt File” on page 858.
- **transformations.txt.** Transformations file in which you specify the converters to apply to convert from the CMDB value to the database value, and vice versa. For details, see “The transformations.txt File” on page 859.

Hibernate Configuration

- **persistence.xml.** Used to override out of the box Hibernate configurations. For details, see “The persistence.xml File” on page 860.

Simple Configuration

- **simplifiedConfiguration.xml.** Configuration file that replaces `orm.xml`, `transformations.txt`, and `reconciliation_rules.txt` with less capabilities. For details, see “The `simplifiedConfiguration.xml` File” on page 846.

The `adapter.conf` File

This file contains the following settings:

- **`use.simplified.xml.config=false`.** **true:** uses `simplifiedConfiguration.xml`.

Note: Usage of this file means that `orm.xml`, `transformations.txt`, and `reconciliation_rules.txt` are replaced with less capabilities.

- **`dal.ids.chunk.size=300`.** Do not change this value.
- **`dal.use.persistence.xml=false`.** **true:** the adapter reads the Hibernate configuration from `persistence.xml`.

Note: It is not recommended to override the Hibernate configuration.

The simplifiedConfiguration.xml File

This file is used for simple mapping of CMDB classes to database tables. The template for editing the file is located under the <HP Business Availability Center root directory>\j2f\fcmdb\CodeBase\GenericDBAdapter\META-INF folder.

This section includes the following topics:

- ▶ “Example of the XSD File” on page 846
- ▶ “The Template” on page 849
- ▶ “Limitations” on page 852

Example of the XSD File

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- edited with XMLSPY v5 rel. 3 U (http://www.xmlspy.com) by Nimrod (Mercury Interactive) -->
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="generic-DB-adapter-config">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="CMDB-class" maxOccurs="unbounded"/>
        <xs:element ref="class" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="class">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="foreign-primary-key" maxOccurs="unbounded"/>
        <xs:element ref="primary-key" maxOccurs="unbounded"/>
        <xs:element ref="attribute" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:attribute name="CMDB-class-name" type="xs:string" use="required"/>
      <xs:attribute name="default-table-name" type="xs:string" use="required"/>
      <xs:attribute name="connected-CMDB-class-name" type="xs:string" use="required"/>
      <xs:attribute name="link-class-name" type="xs:string" use="required"/>
    </xs:complexType>
  </xs:element>
  <xs:element name="reconciliation-by-single-node">
    <xs:complexType>
      <xs:choice>
```

```

<xs:element ref="attribute"/>
<xs:element name="or">
  <xs:complexType>
    <xs:choice minOccurs="2" maxOccurs="unbounded">
      <xs:element name="and">
        <xs:complexType>
          <xs:sequence>
            <xs:element ref="attribute" minOccurs="2"
maxOccurs="unbounded"/>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
      <xs:element ref="attribute"/>
    </xs:choice>
    <xs:attribute name="is-ordered" type="xs:boolean" use="optional"
default="false"/>
  </xs:complexType>
</xs:element>
<xs:element name="and">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="attribute" minOccurs="2" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
</xs:choice>
</xs:complexType>
</xs:element>
<xs:element name="primary-key">
  <xs:complexType>
    <xs:attribute name="column-name" type="xs:string" use="required"/>
  </xs:complexType>
</xs:element>
<xs:element name="attribute">
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="attribute-type"/>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
<xs:complexType name="attribute-type">
  <xs:attribute name="table-name" type="xs:string" use="optional"/>
  <xs:attribute name="column-name" type="xs:string" use="required"/>
  <xs:attribute name="CMDB-attribute-name" type="xs:string" use="required"/>
  <xs:attribute name="from-CMDB-converter" type="xs:string" use="optional"/>
  <xs:attribute name="to-CMDB-converter" type="xs:string" use="optional"/>

```

```

    <xs:attribute name="ignore-case" type="xs:boolean" use="optional" default="false"/>
</xs:complexType>
<xs:complexType name="class-type"/>
<xs:element name="or">
  <xs:complexType>
    <xs:choice minOccurs="2" maxOccurs="unbounded">
      <xs:element ref="and"/>
      <xs:element ref="attribute"/>
      <xs:element ref="connected-node-attribute"/>
    </xs:choice>
    <xs:attribute name="is-ordered" type="xs:boolean" use="optional" default="false"/>
  </xs:complexType>
</xs:element>
<xs:element name="and">
  <xs:complexType>
    <xs:choice minOccurs="2" maxOccurs="unbounded">
      <xs:element ref="attribute"/>
      <xs:element ref="connected-node-attribute"/>
    </xs:choice>
  </xs:complexType>
</xs:element>
<xs:element name="reconciliation-by-two-nodes">
  <xs:complexType>
    <xs:sequence>
      <xs:choice>
        <xs:element ref="attribute"/>
        <xs:element ref="connected-node-attribute"/>
        <xs:element ref="or"/>
        <xs:element ref="and"/>
      </xs:choice>
    </xs:sequence>
    <xs:attribute name="connected-node-CMDB-class-name" type="xs:string" use="required"/>
    <xs:attribute name="CMDB-link-type" type="xs:string" use="required"/>
    <xs:attribute name="link-direction" use="optional" default="main-to-connected">
      <xs:simpleType>
        <xs:restriction base="xs:string">
          <xs:enumeration value="main-to-connected"/>
          <xs:enumeration value="connected-to-main"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:attribute>
  </xs:complexType>
</xs:element>
<xs:element name="connected-node-attribute" type="attribute-type"/>
<xs:element name="CMDB-class">
  <xs:complexType>

```



```

<xs:sequence>
  <xs:element ref="primary-key" maxOccurs="unbounded"/>
  <xs:choice>
    <xs:element ref="reconciliation-by-single-node"/>
    <xs:element ref="reconciliation-by-two-nodes"/>
  </xs:choice>
</xs:sequence>
<xs:attribute name="CMDB-class-name" type="xs:string" use="required"/>
<xs:attribute name="default-table-name" type="xs:string" use="required"/>
</xs:complexType>
</xs:element>
<xs:element name="foreign-primary-key">
  <xs:complexType>
    <xs:attribute name="CMDB-class-primary-key-column" type="xs:string" use="required"/>
    <xs:attribute name="column-name" type="xs:string" use="required"/>
  </xs:complexType>
</xs:element>
</xs:schema>

```

The Template

The **CMDB-class-name** property is the multinode type (the node to which federated CITs connect in the TQL):

```

<?xml version="1.0" encoding="UTF-8"?>
<generic-DB-adapter-config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="..META-CONF/simplifiedConfiguration.xsd">
  <CMDB-class CMDB-class-name="host" default-table-name="[table_name]">
    <primary-key column-name="[column_name]"/>

```

reconciliation-by-two-nodes. Reconciliation can be done using one node or two nodes. In this case example, reconciliation uses two nodes.

connected-node-CMDB-class-name. The second class type needed in the reconciliation TQL.

CMDB-link-type. The relationship type needed in the reconciliation TQL.

link-direction. The direction of the relationship in the reconciliation TQL (from host to ip or from ip to host):

```

  <reconciliation-by-two-nodes connected-node-CMDB-class-name="ip" CMDB-link-
type="contained" link-direction="main-to-connected">

```

The reconciliation expression is in the form of ORs and each OR includes ANDs.

is-ordered. Determines if reconciliation is done in order form or by a regular OR comparison.

```
<or is-ordered="true">
```

If the reconciliation property is retrieved from the main class (the multinode), use the **attribute** tag, otherwise use the **connected-node-attribute** tag.

ignore-case. true: when data in the Universal CMDB class model is compared with data in the RDBMS, case does not matter:

```

    <attribute CMDB-attribute-name="host_hostname" column-
name="[column_name]" ignore-case="true"/>
    <connected-node-attribute CMDB-attribute-name="ip_address" column-
name="[column_name]"/>
  </or>
</reconciliation-by-two-nodes>
</CMDB-class>
<class CMDB-class-name="[CMDB_class_name]" default-table-
name="[default_table_name]" connected-CMDB-class-name="host" link-class-
name="container_f">
```

The column name is the name of the foreign key column (the column with values that point to the multinode primary key column).

If the multinode primary key column is composed of several columns, there needs to be several foreign key columns, one for each primary key column.

```
<foreign-primary-key column-name="[column_name]" CMDB-class-primary-key-
column="[column_name]"/>
```

If there are few primary key columns, duplicate this column.

```
<primary-key column-name="[column_name]"/>
```

The **from-CMDB-converter** and **to-CMDB-converter** properties are Java classes that implement the following interfaces:

- ▶ `com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.FcldbDalTransformerFromExternalDB`
- ▶ `com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.FcldbDalTransformerToExternalDB`

Use these converters if the value in the CMDB and in the database are not the same. For example, the host name in the CMDB has the suffix `mer.com`.

In this example `GenericEnumTransformer` is used to convert the enumerator according to the XML file that is written inside the parenthesis (**generic-enum-transformer-example.xml**):

```
<attribute CMDB-attribute-name="[CMDB_attribute_name]" column-
name="[column_name]" from-CMDB-
converter="com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.impl.GenericE
numTransformer(generic-enum-transformer-example.xml)" to-CMDB-
converter="com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.impl.GenericE
numTransformer(generic-enum-transformer-example.xml)"/>
  <attribute CMDB-attribute-name="[CMDB_attribute_name]" column-
name="[column_name]"/>
  <attribute CMDB-attribute-name="[CMDB_attribute_name]" column-
name="[column_name]"/>
</class>
</generic-DB-adapter-config>
```

Example of Simple Mapping

```
<?xml version="1.0" encoding="UTF-8"?>
<generic-DB-adapter-config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="../META-CONF/simplifiedConfiguration.xsd">
  <CMDB-class CMDB-class-name="host" default-table-name="Device">
    <primary-key column-name="Device_ID"/>
    <reconciliation-by-two-nodes connected-node-CMDB-class-name="ip" CMDB-link-
type="contained">
      <or>
        <attribute CMDB-attribute-name="host_hostname" column-name="Device_Name"/>
        <connected-node-attribute CMDB-attribute-name="ip_address" column-
name="Device_PreferredIPAddress"/>
      </or>
    </reconciliation-by-two-nodes>
  </CMDB-class>
```

```

<class CMDB-class-name="host_card" default-table-name="hwCards" connected-CMDB-class-
name="host" link-class-name="contained">
  <foreign-primary-key column-name="Device_ID" CMDB-class-primary-key-column="Device_ID"/>
  <primary-key column-name="Device_ID"/>
  <primary-key column-name="hwBusesSupported_Seq"/>
  <primary-key column-name="hwCards_Seq"/>
  <attribute CMDB-attribute-name="card_class" column-name="hwCardClass"/>
  <attribute CMDB-attribute-name="card_vendor" column-name="hwCardVendor"/>
  <attribute CMDB-attribute-name="card_name" column-name="hwCardName"/>
</class>
<class CMDB-class-name="sw_sub_component" default-table-name="SWSubComponent" connected-
CMDB-class-name="host" link-class-name="contained">
  <foreign-primary-key column-name="Device_ID" CMDB-class-primary-key-column="Device_ID"/>
  <primary-key column-name="Device_ID"/>
  <primary-key column-name="Version_ID"/>
  <attribute CMDB-attribute-name="installed_dir" column-
name="SWSubComponent_InstalledDirectory"/>
  <attribute CMDB-attribute-name="license_required" column-
name="SWSubComponent_LicenceRequired"/>
  <attribute CMDB-attribute-name="last_access_time" column-
name="SWSubComponent_LastAccessTimeStamp"/>
  <attribute CMDB-attribute-name="last_access_time_string" column-
name="SWSubComponent_LastAccessTimeStamp"/>
</class>
<class CMDB-class-name="host_scsi_device" default-table-name="hwSCSIDevices" connected-
CMDB-class-name="host" link-class-name="contained">
  <foreign-primary-key column-name="Device_ID" CMDB-class-primary-key-column="Device_ID"/>
  <primary-key column-name="Device_ID"/>
  <primary-key column-name="hwSCSIDevices_Seq"/>
  <attribute CMDB-attribute-name="scsi_device_name" column-name="hwSCSIDeviceName"/>
  <attribute CMDB-attribute-name="scsi_device_vendor" column-name="hwSCSIDeviceVendor"/>
  <attribute CMDB-attribute-name="scsi_device_type" column-name="hwSCSIDeviceType"/>
</class>
</generic-DB-adapter-config>

```

Limitations

- ▶ Can be used to map one node TQLs only (in the database source). For example, you can run a host > ticket and a ticket TQL. To bring the hierarchy of nodes from the database, you must use the advanced **orm.xml** file.
- ▶ Only one-to-many relations are supported. For example, you can bring one or more tickets on each host. You cannot bring tickets that belong to more than one host.

- ▶ You cannot connect the same class to different types of CMDB CITs. For example, if you define that ticket is connected to host, it cannot be connected to application as well.

The orm.xml File

This file is used for mapping CMDB CITs to database tables.

A template to use for creating a new file is located in the <HP Business Availability Center root directory>\fcmdb\Codebase\MyAdapter\META-INF\ folder.

This section includes the following topics:

- ▶ “The Template” on page 853
- ▶ “Multiple ORM files” on page 857
- ▶ “Naming Conventions” on page 857
- ▶ “Using Inline SQL Statements Instead of Table Names” on page 857

The Template

```
<?xml version="1.0" encoding="UTF-8"?>
<entity-mappings xmlns="http://java.sun.com/xml/ns/persistence/orm"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" version="1.0"
xsi:schemaLocation="http://java.sun.com/xml/ns/persistence/orm
http://java.sun.com/xml/ns/persistence/orm_1_0.xsd">
<description>Generic DB adapter orm</description>
```

Do not change the package name.

```
<package>generic_db_adapter</package>
```

entity. The Universal CMDB CIT name. This is the multinode entity.

Make sure that **class** includes a **generic_db_adapter.** prefix.

```
<entity class="generic_db_adapter.host">  
  <table name="[table_name]"/>
```

Use a secondary table if the entity is mapped to more than one table.

```
<secondary-table name=""/>  
<attributes>
```

For a single table inheritance with discriminator, use the following code:

```
<inheritance strategy="SINGLE_TABLE"/>  
<discriminator-value>host</discriminator-value>  
<discriminator-column name="[column_name]"/>
```

Attributes with tag **id** are the primary key columns. Make sure that the naming convention for these primary key columns are **idX** (id1, id2, and so on) where **X** is the column index in the primary key.

```
<id name="id1">
```

Change only the column name of the primary key.

```
  <column updatable="false" insertable="false" name="[column_name]"/>  
  <generated-value strategy="TABLE"/>  
</id>
```

basic. Used to declare the CMDB attributes. Make sure to edit only **name** and **column_name** properties. The expression is located in the `reconciliation_rules.txt` file:

```

    <basic name="host_hostname">
      <column updatable="false" insertable="false" name="[column_name]"/>
    </basic>
    <basic name="ip_ip_address">
      <column updatable="false" insertable="false" name="[column_name]"/>
    </basic>
  </attributes>
</entity>

```

For a single table inheritance with discriminator, map the extending classes as follows:

```

<entity name="[cmdb_class_name]" class="generic_db_adapter.nt" name="nt">
  <discriminator-value>nt</discriminator-value>
  <attributes/>
</entity>
<entity class="generic_db_adapter.unix" name="unix">
  <discriminator-value>unix</discriminator-value>
  <attributes/>
</entity>
<entity name="[CMDB_class_name]"
class="generic_db_adapter.[CMDB[cmdb_class_name]]">
  <table name="[default_table_name]"/>
  <secondary-table name=""/>
  <attributes>
    <id name="id1">
      <column updatable="false" insertable="false" name="[column_name]"/>
      <generated-value strategy="TABLE"/>
    </id>
    <id name="id2">
      <column updatable="false" insertable="false" name="[column_name]"/>
      <generated-value strategy="TABLE"/>
    </id>
    <id name="id3">
      <column updatable="false" insertable="false" name="[column_name]"/>
      <generated-value strategy="TABLE"/>
    </id>
  </attributes>
</entity>

```

The following example shows a CMDB attribute name with no prefix:

```

    <basic name="[CMDB_attribute_name]">
      <column updatable="false" insertable="false" name="[column_name]"/>
    </basic>
    <basic name="[CMDB_attribute_name]">
      <column updatable="false" insertable="false" name="[column_name]"/>
    </basic>
    <basic name="[CMDB_attribute_name]">
      <column updatable="false" insertable="false" name="[column_name]"/>
    </basic>
  </attributes>
</entity>

```

This is a relationship entity. The naming convention is **end1Type_linkType_end2Type**. In this example **end1Type** is **host** and the **linkType** is **container_f**.

```

<entity name="host_container_f_[CMDB_class_name]"
class="generic_db_adapter.host_container_f_[CMDB_class_name]">
  <table name="[default_table_name]"/>
  <attributes>
    <id name="id1">
      <column updatable="false" insertable="false" name="[column_name]"/>
      <generated-value strategy="TABLE"/>
    </id>
  </attributes>
</entity>

```

The target entity is the entity that this property is pointing to. In this example, **end1** is mapped to **host** entity.

many-to-one. Many relationships can be connected to one host.

join-column. The column that contains **end1** IDs (the target entity IDs).

referenced-column-name. The column name in the target entity (**host**) that contain the IDs that are used in the join column.

```

<many-to-one target-entity="host" name="end1">
  <join-column updatable="false" insertable="false" referenced-column-
name="[column_name]" name="[column_name]"/>
</many-to-one>

```


one-to-one. One relationship can be connected to one [CMDB_class_name].

```

    <one-to-one target-entity="[CMDB_class_name]" name="end2">
      <join-column updatable="false" insertable="false" referenced-column-
name="" name="[column_name]"/>
    </one-to-one>
  </attributes>
</entity>
</entity-mappings>

```

Multiple ORM files

Multiple mapping files are supported from version 7.5.1. Each mapping file name should end with **orm.xml**. All mapping files should be placed under the META-INF folder of the adapter.

Naming Conventions

- ▶ In each entity, the class property must match the name property with the prefix of `generic_db_adapter`.
- ▶ Primary key columns must take names of the form **idX** where **X = 1, 2, ...**, according to the number of primary keys in the table.
- ▶ Attribute names must match class attribute names even as regards case.
- ▶ The relationship name takes the form `end1Type_linkType_end2Type`.
- ▶ CMDB CITs, which are also reserved words in Java, should be prefixed by **gdba_**. For example, for the CMDB CIT **goto**, the ORM entity should be named **gdba_goto**.

Using Inline SQL Statements Instead of Table Names

You can map entities to inline `select` clauses instead of to database tables. This is equivalent to defining a view in the database and mapping an entity to this view. For example:

```

<entity class="generic_db_adapter.host">
  <table name="(select d.id as id1, d.name as host_hostname , d.os as host_os from Device d)"/>

```

In this example, the host attributes should be mapped to columns **id1**, **host_hostname**, and **host_os**, rather than to **id**, **name**, and **os**.

The following limitations apply:

- The inline SQL statement is available only when using Hibernate as the JPA provider.
- Round brackets around the inline SQL select clause are mandatory.
- The `<schema>` element should not be present in the `orm.xml` file. In the case of Microsoft SQL Server 2005, this means that all table names should be prefixed with `dbo.`, rather than defining them globally by `<schema>dbo</schema>`.

The reconciliation_rules.txt File

- This file is used to configure the reconciliation rules.
- Each row in the file represents a rule. For example:

```
multinode[host] expression[^host.host_hostname OR ip.ip_address] end1_type[host]  
end2_type[ip] link_type[contained]
```

- The `multinode` is filled with the `multinode` name (the CMDB CIT that is connected to the federated database CIT in the TQL).
- This expression includes the logic that decides whether two `multinodes` are equal (one `multinode` in the UCMDB and the other in the database source).
- The expression is composed of ORs or ANDs.
- The convention regarding attribute names in the expression part is `[className].[attributeName]`. For example, attribute `ip_address` in the `ip` class is written `ip.ip_address`.
- For an ordered match (if the first OR sub-expression returns an answer that the `multinodes` are not equal, the second OR sub-expression is not compared), then use `ordered expression` instead of `expression`.
- To ignore case during a comparison, use the control sign (^) sign.

- ▶ The parameters `end1_type`, `end2_type` and `link_type` are used only if the reconciliation TQL contains two nodes and not just a multinode. In this case, the reconciliation TQL is `end1_type > (link_type) > end2_type`.
- ▶ There is no need to add the relevant layout as it is taken from the expression.

The transformations.txt File

This file contains all the converter definitions.

The format is that each line contains a new definition.

The Template

```
entity[[CMDB_class_name]] attribute[[CMDB_attribute_name]]
to_DB_class[com.mercury.topaz.fcldb.adapters.dbAdapter.dal.
transform.impl.GenericEnumTransformer(generic-enum-transformer-example.xml)]
from_DB_class[com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.impl.
GenericEnumTransformer(generic-enum-transformer-example.xml)]
```

entity. The entity name as it appears in the `orm.xml` file.

attribute. The attribute name as it appears in the `orm.xml` file.

to_DB_class. The full, qualified name of a class that implements the interface

com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.FcldbDalTransformerToExternalDB. The elements in the parenthesis are given to this class constructor. Use this converter to transform CMDB values to database values, for example, to append the suffix of **.com** to each host name.

from_DB_class. The full, qualified name of a class that implements the **com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.FcldbDalTransformerFromExternalDB** interface. The elements in the parenthesis are given to this class constructor. Use this converter to transform database values to CMDB values, for example, to append the suffix of **.com** to each host name.

For details, see “Out-of-the-Box Converters” on page 862.

The persistence.xml File

This file is used to override the default Hibernate settings and to add support for database types that are not out of the box (OOB database types are Oracle Server, Microsoft MSSQL Server, and MySQL).

If you need to support a new database type, make sure that you supply a connection pool provider (the default is c3p0) and a JDBC driver for your database (put the *.jar files in the adapter folder).

To see all available Hibernate values that can be changed, check the `org.hibernate.cfg.Environment` class.

Example of the persistence.xml file

```
<persistence xmlns="http://java.sun.com/xml/ns/persistence"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://java.sun.com/xml/ns/persistence
http://java.sun.com/xml/ns/persistence/persistence_1_0.xsd" version="1.0">
<!-- Don't change this value -->
<persistence-unit name="GenericDBAdapter">
  <properties>
    <!-- Don't change this value -->
    <property name="hibernate.archive.autodetection" value="class, hbm"/>
    <!--The driver class name"/-->
    <property name="hibernate.connection.driver_class"
value="com.mercury.jdbc.MercOracleDriver"/>
    <!--The connection url"/-->
    <property name="hibernate.connection.url"
value="jdbc:mercury:oracle://artist:1521;sid=cmdb2"/>
    <!--DB login credentials"/-->
    <property name="hibernate.connection.username" value="CMDB"/>
    <property name="hibernate.connection.password" value="CMDB"/>
    <!--connection pool properties"/-->
    <property name="hibernate.c3p0.min_size" value="5"/>
    <property name="hibernate.c3p0.max_size" value="20"/>
    <property name="hibernate.c3p0.timeout" value="300"/>
    <property name="hibernate.c3p0.max_statements" value="50"/>
    <property name="hibernate.c3p0.idle_test_period" value="3000"/>
    <!--The dialect to use-->
    <property name="hibernate.dialect"
value="org.hibernate.dialect.OracleDialect"/>
  </properties>
</persistence-unit>
</persistence>
```

The discriminator.properties File

This file maps each supported CI type (that is also used as a discriminator value in orm.xml) to a comma-separated list of possible corresponding values of the discriminator column.

Example of discriminator mapping

The discriminator.properties file includes the following code:

```
host=10001, 10005,10010,10011,10012
nt=10002,10003
unix=10004,10006,10008
```

The orm.xml file includes the following code:

```
<entity class="generic_db_adapter.host" name="host">
  <table name="[table_name]"/>
  ...
  <inheritance strategy="SINGLE_TABLE"/>
  <discriminator-value>host</discriminator-value>
  <discriminator-column name="[discriminator_column]"/>
  ...
</entity>
<entity class="generic_db_adapter.nt" name="nt">
  <discriminator-value>nt</discriminator-value>
  <attributes/>
</entity>
<entity class="generic_db_adapter.unix" name="unix">
  <discriminator-value>unix</discriminator-value>
  <attributes/>
</entity>
```

The [discriminator_column] attribute is calculated as follows:

- ▶ The discriminator column of the corresponding table contains 10002 for a certain entry. The entry is mapped to the **nt** CIT.
- ▶ The discriminator column of the corresponding table contains 10006 for a certain entry. The entry is mapped to the **unix** CIT.
- ▶ The discriminator column of the corresponding table contains 10010 for a certain entry. The entry is mapped to the **host** CIT.

Note that the **host** CIT is also the parent of **nt** and **unix**.

The replication_config.txt File

This file contains a comma-separated list of CI and relationship types whose property conditions are supported by the replication plug-in. For details, see “Plug-ins” on page 866.

The fixed_values.txt File

This file enables you to configure fixed values for specific attributes of certain CITs. In this way, each of these attributes can be assigned a fixed value that is not stored in the database.

The file should contain zero or more entries of the following format:

```
entity[<entityName>] attribute[<attributeName>] value[<value>]
```

For example:

```
entity[ip] attribute[ip_domain] value[DefaultDomain]
```

Out-of-the-Box Converters

You can use the following converters (transformers) to convert federated queries and replication jobs to and from database data.

This section includes the following topics:

- ▶ “The enum-transformer Converter” on page 863
- ▶ “The SuffixTransformer Converter” on page 865
- ▶ “The PrefixTransformer Converter” on page 865
- ▶ “The BytesToStringTransformer Converter” on page 865

The enum-transformer Converter

This converter uses an XML file that is given as an input parameter.

The XML file maps between hard-coded CMDb values and database values (enums). If one of the values does not exist, you can choose to return the same value, return null, or throw an exception.

Use one XML mapping file for each entity attribute.

Note: This converter can be used for both the `to_DB_class` and `from_DB_class` fields in the `transformations.txt` file.

Example of the input file XSD

```
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="enum-transformer">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="value" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:attribute name="DB-type" use="required">
        <xs:simpleType>
          <xs:restriction base="xs:string">
            <xs:enumeration value="integer"/>
            <xs:enumeration value="long"/>
            <xs:enumeration value="float"/>
            <xs:enumeration value="double"/>
            <xs:enumeration value="boolean"/>
            <xs:enumeration value="string"/>
            <xs:enumeration value="date"/>
            <xs:enumeration value="xml"/>
            <xs:enumeration value="bytes"/>
          </xs:restriction>
        </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="CMDb-type" use="required">
        <xs:simpleType>
          <xs:restriction base="xs:string">
            <xs:enumeration value="integer"/>
            <xs:enumeration value="long"/>
          </xs:restriction>
        </xs:simpleType>
      </xs:attribute>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

```

        <xs:enumeration value="float"/>
        <xs:enumeration value="double"/>
        <xs:enumeration value="boolean"/>
        <xs:enumeration value="string"/>
        <xs:enumeration value="date"/>
        <xs:enumeration value="xml"/>
        <xs:enumeration value="bytes"/>
    </xs:restriction>
</xs:simpleType>
</xs:attribute>
<xs:attribute name="non-existing-value-action" use="required">
    <xs:simpleType>
        <xs:restriction base="xs:string">
            <xs:enumeration value="return-null"/>
            <xs:enumeration value="return-original"/>
            <xs:enumeration value="throw-exception"/>
        </xs:restriction>
    </xs:simpleType>
</xs:attribute>
</xs:complexType>
</xs:element>
<xs:element name="value">
    <xs:complexType>
        <xs:attribute name="CMDB-value" type="xs:string" use="required"/>
        <xs:attribute name="external-DB-value" type="xs:string" use="required"/>
    </xs:complexType>
</xs:element>
</xs:schema>

```

Example of Converting sys Value to System Value

In this example, sys value in the CMDB is transformed into System value in the federated database, and System value in the federated database is transformed into sys value in the CMDB.

If the value does not exist in the XML file (for example, the string demo), the converter returns the same input value it receives.

```

<enum-transformer CMDB-type="string" DB-type="string" non-existing-value-action="return-original"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="..META-
CONF/generic-enum-transformer.xsd">
  <value CMDB-value="sys" external-DB-value="System"/>
</enum-transformer>

```


The SuffixTransformer Converter

This converter is used to add or remove suffixes from the CMDB or federated database source value.

There are two implementations:

- **com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.impl.AdapterToCmdbAddSuffixTransformer.** Adds the suffix (given as input) when converting from federated database value to CMDB value and removes the suffix when converting from CMDB value to federated database value.
- **com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.impl.AdapterToCmdbRemoveSuffixTransformer.** Removes the suffix (given as input) when converting from federated database value to CMDB value and adds the suffix when converting from CMDB value to federated database value.

The PrefixTransformer Converter

This converter is used to add or remove a prefix from the CMDB or federated database value.

There are two implementations:

- **com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.impl.AdapterToCmdbAddPrefixTransformer.** Adds the prefix (given as input) when converting from federated database value to CMDB value and removes the prefix when converting from CMDB value to federated database value.
- **com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.impl.AdapterToCmdbRemovePrefixTransformer.** Removes the prefix (given as input) when converting from federated database value to CMDB value and adds the prefix when converting from CMDB value to federated database value.

The BytesToStringTransformer Converter

This converter is used to convert byte arrays in the UCMDB to their string representation in the federated database source.

The converter is:

com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.impl.CmdbToAdapterBytesToStringTransformer.

Plug-ins

The generic database adapter supports the following plug-ins:

- An optional plug-in for full topology synchronization.
- A mandatory plug-in for synchronizing changes in topology.
- An optional plug-in for synchronizing layout. You must implement this plug-in if you want to run replication jobs using the scheduler.
- An optional plug-in to retrieve supported queries for synchronization. If this plug-in is not defined, all TQL names are returned.
- An internal, optional plug-in to change the TQL definition and TQL result.
- An internal, optional plug-in to change a layout request and CIs result.
- An internal, optional plug-in to change a layout request and relationships result.

The plug-ins are configured using the **plugins.txt** file under the META-INF folder of the adapter.

Configuration Examples

This section gives examples of configurations.

This section includes the following topics:

- “Use Case” on page 866
- “Single Node Reconciliation” on page 867
- “Two Node Reconciliation” on page 869
- “Using a Primary Key that Contains More Than One Column” on page 874
- “Using Transformations” on page 877

Use Case

Use case. A TQL is:

```
host > (container_f) > host_card
```

where:

host is the UCMDB entity

host_card is the federated database source entity

container_f is the relationship between them

The example is run against the ED database. ED hosts is stored in the Device table and host_card is stored in the hwCards table. In the following examples, host_card is always mapped in the same manner.

Single Node Reconciliation

In this example the reconciliation is run against the host_hostname property.

Simplified Definition

The multinode is the host and it is emphasized by the special tag **CMDB-class**.

```
<?xml version="1.0" encoding="UTF-8"?>
<generic-DB-adapter-config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="..META-CONF/simplifiedConfiguration.xsd">
  <CMDB-class CMDB-class-name="host" default-table-name="Device">
    <primary-key column-name="Device_ID"/>
    <reconciliation-by-single-node>
      <or>
        <attribute CMDB-attribute-name="host_hostname" column-name="Device_Name"/>
      </or>
    </reconciliation-by-single-node>
  </CMDB-class>
  <class CMDB-class-name="host_card" default-table-name="hwCards" connected-CMDB-class-
name="host" link-class-name="container_f">
    <foreign-primary-key column-name="Device_ID" CMDB-class-primary-key-column="Device_ID"/>
    <primary-key column-name="hwCards_Seq"/>
    <attribute CMDB-attribute-name="card_class" column-name="hwCardClass"/>
    <attribute CMDB-attribute-name="card_vendor" column-name="hwCardVendor"/>
    <attribute CMDB-attribute-name="card_name" column-name="hwCardName"/>
  </class>
</generic-DB-adapter-config>
```

Advanced Definition

The orm.xml File

Pay attention to the addition of the relationship mapping. For details, see the definition section in “The orm.xml File” on page 853.

Example of the orm.xml File

```
<?xml version="1.0" encoding="UTF-8"?>
<entity-mappings xmlns="http://java.sun.com/xml/ns/persistence/orm"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://java.sun.com/xml/ns/persistence/orm
http://java.sun.com/xml/ns/persistence/orm_1_0.xsd" version="1.0">
<description>Generic DB adapter orm</description>
<package>generic_db_adapter</package>
<entity class="generic_db_adapter.host" name="host">
  <table name="Device"/>
  <attributes>
    <id name="id1">
      <column name="Device_ID" insertable="false" updatable="false"/>
      <generated-value strategy="TABLE"/>
    </id>
    <basic name="host_hostname">
      <column name="Device_Name"/>
    </basic>
  </attributes>
</entity>
<entity class="generic_db_adapter.host_card" name="host_card">
  <table name="hwCards"/>
  <attributes>
    <id name="id1">
      <column name="hwCards_Seq" insertable="false" updatable="false"/>
      <generated-value strategy="TABLE"/>
    </id>
    <basic name="card_class">
      <column name="hwCardClass" insertable="false" updatable="false"/>
    </basic>
    <basic name="card_vendor">
      <column name="hwCardVendor" insertable="false" updatable="false"/>
    </basic>
    <basic name="card_name">
      <column name="hwCardName" insertable="false" updatable="false"/>
    </basic>
  </attributes>
</entity>
<entity class="generic_db_adapter.host_container_f_host_card" name="host_container_f_host_card">
```

```

<table name="hwCards"/>
<attributes>
  <id name="id1">
    <column name="hwCards_Seq" insertable="false" updatable="false"/>
    <generated-value strategy="TABLE"/>
  </id>
  <many-to-one name="end1" target-entity="host">
    <join-column name="Device_ID" insertable="false" updatable="false"/>
  </many-to-one>
  <one-to-one name="end2" target-entity="host_card">
    <join-column name="hwCards_Seq" referenced-column-name="hwCards_Seq"
insertable="false" updatable="false"/>
  </one-to-one>
</attributes>
</entity>
</entity-mappings>

```

The reconciliation_rules.txt File

For details, see “The reconciliation_rules.txt File” on page 858.

```
multinode[host] expression[host.host_hostname]
```

The transformation.txt File

This file remains empty as no values need to be converted in this example.

Two Node Reconciliation

In this example, reconciliation is calculated according to the `host_hostname` and `ip_address` properties with different variations.

The reconciliation TQL is `host > (contained) > ip`.

Simplified Definition

The reconciliation is `host_hostname` OR `ip_address`:

```
<?xml version="1.0" encoding="UTF-8"?>
<generic-DB-adapter-config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="META-CONF/simplifiedConfiguration.xsd">
  <CMDB-class CMDB-class-name="host" default-table-name="Device">
    <primary-key column-name="Device_ID"/>
    <reconciliation-by-two-nodes connected-node-CMDB-class-name="ip" CMDB-link-
type="contained">
      <or>
        <attribute CMDB-attribute-name="host_hostname" column-
name="Device_Name"/>
        <connected-node-attribute CMDB-attribute-name="ip_address" column-
name="Device_PREFERREDIPAddress"/>
      </or>
    </reconciliation-by-two-nodes>
  </CMDB-class>
  <class CMDB-class-name="host_card" default-table-name="hwCards" connected-
CMDB-class-name="host" link-class-name="contained">
    <foreign-primary-key column-name="Device_ID" CMDB-class-primary-key-
column="Device_ID"/>
    <primary-key column-name="hwCards_Seq"/>
    <attribute CMDB-attribute-name="card_class" column-name="hwCardClass"/>
    <attribute CMDB-attribute-name="card_vendor" column-name="hwCardVendor"/>
    <attribute CMDB-attribute-name="card_name" column-name="hwCardName"/>
  </class>
</generic-DB-adapter-config>
```

The reconciliation is `host_hostname` AND `ip_address`:

```
<?xml version="1.0" encoding="UTF-8"?>
<generic-DB-adapter-config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="..META-CONF/simplifiedConfiguration.xsd">
  <CMDB-class CMDB-class-name="host" default-table-name="Device">
    <primary-key column-name="Device_ID"/>
    <reconciliation-by-two-nodes connected-node-CMDB-class-name="ip" CMDB-link-
type="contained">
      <and>
        <attribute CMDB-attribute-name="host_hostname" column-
name="Device_Name"/>
        <connected-node-attribute CMDB-attribute-name="ip_address" column-
name="Device_PREFERREDIPAddress"/>
      </and>
    </reconciliation-by-two-nodes>
  </CMDB-class>
  <class CMDB-class-name="host_card" default-table-name="hwCards" connected-
CMDB-class-name="host" link-class-name="contained">
    <foreign-primary-key column-name="Device_ID" CMDB-class-primary-key-
column="Device_ID"/>
    <primary-key column-name="hwCards_Seq"/>
    <attribute CMDB-attribute-name="card_class" column-name="hwCardClass"/>
    <attribute CMDB-attribute-name="card_vendor" column-name="hwCardVendor"/>
    <attribute CMDB-attribute-name="card_name" column-name="hwCardName"/>
  </class>
</generic-DB-adapter-config>
```

The reconciliation is `ip_address`:

```
<?xml version="1.0" encoding="UTF-8"?>
<generic-DB-adapter-config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="META-CONF/simplifiedConfiguration.xsd">
  <CMDB-class CMDB-class-name="host" default-table-name="Device">
    <primary-key column-name="Device_ID"/>
    <reconciliation-by-two-nodes connected-node-CMDB-class-name="ip" CMDB-link-
type="contained">
      <or>
        <connected-node-attribute CMDB-attribute-name="ip_address" column-
name="Device_PREFERREDIPAddress"/>
      </or>
    </reconciliation-by-two-nodes>
  </CMDB-class>
  <class CMDB-class-name="host_card" default-table-name="hwCards" connected-
CMDB-class-name="host" link-class-name="contained">
    <foreign-primary-key column-name="Device_ID" CMDB-class-primary-key-
column="Device_ID"/>
    <primary-key column-name="hwCards_Seq"/>
    <attribute CMDB-attribute-name="card_class" column-name="hwCardClass"/>
    <attribute CMDB-attribute-name="card_vendor" column-name="hwCardVendor"/>
    <attribute CMDB-attribute-name="card_name" column-name="hwCardName"/>
  </class>
</generic-DB-adapter-config>
```

Advanced Definition

The `orm.xml` File

Since the reconciliation expression is not defined in this file, the same version can be used for both OR and AND and for `ip_address` alone.

Example of the `orm.xml` File

```
<?xml version="1.0" encoding="UTF-8"?>
<entity-mappings xmlns="http://java.sun.com/xml/ns/persistence/orm"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://java.sun.com/xml/ns/persistence/orm
http://java.sun.com/xml/ns/persistence/orm_1_0.xsd" version="1.0">
  <description>Generic DB adapter orm</description>
  <package>generic_db_adapter</package>
  <entity class="generic_db_adapter.host" name="host">
    <table name="Device"/>
    <attributes>
```



```

<id name="id1">
  <column name="Device_ID" insertable="false" updatable="false"/>
  <generated-value strategy="TABLE"/>
</id>
<basic name="host_hostname">
  <column name="Device_Name" insertable="false" updatable="false"/>
</basic>
<basic name="ip_ip_address">
  <column name="Device_PREFERREDIPAddress" insertable="false" updatable="false"/>
</basic>
</attributes>
</entity>
<entity class="generic_db_adapter.host_card" name="host_card">
  <table name="hwCards"/>
  <attributes>
    <id name="id1">
      <column name="hwCards_Seq" insertable="false" updatable="false"/>
      <generated-value strategy="TABLE"/>
    </id>
    <basic name="card_class">
      <column name="hwCardClass" insertable="false" updatable="false"/>
    </basic>
    <basic name="card_vendor">
      <column name="hwCardVendor" insertable="false" updatable="false"/>
    </basic>
    <basic name="card_name">
      <column name="hwCardName" insertable="false" updatable="false"/>
    </basic>
  </attributes>
</entity>
<entity class="generic_db_adapter.host_container_f_host_card" name="host_container_f_host_card">
  <table name="hwCards"/>
  <attributes>
    <id name="id1">
      <column name="hwCards_Seq" insertable="false" updatable="false"/>
      <generated-value strategy="TABLE"/>
    </id>
    <many-to-one name="end1" target-entity="host">
      <join-column name="Device_ID" insertable="false" updatable="false"/>
    </many-to-one>
    <one-to-one name="end2" target-entity="host_card">
      <join-column name="hwCards_Seq" referenced-column-name="hwCards_Seq"
insertable="false" updatable="false"/>

```

```
</one-to-one>  
</attributes>  
</entity>  
</entity-mappings>
```

The reconciliation_rules.txt File

For more information, see “The reconciliation_rules.txt File” on page 858.

```
multinode[host] expression[ip.ip_address OR host.host_hostname] end1_type[host]  
end2_type[ip] link_type[contained]
```

```
multinode[host] expression[ip.ip_address AND host.host_hostname] end1_type[host]  
end2_type[ip] link_type[contained]
```

```
multinode[host] expression[ip.ip_address] end1_type[host] end2_type[ip]  
link_type[contained]
```

The transformation.txt File

This file remains empty as no values need to be converted in this example.

Using a Primary Key that Contains More Than One Column

If the primary key is composed of more than one column, the following code is added to the XMLS definitions:

Simplified Definition

There is more than one primary key tag and for each column there is a tag.

```
<?xml version="1.0" encoding="UTF-8"?>
<generic-DB-adapter-config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="..META-CONF/simplifiedConfiguration.xsd">
  <CMDB-class CMDB-class-name="host" default-table-name="Device">
    <primary-key column-name="Device_ID"/>
    <reconciliation-by-two-nodes connected-node-CMDB-class-name="ip" CMDB-link-
type="contained">
      <or>
        <attribute CMDB-attribute-name="host_hostname" column-
name="Device_Name"/>
        <connected-node-attribute CMDB-attribute-name="ip_address" column-
name="Device_PREFERREDIPAddress"/>
      </or>
    </reconciliation-by-two-nodes>
  </CMDB-class>
  <class CMDB-class-name="host_card" default-table-name="hwCards" connected-
CMDB-class-name="host" link-class-name="contained">
    <foreign-primary-key column-name="Device_ID" CMDB-class-primary-key-
column="Device_ID"/>
    <primary-key column-name="Device_ID"/>
    <primary-key column-name="hwBusesSupported_Seq"/>
    <primary-key column-name="hwCards_Seq"/>
    <attribute CMDB-attribute-name="card_class" column-name="hwCardClass"/>
    <attribute CMDB-attribute-name="card_vendor" column-name="hwCardVendor"/>
    <attribute CMDB-attribute-name="card_name" column-name="hwCardName"/>
  </class>
</generic-DB-adapter-config>
```

Advanced Definition

The orm.xml File

A new id entity is added that maps to the primary key columns. Entities that use this id entity must add a special tag.

If you use a foreign key for such a primary key, you must map between each column in the foreign key to a column in the primary key.

For details, see “The orm.xml File” on page 853.

Example of the orm.xml File

```

<?xml version="1.0" encoding="UTF-8"?>
<entity-mappings xmlns="http://java.sun.com/xml/ns/persistence/orm"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://java.sun.com/xml/ns/persistence/orm
http://java.sun.com/xml/ns/persistence/orm_1_0.xsd" version="1.0">
<description>Generic DB adapter orm</description>
<package>generic_db_adapter</package>
<entity class="generic_db_adapter.host" name="host">
  <table name="Device"/>
  <attributes>
    <id name="id1">
      <column name="Device_ID" insertable="false" updatable="false"/>
      <generated-value strategy="TABLE"/>
    </id>
    <basic name="host_hostname">
      <column name="Device_Name"/>
    </basic>
  </attributes>
</entity>
<entity class="generic_db_adapter.host_card" name="host_card">
  <table name="hwCards"/>
  <attributes>
    <id name="id1">
      <column name="Device_ID" insertable="false" updatable="false"/>
      <generated-value strategy="TABLE"/>
    </id>
    <id name="id2">
      <column name="hwBusesSupported_Seq" insertable="false" updatable="false"/>
      <generated-value strategy="TABLE"/>
    </id>
    <id name="id3">
      <column name="hwCards_Seq" insertable="false" updatable="false"/>
      <generated-value strategy="TABLE"/>
    </id>
    <basic name="card_class">
      <column name="hwCardClass" insertable="false" updatable="false"/>
    </basic>
    <basic name="card_vendor">
      <column name="hwCardVendor" insertable="false" updatable="false"/>
    </basic>
    <basic name="card_name">
      <column name="hwCardName" insertable="false" updatable="false"/>
    </basic>
  </attributes>
</entity>

```

```

<entity class="generic_db_adapter.host_contained_host_card" name="host_contained_host_card">
  <table name="hwCards"/>
  <attributes>
    <id name="id1">
      <column name="Device_ID" insertable="false" updatable="false"/>
      <generated-value strategy="TABLE"/>
    </id>
    <id name="id2">
      <column name="hwBusesSupported_Seq" insertable="false" updatable="false"/>
      <generated-value strategy="TABLE"/>
    </id>
    <id name="id3">
      <column name="hwCards_Seq" insertable="false" updatable="false"/>
      <generated-value strategy="TABLE"/>
    </id>
    <many-to-one name="end1" target-entity="host">
      <join-column name="Device_ID" insertable="false" updatable="false"/>
    </many-to-one>
    <one-to-one name="end2" target-entity="host_card">
      <join-column name="Device_ID" referenced-column-name="Device_ID" insertable="false"
updatable="false"/>
      <join-column name="hwBusesSupported_Seq" referenced-column-
name="hwBusesSupported_Seq" insertable="false" updatable="false"/>
      <join-column name="hwCards_Seq" referenced-column-name="hwCards_Seq"
insertable="false" updatable="false"/>
    </one-to-one>
  </attributes>
</entity>
</entity-mappings>

```

Using Transformations

In the following example, the generic **enum** transformer is converted from values 1, 2, 3 to values a, b, c respectively in the `host_hostname` column.

The mapping file is `generic-enum-transformer-example.xml`.

```

<enum-transformer CMDB-type="string" DB-type="string" non-existing-value-
action="return-original" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="../../META-CONF/generic-enum-transformer.xsd">
  <value CMDB-value="1" external-DB-value="a"/>
  <value CMDB-value="2" external-DB-value="b"/>
  <value CMDB-value="3" external-DB-value="c"/>
</enum-transformer>

```

Simplified Definition

```
<?xml version="1.0" encoding="UTF-8"?>
<generic-DB-adapter-config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="META-CONF/simplifiedConfiguration.xsd">
  <CMDB-class CMDB-class-name="host" default-table-name="Device">
    <primary-key column-name="Device_ID"/>
    <reconciliation-by-two-nodes connected-node-CMDB-class-name="ip" CMDB-link-
type="contained">
      <or>
        <attribute CMDB-attribute-name="host_hostname" column-
name="Device_Name" from-CMDB-
converter="com.mercury.topaz.fcmbd.adapters.dbAdapter.dal.transform.impl.GenericE
numTransformer(generic-enum-transformer-example.xml)" to-CMDB-
converter="com.mercury.topaz.fcmbd.adapters.dbAdapter.dal.transform.impl.GenericE
numTransformer(generic-enum-transformer-example.xml)"/>
        <connected-node-attribute CMDB-attribute-name="ip_address" column-
name="Device_PreferredIPAddress"/>
      </or>
    </reconciliation-by-two-nodes>
  </CMDB-class>
  <class CMDB-class-name="host_card" default-table-name="hwCards" connected-
CMDB-class-name="host" link-class-name="contained">
    <foreign-primary-key column-name="Device_ID" CMDB-class-primary-key-
column="Device_ID"/>
    <primary-key column-name="hwCards_Seq"/>
    <attribute CMDB-attribute-name="card_class" column-name="hwCardClass"/>
    <attribute CMDB-attribute-name="card_vendor" column-name="hwCardVendor"/>
    <attribute CMDB-attribute-name="card_name" column-name="hwCardName"/>
  </class>
</generic-DB-adapter-config>
```

Advanced Definition

There is a change only to the transformation.txt file.

The transformation.txt File

Make sure that the attribute names and entity names are the same as in the orm.xml file.

```
entity[host] attribute[host_hostname]
to_DB_class[com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.impl.GenericEnumTransformer(generic-enum-transformer-example.xml)]
from_DB_class[com.mercury.topaz.fcldb.adapters.dbAdapter.dal.transform.impl.GenericEnumTransformer(generic-enum-transformer-example.xml)]
```

Federated Database Log Files

To understand the calculation flows and adapter lifecycle, and to view debug information, you can consult the following log files.

This section includes the following topics:

- “Log Levels” on page 879
- “Log Locations” on page 880

Log Levels

You can configure the log level for each of the logs.

Open the following file in a text editor: <HP Business Availability Center root directory>\j2f\conf\core\Tools\log4j\fcldb\fcldb.gdba.properties.

The default log level is **ERROR**:

```
#loglevel can be any of DEBUG INFO WARN ERROR FATAL
loglevel=ERROR
```

- To increase the log level for all log files, change **loglevel=ERROR** to **loglevel=DEBUG** or **loglevel=INFO**.

- To change the log level for a specific file, change the specific **log4j** category line accordingly. For example, to change the log level of `fcmdb.gdba.dal.sql.log` to **INFO**, change

```
log4j.category.fcmdb.gdba.dal.SQL=${loglevel},fcmdb.gdba.dal.SQL.appender
```

to:

```
log4j.category.fcmdb.gdba.dal.SQL=INFO,fcmdb.gdba.dal.SQL.appender
```

Log Locations

The log files are located in the following directory: **<HP Business Availability Center root directory>\j2f\log\fcmdb**.

- **Fcmdb.gdba.log**

The adapter lifecycle log. Gives details about when the adapter started or stopped, and which CITs are supported by this adapter.

Consult for initiation errors (adapter load/unload).

- **fcmdb.log**

Consult for exceptions.

- **cmdb.log**

Consult for exceptions.

- **Fcmdb.gdba.mapping.engine.log**

The mapping engine log. Gives details about the reconciliation TQL that the mapping engine uses, and the reconciliation topologies that are compared during the connect phase.

Consult this log when a TQL gives no results even though you know there are relevant CIs in the database, or the results are unexpected (check the reconciliation).

- **Fcmdb.gdba.TQL.log**

The TQL log. Gives details about the TQLs and their results.

Consult this log when a TQL does not return results and the mapping engine log shows that there are no results in the federated data source.

► **Fcmdb.gdba.dal.log**

The DAL lifecycle log. Gives details about CIT generation and database connection details.

Consult this log when you cannot connect to the database or when there are CITs or attributes that are not supported by the query.

► **Fcmdb.gdba.dal.command.log**

The DAL operations log. Gives details about internal DAL operations that are called. (This log is similar to `cmdb.dal.command.log`).

► **Fcmdb.gdba.dal.SQL.log**

The DAL SQL queries log. Gives details about called JPAQLs (object oriented SQL queries) and their results.

Consult this log when you cannot connect to the database or when there are CITs or attributes that are not supported by the query.

► **Fcmdb.gdba.hibernate.log**

The Hibernate log. Gives details about the SQL queries that are run, the parsing of each JPAQL to SQL, the results of the queries, data regarding Hibernate caching, and so on. For details on Hibernate, see “Hibernate as JPA Provider” on page 809.

External References

For details on the JavaBeans 3.0 specification, see <http://jcp.org/aboutJava/communityprocess/final/jsr220/index.html>.

Troubleshooting and Limitations

Note the following limitations:

JPA Limitations

- All tables must have a primary key column.
- CMDB class attribute names must follow the JavaBeans naming convention (for example, names must start with lower case letters).
- Two CIs that are connected with one relationship in the class model must have direct association in the database (for example, if `host` is connected to `ticket` there must be a foreign key or linkage table that connects them).
- Several tables that are mapped to the same CIT must share the same primary key table.

Functional Limitations

- You cannot create a manual relationship between the CMDB and federated CITs. To be able to define virtual relationships, a special relationship logic must be defined (it can be based on properties of the federated class).
- Federated CITs cannot inherit from a multinode (in most cases this means a new federated CIT cannot be created underneath the Host CIT)
- Federated CITs cannot inherit from another federated CIT, unless they are both located in the same data store.
- To view federated data, you must add the federated CIT itself to a TQL, and not its parent CIT. (If you use the parent CIT, the federated instances will not appear in the results.)
- Federated CITs cannot be trigger CITs in a correlation rule but they can be included in a correlation TQL.
- A federated CIT can be part of an enrichment TQL, but cannot be used as the node on which enrichment is performed (you cannot add, update, or delete the federated CIT).
- Properties from the CI Type list are not supported.
- Using a class qualifier in a condition is not supported.

- Subgraphs are not supported.
- Compound relationships are not supported.
- The external CI CMDB id is composed from its primary key and not its key attributes.
- A column of type `bytes` cannot be used as a primary key column in Microsoft SQL Server.

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The HP ServiceCenter/Service Manager Adapter

This chapter provides information on the HP ServiceCenter/Service Manager Adapter, version 1.0. The Adapter is compatible with HP Business Availability Center, version 8.0 or later, HP ServiceCenter, version 6.2, and HP Service Manager, versions 7.0x, 7.1x or later (following changes to the WSDL configuration).

Note: This Adapter is a specific configuration of the ServiceDesk Adapter.

This chapter includes:

Concepts

- ▶ Adapter Usage on page 886
- ▶ The Adapter Configuration File on page 887

Tasks

- ▶ Deploy the Adapter on page 896
- ▶ Deploy the ServiceDesk Adapter on page 897
- ▶ Add an Attribute to the ServiceCenter/Service Manager CIT on page 902

Adapter Usage

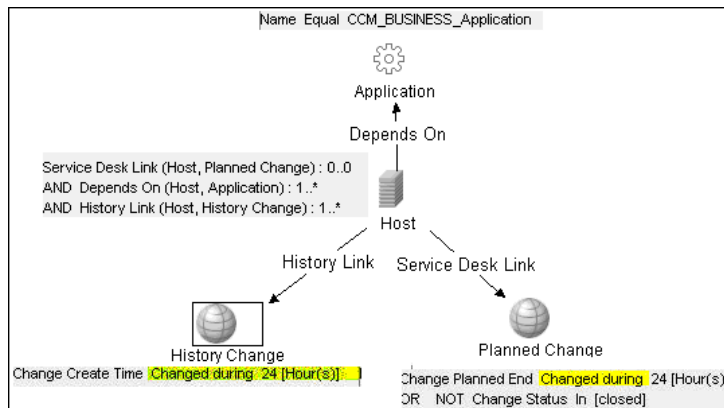
The ServiceCenter/Service Manager Adapter supports the retrieval of data from HP ServiceCenter and HP Service Manager. This adapter connects to, and receives data from, ServiceCenter/Service Manager using the Web Service API. Every request to ServiceCenter/Service Manager to calculate a federated query is made through this adapter.

The Adapter supports three external CI types: Incident, Problem, and Planned Change. The adapter retrieves the CIs of these types from ServiceCenter/Service Manager with the required layout and by a given filter (using reconciliation and/or a CI filter). Each of these CITs can be related to one of the following UCMDB internal CITs: Host, Business Service, Application. Each UCMDB internal CIT includes a reconciliation rule in the ServiceCenter/Service Manager configuration that can be changed dynamically (for details, see “Reconciliation Data Configuration” on page 891). Note that there are no internal relationships between Adapter-supported CITs.

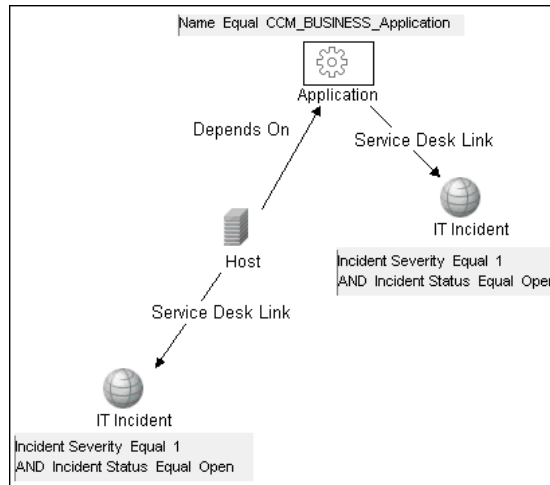
The modeling of the supported CITs and virtual relationships is supplied with the Adapter. You can add attributes to a CIT (for details, see “Add an Attribute to the ServiceCenter/Service Manager CIT” on page 902).

The following use cases (that include TQL examples) describe how the Adapter can be employed:

- 1 A user needs to display all unplanned changes to all hosts running a specific application during the last 24 hours:



2 A user needs to see all open critical incidents on an application and its hosts:



The Adapter Configuration File

The Adapter configuration file **serviceDeskConfiguration.xml** is located in the following directory:

**<HP Business Availability Center Processing server root directory>\
fcmdb\CodeBase\ServiceDeskAdapter**

This file contains three parts:

- 1 The first part, which is defined by the `ucmdbClassConfigurations` element, contains the external CIT configuration that the Adapter supports. For details, see “External CITs Configuration” on page 888.
- 2 The second part, defined by the `reconciliationClassConfigurations` element, contains reconciliation data information for appropriate UCMDB CITs. For details, see “Reconciliation Data Configuration” on page 891.
- 3 The third part, defined by the `globalConnectorConfig` element, includes the global configuration for a specific connector implementation. For details, see “Global Configuration” on page 895.

Important: The adapter is delivered without a default configuration file. Before defining a data store, you must prepare the appropriate file, according to the version of ServiceCenter/Service Manager you are working with:

- ▶ Locate the ...**fcmdb****CodeBase****ServiceDeskAdapter** folder. This folder contains the following configuration files:
 - serviceDeskConfiguration.xml.6.xx for ServiceCenter version 6.xx
 - serviceDeskConfiguration.xml.7.0x for Service Manager version 7.0x
 - serviceDeskConfiguration.xml.7.1x for Service Manager version 7.1x
 - ▶ Delete the suffix of the appropriate configuration file. For example, if you are working with Service Manager 7.0x, locate the **serviceDeskConfiguration.xml.7.0x** file and delete **.7.0x**, so that the new name of the file is **serviceDeskConfiguration.xml**.
-

External CITs Configuration

Each CIT that is supported by the Adapter is defined in the first section of the Adapter configuration file.

This section, `ucmdbClassConfiguration`, represents the only supported CIT configuration. This element contains the CIT name as defined in the UCMDB class model (the `ucmdbClassName` attribute), mapping for all its attributes (the `attributeMappings` element), and a private configuration for a specific connector implementation (the `classConnectorConfiguration` element):

- ▶ The `ucmdbClassName` attribute defines the UCMDB class model name.
- ▶ The `attributeMappings` element contains `attributeMapping` elements.

The `attributeMapping` element defines the mapping between the UCMDB model attribute name (the `ucmdbAttributeName` attribute) to an appropriate ServiceCenter/Service Manager attribute name (the `serviceDeskAttributeName` attribute).

For example:

```
<attributeMapping ucmdbAttributeName="problem_brief_description"
serviceDeskAttributeName="brief.description"/>
```

This element can optionally contain the following converter attributes:

- ▶ The `converterClassName` attribute. This is the converter class name that converts the UCMDB attribute value to the ServiceDesk attribute value.
- ▶ The `reversedConverterClassName` attribute. This is the converter class name that converts the ServiceDesk attribute value to the UCMDB attribute value.
- ▶ The `classConnectorConfiguration` element contains the configuration for the specific connector implementation for the current external CIT. Wrap this configuration in CDATA if it contains special XML characters (for example, `&` replacing `&`).

The useful fields of the Service Manager `classConnectorConfiguration` element are as follows:

- ▶ The `device_key_property_names` element contains the fields names in the WSDL information of the current object that can contain the device ID (for example, `ConfigurationItem`). Each field should be added as a `device_key_property_name` element.
- ▶ The `id_property_name` element contains the field name in the WSDL information that contains the ID of the current object.

The following example shows the ucmdbClassConfiguration section of the serviceDeskConfiguration.xml file. The section includes the ucmdbClassName element for the Incident CIT with a ServiceCenter connector implementation:

```
<ucmdbClassConfiguration ucmdbClassName="it_incident">
  <attributeMappings>
    <attributeMapping ucmdbAttributeName="incident_id"
serviceDeskAttributeName="IncidentID"/>
    <attributeMapping ucmdbAttributeName="incident_brief_description"
serviceDeskAttributeName="BriefDescription"/>
    <attributeMapping ucmdbAttributeName="incident_category"
serviceDeskAttributeName="Category"/>
    <attributeMapping ucmdbAttributeName="incident_severity"
serviceDeskAttributeName="severity"/>
    <attributeMapping ucmdbAttributeName="incident_open_time"
serviceDeskAttributeName="OpenTime"/>
    <attributeMapping ucmdbAttributeName="incident_update_time"
serviceDeskAttributeName="UpdatedTime"/>
    <attributeMapping ucmdbAttributeName="incident_close_time"
serviceDeskAttributeName="ClosedTime"/>
    <attributeMapping ucmdbAttributeName="incident_status"
serviceDeskAttributeName="IMTicketStatus"/>
  </attributeMappings>

  <classConnectorConfiguration>
    <![CDATA[ <class_configuration
connector_class_name="com.mercury.topaz.fcmdb.adapters.serviceDeskAdapter.serv
iceCenterConnector.impl.SimpleServiceCenterObjectConnector">
      <device_key_property_names>
        <device_key_property_name>ConfigurationItem</device_key_property_name>
      </device_key_property_names>
      <id_property_name>IncidentID</id_property_name>
      <keys_action_info>
        <request_name>RetrieveUcmdbIncidentKeysListRequest</request_name>
      <response_name>RetrieveUcmdbIncidentKeysListResponse</response_name>
      </keys_action_info>
      <properties_action_info>
        <request_name>RetrieveUcmdbIncidentListRequest</request_name>
        <response_name>RetrieveUcmdbIncidentListResponse</response_name>
      </properties_action_info>
    </class_configuration> ]]>
  </classConnectorConfiguration>
</ucmdbClassConfiguration>
```

Adding an Attribute to a CIT

When adding an attribute to the UCMDB model for an Adapter-supported CIT:

- 1 In `serviceDeskConfiguration.xml`, add an `attributeMapping` element to the appropriate `ucmdbClassConfiguration` element.
- 2 Verify that ServiceCenter/Service Manager externalizes this attribute in its Web Service API.
- 3 Save `serviceDeskConfiguration.xml`.
- 4 Send a call to the JMX to reload the adapter: **FCmdb Config Services > loadOrReloadCodeBaseForAdapterId**, using the appropriate customer ID and the ServiceDeskAdapter adapter ID.

Reconciliation Data Configuration

Each UCMDB CIT that can be related to the adapter-supported CIT is defined in the second section of the Adapter configuration file.

This section, `reconciliationClassConfigurations`, represents the reconciliation data configuration for one UCMDB CIT. The element includes two attributes:

- ▶ The `ucmdbClassName` attribute. This is the CIT name as defined in the UCMDB class model.
- ▶ The `concreteMappingImplementationClass` attribute. This is the class name of the concrete implementation for the `ConcreteMappingEngine` interface. Use this attribute to map between instances of UCMDB CITs and external Adapter CITs. The default implementation that is used is:

```
com.mercury.topaz.fcmdb.adapters.serviceDeskAdapter.mapping.impl.OneNodeMappingEngine
```

An additional implementation exists that is used only for the host reconciliation CIT for reconciliation by the IP of the host:

```
com.mercury.topaz.fcmdb.adapters.serviceDeskAdapter.mapping.impl.HostIpMappingEngine
```

The `reconciliationClassConfiguration` element can contain one of the following elements:

- ▶ The `reconciliationById` element. This element is used when the reconciliation is done by ID. In this case, the text value of this element is the ServiceDesk field name that contains the CMDB ID. For example:

```
<reconciliationById>UcmdbID</reconciliationById>
```

In this example, the ServiceDesk field `UcmdbID` contains the CMDB ID of the appropriate host.

- ▶ The `reconciliationData` element. Use this element if the reconciliation is done by comparing attributes. You can run reconciliation with one attribute or several attributes by using the logical operators OR and/or AND.

If you run reconciliation with one attribute, the `reconciliationData` child element should be a `reconciliationAttribute` element. The `reconciliationAttribute` element contains an appropriate UCMDB attribute name (the `ucmdbAttributeName` attribute) and an appropriate ServiceDesk attribute name (the `serviceDeskAttributeName` attribute). This element can also contain a `ucmdbClassName` attribute that defines the appropriate UCMDB CIT name. By default, the current reconciliation UCMDB CIT name is used.

You can also use the `converterClassName` and `reversedConverterClassName` attributes; they should contain the converter class name that converts the UCMDB attribute value to the ServiceDesk attribute value, or vice versa.

For example:

```
<reconciliationData>
  <reconciliationAttribute ucmdbAttributeName="host_hostname"
  serviceDeskAttributeName="NetworkName"
  converterClassName="com.mercury.topaz.fcmdb.adapters.serviceDeskAdapter.converter.PropertyValueConverterToUpperCase"/>
</reconciliationData>
```

For reconciliation to run with two or more attributes, use a logical operator between reconciliation attributes.

The logical operator AND can contain several `reconciliationAttribute` elements (the minimum is 2). In this case the reconciliation rule contains an AND operator between attribute comparisons.

For example:

```
<reconciliationData>
  <AND>
    <reconciliationAttribute ucmdbAttributeName="host_hostname"
      serviceDeskAttributeName="NetworkName"
      converterClassName="com.mercury.topaz.fcmdb.adapters.serviceDeskAdapter.converter.PropertyValueConverterToUpperCase"/>
    <reconciliationAttribute ucmdbClassName="ip"
      ucmdbAttributeName="ip_address" serviceDeskAttributeName="NetworkAddress" />
  </AND>
</reconciliationData>
```

In this example, the reconciliation rule follows this format:

host.host_hostname= NetworkName and ip.ip_address= NetworkAddress.

The logical operator OR can contain several reconciliationAttribute and AND elements. In this case the reconciliation rule contains an OR operator between attributes and AND expressions. Since XML does not assure the order of elements, you should provide a priority attribute to each sub-element of OR element type. The comparison between OR expressions is calculated by these priorities.

For example:

```
<reconciliationData>
  <OR>
    <reconciliationAttribute ucmdbAttributeName="host_dnsname"
      serviceDeskAttributeName="NetworkDNSName" priority="2" />
    <AND priority="1" >
      <reconciliationAttribute ucmdbAttributeName="host_hostname"
        serviceDeskAttributeName="NetworkName"
        converterClassName="com.mercury.topaz.fcmdb.adapters.serviceDeskAdapter.converter.PropertyValueConverterToUpperCase"/>
      <reconciliationAttribute ucmdbClassName="ip"
        ucmdbAttributeName="ip_address" serviceDeskAttributeName="NetworkAddress" />
    </AND>
  </OR>
</reconciliationData>
```

In this example the reconciliation rule follows this format: (host.host_dnsname= NetworkDNSName OR (host.host_hostname= NetworkName and ip.ip_address= NetworkAddress)). Since the AND element takes a priority attribute of value 1, the (host.host_hostname= NetworkName and ip.ip_address= NetworkAddress) condition is checked first. If the condition is satisfied, the reconciliation is run. If not, the .host_dnsname= NetworkDNSName condition is checked.

The additional sub-element of the reconciliationClassConfiguration element is classConnectorConfiguration. The classConnectorConfiguration element contains the configuration for a specific connector implementation for the current reconciliation CIT. This configuration should be wrapped by CDATA if it contains some special XML characters (for example, & replacing &).

Changing the Reconciliation Rule of a CIT

- 1 In `serviceDeskConfiguration.xml`, update the appropriate reconciliationData element with the new rule.
- 2 Call to the JMX to reload the adapter: **FCmdb Config Services > loadOrReloadCodeBaseForAdapterId**, using the appropriate customer ID and ServiceDeskAdapter adapter ID, or go to the Data Stores tab and reload the adapter from there. For details, see the **Reload** button information in “Data Stores Tab” on page 751.

Reconciliation of a Host by ip_address or by host_name

To run reconciliation on a host by ip_address or host_name, place the following ReconciliationData element in the Adapter configuration file:

```
<reconciliationData>
  <OR>
    <reconciliationAttribute priority="1" ucmdbClassName="ip"
ucmdbAttributeName="ip_address" serviceDeskAttributeName="NetworkAddress"/>
    <reconciliationAttribute priority="2" ucmdbClassName="host"
ucmdbAttributeName="host_hostname" serviceDeskAttributeName="NetworkName"
converterClassName="com.mercury.topaz.fcmdb.adapters.serviceDeskAdapter.converter.PropertyValueConverterToUpperCase"/>
  </OR>
</reconciliationData>
```

You should also change the value of the `concreteMappingImplementationClass` attribute of the `reconciliationClassConfiguration` element to:

```
= "com.mercury.topaz.fcmdb.adapters.serviceDeskAdapter.mapping.impl.HostIpMappingEngine"
```

Global Configuration

The third section of the Adapter configuration file contains the global configuration for the specific connector implementation.

This configuration, `globalConnectorConfig`, should be wrapped by CDATA if it contains some special XML characters (for example, `&` replacing `&`).

The useful fields of the Service Manager `globalConnectorConfig` element are as follows:

- 1 The **date_pattern** element contains the date pattern that the Service Manager is working with.

The default is `MM/dd/yy HH:mm:ss`.

If the date pattern is wrong, an FTQL returns wrong date condition results.

- 2 The **time_zone** element defines the time zone of Service Manager. The default is the UCMDB server time zone.

To check the Service Manager date pattern and time zone:

- a **Service Manager version 7:** Access **Menu Navigation > System Administration > Base System Configuration > Miscellaneous > System Information Record**. Click the **Date Info** tab.
- b **ServiceCenter version 6.1:** Access **Menu Navigation > Utilities > Administration > Information > System Information**. Click the **Date Info** tab.

- 3 The **max_query_length** element defines the maximal query length in a Service Manager Web service request. The default value is 1000000.
- 4 The **name_space_uri** element defines the name space URI to connect to the Service Manager Web service. The default value is `http://servicecenter.peregrine.com/PWS`.

- 5 The **web_service_suffix** element defines the Service Manager Web service center URI suffix. The default value is `sc62server/ws`. It is used when the URL is created.

Deploy the Adapter

This section describes a typical deployment of the adapter.

Note: If you integrate Problem Isolation and Dashboard with HP ServiceCenter/HP Service Manager, see “HP Service Manager Integration with Business Availability Center Components” in *Solutions and Integrations* and ignore the rest of this section.

This section includes the following steps:

- 1 “Deploy the ServiceDesk Adapter” on page 897
 - a “Extract the Adapter Implementation Files and Deploy the Package” on page 897
 - b “Add a ServiceCenter/Service Manager External Data Source” on page 898
 - c “Configure HP ServiceCenter 6.2” on page 898 (when connecting to HP ServiceCenter)
 - d “Configure HP Service Manager 7.0/7.1” on page 901 (when connecting to HP Service Manager)
- 2 “Add an Attribute to the ServiceCenter/Service Manager CIT” on page 902
 - a “Add an Attribute to the Business Availability Center Model” on page 902
 - b “Export Attributes from HP ServiceCenter by Changing the Configuration” on page 904 (when connecting to HP ServiceCenter)
 - c “Export Attributes from HP Service Manager by Changing the Configuration” on page 906 (when connecting to HP Service Manager)
 - d “Modify the Adapter Configuration File” on page 909

- e “Load the Changes” on page 909

Deploy the ServiceDesk Adapter

This section explains where to place the files needed for deployment.

Note: If you integrate Problem Isolation and Dashboard with HP ServiceCenter/HP Service Manager, see “HP Service Manager Integration with Business Availability Center Components” in *Solutions and Integrations*.

This section includes the following steps:

- “Extract the Adapter Implementation Files and Deploy the Package” on page 897
- “Add a ServiceCenter/Service Manager External Data Source” on page 898
- “Configure HP ServiceCenter 6.2” on page 898
- “Configure HP Service Manager 7.0/7.1” on page 901

1 Extract the Adapter Implementation Files and Deploy the Package


- a Verify the location of the following folder and file:
 - ServiceDeskAdapter
 - serviceDeskAdapter.zip
- b Deploy the **serviceDeskAdapter.zip** package. For details, see “Deploy a Package” on page 470.
- c Move the **ServiceDeskAdapter** folder to the following directory:
 - <HP Business Availability Center root directory>\fcmdb\CodeBase

2 Add a ServiceCenter/Service Manager External Data Source

In this step, you add an external data store.



a In Business Availability Center, access the Federated CMDB window:
Admin > Universal CMDB > Settings > Federated CMDB.

b Click the button  to add a data store. In the Data Store dialog box that opens, choose **ServiceDeskAdapter** and fill in the mandatory fields.

For help with this dialog box, see “Data Stores Tab” on page 751.

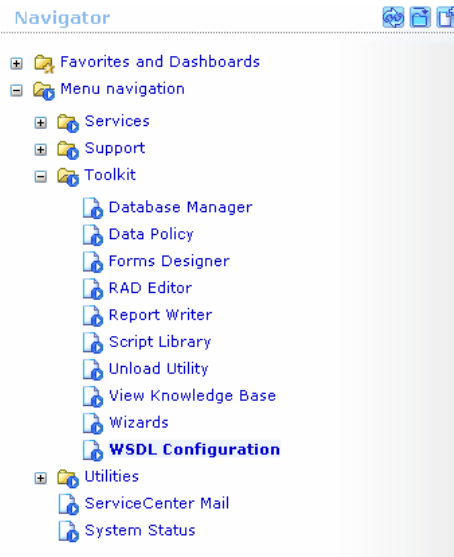
c Continue to “Configure HP ServiceCenter 6.2” on page 898 or
“Configure HP Service Manager 7.0/7.1” on page 901.

3 Configure HP ServiceCenter 6.2

If you are connecting to HP ServiceCenter 6.2, perform the following procedure. If you are connecting to HP Service Manager 7.0/7.1, skip this step.

a Open HP ServiceCenter, then the ServiceCenter client.

b Display **WSDL Configuration** in the Navigator (**Main Menu > Menu navigation > Toolkit**):



c In the Name field, enter **device** and press **Enter**:

Search External Access Definition Records

External Access Definition

Service Name:

Name: Object Name:

Allowed Actions	Action Names
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>

d Select the **Data Policy** tab and ensure that the **network.name** attribute is not empty (its value should be **NetworkName**). Change the value to **false**. Save your changes.

Service Name:

Name: Object Name:

mac.address	<input type="text"/>	<input type="text" value="true"/>	<input type="text"/>	<input type="button" value="v"/>
manufacturer	<input type="text"/>	<input type="text" value="true"/>	<input type="text"/>	<input type="button" value="v"/>
model	<input type="text" value="Model"/>	<input type="text" value="false"/>	<input type="text"/>	<input type="button" value="v"/>
mtbf	<input type="text"/>	<input type="text" value="true"/>	<input type="text"/>	<input type="button" value="v"/>
network.address	<input type="text"/>	<input type="text" value="true"/>	<input type="text"/>	<input type="button" value="v"/>
network.name	<input type="text" value="NetworkName"/>	<input type="text" value="false"/>	<input type="text"/>	<input type="button" value="v"/>
nm.id	<input type="text"/>	<input type="text" value="true"/>	<input type="text"/>	<input type="button" value="v"/>
nondevice	<input type="text"/>	<input type="text" value="true"/>	<input type="text"/>	<input type="button" value="v"/>
objid	<input type="text"/>	<input type="text" value="true"/>	<input type="text"/>	<input type="button" value="v"/>
operating.system	<input type="text"/>	<input type="text" value="true"/>	<input type="text"/>	<input type="button" value="v"/>
order.line.item	<input type="text"/>	<input type="text" value="true"/>	<input type="text"/>	<input type="button" value="v"/>

e After saving, click the **Cancel** button.

f In the Object Name field type **Change** and press **Enter**.

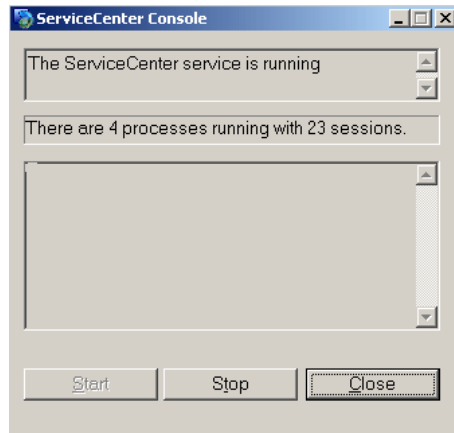
- g** Select the Data Policy tab and ensure that:
- ▶ The **header,coordinator** attribute is not empty (its value should be **Coordinator**). Change the value to **false**.

Field Name	API Caption	Exclude	API Data Type
header,company	Company	false	
header,coord.date		true	
header,coord.dept		true	
header,coord.phone	CoordinatorPhone	false	
header,coordinator	Coordinator	false	

- ▶ The **header,orig.operator** attribute is not empty (its value should be **OpenedBy**). Change the value to **false**.

h Save the changes.

i Restart ServiceCenter: Select **Start > Programs > ServiceCenter 6.2 > Server > Console** to open the ServiceCenter Console.



j Click **Stop** and then **Start**.

k Continue to “Add an Attribute to the Business Availability Center Model” on page 902.

4 Configure HP Service Manager 7.0/7.1

If you are connecting to HP Service Manager 7.0/7.1, perform the following procedure. If you are connecting to HP ServiceCenter 6.2, skip this step.

- a** Import the unload file relevant to the Service Manager version with which you are working: **ucmdbIntegration7_0x.unl** or **ucmdbIntegration7_1x.unl**. To do so, in Service Manager, click **Menu Navigation > Tailoring > Database Manager**.
 - Right-click the detail button and select **Import/Load**.
 - In the HP Service Manager File Load/Import page, click **Specify File** and browse to the following unload file:

```
<HP Business Availability Center root directory>\fcmdb\CodeBase  
\ServiceCenterAdapter\ucmdbIntegration7_0x.unl or  
ucmdbIntegration7_1x.unl.
```

The file is loaded via the file browser.
 - Enter the description in the **Import Description** box.
 - Select **winnt** in the **File Type** list.
 - Select a display option.
 - Click **Load FG** to start loading.
- b** Continue to “Add an Attribute to the Business Availability Center Model” on page 902.

Add an Attribute to the ServiceCenter/Service Manager CIT

This section explains how to retrieve additional data from ServiceCenter or Service Manager by adding an attribute.

Note: If you integrate Problem Isolation and Dashboard with HP ServiceCenter/HP Service Manager, see “HP Service Manager Integration with Business Availability Center Components” in *Solutions and Integrations*.

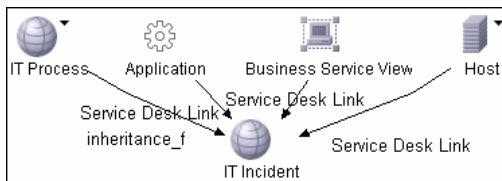
This section includes the following steps:

- ▶ “Add an Attribute to the Business Availability Center Model” on page 902
- ▶ “Export Attributes from HP ServiceCenter by Changing the Configuration” on page 904
- ▶ “Export Attributes from HP Service Manager by Changing the Configuration” on page 906
- ▶ “Modify the Adapter Configuration File” on page 909
- ▶ “Load the Changes” on page 909

1 Add an Attribute to the Business Availability Center Model

To add an attribute to the model, proceed as follows:

- a Add the new attribute to Business Availability Center: Edit the Incident CIT: Select **Admin > Universal CMDB > Modeling > CI Type Manager**. In View Explorer, select **IT Process > IT Incident**.



- b** Select the Attribute tab and add the new attribute:

The screenshot shows a dialog box titled "Add Attribute" with a blue header bar. It has two tabs: "Details" and "Advanced". The "Advanced" tab is active. The dialog contains the following fields and controls:

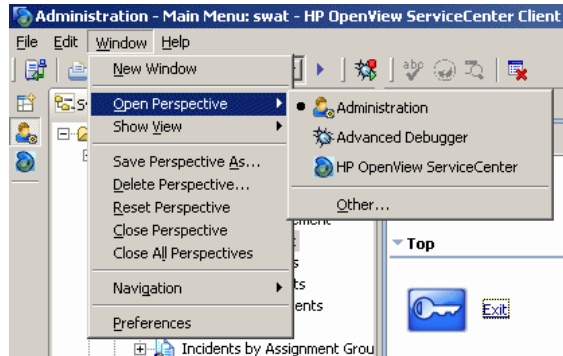
- Attribute Name:** A text input field.
- Display Name:** A text input field.
- Description:** A larger text input area.
- Attribute Type:** A section containing two radio buttons: "Primitive" (which is selected) and "Enumeration/List". Below the radio buttons is a dropdown menu currently showing "boolean".
- Value Size:** A text input field.
- Default Value:** Two radio buttons: "True" and "False" (which is selected).
- Buttons:** "OK" and "Cancel" buttons are located at the bottom right of the dialog.

- c** Continue to “Export Attributes from HP ServiceCenter by Changing the Configuration” on page 904 or “Export Attributes from HP Service Manager by Changing the Configuration” on page 906.

2 Export Attributes from HP ServiceCenter by Changing the Configuration

If you are connecting to HP ServiceCenter, perform the following procedure.

- a In HP ServiceCenter, open the ServiceCenter client.
- b Select **Window > Open Perspective > Administration**:



- c Select **Incident Management > All Open Incidents**, and select one of the incidents you created.

Note: Verify that the value in the Class field is the one that you want to report to Business Availability Center.

- d** Search for the value you entered in the Class field (that is, **myclass**), in the XML file displayed below. This is the CI name in ServiceCenter.

The screenshot shows the HP ServiceCenter interface. The top part is an incident form with the title "this is my first fed". The form includes tabs for Incident Details, Activities, Contact, Associated CI, and Attachment. The Category is "security" and the Subcategory is "virus infection". Below the form is a list of tabs: Messages, Console, Detail Form, Detail Data (selected), List Form, List Data, Last Request, and Last. The main area displays XML data for the selected incident. A "Find/Replace" dialog box is open over the XML, with "myclass" entered in the Find field. The dialog also shows options for Direction (Forward), Scope (All), and various search options like Case Sensitive, Wrap Search, Whole Word, Incremental, and Regular expressions.

Incident Title: this is my first fed

Alert Status: updated

Category: security

Subcategory: virus infection

Messages Console Detail Form **Detail Data** List Form List Data Last Request Last

```
<third.party.reference sctype="string" NullValue="1" />
</third.party.reference>
<third.party.referred sctype="array" NullValue="1">
  <third.party.referred sctype="dateTime" NullValue="1" />
</third.party.referred>
<third.party.referred.by sctype="array" NullValue="1">
  <third.party.referred.by sctype="string" NullValue="1" />
</third.party.referred.by>
<class sctype="string">myclass</class>
<alternate.contact sctype="string" NullValue="1" />
<site.visit.date sctype="dateTime" NullValue="1" />
<site.visit.technician sctype="string" NullValue="1" />
<operating.system sctype="string" NullValue="1" />
<os.release.level sctype="string" NullValue="1" />
<os.maint.level sctype="string" NullValue="1" />
<manufacturer sctype="string" NullValue="1" />
```

Find/Replace dialog box:

Find: myclass

Replace With:

Direction: Forward Backward

Scope: All Selected Lines

Options:

Case Sensitive Wrap Search

Whole Word Incremental

Regular expressions

Find Replace/Find

Replace Replace All

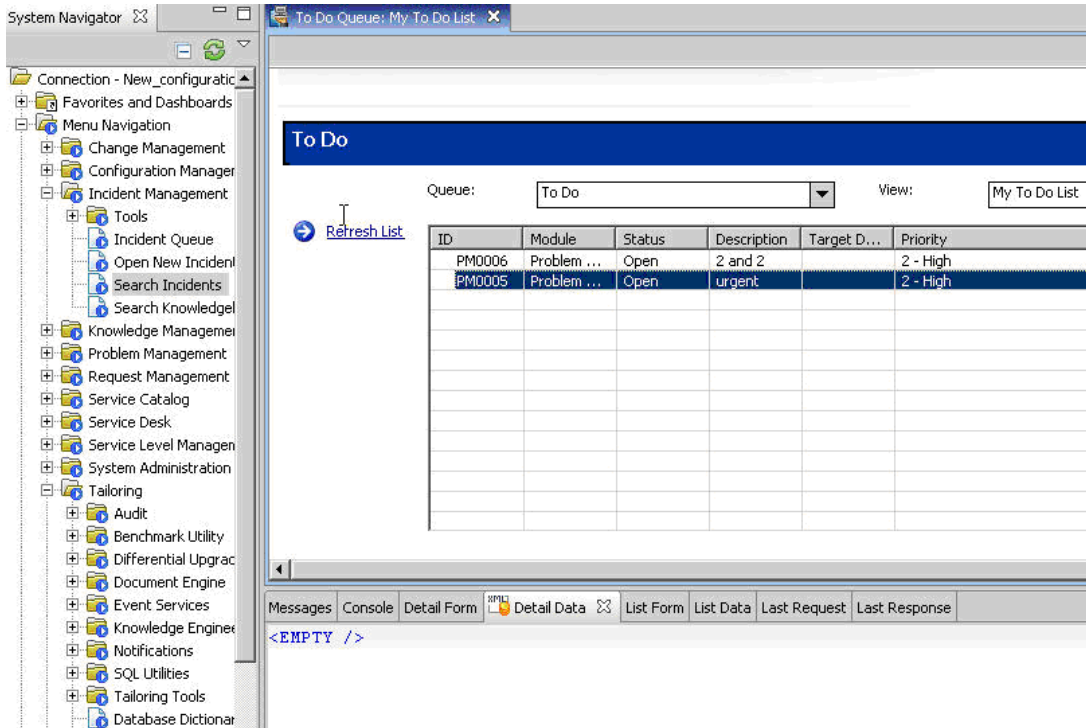
Close

- e** Display **WSDL Configuration** in the Navigator (**Main Menu > Menu navigation > Toolkit**). Locate the Object Name field, enter **Incident** and press **Enter**.
- f** Select the **Data Policy** tab. Enter a name for the CI mentioned in the XML file (that is, **class**). Change the value to **false**. Save your changes.
- g** Restart ServiceCenter: Select **Start > Programs > ServiceCenter 6.2 > Server > Console** to open the ServiceCenter Console.
- h** Click **Stop** and then **Start**.
- i** Continue to “Modify the Adapter Configuration File” on page 909.

3 Export Attributes from HP Service Manager by Changing the Configuration

If you are connecting to HP Service Manager, perform the following procedure.

- a In the HP Service Manager client, restore the bottom right pane by clicking the **Restore** button. Click the **Detail Data** tab.



- b** Open one of the incidents you created: Select **Incident Management > Search Incidents**. Click the search button (you can filter the fields to limit the search).

The screenshot shows the 'Update Incident Number IM10002' window. At the top, there is a table with columns: Incident..., Open Time, Update Time, Alert Status, Category, and Brief Description. Below the table is a toolbar with buttons for OK, Cancel, Previous, Next, Save, Undo, Close, Find, Fill, Clocks, and Apply Template. The main form area contains the following fields:

- Incident Number: IM10002
- Ticket Status: Open
- Incident Title: test1

The 'Incident Details' tab is active, showing the following information:

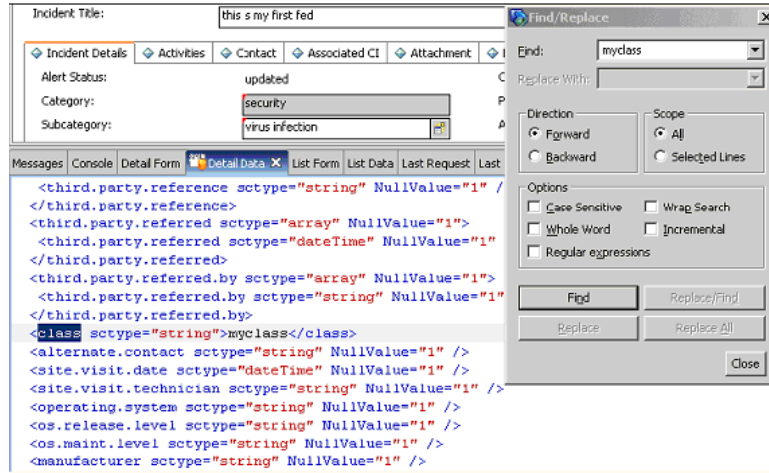
- Alert Status: open
- Category: network
- Subcategory: remote communications
- Product Type: remote communications
- Problem Type: dial-in
- Manufacturer: Unknown
- Class: myclass
- Owner: falcon
- Primary Asgn Group: LAN SUPPORT
- Assignee Name: (empty)
- Second Asgn Group: TELCOM SUPPORT
- Hot Ticket:
- Total Loss of Service:
- Initial Impact Assessment: 1 - Enterprise
- Urgency: 4 - Low

At the bottom, there is a console area showing XML data:

```
<model name="probsummary" query="true">
<keys>
<number sctype="string">IM10002</number>
</keys>
<instance recordid="IM10002 - test1" uniquequery="number=&quot;IM10002&quot;">
<number type="string">IM10002</number>
<number.vj type="string">IM10002</number.vj>
<number.vj.alerts type="string">IM10002</number.vj.alerts>
<vj.number.1 type="string">IM10002</vj.number.1>
```

Note: Verify that the value in the Class field is the one that you want to report to Business Availability Center.

- c Search for the value you entered in the Class field (that is, **myclass**), in the XML file displayed below. This is the CI name in Service Manager.



- d Display **WSDL Configuration** in the Navigator (**Main Menu > Menu Navigation > Tailoring**). Locate the Object Name field, enter **UcmdbIncident** and press ENTER.
- e Select the **Data Policy** tab.
- f Select the **Fields** tab and ensure that the CI name mentioned in the XML file (that is, **class**) appears in the Field list with **ClassName** as its caption. If this attribute does not appear in the Field list, add it and save your changes.
- g Continue to “Modify the Adapter Configuration File” on page 909.

4 Modify the Adapter Configuration File

Perform this procedure for all configurations.

- a** Edit the `ServiceDeskConfiguration.xml` file in

```
<HP Business Availability Center root directory>\fcmdb\CodeBase
\ServiceDeskAdapter
```

- b** Add the new attribute line under the Incident area: Locate the following marker:

```
<ucmdbClassConfiguration ucmdbClassName="it_incident">
<attributeMappings>
```

- c** Add the following line:

```
<attributeMapping ucmdbAttributeName="incident_class"
ServiceDeskAttributeName="ClassName"/>
```

where:

- `ucmdbAttributeName="incident_class"` is the value defined in the CI Type Manager
- `ServiceDeskAttributeName="ClassName"` is the value defined in ServiceCenter/Service Manager

- d** Continue to “Load the Changes” on page 909.

5 Load the Changes

Perform this procedure to load changes.

- a** Launch the Web browser and enter the following address:

```
http://<machine name or IP address>:8080/jmx-console/
```

where `<machine name or IP address>` is the machine on which Business Availability Center is installed.

Note: In the case of a distributed deployment, the machine name is the machine on which the Data Processing server is installed.

You may have to log in with the administrator's user name and password.

- b** Click the **Topaz > service=Fcmdb Config Services** link.
- c** In the JMX MBEAN View page, locate the following operation:
loadOrReloadCodeBaseForAdapterId().
- d** In the customerID field, enter **1**. In the AdapterId field, enter the name of the Adapter folder (ServiceDeskAdapter). Click **Invoke**.

34

The HP Release Control Federation Adapter

This chapter provides information on the HP Release Control Federation adapters. The adapters are compatible with HP Business Availability Center, version 7.5 or later.

This chapter includes:

Concepts

- Release Control Federation Adapter – Overview on page 911

Tasks

- Configure the Federation Adapter on page 914
- Retrieve Planned Change Attributes on page 915
- Add Custom Fields to the Federation Adapter on page 915

Release Control Federation Adapter – Overview

The HP Release Control Federation adapter supports the retrieval of data from HP Release Control. Every request to HP Release Control to calculate a federated query is made through this adapter.

This section includes the following topics:

- “The Change Federation Adapter” on page 912
- “The KPI Federation Adapter” on page 913

The Change Federation Adapter

The Change Federation adapter supports the **Planned Change** CI type. You use **service desk** links to create a query.

The adapter ID for the Change Federation adapter is **CcmChangeAdapter**.

The following use cases describe how the adapter can be employed:

- ▶ A user needs to display **planned changes to any CI** within a specific time frame.
- ▶ A user needs to display **planned changes to specified system CIs**.
In this case, HP Business Availability Center retrieves changes that directly affect system CIs and does not retrieve changes that indirectly affect system CIs.
- ▶ A user needs to display **planned changes to a specified business CI**.

In this case, HP Business Availability Center retrieves changes that directly affect business CIs and does not retrieve changes that indirectly affect business CIs.

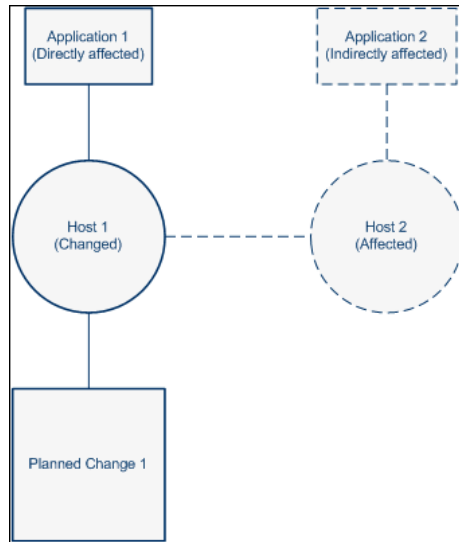
In all the above cases, HP Business Availability Center retrieves parent changes and independent tasks. HP Business Availability Center does not retrieve tasks that are included in a parent request.

Example of Use Cases

The following example illustrates some of the use cases. Assume there is one planned change in HP Release Control, **Planned Change 1**.

Planned Change 1 is performed on **Host 1**. **Application 1** runs on **Host 1** and is therefore directly affected by the change.

Host 2 is connected to **Host 1** and may be affected by **Planned Change 1** but no actual change is made to **Host 2**. **Application 2** runs on **Host 2** and may be indirectly affected by the change.



If the user runs a query to retrieve planned changes to **Host 1** or **Application 1**, HP Business Availability Center displays **Planned Change 1**, because this change directly affects those CIs.

If the user runs a query to retrieve planned changes to **Host 2** or **Application 2**, HP Business Availability Center does not display any changes because there are no changes that directly affect those CIs.

The KPI Federation Adapter

The KPI Federation adapter supports the **Real Time KPI** CI type. You use **KPI of** links to create a query.

When this adapter is configured, you can view KPIs (Key Performance Indicators) in the HP Business Availability Center Dashboard that indicate the number of planned/actual changes that have taken place to the relevant CIs during the last 24 hours.

The adapter ID for the KPI Federation adapter that displays information about **planned** changes is **RCKpiPlannedChangeAdapter**.

The adapter ID for the KPI Federation adapter that displays information about **actual** changes is **RCKpiActualChangeAdapter**.

For details, see **BACKPIsAdapter** in “Adapters” on page 744.

Configure the Federation Adapter

This section explains how to configure the HP Release Control Federation adapter to work with HP Business Availability Center.

For details on federation, see Part IV, “Federation.”

To configure the adapter:

- 1** Deploy the following file in the HP Business Availability Center Package Manager (**Settings > Package Manager**):
 - **<Release Control installation directory>\conf\uCmdb
-<version_number>-extensions\federation\<adapter_name>.zip**
where **<adapter_name>** is the name of the relevant adapter, for example, **CcmChangeAdapter.zip**.
- 2** Reload the adapter: **Settings > Federated CMDB > Data Stores** tab. Click the **Reload** button. For details, see “Data Stores Tab” on page 751.
- 3** Configure the adapter. In the Properties tab, enter the following details:
 - **Name.** The logical name of the adapter.
 - **Host.** The URL of HP Release Control.
 - **Port.** The port used by the Tomcat server. If no value is entered, 8080 is used as the default port. To use a different port, enter a value.
 - **User.** The user name of an administrator user in HP Release Control.
 - **Password.** The password of the administrator user specified above.
- 4** If you are configuring the Change Federation adapter, see “Retrieve Planned Change Attributes” on page 915 or “Add Custom Fields to the Federation Adapter” on page 915.

Retrieve Planned Change Attributes

HP Business Availability Center contains a list of the **planned change** attributes selected in the **CI Type Manager Attributes** tab. HP Business Availability Center retrieves **planned change** attributes from HP Release Control using the following rule:

HP Business Availability Center converts all underscores (_) in the attribute names and converts them to hyphens (-) and searches through the HP Release Control fields for matching fields. The list of fields in HP Release Control is located in the Administrator module **Fields** tab.

In addition, specific attribute properties are mapped to specific fields in the **convertfields.properties** file, located in the **CcmChangeAdapter** directory. You can map additional attributes to HP Release Control fields in this file.

Add Custom Fields to the Federation Adapter

This section explains how to add custom fields to the Federation adapter.

To add new custom fields to the Federation adapter:

- 1** In HP Release Control, add the relevant fields in the Administrator module **Fields** tab. For more information about adding custom fields, see “Creating or Modifying Change Request Fields” in *Release Control Installation and Configuration Guide*.
- 2** In HP Business Availability Center, go to the **planned change** CI type and add the new attribute names. For details, see “Attributes Page” on page 261.
 - Use the same name for the attribute as you used for the custom field that you created in HP Release Control. However, if you used a hyphen (-) in the field name, substitute the hyphen with an underscore (_) in the name of the attribute.
 - To use an attribute name that is different to the custom field name, you can map the attribute name to a specific field name in the **convertfields.properties** file, located in the **CcmChangeAdapter** directory.

35

Viewing KPIs in External Applications

This chapter explains how to retrieve the status and value of HP Business Availability Center KPIs when working in an external application. You can view the results in your application, or you can use the results in calculations, statistics, and so on.

This chapter includes:

Tasks

- Set Up an Adapter to View KPIs in an External Application on page 917

Set Up an Adapter to View KPIs in an External Application

This task describes how to set up the BACKPIsAdapter.

This task includes the following steps:

- “Create an Adapter Instance” on page 917
- “View the Attributes in the CIT Manager” on page 918
- “Define a TQL” on page 919
- “Consume KPIs in External Application” on page 919

1 Create an Adapter Instance

In HP Business Availability Center, in the Data Store, create an adapter instance with the **BACKPIsAdapter**. In the second stage, choose the **Real Time KPI** CIT. For details, see “Data Stores Tab” on page 751.

2 View the Attributes in the CIT Manager

The following attributes are used by the Real Time KPI CIT:

- **kpi_name.** The name of the KPI, for example, Availability, Performance.
- **kp_source.** The origin of the KPIs, for example, HP Business Availability Center.
- **numeric_value.** The numeric value of the KPI as calculated by the KPI business logic rule, for example, 0, 100, 3.2. (This value is optional.)
- **status.** The status of the KPI as calculated by the business logic rule (can be one of the following values: OK, WARNING, MINOR, MAJOR, CRITICAL, NONE).
- **value_units.** The measurement unit of the NumericValue field, for example, %, \$. (This value is optional.)
- **additional_info.** A string containing information about the KPIs.
- **calculation_method.** A description of the calculation method, in this case a description of the rule.
- **last_update_change.** The date when the status last changed.
- **threshold_operator.** This attribute contains enum operators: na, =, >, <, <=, >=.
- **threshold_ok.** The range of values that defines the OK KPI status.
- **threshold_warning.** The range of values that defines the WARNING KPI status.
- **threshold_minor.** The range of values that defines the MINOR KPI status.
- **threshold_major.** The range of values that defines MAJOR KPI status.
- **threshold_critical.** The range of values that defines the CRITICAL KPI status.

For details on working with the CIT Manager, see “CI Type Manager” and “CI Type Attributes.”

For details on KPI rules, see “Business Rule Repository” in *Using Dashboard*.

3 Define a TQL

Define a TQL using the **Real Time KPI** CIT. For details, see “Define a TQL Query” on page 360.

4 Consume KPIs in External Application

Using the API of your external application, send a query to run the relevant TQL in HP Business Availability Center, to retrieve the status and value of the federated KPIs.

36

Troubleshooting and Limitations

This chapter includes troubleshooting and limitations for the Federated CMDB functionality.

This chapter includes:

Reference

- Federated CMDB Troubleshooting and Limitations on page 921

Federated CMDB Troubleshooting and Limitations

This section includes the following topics:

- “All Adapters” on page 922
- “The RMI Adapter” on page 922
- “The CmdbChanges Adapter” on page 922

All Adapters

- ▶ When changes are made in View Manager and these changes affect the results of a TQL, federated CIs in the view are not updated. This is because federated TQLs are calculated ad-hoc only and are not updated when a view is recalculated. To update the federated CIs, select the view in View Explorer and click the **Rebuild View** button. (Note that the recalculation may take a long time.) For details, see “Browse Mode” on page 690.
- ▶ When configuring a local UCMDB data store, if your RMI adapter also supports federated queries, do not choose CITs in the CITs Supported by Adapter dialog box. (You should add an adapter for the local UCMDB data store only if you want to use it for replication jobs).
- ▶ Do not choose a CIT to be supported by an external data store if instances of this CIT exist in the local UCMDB, as this can lead to state inconsistency. For example, if there are instances of the CPU CIT in the local UCMDB, you must not choose the CPU when defining an external data store, even if the selected adapter supports it.
- ▶ When configuring a replication job between two CMDBs, verify that the class model is the same in the two CMDBs.

The RMI Adapter

- ▶ When using the RMI adapter, the version of the CMDB running on the configured host must be the same as the version of the UCMDB.

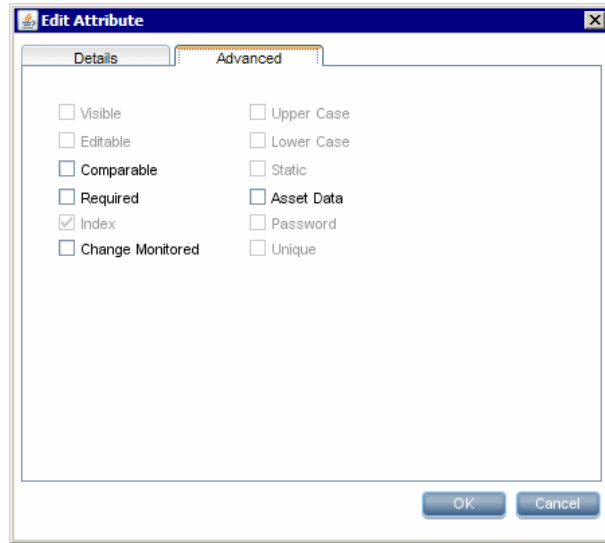
The CmdbChanges Adapter

- ▶ The adapter does not support any property condition beside the `root_class IN ...` condition on the Root node.
- ▶ A query should contain one CI that is labeled **Root**, or one or more relations that are labeled **Root**.

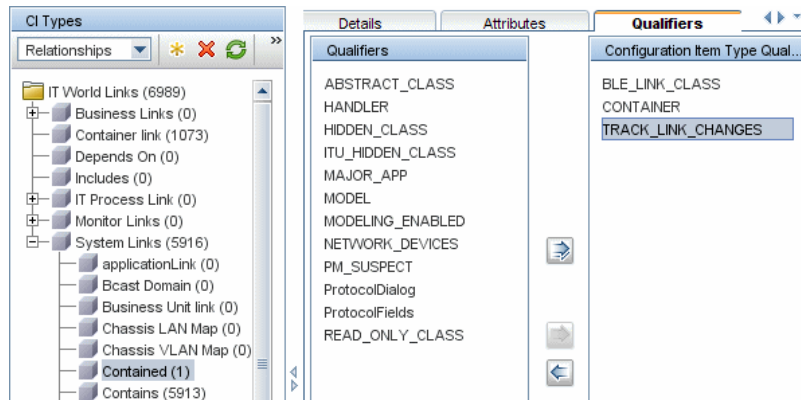
The root node is the main CI that is synchronized; the other nodes are the contained CIs of the main CI. For example, when synchronizing hosts, the host node is labeled as root and the host resources are not root.

- ▶ The TQL graph must not have cycles.
- ▶ The TQL must contain only the Root CI and optional CIs that are directly connected to it.

- A query that is used to synchronize relations should have the cardinality 1...* and an OR condition between the relations.
- The adapter does not support compound relations.
- All CI attributes to be replicated must have the **Change Monitored** check box selected (STATIC qualifier) so that they can be written to the History database:



- Each relation must include the **TRACK_LINK_CHANGES** qualifier so that it can be written to the History database:



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Introduction to Reconciliation

This chapter provides information on Reconciliation.

This chapter includes:

Concepts

- Reconciliation – Overview on page 925
- Host Reconciliation Rules on page 926
- Cluster Reconciliation Rules on page 926
- Software Element Reconciliation Rules on page 927
- Process Reconciliation Rules on page 927

Reconciliation – Overview

Reconciliation is a process of identifying and matching entities from different data stores (DDM, DDMi, ticketing, and so on). It is designed to avoid duplication of CIs in the CMDB.

The following sections include details of the out-of-the-box reconciliation rules:

Host Reconciliation Rules

- ▶ Any host in UCMDB is identified either by an IP address or a strong ID value (such as a MAC address or hardware ID):

Hosts identified by an IP address are considered **incomplete** (the Host Is Complete attribute has a false value).

Hosts identified by a strong ID are considered **complete**. If a host has several MAC addresses, DDM uses the lowest MAC address as the identifier.

- ▶ An **incomplete** host can be reconciled with a **complete** host by its IP address, or with an **incomplete** host that has the same ID.
- ▶ A **complete** host can be reconciled with an **incomplete** host by its IP address, or with a **complete** host that has the same ID.
- ▶ When an **incomplete** host exists in the CMDB and a **complete** host is reported, the **complete** host replaces the **incomplete** host and the topology (related CIs) that is connected to the **incomplete** host is moved to the new, **complete** host.
- ▶ When a **complete** host exists in the CMDB and an **incomplete** host is reported, the properties of the **incomplete** host are copied to the **complete** host that is already in the CMDB.

Note: Properties are updated according to the conflict resolution policy.

Cluster Reconciliation Rules

- ▶ A Cluster Server is a **complete** host.
- ▶ If an **incomplete** host is identified by its IP with two **complete** hosts, and one of these hosts is a cluster, the **incomplete** host is identified with the cluster only.
- ▶ If a Cluster Server and a **complete** host are connected to the same VIP (virtual IP), all software elements that include the VIP in the `application_ip` attribute move from the physical **complete** host to the Cluster Server.

Software Element Reconciliation Rules

- ▶ Software Element CITs are considered to be either of a strong type or a weak type:
 - ▶ **Strong Type Software Element CITs.** These CITs are specialized (they are derived from the Software Element CIT) and include more attributes, different identification rules, a display label, and so on.
 - ▶ **Weak Type Software Element CITs.** These CITs are CI instances of the Software Element CI Type itself. They include basic configuration attributes only. Also, only one instance of each software component type can exist in the model. That is, you cannot model two different Oracle instances on a single host using a weak type software element.
- ▶ A reconciliation mechanism handles the mapping of weak type software elements to their corresponding strong type, once they are discovered. This mechanism enables DDM to detect the existence of software by one method, and report additional details about the software when it is discovered using another method, knowing the two CIs will eventually be merged in the CMDB.
- ▶ The reconciliation mechanism relies on a shared attribute value between the weak type and strong type: the **Name** attribute (`data_name`). All software elements (strong or weak) are created with a distinguishing name: when a strong software element is discovered on a host containing a weak software element with the same name, the weak software element is merged with the strong one.

Process Reconciliation Rules

Process CITs are considered to be either of a strong type or a weak type:

- ▶ **Strong Type Process CITs.** These CITs contain the process command line.
- ▶ **Weak Type Process CITs.** These CITs do not include information about the process command line; instead, they contain an empty string that can be mapped to any command line.

Reconciliation receives a process CI from a data store and searches the CMDB for an identical CI, by comparing key attributes:

- ▶ If one of the CIs contains an empty string in the command line attribute but the other key attributes are identical in both CIs, they are considered identical and are mapped to each other.

For example, if the process CI is of the strong type, that is, includes a command line attribute, and the CI in the CMDB is of the weak type, that is, includes an empty string for the command line attribute, they are considered identical.

Once the two CIs are identified, a data change procedure merges them.

- ▶ If the CIs have identical attributes, including the process command line attribute, they are merged.

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