

HP Universal CMDB

for the Windows and Solaris operating systems

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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 11
- Who Should Read This Guide on page 13
- Getting More Information on page 13

How This Guide Is Organized

The guide contains the following chapters:

Part I Modeling

Describes the main concepts, tasks, and reference information for CMDB; describes how to model your business environment by defining views and by building TQL queries that retrieve the required information from the CMDB. The TQL query results populate the views with CIs and relationships.

Furthermore, describes how to work with the topology of the views defined in the Modeling Managers. You can edit CI properties, define new CIs, and attach existing CIs to each other to reflect changes in your IT infrastructure.

Part II Settings

Describes how to create or edit a package out of existing resources to suit your IT management needs using the Package Manager; how to define schedules for tasks that are activated on a periodic basis using the Scheduler; how to define attribute states using the State Manager; how to perform federation over several data sources using Federated CMDB; how to use the Infrastructure Settings Manager. Also describes how to set up users and roles and grant permissions to roles to use components of the application.

Part III Application

Describes how to view the CIs of the currently selected view in graphical format in Topology View, how to view a list of CIs and relationships that are candidates for deletion by the aging mechanism, how to compare two snapshots of a specific view taken at different times, how to compare the hierarchies of two compound CIs, and how to create a Gold Master report definition. In addition, this part describes the pages and dialog boxes that you use to work with Asset report, Host Dependency report, Change report, System report, and Gold Master report, and the Overview reports.

Part IV View Explorer

Explains how View Explorer presents the elements of the IT universe model in HP Universal CMDB through the medium of views.

Part V 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 VI Users and Permissions

Explains how to create roles, how to create users, and how to relate the users to specific views. Also explains how to set security for users.

Who Should Read This Guide

This guide is intended for the following users of HP Universal CMDB:

- HP Universal CMDB administrators
- HP Universal CMDB platform administrators
- HP Universal CMDB application administrators
- HP Universal CMDB data collector administrators

Readers of this guide should be knowledgeable about enterprise system administration, have familiarity with ITIL concepts, and be knowledgeable about HP Universal CMDB.

Getting More Information

For a complete list of all online documentation included with HP Universal CMDB, additional online resources, information on acquiring documentation updates, and typographical conventions used in this guide, see the *HP Universal CMDB 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 18
- Configuration Items (CI) on page 19
- Nodes and Relationships on page 19

Reference

- CMDB Log Files on page 19
- Log Severity Levels on page 27
- CMDB Configuration Parameters on page 29

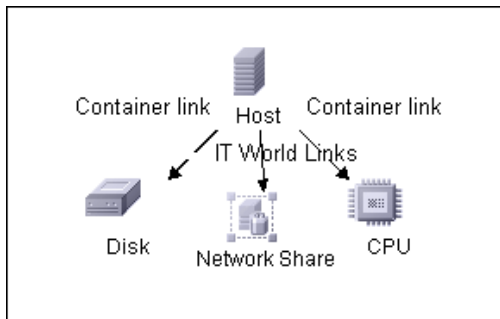
CMDB Overview

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 Universal CMDB, whether created automatically from the DDM process or inserted manually. 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 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. 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 pattern views (views based on TQLs); 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 235.

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, customers, and so on. 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 Universal CMDB are called relationships.

Each CI belongs to a configuration item type (CIT). The CIT defines a category of CIs used in HP Universal CMDB. 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. Furthermore, changes that you make in the view are actually changes to the IT Universe model.

Nodes and Relationships

Nodes are the components from which TQL queries are built in Enrichment Manager, View Manager, Correlation Manager, 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 Universal CMDB root directory>\UCMDBServer\j2f\log folders.

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 27.

This section includes the following topics:

- “Lifecycle Log” on page 20
- “General CMDB Log” on page 21
- “Quota Log” on page 21

Lifecycle Log

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

Log File	Description
Purpose	<p>CMDB server lifecycle:</p> <ul style="list-style-type: none"> ➤ all server tasks ➤ customer loading and unloading ➤ startup and shutdown of Task manager <p>Contains information about any application that does not start up correctly.</p>
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.
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 <code>duplicate attributes</code> .
Error Level	Not available.
Debug Level	Every CI Type update includes the following: <ul style="list-style-type: none"> ▶ original CIT in XML format ▶ new CIT in XML format ▶ differences between the CITs If the CI Type Model update is rejected, the reason is logged.
Basic Troubleshooting	Compares the differences that the server finds between the original CIT and the new CIT. This is useful to understand the following scenarios: <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	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.
Information Level	<ul style="list-style-type: none"> ▶ startup and shutdown of publishers ▶ register and unregister remote and internal listeners

Log File	Description
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
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.

Log File	Description
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.
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
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 Universal CMDB root directory>\UCMDBServer\j2f\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
```

For a description of the log levels, see “Log Severity Levels” on page 27.

- 4 Save the file.

CMDB Configuration Parameters

This section describes the parameters needed for configuring the CMDB. By changing the values of CMDB parameters, the administrator can change the runtime behavior of CMDB.

This section includes the following topics:

- “Overview” on page 29
- “Aging Parameters” on page 30
- “Configuration Item Type Parameters” on page 31
- “Configuration Item Type Setting Parameters” on page 33
- “Data Model Parameters” on page 33
- “General Server Parameters” on page 34
- “History Database Parameters” on page 37
- “History Database Purging Parameters” on page 39
- “Monitoring Parameters” on page 40
- “Notification Parameters” on page 41
- “Other Parameters” on page 42
- “Plug-in Parameters” on page 45
- “Quota Parameters” on page 45
- “System TQL Parameters” on page 48

Overview

Note: Changed parameters may impact the entire system and not just the CMDB. Parameters that can be changed by users are marked **Y** in the Change Value? (Y/N) column of each table. All other parameters should be changed by HP Software Support only.

Aging Parameters

This section describes the aging parameters:

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
model.aging.is.aging.enabled	Defines whether the aging mechanism is enabled.	boolean	<ul style="list-style-type: none"> ▶ true. Aging is enabled. The scheduler runs and marks candidates (objects/links) for deletion. ▶ false. Aging is disabled. The scheduler does not run but the dates when candidates must be deleted and the actual deletion are set. This is the default. 	Y
model.aging.scheduler.hour.of.first.run	The time when the aging parameter runs after startup.	integer	Default: 2:00 AM	N
model.aging.scheduler.interval.in.hours	The interval in hours between aging parameter runs.	integer	Default: 24 hours	N
model.aging.time.unit=days				

Configuration Item Type Parameters

This section describes the CIT parameters:

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
dal.classmodel.dao.type	Defines the storage type of the CI Type Model.	string	<ul style="list-style-type: none"> ▶ jdbc. Storage in the database. ▶ xml. Storage in an XML file. 	N
dal.classmodel.filesystem.file.name	Defines the relative directory path where a CI Type is saved when the storage type is xml .	string	The path is relative to the HP Universal CMDB home directory.	
dal.classmodel.deployement.dao.type	Defines the storage type of a CI Type definition for initial deployment.	string	xml . CMDB reads from the XML files and deploys the CI Type in CMDB.	N
dal.classmodel.deployement.file.name	Defines the relative directory path to the CI Type XML files. These files are needed for CI Type deployment.	string	All XML files must have the suffix <code>_deployment.xml</code> .	N
dal.classmodel.db.name	Defines the name of the schema for CMDB management. CMDB management includes two tables: ID gen and CMDB versions.	string	Relevant for Microsoft SQL Servers only.	Y

Chapter 1 • Configuration Management Database (CMDB)

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
dal.classmodel.host.name	The IP address of the CMDB management database host.	string		Y
dal.classmodel.user.name	User name to log into the CMDB management database.	string	In Oracle, it is also the schema name.	Y
dal.classmodel.password	Password to log into the CMDB management database.	string		Y
dal.classmodel.server	The same as dal.classmodel.host.name.	string	Defined for DB context only. DB context is the name of a parameter in the connection pool.	Y
dal.classmodel.sid	The sid of a CI Type Model.	string	Relevant for Oracle database.	Y
dal.classmodel.port	Defines a TCP port of database host.	integer		Y
dal.classmodel.db.type	The type of CMDB.	string	<ul style="list-style-type: none"> ▶ ORACLE Server ▶ SQL Server 	Y

Configuration Item Type Setting Parameters

This section describes the CI Type settings parameters:

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
classmodel.persistence.file=/cmdb/classmodel/persistence/classmodel.xml				

Data Model Parameters

This section describes the data model parameters:

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
dal.datamodel.dao.type	Defines the type of continuous storage of a data model.	string	<ul style="list-style-type: none"> ▶ jdbc. Continuous storage in the database. ▶ mock. 	N
dal.datamodel.db.name	Defines the name of the schema.	string	Relevant for Microsoft SQL Servers only.	Y
dal.datamodel.host.name	The IP address of the CMDB database host. Note: CMDB database includes CI Type Model and data model database.	string		Y
dal.datamodel.user.name	User name to log into the CMDB database.	string	In Oracle, it also denotes the schema name.	Y
dal.datamodel.password	Password to log into the CMDB database.	string		Y

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
dal.datamodel.server	The same as dal.datamodel.host.name.	string	Defined for DB context only. DB context is the name of a parameter in the connection pool.	Y
dal.datamodel.sid	If the CMDB database is Oracle, this parameter defines the sid of the CI Type Model.	string		Y
dal.datamodel.port	The TCP port of the database host.	integer		Y
dal.datamodel.db.type	The type of CMDB database.	string	<ul style="list-style-type: none"> ➤ ORACLE Server ➤ SQL Server 	Y

General Server Parameters

This section describes the general server parameters:

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
server.sync.session.timeout	The default time-out for executing synchronous CMDB operations. Does not affect asynchronous operations.	integer	<ul style="list-style-type: none"> ➤ Value is in seconds. ➤ If the CMDB operation runs longer than the defined value, a request time-out exception is sent to the client. 	N
upgrade.enabled	Defines whether CMDB should perform an upgrade on startup.	boolean	<ul style="list-style-type: none"> ➤ true. Perform an upgrade. ➤ false. Do not perform an upgrade. 	N

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
upgrade.file=/cmdb/upgrade.dat	The file containing the date of the last upgrade for each customer.		/cmdb/upgrade.dat	
task.threads.pool.size.process	For internal HP use only.	integer	20	
task.threads.pool.size.modeltopology	The number of threads dedicated to the CMDB model topology.	integer	10	
task.threads.pool.size.tqlcalculator	The number of threads dedicated to the TQL calculator.	integer	15	
task.threads.pool.size.tqlresultrepository	The number of threads dedicated to the TQL result repository.	integer	8	
task.threads.pool.size.modelquery	The number of threads dedicated to the CMDB model query.	integer	20	
task.threads.pool.size.tqlnotification	The number of threads dedicated to TQL notification.	integer	8	
task.threads.pool.size.tqlresultsutilities	The number of threads dedicated to TQL results utilities.	integer	20	
task.threads.pool.size.tqlpatternscache	The number of threads dedicated to the TQL query cache.	integer	6	
task.threads.pool.size.tqlpatternsmanager	The number of threads dedicated to the TQL query manager.	integer	2	
task.threads.pool.size.plugins	The number of threads dedicated to plug-ins	integer	1	

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
task.threads.pool.size.raw.event	The number of threads dedicated to raw events.	integer	1	
task.threads.pool.size.enrichment.admin	The number of threads dedicated to enrichment administration.	integer	1	
task.threads.pool.size.enrichment.definition	The number of threads dedicated to enrichment definitions.	integer	4	
task.threads.pool.size.enrichment.calculation	The number of threads dedicated to the enrichment calculation.	integer	4	
task.threads.pool.size.classmodel	The number of threads dedicated to the CIT model.	integer	1	
task.threads.pool.size.deployment	The number of threads dedicated to deployment.	integer	1	
task.threads.pool.size.modelupdate	The number of threads dedicated to updating the CMDB model.	integer	1	
task.threads.pool.size.tqlresultrepositorycache	The number of threads dedicated to the TQL results repository cache.	integer	1	
task.threads.pool.size.tqlscheduler	The number of threads dedicated to the TQL scheduler.	integer	1	

History Database Parameters

This section describes the History database parameters:

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
dal.history.db.name	Defines the name of the History schema.	string	Relevant for Microsoft SQL Servers only.	Y
dal.history.host.name	The IP address of the database host.	string		Y
dal.history.user.name	User name to log into History database.	string	In Oracle, it also denotes the schema name.	Y
dal.history.password	Password to log into the data model database.	string		Y
dal.history.server	Defined for DB context only. DB context is the name of a parameter in the connection pool.	string	The value must be the same as dal.history.host.name.	Y
dal.history.sid	If the CI Type database is Oracle, this parameter defines the SID of the CI Type.	string		Y
dal.history.port	The TCP port of the database host.	integer		Y
dal.history.db.type	The type of History database.	string	<ul style="list-style-type: none"> ➤ ORACLE Server ➤ SQL Server 	Y

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Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
dal.history.data.tablespace.name	This parameter is relevant for the Oracle database only. The DBA can define the tablespace for the History data.		cmdbhistorydata	
dal.history.index.tablespace.name	This parameter is relevant for the Oracle database only. The DBA can define the tablespace for indexes.		cmdbhistoryindex	

History Database Purging Parameters

This section describes the History database purging parameters:

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
history.purging.days.to.save.backup	The minimum number of days to keep update and last create changes in the CMDB before purging those changes from the History database. Note: The last change of an attribute is not purged until a newer one overrides it.	integer	For example, if the value is 90 , changes that occur today remain in the History database for at least 90 days.	Y
history.purging.scheduler.interval.in.hours	The interval of time between purges of the History database.	integer	Value is in hours. For example, if the value is 24 , the History database is purged every 24 hours.	Y
history.purging.scheduler.hour.of.first.run	The hour of the day, using a 24 hour format, to begin purging. Purging is generally performed during the night hours.	integer	For example, if the value is 01 , purging begins at 01:00 every day.	Y

Monitoring Parameters

This section describes the monitoring parameters:

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
monitor.scheduler.load.customer.number	Defines the number of customers to be monitored.	integer	If the value is -1, no customer is monitored. Values other than -1 define the number of monitored customers.	N
monitor.performance.warning	The minimum threshold to define CMDB performance as Warning. The maximum threshold to define CMDB performance as Good.	long	Value is in milliseconds.	N
monitor.performance.error	The minimum threshold to define CMDB performance as Error. The maximum threshold to define CMDB performance as Warning.	long	Value is in milliseconds.	N
monitor.scheduler.timer.time	The interval of time to run a performance check.	long	Value is in milliseconds.	N
monitor.scheduler.delay.time	The delay between system startup and the first performance check run.	long	Value is in milliseconds.	N

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
task.threads.pool.size.monitorQuery	The number of threads dedicated to the pool size monitor query.		1	
task.threads.pool.size.monitorCollector	The number of threads dedicated to the pool size monitor collector.		1	
task.threads.pool.size.customer.load			1	

Notification Parameters

This section describes the notification parameters:

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
notification.number.of.publish.tasks	Number of single-threaded tasks that publish CMDB changes to internal listeners.	integer		N
notification.jms.connection.factory	The JMS connection used for receiving notification.			N
notification.topic.jndi.name	The JNDI name of the topic selected for notification.			N

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
notification.sessions.applications=DASHBOARD=3;MAM_Viewing_system=3;MAM_=10;CmdbExt=3;AdaptersFramework=3;MAM_AutoDiscovery=3;sap=2;siebel=2;MAM_Correlation_system=3	Defines a number of topic sessions for JMS subscribers per caller application.	string	Definitions are separated by a semicolon (;).	N
notification.queue.size.max	Maximum number of messages that can accumulate in the internal queue when the JMS server is down.	integer		N
notification.queue.flush.interval	Interval of time to send any JMS messages accumulated in the queue.	integer	Value is in seconds.	N

Other Parameters

This section describes other data parameters:

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
dal.datamodel.data.tablespace.name	The tablespace name for the data model.	string	Relevant for Oracle database only.	Y
dal.datamodel.index.tablespace.name	The tablespace name for indexes.	string	Relevant for Oracle database only.	Y
dal.in.clause.threshold	The maximum number of values in a SQL IN clause.	integer		N

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
dal.num.of.in.chunks	The maximum number of chunks to be performed by an SQL IN clause.	integer	For example: an SQL WHERE clause generates n number of values. If (dal.in.clause.threshold * dal.num.of.in.chunks) > n, a temporary table is used. If, however, n is larger, several SQL statements are executed with the SQL IN clause.	N
dal.use.dirty.read	Defines whether the database queries use dirty read.	boolean	Relevant only for certain queries. <ul style="list-style-type: none"> ▶ true. Queries use dirty read. ▶ false. Queries do not use dirty read. 	N
dal.update.class.model.enabled	Defines whether CI Type Model updates are permitted. This parameter is currently used for consolidated tables in HP Software-as-a-Service.	boolean	<ul style="list-style-type: none"> ▶ false. Tables are consolidated and an update of CI Type Model is not allowed. ▶ true. Tables are not consolidated and an update of CI Type Model is allowed. 	N
dal.use.memory.instead.temp.table.low.threshold=				
dal.use.memory.instead.temp.table.high.threshold=				

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
dal.datamodel.max.name.length.allow	Maximum length of table and column names in database.	integer		N
dal.classmodel.use.idgen	Defines whether to use the HP sequence ID generator for the database.	boolean	<ul style="list-style-type: none"> ▶ true. Use ID generator. ▶ false. Do not use ID generator. 	N
dal.datamodel.create.time.attribute.name	Name of the attribute with the creation time of the CI or relationship.	string		N
dal.datamodel.update.time.attribute.name	Name of the attribute with the last update time of the CI or relationship.	string		N
dal.handle.statistics.on.startup=true				
dal.statistics.startup.percentage.threshold=5				
dal.statistics.startup.aging.threshold.hours=36				

Plug-in Parameters

This section describes the plug-in parameters:

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
plugins.raw.event.qualifiers	The list of attribute qualifiers relevant for raw events. If an attribute has one of the qualifiers in the list, this qualifier is sent as a raw event to the HP Universal CMDB server, to the event system.	string	Names of attribute qualifiers must be separated by a semicolon (;).	N

Quota Parameters

This section describes the quota parameters:

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
quota.name.customer.model.objects	The maximum number of CIs in a CIT. Every customer in HP Software-as-a-Service mode has a maximum number.	integer	For example, if the value is 100 and the CIT already includes 100 CIs, no additional CIs can be added.	N
quota.name.customer.tql.active	The maximum number of active TQLs that can be run concurrently.	integer	When the quota limit is reached, no further TQLs can be added.	N

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
quota.name.server.model.objects	The maximum number of CIs that the CMDB server can hold in a CIT for all customers combined.	integer	<ul style="list-style-type: none"> ▶ In HP Universal CMDB, the value must be the same as quota.name.customer.model.objects. ▶ In HP Software-as-a-Service, the value must be greater than quota.name.customer.model.objects. 	N
quota.name.server.tql.active	The maximum number of active TQLs that can run in the entire CMDB Server.	integer	<ul style="list-style-type: none"> ▶ In HP Universal CMDB, the value must be the same as quota.name.customer.tql.active. ▶ In HP Software-as-a-Service, the value must be greater than quota.name.customer.tql.active. 	N

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
quota.scheduler.interval.sec	The frequency in which the actual customer and server counts are checked against their defined quota value.	integer	Value is in seconds.	N
quota.statistics.enabled	Defines if quota counts should be returned to the Self-Alert Monitor. This is relevant for HP Business Availability Center.	boolean	<ul style="list-style-type: none"> ▶ false. Do not return the quota count. This value is relevant for HP Universal CMDB. ▶ true. Return the quota count to the Self-Alert Monitor. This value is relevant for HP Business Availability Center. 	N
quota.check.enabled	Defines whether to enforce quota checking.	boolean	<ul style="list-style-type: none"> ▶ true. Perform quota checking. ▶ false. Do not perform quota checking. 	N
quota.loader.name	Defines where to load quota values.	string	settings. Read from the HP Universal CMDB configuration file.	N

System TQL Parameters

This section describes the threshold parameters that determine whether or not node conditions are stored in the system TQL.

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
System TQL Cache Clean Frequency	Defines the frequency in which the system TQLs that are not used, and their results, are removed from the system.	integer	The value is measured in hours.	N
System TQL Enabled	Defines whether the system TQL component is enabled or not.	boolean	<ul style="list-style-type: none"> ▶ true. System TQL is enabled. ▶ false. System TQL is not enabled. 	N
System TQL's Life Time	Defines the time after which a system TQL's results are deleted from the system if not used.	integer	The value is in hours.	N
System TQL's Max Result Size	Defines the maximum number of CIs returned for the node condition for the results to be held in the system TQL.	integer	If the number exceeds the maximum, the node condition results are not held in the system TQL.	N

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
System TQL's Min DB Query Time	The minimum amount of time it takes for the database to calculate the node condition results above which a system TQL can be created to hold the results.	integer	For example, if calculation time is less than 10 seconds, then the node condition results are not stored in the system TQL. The value is measured in milliseconds.	N

2

IT Universe Manager

This chapter provides information on IT Universe Manager.

This chapter includes:

Concepts

- ▶ IT Universe Manager Overview on page 52
- ▶ Working with Pattern and Instance Views in IT Universe Manager on page 53
- ▶ View Tree Structure on page 55
- ▶ Working with CIs on page 56
- ▶ Working with Relationships on page 62

Tasks

- ▶ Populate an Instance View on page 67

Reference

- ▶ IT Universe Manager User Interface on page 69

IT Universe Manager Overview

IT Universe Manager offers a number of possibilities for managing your view content. The following tasks represent the basic functionality of the application:

- ▶ **Creating CIs without creating relationships.** You can define new CIs that are added at the root level of the view, so that no new relationships are created. For details, see “Creating a Non-Related CI” on page 57.
- ▶ **Creating CIs with relationships for them.** You can define new CIs and attach them to existing CIs in the view, so defining a new CI and a new relationship in the CMDB. For details, see “Creating a Related CI” on page 58.
- ▶ **Adding existing CIs and creating relationships for them.** You can copy CIs and CI subtrees from another view to the current view, and attach them to an existing CI in the view, so creating new relationships for existing CIs. For details, see “Attaching Existing CIs” on page 65.

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 Universal CMDB. Most CIs and relationships originate from one of the following sources:

- ▶ **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*.
- ▶ **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 56.
- ▶ **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 211.

Working with Pattern and Instance Views in IT Universe Manager

There are two types of service views: pattern and instance.

- Pattern 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.
- Instance views are built by manually defining individual CIs and relationships directly in the new view and/or by adding CIs that exist in other views in the CMDB.

The functionality for working with the two view types in IT Universe Manager differs somewhat, as described in the following sections.

For information on the different view types and how they function, see “Instance Views and Pattern Views” on page 100.

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

This section includes the following topics:

- “Working in Instance Views” on page 54
- “Working in Pattern Views” on page 54
- “View Lifecycle” on page 55

Working in Instance Views

The instance views you create are empty until you manually add CIs to them. You can add any type of CI or relationship to an instance view, either by adding existing CIs or by creating new CIs within the view. When you define a new CI in the view, the CI (and any associated relationship) is also created in the CMDB, and is automatically added to any other view where the new CI is relevant. For example, if the parent of the created CI appears in another instance view and is set to show its child CIs, then the new child CI is automatically added to the parent in that view; or if the new CI fits the requirements of the TQL query in a pattern view, then it automatically appears in the pattern view.

Working in Pattern Views

CIs created by DDM are automatically added to each pattern view where the CIs (and their relationships) fit the TQL definition for the view. When you open a pattern view in View Explorer, the TQL query for the view queries the CMDB for CIs 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 also added to your current view if you are working in an instance view. However, if you are working in a pattern view, the new CI (and relationship) is visible in the 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 CIs 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\reloadSystemParamaters()` 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 User Interface” on page 320.

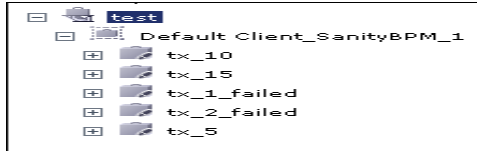
Note: Views defined as persistent are not cleared out and always remain in the memory.

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.

When defining an instance view, you build your own topology for the subtrees, according to the business structure or process you want represented. For more information, see “Working in Instance Views” on page 54.

When working with pattern views, the tree topology is determined by the pattern defined for the view. For more information on defining pattern views, see “Working in Pattern Views” on page 54.

Working with CIs

In IT Universe Manager, you can create related and non-related 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 57
- ▶ “Creating a Related CI” on page 58
- ▶ “General Properties for CIs” on page 59
- ▶ “CIT-Specific Properties” on page 59

- “Removing Out of Date CIs Using the Aging Mechanism” on page 60
- “Deleting CIs” on page 61

Creating a Non-Related CI

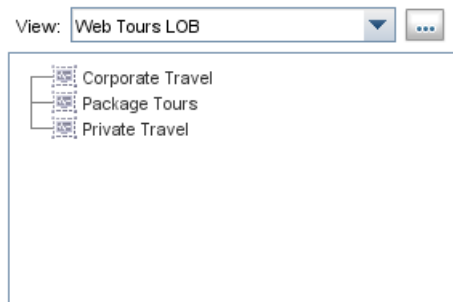
When you build a new subtree in your view, you generally start by creating a root CI representing a high-level logical element in your business. When working at the top level of the view, you can add a root CI by clicking the **Insert CI** button in the toolbar.

The New CI Wizard opens, which enables you to define the properties for the new CI. The wizard creates the CI in the CMDB and adds the created CI as a root CI in your view. For details, see “New CI Wizard” on page 83.

Note: If you are working in a pattern view, the CI is added to the view only if it meets the pattern specifications.

A CI created in this way is added as an independent entity without any current relationship to any other CI existing in the CMDB. After creating the first CI, you can then create or add related CIs below the first CI.

For example, if you are building an instance view to show your lines of business (LOB), you can add root CIs representing different LOBs within your organizational structure, as shown in the following figure:



Each LOB CI in the example is an independent entity, with no relationships, ready to become the root CI for a subtree. To build the subtree, you attach existing or new CIs. For details on attaching existing CIs, see “Attaching Existing CIs” on page 65.

Creating a Related CI

You can define a new CI to be added to your view as a parent, child, or sibling of an existing CI. Both the new CI and its relationship are created in the CMDB.

To define a new related CI:

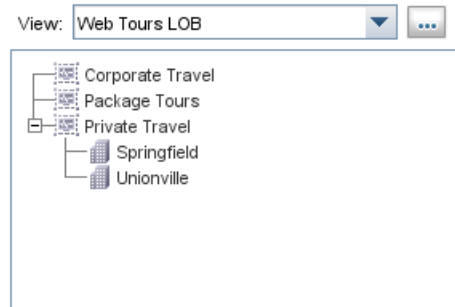
- 1 Select the CI in your view to which you want to attach the new CI.
- 2 Click the **Insert CI and Relate** button in the toolbar.
- 3 In the New CI Wizard, define the properties and relationship for the CI. For details, see “New CI Wizard” on page 83.

The wizard creates the CI in the CMDB, and adds the new CI as a related CI in your view.

Note: If you are working in a pattern view, the CI is added to the view only if it meets the pattern specifications.

In an instance view, the new child CI is included in other instances of the parent CI, on condition that the subtree is configured to use the Include All Child CIs rule. For information on the relationships between CIs, see “Working with Relationships” on page 62.

For example, if you are building an instance view to show your lines of business, under the LOB CIs at the root of the subtrees you can add logical CIs representing different locations dealing with that business line within your organizational structure. Each location is added as a child of the LOB CI, so that the LOB CI depends on the Location CI:



You can continue to build the branches of each LOB subtree by creating more related CIs to attach under the locations, and/or by attaching CIs or whole CI subtrees that already exist in the CMDB. For details on attaching existing CIs and CI subtrees, see “Attaching Existing CIs” on page 65.

General Properties for CIs

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 General Properties page of the wizard. You can access the Properties page to view the CI properties from IT Universe Manager by right-clicking the CI in View Explorer and selecting **Properties** from the context menu or by clicking the Properties tab. You can edit the CI properties as well if you have the necessary permissions for editing CIs. For details on CI properties, see “Properties Dialog Box” on page 91.

CIT-Specific Properties

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 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” in *CI Attribute Customization*.

The CIT-specific properties are displayed in the **Specific Properties** section of the 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 Properties dialog box.

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. For more information, see “Change Report” on page 547.

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.

When the aging mechanism is enabled, the CI is marked for deletion if the CI has not been accessed for a specified period of time (by default, 14 days). The **Last Access Time** parameter (displayed in the General Properties area), is used to make the calculations. By default, the CI is deleted 28 days after the last access time. These default values are set per CIT and can be changed in the CI Type Manager.

The aging mechanism for the CMDB is enabled or disabled from Infrastructure Settings Manager: Select **Admin > Settings > Infrastructure Settings Manager**, choose **Foundations**, select **CMDB**, and locate the **Is Aging Enabled** entry in the **Aging Settings** table. Change the value to **true** or **false**, as required.

When the aging mechanism is enabled for the CMDB in Infrastructure Settings, you can enable or disable aging and automatic deletion for individual CIs by selecting or clearing the **Enable Aging** box in the CI General Properties (the box is selected by default for DDM CIs). If the aging mechanism is disabled for the CMDB, the **Enable Aging** box is ignored and no CIs are deleted.

Note: The default setting of the aging mechanism is disabled.

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 a 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 were added within the view, the child CIs are not removed from the view, and they move up to the root level. This does not apply when deleting CIs from the view when working in the Instance View Editor in View Manager.

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 pattern 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 and the view. 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 DDM process, the CI is restored the next time that DDM runs (if the CI is still valid), and it reappears in all relevant pattern views.

Working with Relationships

Many of the relationships between CIs in the CMDB are created automatically, for example, by DDM. In addition, you can manually create relationships in IT Universe Manager, in Enrichment Manager, or in the Instance View Editor in View Manager.

This section includes the following topics:

- ▶ “Creating Relationships” on page 62
- ▶ “Creating Hierarchical Relationships” on page 63
- ▶ “Automatically-Created Relationships” on page 64
- ▶ “Parent and Child Relationships” on page 64
- ▶ “Attaching Existing CIs” on page 65
- ▶ “Adding Folding Rules to Relationships” on page 66
- ▶ “Deleting Relationships” on page 67

Creating Relationships

You can create relationships 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 Attach Related CIs wizard. For details, see “Attach Related CIs Wizard” on page 71.



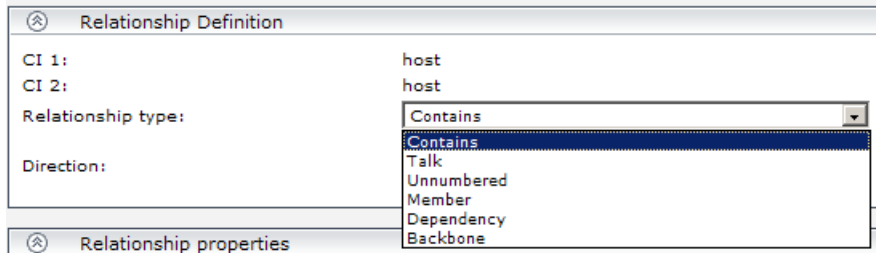
You can create as many relationships as necessary between a CI in the CMDB and other CIs. Each new relationship exists as its own entity in the CMDB, and has its own properties that can be edited in IT Universe Manager (as described in “Properties Dialog Box” on page 91). You can also create more than 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 you create a hierarchical relationship (parent-child) between them, so that one CI is influenced by the other.

Certain relationships defined in this way can be only of relationship type **Depends On** (if the relationship is between two non-monitoring CIs), or of 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.



Automatically-Created Relationships

When a CI is added to your view under another CI using the Instance View Editor in View Manager, a relationship is automatically created between the two CIs, using the default relationship for the two CI types. This can be a **Depends On** relationship (for example, between two logical CIs) or a **Monitored By** relationship (between a logical CI and a monitor CI). If there is no valid relationship between the two CIs (for example, between two monitor CIs), a message is displayed saying that no valid link was found between the two items.

Parent and Child Relationships

When you attach a child CI to a parent CI in your view, you are also 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 instance view where the parent CI is set to display all CMDB children (and for pattern views, where the child and relationship matches the TQL). For more information, see “Using the Instance View Editor” on page 103.

Attaching Existing CIs

You attach existing CIs using the Attach Related CIs wizard. The wizard has two main stages:

- 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 62.

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. This is true even if you attach each instance of the child with different settings, for example, one instance set to display child CIs, and one instance set to not display them.

Attaching CIs in Instance Views

When attaching CIs to a parent CI in an instance view, you can choose to set the CIs to display all CMDB children, by using the **Add CIs and Their Children** button. For more information, see “Child CI Rule Functionality” on page 104.

When CIs are added under a CI that is already set to display all CMDB children, the child CIs are displayed, regardless of which child rule the CIs in the subtree are using. The CIs are added to the list in the right pane, with the **Include Child CIs** column selected as relevant.

If there is a compatibility problem with the relationship types for the different CIs that you select, an error message is displayed saying that no valid relationships were found. In this case, select the CIs that you think are causing the problem from the list in the right pane, and remove them using the **Remove CIs** arrow button.

If, when attaching multiple CIs to a CI, you define all of the attached CIs as parents to the original CI (for example, so that the relationship direction reads CI X, CI Y, CI Z Depends On CI 1), a separate subtree is created in the view for each parent, with the original CI appearing as a child in each subtree.

When you add an existing CI to an instance view as a child CI, there may already exist relationships in the CMDB between that CI and other CIs in your view. Now that the CI is displayed in the view in the new location, it also appears under other CIs in the view to which it is related.

Attaching CIs in Pattern Views

When working in pattern views, the **Add CIs and Their Children** option is not available. Both the added CI and its child CIs appear in the view only if the CIs and the relationships conform to the requirements of the TQL for the view. For more information, see “Working in Pattern Views” on page 54.

Note: When copying a CI from a DDM process pattern view to an instance view, if you choose to display the child CIs, be aware that you may be adding hundreds of hidden child CIs that do not appear in the pattern view.

Adding Folding Rules to Relationships

After setting the node and relationship definitions of a pattern 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” on page 244.

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 from the current view, it is also deleted from the other views.

When a relationship is deleted, CIs that were added to the view are not removed. Following the deletion of the relationship, the CI is no longer related to any other CI in the view, and the CI is shown at the top level of the view. To remove the CI completely from the view (without deleting it from the CMDB), use the **Delete Relationship to Parent CI** option in the Instance View Editor.

When you delete a relationship that was created by the DDM process, the relationship is restored the next time that DDM runs (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.

Populate an Instance View

This task describes how to populate an instance view with CIs.

This task includes the following steps:

- “Prerequisites” on page 68
- “Add CIs to the View” on page 68

- ▶ “Set Permissions” on page 68

1 Prerequisites

You can create a new instance view from within View Manager. For details, see “Create New View/View Properties Dialog Box” on page 115.

2 Add CIs to the View

To populate an instance view with CIs, you can add existing CIs from the CMDB to your view or you can define new CIs to appear in your view. The new CI and relationship are created in the CMDB and the created CI is added at the specified point in the view tree. For details, see “Instance View Editor” on page 121.



Tip: If the CI does not appear in the view, try refreshing the view using the **Refresh** button in View Explorer.

Adding Existing CIs

You can add existing CIs from the CMDB to your view using the Attach Related CIs Wizard. Select the CIs you want to add to your view in the Select Related CIs dialog box of the wizard. Then define the relationships in the Relationship Properties dialog box of the wizard. For details, see “Attach Related CIs Wizard” on page 71.

Adding New CIs

To define a new CI in IT Universe Manager, select **Insert CI and Relate** to access the New CI Wizard. For details, see “New CI Wizard” on page 83.

3 Set Permissions

You should apply viewing and editing permissions to users and user groups for that view. You set permissions in **Admin > Settings > User Manager**. For details, see “User Manager User Interface” on page 641.

IT Universe Manager User Interface

This section describes:

- Add Background Image Dialog Box on page 70
- Attach Related CIs Wizard on page 71
- CI/Relationship History Dialog Box on page 75
- Get Related CIs Report on page 76
- IT Universe Manager Window on page 77
- New CI Wizard on page 83
- Properties Dialog Box on page 91
- Select Configuration Item Type Dialog Box on page 94
- View Discovery Wizard on page 95

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 Universal CMDB root directory>\UCMDBServer\j2f\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. Click Save Layout in the toolbar to save your changes.</p>




Attach Related CIs Wizard

Description	Enables you to attach CIs to the CI you selected in View Explorer. To access: In IT Universe Manager, right-click a CI in the Topology Map, and select Relate to CI from the context menu.
Important Information	The left pane of the Select Related CIs dialog box functionality follows the standard View Explorer functionality. For details, see “View Explorer” on page 587. To create a relationship between two CIs, select the CIs in View Explorer or the Topology Map and then select Relate to CI from the context menu.
Included in Tasks	“Populate an Instance View” on page 67
Useful Links	“View Explorer” on page 587
Wizard Map	The Attach Related CIs wizard contains: Select Related CIs Dialog Box > Relationship Properties Dialog Box

Select Related CIs Dialog Box

Description	Enables you to select the CIs to be attached to the CI you selected in View Explorer.
Important Information	The left pane of the Select Related CIs dialog box functionality follows the standard View Explorer functionality. For details, see “View Explorer” on page 587. For general information about the Attach Related CIs Wizard, see “Attach Related CIs Wizard” on page 71.
Wizard Map	The Attach Related CIs wizard contains: Select Related CIs Dialog Box > Relationship Properties Dialog Box

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

GUI Element (A-Z)	Description
	Click Add CIs to add the selected CIs in the left pane to the Edit pane without adding the children of the CI.
	Click the Add CIs and their Children button to add the selected CIs in the left pane to the edit pane together with all the children of the selected CIs in the CMDB. Note: This option appears for instance views only.
	Click Remove CIs to remove selected CIs in the Edit pane (this does not delete the CIs from the CMDB).
CI Name column	Shows the names of the selected CIs.
CI Type column	Shows the types of the selected CIs.
Include child CIs column	Indicates whether the selected CI was added together with its child CIs. Note: This column appears for instance views only.

Relationship Properties Dialog Box

Description	Enables you to define the relationship to be created between your CI and the CIs selected in the previous step.
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.
Wizard Map	The Attach Related CIs wizard contains: Select Related CIs Dialog Box > Relationship Properties Dialog Box

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

GUI Element (A–Z)	Description
Allow CI Update	When the check box is selected, the DDM process automatically updates the relationship.
CI 1	Displays the name of the CI on the first end of the relationship. This is the CI that you selected in the view.
CI 2	Displays the name of the CI on the second end of the relationship, that is attached to the original CI.
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 detailed description of the relationship.
Destination Network Address	Defined only for route links. Indicates the destination network address to which this route is configured.
Direction	<p>Enables you to define the direction of the relationship, by selecting the appropriate radio button. For example, if [CI 1] Depends On [CI 2] (generally the default option), then the new CI is created as child CIs of the originally selected CI. If [CI 2] Depends On [CI 1], then the new CI is created as a parent to the originally selected CI.</p> <p>For some relationship types (for example, Container link, or between a group CI and a monitor CI), only one direction is enabled.</p>
Enable Aging	(Only displayed for certain CIs.) When this option is selected, the aging mechanism is enabled for this relationship. It is selected by default for DDM CIs. For details, see “Removing Out of Date CIs Using the Aging Mechanism” on page 60.
Last Access Time	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.


GUI Element (A–Z)	Description
Must	<p>When the check box is selected, 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.</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.
Origin	An ID for the source that automatically created the relationship, or the application where the relationship was created.
Relationship Type	Enables you to 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.
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.

GUI Element (A–Z)	Description
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 in the box, 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.</p>

CI/Relationship History Dialog Box


Description	<p>Displays a list of attributes in which changes have occurred as well as the difference between two configuration files.</p> <p>To access: 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.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A–Z)	Description
	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.
Attribute	The name of the attribute.

GUI Element (A–Z)	Description
Change Date	The date when the last change occurred.
Changer	Indicates the cause of the change. For example, the field can contain the name of a user or a DDM pattern.
Filter by	Select an attribute type from the drop-down list to reduce the number of attributes appearing in the list.
New Value	The new value of the attribute.

Get Related CIs Report

Description	<p>Enables you to view the CIs related to a specified CI in a tree format.</p> <p>To access: In IT Universe Manager, click Generate Report  from the toolbar.</p>
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>Reference Information</i>. ▶ For details on how to work with reports, see “Working in Reports - Overview” in <i>Reference Information</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.

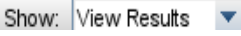
IT Universe Manager Window

Description	<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 587. ▶ Topology Map. Displays the CIs of a selected view. ▶ Information Pane. Displays properties and history for the selected CI. <p>To access: Select Admin > Modeling > IT Universe Manager.</p>
Important Information	<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>
Useful Links	<p>“Save Snapshot Dialog Box” on page 501</p> <p>“Set View Parameters/Set View Element Parameters Dialog Box” on page 127</p>

Topology Map

<p>Description</p>	<p>Displays the CIs of the currently selected view in graphical format.</p> <p>To access: Select Admin > Modeling > IT Universe Manager.</p>
<p>Important Information</p>	<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 Wizard” in <i>CI Attribute Customization</i>.</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 “Group By Dialog Box” on page 118.</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>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>Note: The modes can also be selected from the Operations drop-down in the Main Menu.</p>
<Main Menu>	For details, see “Main Menu” on page 620.
<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>
<Toolbar>	For details, see “Toolbar Options” on page 625

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 or Topology Map:

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.
CI/Relationship History	Displays the CI History dialog box. For details, see “CI/Relationship History Dialog Box” on page 75.
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>
Detach from Instance View	Enables you to delete a CI from an instance view (the CI remains in the CMDB). <p>Note: This options only appears in the context menu for instance views.</p>

Menu Item	Description
Get Related CIs	<p>The following options are available:</p> <ul style="list-style-type: none"> ▶ From View. Opens a window displaying the selected CI and its immediate neighbors within the current view. ▶ From Database without Filter. Opens a window displaying the selected CI and its immediate neighbors in the CMDB. ▶ 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 Topology Map results 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.

Menu Item	Description
Open	Appears only for configuration file CIs. Opens the configuration file in a popup window.
Properties	Displays the Properties page for the selected CI or relationship. For details, see “Properties Dialog Box” on page 91.
Relate to CI	Opens the Attach Related CI Wizard. For details, see “Attach Related CIs Wizard” on page 71.
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 75.
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.

Information Pane

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

GUI Element (A–Z)	Description
Edit	Click Edit to open the Properties dialog box for the selected CI.
History Tab	Displays the history for the selected CI. For details, see “CI/Relationship History Dialog Box” on page 75.
Properties Tab	Displays the selected CI’s properties. For details, see “Properties Dialog Box” on page 91.

 **New CI Wizard**


Description	<p>Enables you to enter basic information to define a new CI.</p> <p>To access: In IT Universe Manager, click the Insert CI icon in the toolbar to create a non-related CI. Click the Insert CI and Relate icon to create a new related CI.</p>
Important Information	<p>The first step of the wizard is the Define General Properties dialog box. The next step depends on the selected CI type. For some CI types, the Next button takes you to the Define CIT-Specific Properties dialog box, followed by the Define CI Relationship dialog box for related CIs. For others, it takes you directly to the Define CI Relationship dialog box. For non-related CIs, the wizard does not take you to the CI Relationship dialog box.</p>
Included in Tasks	<p>“Populate an Instance View” on page 67, “Create and Populate an Instance View” on page 111</p>
Useful Links	<p>“View Explorer” on page 587</p>
Wizard Map	<p>The New CI wizard contains:</p> <p>Define General Properties Dialog Box > (Define CIT-Specific Properties Dialog Box) > (Define Configuration Item Relationship Dialog Box)</p>

Define General Properties Dialog Box

Description	Enables you to enter basic information to define a new CI.
Important Information	<p>This is the first step of the New CI Wizard. Mandatory fields are denoted by a red asterisk.</p> <p>The general properties are common to all CI types. There are additional properties which may appear under general properties for specific CI types when they are defined as key properties of those CI types. For example, the Container field is defined as a key property for all CI types grouped under Host Resources.</p> <p>For general information on the New CI Wizard, see “New CI Wizard” on page 83.</p>
Wizard Map	<p>The New CI wizard contains:</p> <p>Define General Properties Dialog Box > (Define CIT-Specific Properties Dialog Box) > (Define Configuration Item Relationship Dialog Box)</p>

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

GUI Element (A–Z)	Description
Allow CI Update	<p>When selected, 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 this option is cleared, 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.

GUI Element (A–Z)	Description
CI Type	<p>Enables you to select the CI type for the new CI. The CI type property is context sensitive, permitting you to select only the CI types that are appropriate for the selected CI or view.</p> <p>You can select the CI type from the drop–down list by clicking the down arrow to the right of the CI Type box. This contains an abbreviated list of the most commonly used CI types as well as CI types that you have previously used.</p> <p>Alternatively, you can select from the CI Types Tree or CI Types Table by clicking the ellipsis button  next to the CI Type box. For details, see “Select Configuration Item Type Dialog Box” on page 94.</p> <p>These display all the available CITs that are appropriate for the context. You can toggle the display between the CI Types Tree and the CI Types Table using the button in the bottom left of the box.</p>
Country	The country in which the CI is located. Select an option from the list.
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.
Description	A description of the CI.
Enable Aging	<p>When this option is selected, the aging mechanism is enabled for this CI. It is selected by default for DDM CIs. For details, see “Removing Out of Date CIs Using the Aging Mechanism” on page 60.</p> <p>Note: This field is only displayed for certain CIs.</p>
Include Related CIs	<p>This feature is only enabled for instance views.</p> <p>If the check box is selected, the CI is set to recursively display in the view all child CIs from the CMDB, and all CIs in the subtree for the CI are also displayed in the view.</p> <p>If the check box is not selected, the CI is set to display only child CIs that are manually added within the view.</p>

GUI Element (A–Z)	Description
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 “Removing Out of Date CIs Using the Aging Mechanism” on page 60.</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.
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.
Tooltip Descriptions	To display tooltips for the fields on the page, select the Tooltip Descriptions check box and hold the pointer over the field names.
Updated By	The user name of the administrator who updated the CI properties.
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.

Define CIT-Specific Properties Dialog Box

Description	Enables you to enter CIT-specific properties for certain CIs.
Important Information	Each CIT has fields for the specific properties relevant to that CIT. Click the Tooltip Descriptions box and hold the pointer over a selected property field for more information on the property. Mandatory fields are denoted by a red asterisk.
Wizard Map	The New CI wizard contains: Define General Properties Dialog Box > Define CIT-Specific Properties Dialog Box > (Define Configuration Item Relationship Dialog Box)

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

GUI Element (A–Z)	Description
<Properties>	Enter the relevant information for the properties specific to the selected CIT. Fields designated with a red asterisk are mandatory. Note: Certain CITs have ID fields in the CIT-Specific Properties page which are automatically generated randomly and cannot be edited. These are indicated on the page as Auto-generated.
Tooltip Descriptions	To display tooltips for the fields on the page, select the Tooltip Descriptions check box and hold the pointer over the field names.

Define Configuration Item Relationship Dialog Box

Description	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.
Important Information	This is the final step of the New CI Wizard, when creating a related CI.
Wizard Map	The New CI wizard contains: Define General Properties Dialog Box > (Define CIT-Specific Properties Dialog Box) > Define Configuration Item Relationship Dialog Box

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

GUI Element (A–Z)	Description
Allow CI Update	When the check box is selected, the DDM process automatically updates the relationship.
CI 1	The name of the CI on the first side of the relationship. This is the CI that you selected in the view.
CI 2	The name of the CI on the second side of the relationship. This is the new CI that you are creating.
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.
Enable Aging	Enables the aging mechanism for the CI being created. It is selected by default for DDM CIs.
Last Access Time	The time that the CI was last accessed, whether when being updated or being discovered by DDM. This field is only displayed for certain CIs.




GUI Element (A–Z)	Description
Must	<p>When the check box is selected, 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 Type	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.
Tooltip Descriptions	To display tooltips for the fields on the page, select the Tooltip Descriptions check box and hold the pointer over the field names.
Updated By	The user name of the administrator who updated the relationship properties.
Update Time	The date and time when the CI properties were last updated.



GUI Element (A-Z)	Description
User Label	Enables you to define a display label for the relationship.
Weight	<p>When a weight value is entered in the box, 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>

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 > 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 Information 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 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 . <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 Properties dialog box. Click the Show/Hide Description Area button to display the Description Area.</p> <p>Mandatory fields are denoted by an asterisk.</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.

GUI Element (A–Z)	Description
	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.
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.
Change State	Indicates whether the CI or relationship has been changed (read-only value).
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	The type of the CI or relationship (read-only value). For information about CITs in HP Universal CMDB, see <i>CI Attribute Customization</i> .
Country	<p>The country in which the CI is located. Select an option from the list.</p> <p>Note: This field does not appear for relationships.</p>
Created By	The user name of the administrator who manually created the CI or relationship, where applicable (read-only value).
Create Time	The date and time when the CI or relationship was created.
Deletion Candidate Period	The number of days after which the CI or relationship becomes a candidate for deletion.

GUI Element (A–Z)	Description
Description	A brief description of the CI or relationship.
Display Label	The name of the CI or relationship as it appears in View Explorer.
Enable Aging	Enables the aging mechanism for this CI or relationship. It is selected by default for DDM CIs. This field is only displayed for certain CIs. For details, see “Removing Out of Date CIs Using the Aging Mechanism” on page 60.
ID	The internal ID of the CI or relationship in the CMDB (read-only value).
Include Related CIs	<p>This feature is only enabled for instance views.</p> <p>If the check box is selected, the CI is set to recursively display in the view all child CIs from the CMDB, and all CIs in the subtree for the CI are also displayed in the view.</p> <p>If the check box is not selected, the CI is set to display only child CIs that are manually added within the view. For details, see “Include Related CIs” on page 106.</p> <p>This element appears only in the CI Properties page, not in the Edit CI dialog box.</p>
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 only displayed for certain CIs.</p> <p>This parameter is used by the aging mechanism – for details, see “Removing Out of Date CIs Using the Aging Mechanism” on page 60.</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.

GUI Element (A–Z)	Description
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. Note: This field does not appear for relationships.
Updated by	The user name of the administrator who updated the CI or relationship properties.
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.

Select Configuration Item Type Dialog Box


Description	Enables you to select a CI type for a new CI from a table or tree. To access: In IT Universe Manager, click the ellipsis button  from the Define General Properties page of the New CI Wizard.
--------------------	---

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

GUI Element (A–Z)	Description
<CI types>	The list of available CI types to select from when creating a new CI.
CI Types Tree/Table	Toggles between the tree view and table view of the available CI types.

GUI Element (A–Z)	Description
Display all possible CITs	Select this option to display all possible CI types in the tree or table.
Display only CITs that match the current view	Select this option to display in the tree or table only those CI types matching the current view. Note: This option is only available for pattern views.

View Discovery Wizard

Description	<p>Enables you to find recent changes in a configuration, by manually running an ad-hoc DDM that rediscovers the CIs in a view. The DDM Probe immediately runs the jobs that originally discovered the CIs.</p> <p> To access: In IT Universe Manager, select the CIs to be rediscovered and click the Rediscover View Content button in the toolbar or select Operations > Rediscover View Content.</p>
Important Information	This wizard is displayed on condition that at least one Probe is connected to the server.
Included in Tasks	“Run an Ad-Hoc Discovery to Rediscover CIs” in <i>Discovery and Dependency Mapping Guide</i> .
Wizard Map	The View Discovery wizard contains: View Discovery Wizard (this page) > Choose Jobs for View Dialog Box > View Discovery Dialog Box > Discovered Changes Details Dialog Box

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


GUI Element (A-Z)	Description
<Text box>	<ul style="list-style-type: none"> ▶ Includes an explanation of the wizard. ▶ Probes that are defined on the server but are not connected are listed; they are not included in the rediscovery of the CIs. ▶ Scheduling is ignored, that is, the job is run immediately, even if it is scheduled to run at a later time. ▶ Any DDM policies connected to the job are also ignored.

Choose Jobs for View Dialog Box

Description	Enables you to choose the jobs that need to be run again. To access: Click the Next button in the View Discovery Wizard dialog box.
Included in Tasks	“Run an Ad-Hoc Discovery to Rediscover CIs” in <i>Discovery and Dependency Mapping Guide</i> .
Wizard Map	The View Discovery wizard contains: View Discovery Wizard > Choose Jobs for View Dialog Box > View Discovery Dialog Box > Discovered Changes Details Dialog Box

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

GUI Element (A-Z)	Description
Enable	Select to enable the DDM job.
Job Name	The DDM job name.

GUI Element (A–Z)	Description
Relevant Probe	The probe which the DDM job runs on. Click the ellipsis button  to open the Choose Probes dialog box and select the probe on which you want the Ad-Hoc view to run.
Triggered CIs Count	The number of CIs triggered by the DDM job.

View Discovery Dialog Box

Description	Enables you to view the progress of the rediscover process. To access: Click the Finish button in the Choose Jobs for View dialog box.
Included in Tasks	“Run an Ad-Hoc Discovery to Rediscover CIs” in <i>Discovery and Dependency Mapping Guide</i> .
Wizard Map	The View Discovery wizard contains: View Discovery Wizard > Choose Jobs for View Dialog Box > View Discovery Dialog Box > Discovered Changes Details Dialog Box

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

GUI Element (A–Z)	Description
Discovered Changes	The number of changes that occurred to CITs since the last run.
Probe Name	The name of the probe on which the job is running.
Progress	The progress of the CI rediscovery.

Discovered Changes Details Dialog Box

Description	Enables you to view the changes that have occurred to the CITs in the selected jobs. To access: Click the Details button in the View Discovery dialog box.
Included in Tasks	“Run an Ad-Hoc Discovery to Rediscover CIs” in <i>Discovery and Dependency Mapping Guide</i> .
Wizard Map	The View Discovery wizard contains: View Discovery Wizard > Choose Jobs for View Dialog Box > View Discovery Dialog Box > Discovered Changes Details Dialog Box

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

GUI Element (A–Z)	Description
CIT	The name of the CI type that changed.
Deleted Count	The number of CIs that have been deleted since the previous DDM run.
Insert/Update Count	The number of new or updated CIs since the previous DDM.

3

View Manager

This chapter includes the main concepts, tasks and reference information for View Manager.

This chapter includes:

Concepts

- ▶ View Manager Overview on page 100
- ▶ Instance Views and Pattern Views on page 100
- ▶ Predefined Folders and Views on page 101
- ▶ Building a Business View on page 102
- ▶ Using the Instance View Editor on page 103
- ▶ Link Nodes to Application CI on page 106
- ▶ Grouping By Attribute Properties on page 109
- ▶ Merge Identical Instances on page 110

Tasks

- ▶ Create and Populate an Instance View on page 111
- ▶ Pattern View Workflow on page 113

Reference

- ▶ View Manager User Interface on page 114

Troubleshooting and Limitations on page 137

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 Universal CMDB installation.

The IT universe model in the configuration management database can be very large, holding thousands of configuration items (CIs). A view enables you to build a subset of the overall 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.

HP Universal CMDB supports two view formats, pattern and instance views, which are populated through different processes. For details, see “Instance Views and Pattern Views” on page 100.

Instance Views and Pattern Views

HP Universal CMDB supports two view formats, pattern and instance views, 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 build the view based on an existing query). The view displays only those CIs and relationships that satisfy the query definition. When the view is opened up or refreshed, View Manager queries the CMDB for all elements that fit the query, and automatically updates the view with those elements.

For more information on pattern views, see “Working in Pattern Views” on page 54.

- ▶ **Instance views** are built by manually defining individual CIs and relationships directly in the view and/or by adding CIs that exist in the CMDB in the view.

For more information on instance views, see “Working in Instance Views” on page 54.

You can also create new views (both instance and pattern views) by cloning an existing view, and editing the view contents. You can then select **Save As** from the context menu and give the new view a unique name.

Predefined Folders and Views

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

- “About Predefined Folders” on page 101
- “About Factory Views” on page 101

About Predefined Folders

View Manager contains a hierarchical file folder system to help you organize your views, displayed in the Folders 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.

About Factory Views

Your HP Universal CMDB installation includes out-of-the-box pattern views. These views provide a quick start for working with the CMDB.

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.

Pattern views for CIs are created when a Discovery and Dependency Mapping (DDM) process is run; the out-of-the-box views that are provided correspond to the relevant 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*.

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

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 instance 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:

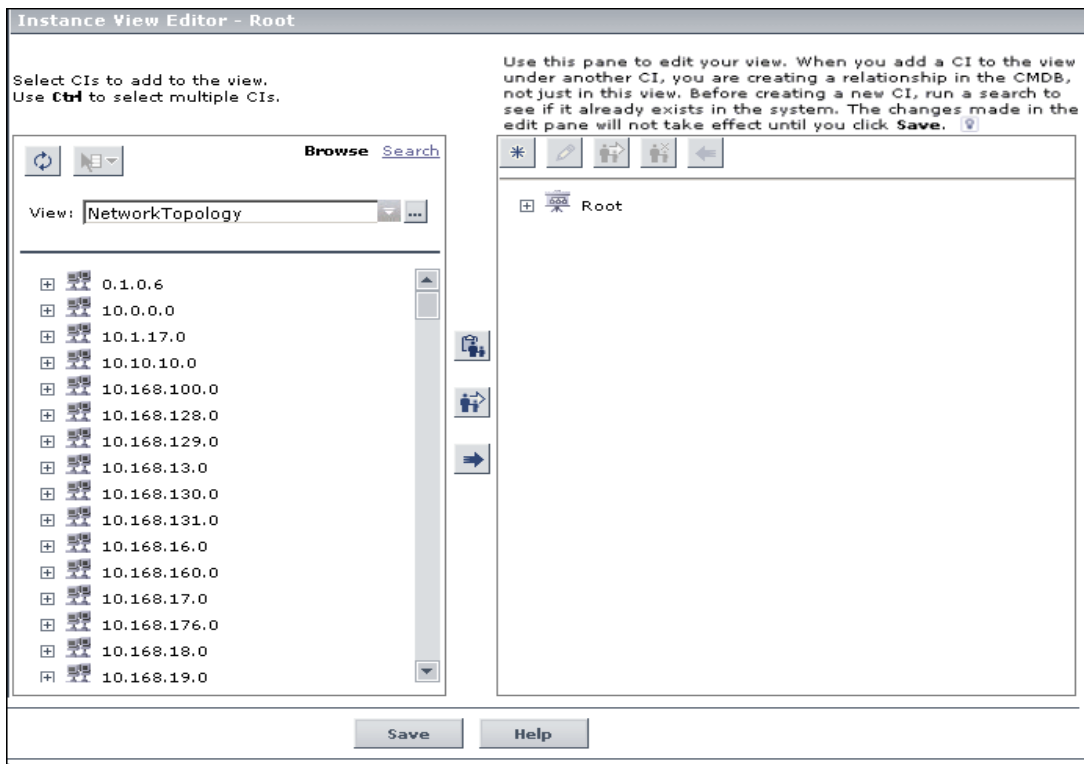
- ▶ **Top level.** The highest levels of the view, consisting of the root CI and the branches below it, are normally built from logical **Business** CI types such as **Location, Line of Business, Customer, Application**, and so on.
- ▶ **Intermediate level.** The intermediate branches of the view normally 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.

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

Using the Instance View Editor

The Instance View Editor contains two panes. In the View Explorer pane on the left, you can survey the existing views in HP Universal CMDB, and view information for CIs, such as CI properties. In the edit pane on the right, you can build and modify the contents of your view.

You access the Instance View Editor by selecting an Instance View in the Views pane in View Manager. For details, see “Instance View Editor” on page 121.



Note: If you navigate away from the Instance View Editor without clicking **Save**, your changes are not updated to the CMDB.

The following functionality is available from the edit pane of the Instance View Editor:

- ▶ Create a CI in your view and in the CMDB, as described in “New CI Wizard” on page 83.
- ▶ Edit the properties for a CI, as described in “Properties Dialog Box” on page 91.
- ▶ Change the display/hide all child CIs status for a CI, as described in “Add All CMDB Children” on page 124.
- ▶ Disconnect a CI from the parent CI, so removing the relationship between the two CIs in the IT universe, as described in “Delete Relationship to Parent CI” on page 125.

Child CI Rule Functionality

The child CI rule assigned to a parent CI determines which child CIs are displayed for the parent CI in the view.

A child CI is displayed or hidden depending on the child CI rule that is applied to the parent:

- ▶ A CI defined as **Display all CMDB children**, by clicking the **Add all CMDB children** button recursively displays in the view all child CIs that exist in the CMDB. The subtree is dynamically updated with every added child CI, whether it is added within the current view or in a different view. Once a parent CI is set to display all CMDB children, the child rule used for the CIs on the next branches in the subtree is irrelevant—all child CIs are displayed all the way down the subtree.



In the edit pane of the Instance View Editor, all child CIs that are included recursively are displayed in italic text and with a faded icon.



Note: The recursively-included child CIs are all marked in their tooltips as **Display only manually added children**, but they dynamically display all child CIs in the CMDB.



- If you define a CI as **Display only manually added children** by clicking the **Remove manually added children** button, it displays only those child CIs that were created or added to that CI within the current view. The child CIs themselves may be set to display or hide their children.

In the edit pane of the Instance View Editor, these child CIs are shown in the standard format used for CIs. In the following figure, CI `app1` is set as **Display only manually added children**:



However, the child CI of a parent with this rule can itself be set to use either rule. In the following picture, the rule for `tx_yellow2` has been changed to **Display all CMDB children**:



You can toggle the rule used by a parent CI, as described in “Add All CMDB Children” on page 124.

Include Related CIs

You can set the child CI rule when creating CIs using the New CI wizard or when attaching CIs using the Attach Related CIs wizard.

You can set CIs to display or hide child CIs as follows:

- ▶ **Creating or editing the CI.** Select the **Include Related CIs** check box in the CI properties to set the child CI rule to display all CMDB children. Clear the check box to set the child CI rule to display only future manually added children. (This option may be non-editable, depending on the definitions for the parent CI.) For details on editing properties, see “Properties Dialog Box” on page 91.
- ▶ **Adding an existing CI to a view.** Use the **Add CIs and their children** (recursive) button to set the child CI rule to display all CMDB children. Use the **Add CIs** (single arrow) button to set the child CI rule to display only future manually added children. For details, see “Attaching Existing CIs” on page 65.
- ▶ **Working in the Instance View Editor.** Use the recursive arrow button or select the **Add all CMDB children** option to set the child CI rule to display all CMDB children. Use the single arrow button or select the **Remove manually added children** option to set the child CI rule to display only future manually added children. For details, see “Instance View Editor” on page 121.

Link Nodes to Application CI

HP Universal CMDB 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 **Depends On** links.

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 enrichment recalculation is performed immediately. However, if you add a node to the view, the enrichment recalculation is performed at the next scheduled enrichment 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).

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 **Depends On** links to all the instances of the node.

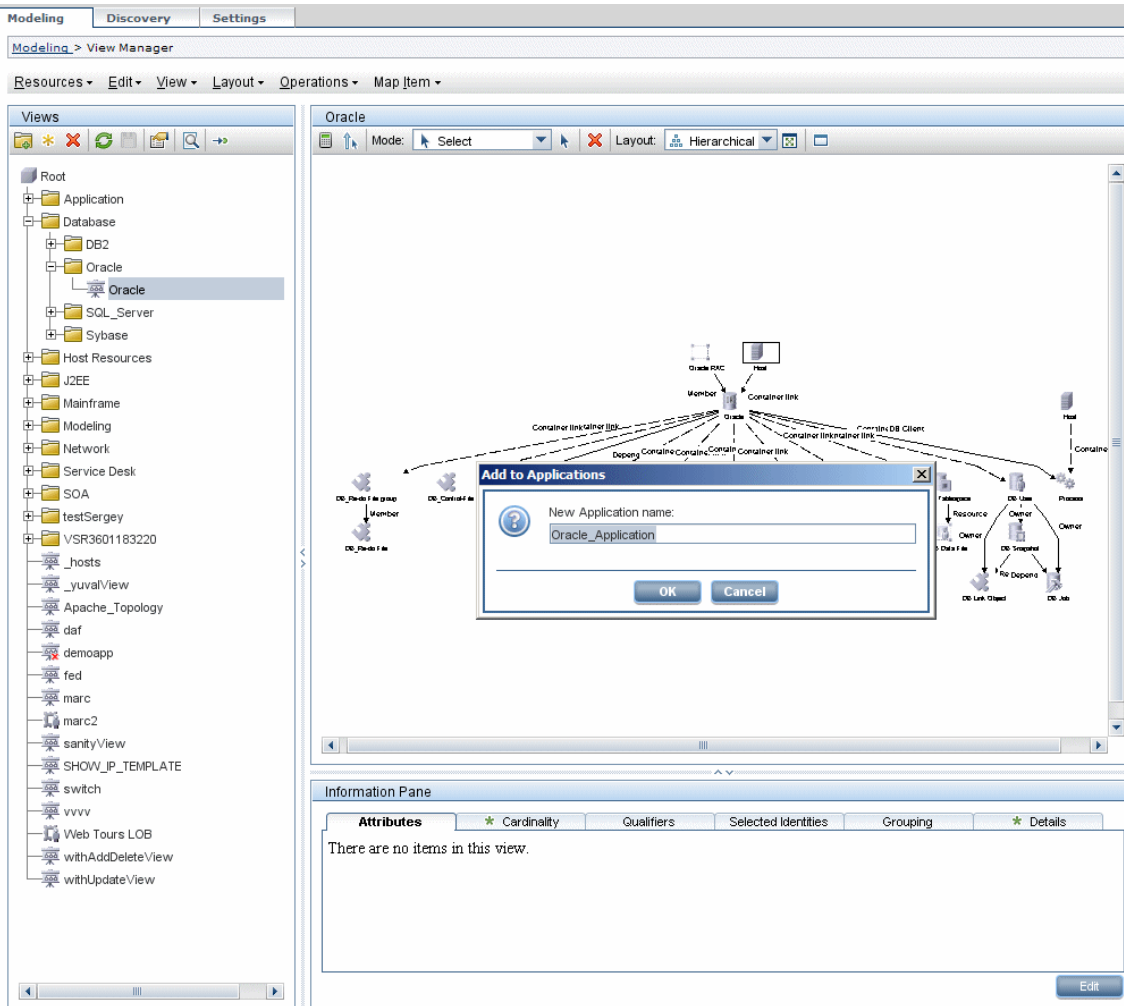


A small black briefcase icon appears to the right of the node. The creation of the application CI and the links occurs when you save the view.

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 **Depends On** 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 Depends On 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.

Grouping By Attribute Properties

When grouping CIs in View Manager by attribute using **Node Definition**, you can group CIs of different types in the Topology Map by using a regular expression as described in “Grouping Dialog Box” on page 119. You should enter the expression in the **Mask to group by** field. For details about regular expressions, see “Regular Expression Examples” in *Reference Information*.

Nested Groups

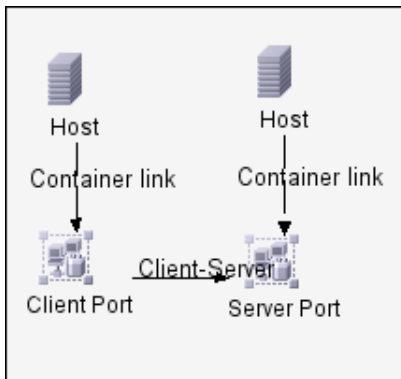
You can create nested groups (a node group inside another node group) to help fine-tune the TQL results that are displayed in the Topology Map.

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

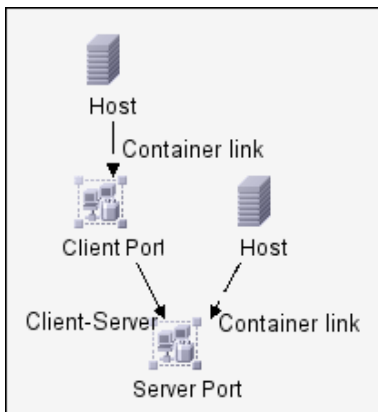
Merge Identical Instances

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.

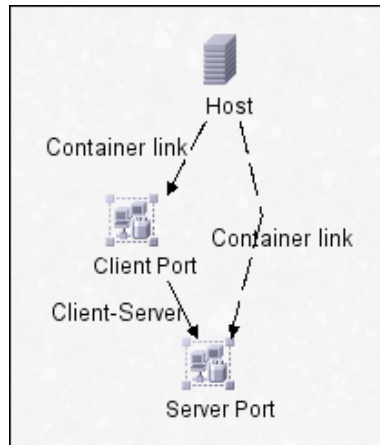
For example, if you want to discover and display hosts that are connected to other hosts in a server-client relationship, you can create the following TQL:



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** in the **Advanced** area of the **Create New View** dialog box:



Create and Populate an Instance View

This task describes how to define a new instance view and populate it with CIs.

This task includes the following steps:

- “Create a New Instance View” on page 111
- “Add CIs to the View” on page 112
- “Set Permissions” on page 112

1 Create a New Instance View

You can define a new instance view from the Create View – View Properties dialog box. Select **Instance View** and enter a name for the view. For details, see “Create New View/View Properties Dialog Box” on page 115.

Note: The view is created in the same folder as the view currently displayed in View Explorer.

2 Add CIs to the View

You can add existing CIs from the CMDB to your view or you can define new CIs to appear in your view.

Using the Instance View Editor

The Instance View Editor enables you to add any CIs in the CMDB to your view, by adding them from other views in the system. When a CI is added to your view under another CI, a relationship is automatically created between the two CIs, using the default relationship for the two CI types. For details, see “Using the Instance View Editor” on page 103.

You can also define a new CI from within the Instance View Editor using the New CI Wizard. The new CI and relationship are created in the CMDB and the created CI is added at the specified point in the view tree, if the created CI is appropriate for the current view. For details, see “Instance View Editor” on page 121.



Tip: If the CI does not appear in the view, try refreshing the view using the **Refresh** button in View Explorer.

3 Set Permissions

You should apply viewing and editing permissions to users and user groups for that view. You set permissions in **Admin > Settings > User Manager**. For details, see “User Manager User Interface” on page 641.

Pattern View Workflow

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

This task includes the following steps:

- “Prerequisites” on page 113
- “Create a Pattern View” on page 113
- “Add Nodes and Relationships to a TQL Query” on page 113
- “Add Folding Rules to Relationships” on page 113
- “Define Multiple Relationship Rules” on page 113

1 Prerequisites

In View Manager, select **New** from the context menu to open the Create New View dialog box.

2 Create a Pattern View

Set the name and properties of the managed view in which you want to define the TQL query. For details on defining the properties to create the view, see “Create New View/View Properties Dialog Box” on page 115.

3 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 240.

4 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 243.

5 Define Multiple Relationship Rules

You can define multiple relationship rules to define the structure between CITs in a view using the Relationship Rules dialog box. For details, see “Relationship Folding Rules Dialog Box” on page 126.

View Manager User Interface

This section describes:

- ▶ Add Rule/Edit Rule Dialog Box on page 114
- ▶ Create New View/View Properties Dialog Box on page 115
- ▶ Group By Dialog Box on page 118
- ▶ Grouping Dialog Box on page 119
- ▶ Instance View Editor on page 121
- ▶ Relationship Folding Rules Dialog Box on page 126
- ▶ Set View Parameters/Set View Element Parameters Dialog Box on page 127
- ▶ View Manager Window on page 128

Add Rule/Edit Rule Dialog Box

Description	Enables you to add a new folding rule or edit an existing folding rule. To access: In View Manager, click Add or Edit from the Relationship 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	“Pattern View Workflow” on page 113
Useful Links	“Relationship Folding Rules Dialog Box” on page 126

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 66.



Create New View/View Properties Dialog Box

Description	Enables you to define a new view or edit the properties of an existing view. To access: In View Manager, click the New or Properties icon from the toolbar or select New or Properties from the context menu available in the Views pane.
Important Information	TQL queries should only be created by administrators with an advanced knowledge of the TQL system.
Included in Tasks	“Create and Populate an Instance View” on page 111

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

GUI Element (A-Z)	Description
Advanced	Click to open the Advanced area of the dialog box.
Based on TQL	<p>Select the check box to base the 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 200.</p> <p>Clear the check box to define a new TQL with the same name as the view. The TQL name appears in the Based on TQL window when you enter it in the View Name window.</p> <p>Note: This field is only relevant for pattern views.</p>
Description	<p>Enter a description of the view.</p> <p>Note: This field is optional.</p>
Instance View	Select to create an instance view. (Not relevant in edit mode.)
Pattern View	Select to create a pattern view. (Not relevant in edit mode.)
View Name	Enter a unique name for the view. The name can contain all characters except the following: " \ / : < > %.

Advanced Area

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

GUI Element (A-Z)	Description
Ad Hoc View	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. For details, see “Scheduler User Interface” on page 354
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 110.
Organization Name	The name of the organization related to the query.
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.
Service Name	The name of the service related to the query.
Simple	Click to collapse the Advanced area of the dialog box.
Track Changes	Select to be notified when CIs are added or removed. The changes are tracked in the system by creating daily snapshots of the view.
TQL Description	A description of the query. Note: This field is only relevant for pattern views.
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. Note: This field is only relevant for pattern views.

Group By Dialog Box

Description	Enables you to define a new grouping of CIs or to edit an existing one. To access: In View Manager, click Add or Edit from the Grouping dialog box.
Important Information	Grouped CIs appear in the View Explorer pane in IT Universe Manager in parentheses.

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







GUI Element (A-Z)	Description
Attribute	Select to group 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.
Attribute Name	If you are grouping by attribute, select the appropriate Attribute Name.
Configuration Item Type	Select to group CIs in the Topology Map by their CI type.
Group Label	Enter the label of the group. Note: This field is optional.
Group List	If you are grouping by attribute, 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.

GUI Element (A-Z)	Description
Mask to group by	<p>If you are grouping by attribute, enter a regular expression, as follows:</p> <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 to focus on when creating the group. <p>For details, see “Grouping By Attribute Properties” on page 109.</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>
TQL Node	<p>Select to group all CIs of the same CI type that fulfill the node definition 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.</p>

Grouping Dialog Box

Description	<p>Displays the different CI groupings you have defined for the Topology Map.</p> <p>To access: In View Manager, select Node Definition or Relationship Definition from the context menu in the Editing pane.</p>
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The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
	Opens the Group By dialog box which enables you to define a new CI group. For details, see “Group By Dialog Box” on page 118.
	Opens the Group By dialog box which enables you to edit the selected CI group. For details, see “Group By Dialog Box” on page 118.
	Deletes the selected CI group.
	Moves selected row up.
	Moves selected row down.
	Click to open the online Help for this dialog box.
Data	Displays the attribute used to define the group, for a group defined by attribute.
Group By	The criteria by which the CI group is defined.
Label	The label of the CI group.
Minimum	The minimum number of matching CIs required to create the group.

Instance View Editor

Description	<p>Enables you to add or remove existing CIs from instance views and to define new CIs to be added to the view.</p> <p>To access: In the Views pane of View Manager, select the instance view you want to edit. The Instance View Editor opens in the Editing pane. You can also select Go To View Definition from within the view in IT Universe Manager.</p>
Important Information	<p>In the editing pane, a context menu is available for views and CIs. The menu for views includes the Create New CI option only. The context menu for CIs includes the following options:</p> <ul style="list-style-type: none"> ▶ Create New CI ▶ Edit CI ▶ Display All CMDB Children ▶ Hide All CMDB Children ▶ Delete Relationship to Parent CI <p>When you make a change in the Instance View Editor, it affects the entire CMDB. For example, if you create a relationship between two CIs, they are now related and this is reflected in other views that match the new pattern. All changes made in the Instance View Editor only take effect when the view is saved.</p>
Included in Tasks	“Create and Populate an Instance View” on page 111






Left Pane



Description	<p>The left pane of the Instance View Editor provides the list of CIs that can be selected to add to your view using the buttons described below. You can select multiple CIs using the CTRL key. The left pane functionality follows the standard View Explorer functionality. For details, see “View Explorer User Interface” on page 587.</p>
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Right Pane

<p>Description</p>	<p>In the edit pane (the right pane of the Instance View Editor), select the CI to which you want to add the selected CIs. You can select multiple CIs using the CTRL key – the added CIs are repeated under each selected CI.</p>
<p>Important Information</p>	<p>The Instance View Editor enables you to add the selected CIs to the view being edited:</p> <ul style="list-style-type: none"> ▶ Add the CIs with Display all CMDB children status, so that the CIs are added to the edited view together with all recursive child CIs from the CMDB. ▶ Add the CIs to the edited view together with all recursive child CIs from the selected view only. ▶ Add the CIs with Display only manually added children status, so that the CIs are added to the edited view without any child CIs.

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

GUI Element (A-Z)	Description
	<p>Click to add the selected CIs in the left pane to the CIs in the edit pane along with all the children of the selected CIs in the current view. In this case, CIs added to the view later do not appear in the Instance View Editor. However, if a child CI is deleted from the view, it is deleted from the entire universe and no longer appears in the Instance View Editor. Similarly, if the relationship between a parent and child CI is deleted, it is also updated in the Instance View Editor (the child CI appears on the same level as the parent CI).</p> <p>Note: This option is only active when the View Explorer pane of the Instance View Editor is in Browse mode. In Search mode, the option is disabled.</p>
	<p>Click to add the selected CIs in the left pane to the CIs in the edit pane along with all the children of the selected CIs in the CMDB. In this case, the view is dynamically updated whenever any change is made in the CMDB (addition of CIs, deletion of CIs or deletion of relationships).</p>
	<p>Click to add the selected CIs in the left pane to the CIs in the edit pane without adding the children of the CI.</p>
	<p>The View name is the root of the CI tree in the right pane. You can expand the tree to see all the CIs in the view.</p>
	<p>Hold the pointer over the Tip button to display a tooltip with useful information about the Instance View Editor.</p>





GUI Element (A-Z)	Description
<CIs>	<p>The CIs listed under the view name represent the CIs appearing in that view. Select the relevant CI in order to perform the selected action for that CI by clicking the buttons or selecting from the context menu.</p> <p>Each CI in the edit pane has a tooltip showing:</p> <ul style="list-style-type: none"> ▶ the CI type, for example, Application. ▶ the child CI rule in effect for the CI. This states Display all CMDB children if the CI is set to include all its child CIs, or Display only manually added children if the CI is set to exclude all child CIs apart from those added to it within the current view. For more information, see “Child CI Rule Functionality” on page 104. ▶ the total number of CIs in the subtree under the CI, within the current view (the total is recalculated when the view is saved).
<p>Add All CMDB Children</p> 	<p>Select Add all CMDB children from the CI context menu or click the Add all CMDB children button to display all the child CIs of the selected CI. All child CIs that exist in the CMDB under the parent CI are added to the view. (If the parent CI is then deleted from the view, all the child CIs are deleted as well.)</p> <p>All the child CIs are shown with faded icons and in italicized text, including any that were manually added to the parent before its status changed.</p>
<p>Create New CI</p> 	<p>Select the Create New CI option from the CI context menu or click the Create New CI button to create a new CI. The Define General Properties dialog box opens.</p>


GUI Element (A-Z)	Description
<p data-bbox="349 225 521 312">Delete Relationship to Parent CI</p> 	<p data-bbox="589 225 1256 503">Select the Delete Relationship to Parent CI option from the CI context menu or click the Delete Relationship to Parent CI button to delete the relationship to the parent CI. Using this option disconnects the child CI from the parent and removes the CI from the view (unless it appears elsewhere in the view). When you save your changes in the Instance View Editor, the relationship is deleted from the CMDB, so the CI no longer appears as a child of the parent CI in any view.</p> <p data-bbox="589 529 1256 711">Any child CIs in the subtree under the disconnected CI are also removed from the view, (without affecting their relationship with the disconnected CI). If there are other instances of the disconnected CI (or any of its children) anywhere else in the view, these other instances are not affected, they remain in the view.</p> <p data-bbox="589 737 1256 850">If you create a CI during the current Instance View Editor session, but then use the Delete Relationship to Parent CI option to remove it before saving it to the CMDB, the new CI is never created in the CMDB.</p>
<p data-bbox="349 876 428 902">Edit CI</p> 	<p data-bbox="589 876 1256 963">Select the Edit CI option from the CI context menu or click the Edit CI button to edit the selected CI. The Edit CI Properties dialog box opens.</p>
<p data-bbox="349 992 549 1050">Remove Manually Added Children</p> 	<p data-bbox="589 992 1256 1241">Select Remove manually added children from the CI context menu or click the Remove manually added children button to hide all child CIs of the selected CI. All child CIs in the subtree under the parent CI are hidden, whether they were added manually or recursively. If the subtree includes a CI created during the current Instance View Editor session and not yet saved, that CI is removed completely and is never created in the CMDB.</p>

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	"Pattern View Workflow" on page 113
Useful Links	"Add Rule/Edit Rule Dialog Box" on page 114

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 Rule/Edit Rule Dialog Box" on page 114.
	Opens the Edit Rule dialog box where you can edit the selected rule. "Add Rule/Edit Rule Dialog Box" on page 114.
	Deletes the selected rule.
	Moves selected row up.

GUI Element (A-Z)	Description
	Moves selected row down.
Node 1	The node at one end of the relationship.
Node 2	The node at the other end of the relationship.
Relationship	The type of relationship.
Rule	The relevant folding rule.

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>
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>

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

GUI Element (A-Z)	Description
<Element name>	For each element, every condition appears on a separate line. You can edit the parameter by clicking on it to open the editing window.




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 > Modeling > View Manager.</p>
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Views Pane

Description	Enables you to select a view to edit.
Important Information	<p>The Views Pane contains a hierarchical file folder system to help you organize your views, displayed in the Folders 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
	Create a new folder.
	Define a new view. For details, see “Create New View/View Properties Dialog Box” on page 115.
	Delete the selected folder or view.

GUI Element (A-Z)	Description
	Refresh the data content of the hierarchical tree structure that may have been modified by other users.
	Save the view to the CMDB.
	Open the View Properties dialog box. For details, see “Create New View/View Properties Dialog Box” on page 115.
	Generate a preview of the existing views in the CMDB that match the pattern of the current view.
	Go directly to IT Universe Manager for the current view.
	Denotes a view folder. Double-click the icon to expand the folder.
	Denotes a pattern view. When you select a pattern view, the Editing pane displays a Topology Map of the selected view.
	Denotes an instance view. When you select an instance view, the Editing pane displays the Instance View Editor.
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.
Delete	Deletes a selected folder or view.

Menu Item	Description
Export	Displays a standard Save As dialog box, enabling you to save the view as an XML script.
Go to IT Universe	Takes you to IT Universe Manager and opens the selected view.
Import	Opens the Import dialog box which enables you to import XML files containing views.
New	Displays the Create New View dialog box which enables you to define a new view. For details, see “Create New View/View Properties Dialog Box” on page 115.
New Folder	Creates a new view folder.
Preview	Generates a preview of the existing views in the CMDB that match the pattern of the current view.
Properties	Displays the View Properties dialog box which enables you to change the description of the view, the TQL priority, the TQL description and other details. For details, see “Create New View/View Properties Dialog Box” on page 115.
Relationship Folding Rules	Displays the Relationship Rules dialog box which enables you to define multiple relationship rules. For details, see “Relationship Folding Rules Dialog Box” on page 126.
Rename Folder	Enables you to rename the view folder.
Save/Save As	Saves the view to the CMDB after you have modified it. Note: If you exit View Manager without saving, a confirmation dialog box is displayed, requesting that you save your view.
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 127.

Editing Pane

Description	<p>Displays the selected view, which consists of nodes and the relationships between them.</p> <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	<p>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.</p>
Useful Links	<p>For information on defining a TQL query, see “Add Nodes and Relationships to a TQL Query” on page 240.</p>

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 243.
<Main menu>	For details, see “Main Menu” on page 620.
<Node>	A component from which TQL queries are built.
<Relationship>	The entity that defines the relationship between two nodes.




GUI Element (A-Z)	Description
<Toolbar>	For details, see “Toolbar Options” on page 625
<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” in <i>CI Attribute Customization</i>. ▶ 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” in <i>CI Attribute Customization</i>.</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>
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Important Information	The CI Type Selector is part of the following managers: View Manager, Enrichment Manager, Query Manager, Correlation Manager, Report Manager, and Trigger TQL Editor.
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 239 ➤ “Pattern View Workflow” on page 113 ➤ “Define a Report Rule - Scenario” on page 164

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.
<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, 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 - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 239 ➤ “Pattern View Workflow” on page 113 ➤ “Define a Report Rule - Scenario” on page 164

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

GUI Element (A-Z)	Description
	Click the Show List button 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 148. 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 289.
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 291.
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 229.</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 66.</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 192.</p> <p>Note: This tab appears only in Report Manager.</p>
Qualifiers	<p>Displays the qualifier conditions defined for the node or the relationship. For details, see “Qualifier Tab” on page 295.</p>
Rule	<p>Displays the report folding rule defined for the selected relationship. For details about folding rules, see “Editing Pane” on page 185.</p> <p>Note: This tab appears only when a relationship is selected in 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 297.</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()
```


4

Correlation Manager

This chapter provides information on Correlation Manager.

This chapter includes:

Concepts

- ▶ Correlation Manager Overview on page 139

Tasks

- ▶ Define a Correlation Rule - Scenario on page 141

Reference

- ▶ Correlation Manager User Interface on page 147

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 235.

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, the 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 > 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 498). 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 497.

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 106.

Define a Correlation Rule - Scenario

This task describes how to define a Correlation rule.

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 142
- “Define a State” on page 144
- “Create a Correlation TQL Query” on page 145
- “Create a Correlation Rule” on page 145

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 479.

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” in *CI Attribute Customization*.

Note: Alternatively, you can create an Enumeration definition in the System Type Manager. For details, see “System Type Manager” in *CI Attribute Customization*. The Enumeration definition you create appears in the State Manager.

Example

Select **Admin > 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

<input type="checkbox"/>	10% load
<input type="checkbox"/>	20% load
<input checked="" type="checkbox"/>	50% load

Value:

Key:

Color

- Green
- Light Olive
- Yellow
- Orange
- Red
- Gray

2 Define a State

Note: This step is optional. You can use the default States that appear in the State Manager.

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 > Settings > State Manager** to open the State Manager. For details on defining a new state, see “State Manager Dialog Box” on page 481.

Example

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	cpu_usage
		Change States
		Operation States
		Test States
		Status Accounting
		concrete_synch_config_status
		synch_config_unit_status
		synch_unit_state
		cpu_usage

3 Create a Correlation TQL Query

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

Select **Admin > Modeling > Correlation Manager** to open the Correlation Manager. For details about how to create a Correlation TQL query, see “Create New Correlation Rule/Properties Dialog Box” on page 160. For details about how to add nodes and relationships to a query, see “Add Nodes and Relationships to a TQL Query” on page 240.

Example

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 311.

4 Create a Correlation Rule

When you create 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 149.

Example

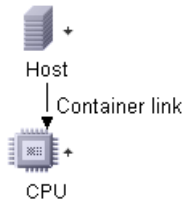
The Conditions area in the Correlation Definition dialog box defines the conditions under which the simulated change in the system is triggered. The Affected Severity area defines the severity of the Correlation impact on the affected node.

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 486.

Correlation Manager User Interface

This section describes:

- ▶ Affected Nodes Dialog Box on page 148
- ▶ Correlation Definition Dialog Box on page 149
- ▶ Correlation Manager Window on page 152
- ▶ Create New Correlation Rule/Properties Dialog Box on page 160
- ▶ Details Dialog Box on page 162

Affected Nodes Dialog Box

Description	<p>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.</p> <p>Note: This information should be known beforehand, when first creating the TQL query, but the definition is performed here.</p> <p>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.</p>
Included in Tasks	“Define a Correlation Rule - Scenario” on page 141.

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

Description	Set conditions for defining affected nodes. To access: Click Add in the Details dialog box.
Included in Tasks	“Define a Correlation Rule - Scenario” on page 141

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

GUI Element (A-Z)	Description
Description	A description of the Correlation rule you are defining.

The Correlation Definition dialog box also includes the following areas:

- “Conditions Area” on page 149
- “Scope Area” on page 150
- “Affected Severity Area” on page 151

Conditions Area

Description	Define a condition for the node’s attributes. 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. To access: Click Add in the Details dialog box.
--------------------	--

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

GUI Element (A-Z)	Description
State	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 479.
Operator	Select the required operator. For a list of the operators you can use for defining an attribute condition, see “Attribute Operator Definitions” on page 248.
Value Comparison	Select the required attribute.

Scope Area

Description	<p>Define how many instances of the trigger node should fulfill the conditions for triggering the changes in the system.</p> <p>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.</p> <p>For example, you can define that impact is calculated when at least 10% of the system’s hosts are down.</p> <p>To access: Click Add in the Details dialog box.</p>
--------------------	--

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

GUI Element (A-Z)	Description
All	All instances should fulfill the conditions.
Any	One instance or more should fulfill the conditions.
Range	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.

Affected Severity Area

Description	Define the severity of the Correlation impact. To access: Click Add in the Details dialog box.
--------------------	---

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

GUI Element (A-Z)	Description
Fixed severity	Define a fixed severity level for every system change generated. Then, select the required severity level from the list.
Function	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 . For example, if you select Average , the severity level of the system changes is the average severity of all the trigger instances.
Severity relative to trigger severity (%)	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. Enter the percentage in the box provided.

Correlation Manager Window

Description	Define Correlation rules. To access: Select Admin > 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 311.
Included in Tasks	“Define a Correlation Rule - Scenario” on page 141
Useful Links	“Correlation Manager Overview” on page 139










The Correlation Manager window includes the following panes:

- “Correlation Rules Pane” on page 152
- “Editing Pane” on page 154
- “CI Type Selector” on page 156
- “Information Pane” on page 157

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 Universal CMDB 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>
--------------------	---

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 Create New Correlation Rule/Properties dialog box.
	(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.
	Deletes the selected folder or Correlation rule.
	Refreshes the data content of the hierarchical tree structure that may have been modified by other users.
	Opens the Properties dialog box. 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.

GUI Element (A-Z)	Description
New	Creates a Correlation rule. Opens the Create New Correlation Rule/Properties dialog box.
New Folder	Creates a new folder.
Properties	Opens the Create New Correlation Rule/Properties dialog box. Enables you to change the description of the rule.
Rename Folder	Rename the folder.
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 dialog box, enabling you to define a new name and description for a query. This option can be used for creating new Correlation rules based on an existing one.

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 240
Important Information	When selecting nodes to function as Correlation triggers, they must comply with certain restrictions. For details, see “Troubleshooting and Limitations” on page 311.




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.
<Main Menu>	For details, see “Main Menu” on page 620.
<Node>	A component from which TQL queries are built.
<Relationship>	The entity that defines the relationship between two nodes.
<Context menu options>	For details, see “Context Menu Options” on page 243.
<Toolbar>	For details, see “Toolbar Options” on page 625.
<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 <i>CI Attribute Customization</i>. ▶ Definitions of the selected nodes and relationships. The attribute conditions, as described in “Node/Relationship Properties Dialog Box” on page 287. ▶ 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” in <i>CI Attribute Customization</i>.</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, Report Manager, and Trigger TQL Editor.</p>
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 239 ➤ “Pattern View Workflow” on page 113 ➤ “Define a Report Rule - Scenario” on page 164

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.
<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, 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 - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 239 ➤ “Pattern View Workflow” on page 113 ➤ “Define a Report Rule - Scenario” on page 164

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

GUI Element (A-Z)	Description
	Click the Show List button 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 148. 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 289.
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 291.
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 229.</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 66.</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 192.</p> <p>Note: This tab appears only in Report Manager.</p>
Qualifiers	<p>Displays the qualifier conditions defined for the node or the relationship. For details, see “Qualifier Tab” on page 295.</p>
Rule	<p>Displays the report folding rule defined for the selected relationship. For details about folding rules, see “Editing Pane” on page 185.</p> <p>Note: This tab appears only when a relationship is selected in 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 297.</p>

Create New Correlation Rule/Properties Dialog Box

<p>Description</p>	<p>Create or modify a Correlation rule.</p> <p>To access:</p> <ul style="list-style-type: none"> ▶ Right-click anywhere in the Correlation Rules pane and click New or click the New  button. or ▶ Right-click a Correlation rule and select Properties.
<p>Important Information</p>	<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 291). ▶ 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, must comply with the restrictions described in “Troubleshooting and Limitations” on page 311. If the TQL is not valid, it cannot be used for the creation of a Correlation rule.
<p>Included in Tasks</p>	<p>“Define a Correlation Rule - Scenario” on page 141</p>
<p>Useful Links</p>	<p>“Add Nodes and Relationships to a TQL Query” on page 240.</p>

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

GUI Element (A-Z)	Description
<input type="button" value="Advanced"/>	<p>Includes the following elements:</p> <ul style="list-style-type: none"> ▶ TQL Priority list. From the Priority list, 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. ▶ TQL Description. (Optional) Enter a description of the TQL query. ▶ UCMDB. Enables you to run a Correlation rule in the Topology View Application tab in Universal CMDB. For details, see “Topology View Overview” on page 486. ▶ Others. Currently not supported.
<input type="button" value="Simple"/>	<p>Hide the options that appear when you click the Advanced button.</p>
Based on TQL	<p>Select this check box if you want to link a Correlation rule to an existing TQL query. From the Attach TQL list, select the Correlation TQL to which you want to link the rule.</p>
Description	<p>(Optional) Enter a description of the rule.</p>
Rule Name	<p>Enter a unique name for the Correlation rule.</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 - Scenario” on page 141

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 Category list in the Correlation Definition dialog box.

5

Report Manager

This chapter provides information on Report Manager.

This chapter includes:

Concepts

- ▶ Report Manager Overview on page 164

Tasks

- ▶ Define a Report Rule - Scenario on page 164
- ▶ Compare a CI Configuration to a Gold Master Template on page 174

Reference

- ▶ Report Manager User Interface on page 174

Report Manager Overview

Report Manager enables you to define the following reports:

- ▶ **System 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 235. The 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 “Report Manager Window” on page 182.
- ▶ **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 180.

Define a Report Rule - Scenario

This task 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 parametrized 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 task.

This task includes the following steps:

- “Create a Report TQL Query” on page 165
- “Set TQL Node Definitions” on page 166
- “Define the Column Content of the Selected Node” on page 167
- “Sort the Column Information” on page 168
- “Set the Node Order” on page 169
- “Refine the Report Layout” on page 170
- “View a System Report Displaying Hosts that Run on a Windows Operating System” on page 172
- “View a System Report Displaying Hosts that Run on a Linux Operating System” on page 173

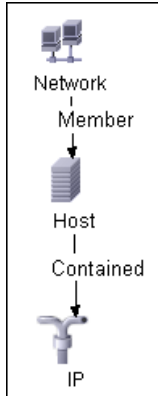
1 Create a Report TQL Query

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 > Modeling > Report Manager** to open the Report Manager. For details about how to create a Report TQL query, see “Create New Report Definition/Properties Dialog Box” on page 177. For details about how to add nodes and relationships to a query, see “Add Nodes and Relationships to a TQL Query”.

Example

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 311.

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 287.

Example

In the 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 192.

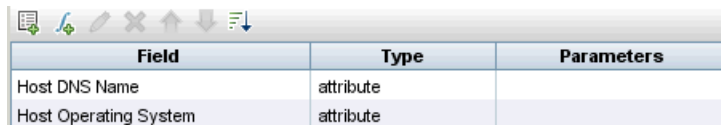
Example

- The attributes **Network Address** and **Network Class** are selected for the Network node.



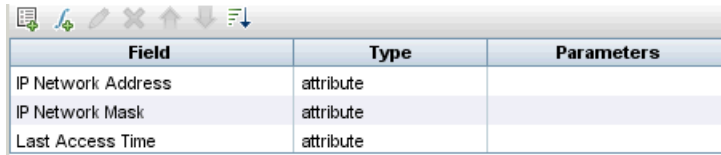
Field	Type	Parameters
Network Address	attribute	
Network Class	attribute	

- 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.



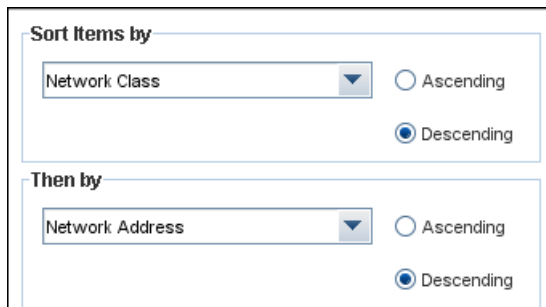
Field	Type	Parameters
IP Network Address	attribute	
IP Network Mask	attribute	
Last Access Time	attribute	

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 System report. For details, see "Attribute Columns Dialog Box" on page 177.

Example

In the Attribute Columns dialog box, the attributes for the Network node are defined to appear in the System 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 System report in the following order:

The screenshot shows a dialog box with two sections. The first section, titled "Sort Items by", contains a dropdown menu with "Host Operating System" selected and two radio buttons: "Ascending" (unselected) and "Descending" (selected). The second section, titled "Then by", contains a dropdown menu with "Host DNS Name" selected and two radio buttons: "Ascending" (unselected) and "Descending" (selected).

In the Attribute Columns dialog box, the attributes for the IP node are defined to appear in the System report in the following order:

The screenshot shows a dialog box with two sections. The first section, titled "Sort Items by", contains a dropdown menu with "IP Network Address" selected and two radio buttons: "Ascending" (unselected) and "Descending" (selected). The second section, titled "Then by", contains a dropdown menu with "IP Network Mask" selected and two radio buttons: "Ascending" (unselected) and "Descending" (selected).

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 194.

Example

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 “Report Manager Window” on page 182.

Example

- 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 **Network**, **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 System Report Displaying Hosts that Run on a Windows Operating System

In the Reports pane, right-click the **Hosts** report 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 System Report Displaying Hosts that Run on a Linux Operating System

In the Reports pane, right-click the Hosts report and select **Set Report Parameters** to open the **Set Report Parameters** dialog box. 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.

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 180.

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 180.


Report Manager User Interface

This section describes:

- ▶ Add Attributes Dialog Box on page 175
- ▶ Add/Edit Function Dialog Box on page 176
- ▶ Attribute Columns Dialog Box on page 177
- ▶ Create New Report Definition/Properties Dialog Box on page 177
- ▶ Edit Attribute Dialog Box on page 179
- ▶ Filter CIs Dialog Box on page 179
- ▶ Gold Master Report Pane on page 180
- ▶ Report Manager Window on page 182
- ▶ Report Node Definition Dialog Box on page 192
- ▶ Set Node Order Dialog Box on page 194
- ▶ Set Report Parameter Dialog Box on page 195

► Set View-specific Report Dialog Box on page 196


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 164
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 164

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 Sort in the Report Node Definition dialog box.
Included in Tasks	“Define a Report Rule - Scenario” on page 164

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

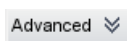
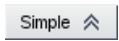
GUI Element (A-Z)	Description
Ascending	Sort the information in ascending order.
Descending	Sort the information in descending order.
Sort Items by	Select the primary sort column from the Sort Item by list.
Then by	Define up to three secondary sort columns from the Then by lists.

Create New Report Definition/Properties Dialog Box


Description	Create or modify a System or Gold Master report definition. To access: <ul style="list-style-type: none"> ▶ To create a System or Gold Master report definition, right-click anywhere in the Reports pane and click New or click the New  button. or ▶ To modify a System or Gold Master report definition, right-click a Report definition and select Properties.
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Included in Tasks	“Define a Report Rule - Scenario” on page 164
Important Information	For information on how to add nodes and relationships to a query, see “Add Nodes and Relationships to a TQL Query” on page 240.

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

GUI Element (A-Z)	Description
	TQL Description. (Optional) Enter a description of the Report TQL query.
	Hide the TQL Description box that appears when you click the Advanced button.
Based on TQL	Select this check box if you want to link a report to an existing TQL query. From the Attach TQL list, select the required TQL to which you want to link the report.
Description	(Optional) Enter a description of the report.
Gold Master	Create a Gold Master report. For details on how to define a Gold Master report, see “Gold Master Report Pane” on page 180.
Name	The name of the System report or the Gold Master report.
Sub Title	Enter the subtitle of the report. This title appears underneath the title at the head of the report.
Title	Enter the title of the report. This title appears at the head of the report.
Topology	Create a System report.


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 164

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 CIs 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.
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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 > Modeling > Report Manager. 2 Right-click anywhere in the Reports pane and click New or click the New  button to open the Create New Report Definition dialog box. 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 351. ▶ 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” in <i>CI Attribute Customization</i>.</p>

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

GUI Element (A-Z)	Description
	<p>Determines which CI types are not included in the Gold Master report. Opens the Filter CIs dialog box.</p>
	<p>Generates a Gold Master report. For details, see “Gold Master Report” on page 563.</p>

GUI Element (A-Z)	Description
	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 559. ▶ Search. Search for a specific CI in existing views or in the entire CMDB. For details, see “Search Tab” on page 560.
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Report Manager Window

Description	<p>The Report Manager enables you to:</p> <ul style="list-style-type: none"> ▶ Define System 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 180. <p>To access: Select Admin > Modeling > Report Manager.</p>
Important Information	<p>You can also define a schedule that creates system reports based on a specific Report query, on a periodic basis. For details, see “Scheduler” on page 351.</p>
Included in Tasks	<ul style="list-style-type: none"> ▶ “Define a Report Rule - Scenario” on page 164 ▶ “Compare a CI Configuration to a Gold Master Template” on page 174









The Report Manager window includes the following panes:



- ▶ “Reports Pane” on page 183
- ▶ “Editing Pane” on page 185
- ▶ “CI Type Selector” on page 187
- ▶ “Information Pane” on page 189

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 Universal CMDB 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 Create New Report Definition/Properties dialog box.
	(Enabled only when a report is created or when changes are made to an existing one.) Save the Gold Master or System report to the CMDB.
	Delete the selected folder or report.
	Refresh the data content of the hierarchical tree structure that may have been modified by other users.
	Open the Create New Report Definition/Properties dialog box. 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.

GUI Element (A-Z)	Description
	Represents a Gold Master report definition.
	Represents a System 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 System reports and not Gold Master reports.
Generate	Generate the selected report.
Import	Import XML files that contain saved Report queries to the Report Manager.
New	Create a TQL Report or Gold Master report definition. Opens the Create New Report Definition/Properties dialog box.
New Folder	Create a new folder.
Properties	Open the Create New Report Definition/Properties dialog box. Enables you to change the description and activation state of the report.
Rename Folder	Rename the folder.
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.

GUI Element (A-Z)	Description
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.
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 dialog box. Note: This option only appears if you defined a parameterized value in the Attribute tab in the Node/Relationship 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 240

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

GUI Element (A-Z)	Description
<Main Menu>	For details, see “Main Menu” on page 620.
<Node>	A component from which TQL queries are built.
<Relationship>	The entity that defines the relationship between two nodes.
<Right click> options	For details, see “Context Menu Options” on page 243.
<Toolbar>	For details, see “Toolbar Options” on page 625.
<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 system 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” in <i>CI Attribute Customization</i>.</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, Report Manager, and Trigger TQL Editor.</p>

Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 239 ➤ “Pattern View Workflow” on page 113 ➤ “Define a Report Rule - Scenario” on page 164
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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.
<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, 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 - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 239 ➤ “Pattern View Workflow” on page 113 ➤ “Define a Report Rule - Scenario” on page 164

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



GUI Element (A-Z)	Description
	Click the Show List button 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 148. 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 289.
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 291.
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 229.</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 66.</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 192.</p> <p>Note: This tab appears only in Report Manager.</p>
Qualifiers	<p>Displays the qualifier conditions defined for the node or the relationship. For details, see “Qualifier Tab” on page 295.</p>
Rule	<p>Displays the report folding rule defined for the selected relationship. For details about folding rules, see “Editing Pane” on page 185.</p> <p>Note: This tab appears only when a relationship is selected in 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 297.</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	"Define a Report Rule - Scenario" on page 164
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.


GUI Element (A-Z)	Description
	<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 Edit Attribute dialog box. For more details, see the Add Attributes 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.
	<p>Delete the selected report node definition. A column for the node definition you deleted does not appear in the report.</p>
	<p>Use the up and down arrows to determine the order of each node included in the report.</p>
	<p>Define the sort order of the information reported for each Report node. Opens the Attribute Columns dialog box.</p>
<p><click a column header></p>	<p>For details, see “Customizing Columns” in <i>Reference Information</i>.</p>
<p><right-click a column header></p>	<p>For details, see “Customizing Columns” in <i>Reference Information</i>.</p>
<p>Field</p>	<p>Displays the nodes that are included in the report, that is, the report’s columns.</p> <p>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.</p>
<p>Parameters</p>	<p>Displays the parameters you defined for the Report node. For details, see the Add/Edit Function dialog box.</p>

GUI Element (A-Z)	Description
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	<p>Determine the order in which the Report nodes appear in the report.</p> <p>To access: Right-click any node displayed in the Editing pane and select Node Order to open the Set Node Order dialog box.</p> <p>The Set Node Order dialog box displays a row for each node that is included in the report.</p>
Included in Tasks	“Define a Report Rule - Scenario” on page 164

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 Parameter Dialog Box

Description	<p>Displays a list of all the parameterized values defined for the nodes in the TQL 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 Parameter dialog box 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 164
Useful Links	“System Report” on page 573


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 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.
Included in Tasks	“Define a Report Rule - Scenario” on page 164
Useful Links	“System Report” on page 573

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.

6

Query Manager

This chapter provides information on Query Manager.

This chapter includes:

Concepts

- ▶ Query Manager Overview on page 197

Tasks

- ▶ Define a TQL Query on page 199

Reference

- ▶ Query Manager User Interface on page 200

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, Report Manager, Trigger TQL Editor) to create your TQL queries, rather than the Query Manager. All TQL queries that are created in the other managers automatically appear in the Query Manager.

You can use the Save As option in the Query Manager to change the type of a TQL, so you do not have to recreate it. For details, see “TQLs Pane” on page 203. 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 the Query Manager. Then you can edit the TQL query which was created in the Query Manager, in the View Manager. Any changes you make to the query in the View Manager appear in the TQL query in the Query Manager. You can only edit queries of the types Integration or Discovery in the 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 485. 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 235.

Define a TQL Query

This task describes how to define a TQL query and add the required nodes and relationships.

1 Create a TQL Query

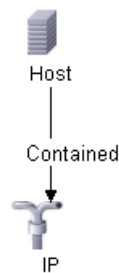
Create a TQL rule. Select **Admin > Modeling > Query Manager** to open the Query Manager. For details about how to create a TQL query, see “Create New TQL/TQL Properties Dialog Box” on page 200.

2 Add Nodes and Relationships to the Query

After you have created the TQL query, add the TQL nodes and relationships that define the query. The TQL nodes represent the CITs, as defined in the CI Type Manager (for details, see *CI Attribute Customization*), 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 about how to add nodes and relationships to a query, see “Add Nodes and Relationships to a TQL Query” on page 240.

Example

In this TQL query, a Host and an IP node are linked 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 311.

Query Manager User Interface

This section describes:

- ▶ Create New TQL/TQL Properties Dialog Box on page 200
- ▶ Query Manager Window on page 202

Create New TQL/TQL Properties Dialog Box

Description	Create or modify a TQL query. To access: <ul style="list-style-type: none"> ▶ Right-click anywhere in the TQLs pane and click New or click the New  button. or ▶ Right-click a TQL query and select Properties.
Important Information	TQL queries are subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 311. If the TQL is not valid, you cannot save it.
Included in Tasks	“Define a TQL Query” on page 199

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 TQL query.
Persistent	(Optional) Define whether the selected TQL should always remain in the system memory. Use this option only for frequently used TQLs.

GUI Element (A-Z)	Description
Priority	<p>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.</p> <p>Note: If you are creating a TQL of the type Enrichment, you can choose a priority of either Low or Medium only.</p>
TQL Name	Enter a unique name for the TQL query.
Type	<p>You can create a TQL query of the following types:</p> <ul style="list-style-type: none"> ▶ View. Creates pattern and instance views whose results are displayed in IT Universe. For details, see “View Manager” on page 99. ▶ Correlation. Creates queries containing Correlation nodes that influence other Correlation nodes in the system, as defined using the Correlation Manager. For details, see “Correlation Manager” on page 139. ▶ Enrichment. Creates queries containing Enrichment nodes and relationships. For details, see “Enrichment Manager” on page 211. ▶ Report. Creates queries whose results are compiled into reports using the Report Manager. For details, see “Report Manager” on page 163. ▶ Discovery. Creates queries for use by the Discovery and Dependency Mapping (DDM) system. For details, see, “Trigger TQL Editor” in <i>Discovery and Dependency Mapping Guide</i>. ▶ Integration. Creates queries for use with the CMDB API. For details, see “Working with the HP Universal CMDB API” on page 101 in <i>Reference Information</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 > 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, Report Manager, Trigger TQL Editor) to create your TQL queries, rather than the Query Manager. All TQLs that are created in the other managers automatically appear in the Query Manager. You can use the Save As option in the Query Manager to change the type of TQL, so you do not have to recreate it. For details, see “TQLs Pane” on page 203. ▶ 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 the Query Manager. You can then edit the TQL query (which was created in the Query Manager) in the View Manager. Any changes you make to the query in the View Manager appear in the TQL query in the Query Manager. You can only edit queries of the Integration or Discovery types in the Query Manager. ▶ For TQL queries to be valid, they must comply with the restrictions described in “Troubleshooting and Limitations” on page 311.
Useful Links	<p>“Topology Query Language (TQL) Overview” on page 236</p>








The Query Manager window includes the following panes:



- ▶ “TQLs Pane” on page 203
- ▶ “Editing Pane” on page 205
- ▶ “CI Type Selector” on page 206
- ▶ “Information Pane” on page 208

TQLs 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 Universal CMDB 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: <ul style="list-style-type: none"> ▶ 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 the Query Manager. ▶ Open the Create New TQL/TQL Properties dialog box.
	(Enabled only when a TQL query is created or when changes are made to an existing one.) Save the TQL query to the CMDB.
	Deletes the selected folder or TQL query.
	Refreshes the data content of the hierarchical tree structure that may have been modified by other users.
	Opens the TQL Properties dialog box. For a description, see "Properties" below.
	Generates a preview of the results of the selected TQL query.

GUI Element (A-Z)	Description
	Represents a folder.
	Represents a TQL query.

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 the Query Manager.
New	Create a TQL query. For details, see “Create New TQL/TQL Properties Dialog Box” on page 200.
New Folder	Create a new folder.
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).
Rename Folder	Rename the folder.

GUI Element (A-Z)	Description
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 TQL Builder without saving, a confirmation dialog box is displayed, requesting that you save your query.
Save As	Displays the Save TQL 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 “Type” on page 201.

Editing Pane

Description	Displays the currently selected TQL. <ul style="list-style-type: none"> ▶ When you select a folder in the TQLs pane, the Editing pane is empty. ▶ When you select a TQL query in the TQLs 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 240.

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

GUI Element (A-Z)	Description
<Main Menu>	For details, see “Main Menu” on page 620.
<Node>	A component from which TQL queries are built.
<Relationship>	The entity that defines the relationship between two nodes.




GUI Element (A-Z)	Description
<Right click> options	For details, see “Context Menu Options” on page 243.
<toolbar>	For details, see “Toolbar Options” on page 625.
<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 <i>CI Attribute Customization</i>. ▶ Definitions of the selected nodes and relationships. The attribute conditions, as described in “Node/Relationship Properties Dialog Box” on page 287.

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” in <i>CI Attribute Customization</i>.</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, Report Manager, and Trigger TQL Editor.</p>

Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 239 ➤ “Pattern View Workflow” on page 113 ➤ “Define a Report Rule - Scenario” on page 164
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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.
<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, 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 - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 239 ➤ “Pattern View Workflow” on page 113 ➤ “Define a Report Rule - Scenario” on page 164

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

GUI Element (A-Z)	Description
	Click the Show List button 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 148. 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 289.
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 291.
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 229.</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 66.</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 192.</p> <p>Note: This tab appears only in Report Manager.</p>
Qualifiers	<p>Displays the qualifier conditions defined for the node or the relationship. For details, see “Qualifier Tab” on page 295.</p>
Rule	<p>Displays the report folding rule defined for the selected relationship. For details about folding rules, see “Editing Pane” on page 185.</p> <p>Note: This tab appears only when a relationship is selected in 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 297.</p>

7

Enrichment Manager

This chapter provides information on Enrichment Manager.

This chapter includes:

Concepts

- ▶ Enrichment Manager Overview on page 211

Tasks

- ▶ Define an Enrichment Rule - Scenario on page 214

Reference

- ▶ Enrichment Manager User Interface on page 217

Enrichment Manager Overview

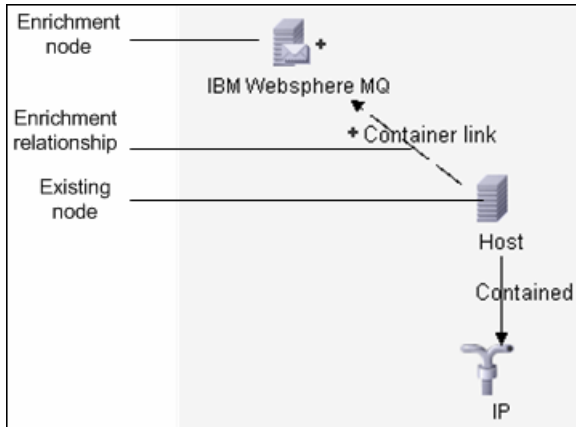
Enrichment rules can be used for several purposes:

- ▶ 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 and Dependency Mapping (DDM) 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 235 in *Model Management*.

The following example displays a regular **Host** node linked to an **IBM Websphere MQ Enrichment** node by an Enrichment **Container link** relationship.

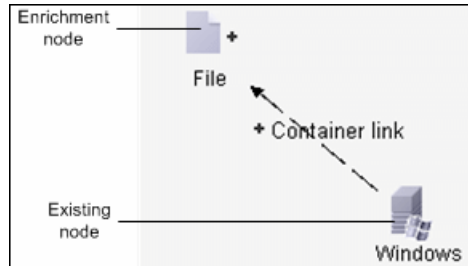


By placing an Enrichment node within a TQL query context, the query receives data from its attributes, and uses it to insert new information into the CMDB.

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 214.
- **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 **Disk** node (that already exists in the CMDB) has been updated with an Enrichment rule.



This Enrichment rule states that every **Disk** 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 214
- ▶ “Define the Host Node that Is Identified by its Lowest MAC Address” on page 216
- ▶ “Define the Host Node that is Identified by its IP Address” on page 216
- ▶ “Define the Enrichment Rule” on page 217

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 > Modeling > Enrichment Manager**. For details about how to create an Enrichment TQL query, see “Create New Enrichment Rule/Properties Dialog Box” on page 218. For details about how to add nodes and relationships to a query, see “Add Nodes and Relationships to a TQL Query” on page 240.

Example

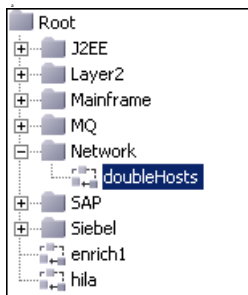
A new Enrichment TQL query called `doubleHosts` is created in the Enrichment Manager.

The screenshot shows a configuration dialog for an enrichment rule. The fields are as follows:

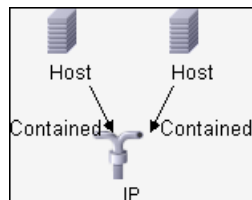
- Name:** `doubleHosts`
- Description:** Delete incomplete host
- Based on TQL:** `doubleHosts` (checkbox is unchecked)
- Active:** (checkbox is checked)

At the bottom, there is an "Advanced" dropdown menu, and "OK" and "Cancel" buttons.

The **doubleHosts** 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 311.

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 289.

Example

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** — Fixed 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 289.

Example

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** — Fixed 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.

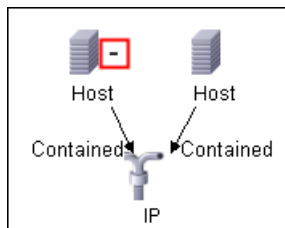
- **Attribute name** — Host is Complete
- **Operator** — Is null
- **Value** — Fixed value (Value cannot be changed)

4 Define the Enrichment Rule

Define the Enrichment rule that deletes all instances of the **Host** node that are identified by their IP address. At the top of the Enrichment Manager window, select **Enrichment** mode. In the Enrichment Rules pane, select the **doubleHosts** Enrichment rule. Then right-click the **Host** node that is identified by its IP address and select **Delete Relationship/Node Item**.

Example

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:

- Create New Enrichment Rule/Properties Dialog Box on page 218
- Enrichment Manager Window on page 220
- Node/Relationship Definition Dialog Box on page 229
- Node Definition – Advanced Attribute Dialog Box on page 231

Create New Enrichment Rule/Properties Dialog Box

Description	<p>Create or modify an Enrichment rule.</p> <p>To access:</p> <ul style="list-style-type: none"> ▶ Right-click anywhere in the Enrichment Rules pane and click New or clicking the New  button. or ▶ Right-click an Enrichment rule and select Properties.
Included in Tasks	“Define an Enrichment Rule - Scenario” on page 214
Important Information	<p>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:</p> <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 287. <p>Note: Enrichment TQLs that serves as the basis for Enrichment rules, are subject to certain validation restrictions. For details, see “Troubleshooting and Limitations” on page 311. If the TQL is not valid, you cannot save it.</p>
Useful links	“Add Nodes and Relationships to a TQL Query” on page 240.

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

GUI Element (A-Z)	Description
<input type="button" value="Advanced"/>	<p>Includes the following elements:</p> <ul style="list-style-type: none"> ▶ TQL Priority list. From the Priority list, 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. ▶ TQL Description. (Optional) Enter a description of the TQL query.
<input type="button" value="Simple"/>	<p>Hide the TQL Priority list and TQL Description box that appear when you click the Advanced button.</p>
Active	<p>(Optional) Verify that Active is selected to activate the rule in the system as soon as it is saved.</p> <p>Notes:</p> <ul style="list-style-type: none"> ▶ If an active Enrichment rule is deactivated (by clearing Active in the Properties dialog 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 Properties dialog box, select Active.
Based on TQL	<p>Select this check box if you want to link an Enrichment rule to an existing TQL query.</p> <p>From the Attach TQL list, select the Enrichment TQL to which you want to link the rule.</p>
Description	<p>(Optional) Enter a description of the rule.</p>
Name	<p>Enter a unique name for the Enrichment rule. The name you enter automatically appears in the box to the right of the Based on TQL check box if you do not select the Based on TQL check box.</p>

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 > 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 214</p>










The Enrichment Manager window includes the following panes:

- “Enrichment Rules Pane” on page 220
- “Editing Pane” on page 223
- “CI Type Selector” on page 225
- “Information Pane” on page 226

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 Universal CMDB 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>
--------------------	--

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 Create New Enrichment Rule/Properties dialog box.
	(Enabled only when an Enrichment rule is created or when changes are made to an existing one.) Saves the Enrichment rule to the CMDB.
	Deletes the selected folder or Enrichment rule.
	Refreshes the data content of the hierarchical tree structure that may have been modified by other users.
	Opens the Create New Enrichment Rule/Properties dialog box. 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.

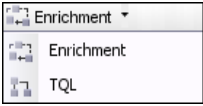
GUI Element (A-Z)	Description
Import	Imports XML files that contain saved Enrichment queries to the Enrichment Manager.
New	Creates an Enrichment rule. Opens the Create New Enrichment Rule dialog box.
New Folder	Creates a new folder.
Properties	Opens the Create New Enrichment Rule/Properties dialog box. 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 625 and “Remove Enrichment Results” on page 630.
Included in Tasks	“Define an Enrichment Rule - Scenario” on page 214
Useful Links	For details on how to create a TQL query, see “Add Nodes and Relationships to a TQL Query” on page 240.

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.
<Main Menu>	For details, see “Main Menu” on page 620.
<Node>	A component from which TQL queries are built.
<Relationship>	The entity that defines the relationship between two nodes.
<Context menu> options	For details, see “Context Menu Options” on page 243.
<Toolbar>	For details, see “Toolbar Options” on page 625
<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 <i>CI Attribute Customization</i>. ▶ Definitions of the selected nodes and relationships. The attribute conditions, as described in “Node/Relationship Properties Dialog Box” on page 287.

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” in <i>CI Attribute Customization</i>.</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, Report Manager, and Trigger TQL Editor.</p>
Included in Tasks	<ul style="list-style-type: none"> ▶ “Define a Correlation Rule - Scenario” on page 141 ▶ “Define an Enrichment Rule - Scenario” on page 214 ▶ “Define a TQL Query” on page 239 ▶ “Pattern View Workflow” on page 113 ▶ “Define a Report Rule - Scenario” on page 164

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.
<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, 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 - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 239 ➤ “Pattern View Workflow” on page 113 ➤ “Define a Report Rule - Scenario” on page 164

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

GUI Element (A-Z)	Description
	Click the Show List button 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 148. 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 289.
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 291.
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 229.</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 66.</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 192.</p> <p>Note: This tab appears only in Report Manager.</p>
Qualifiers	<p>Displays the qualifier conditions defined for the node or the relationship. For details, see “Qualifier Tab” on page 295.</p>
Rule	<p>Displays the report folding rule defined for the selected relationship. For details about folding rules, see “Editing Pane” on page 185.</p> <p>Note: This tab appears only when a relationship is selected in 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 297.</p>

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 host_key for the CIT Host or an IP address attribute for the CIT IP.</p>
Included in Tasks	“Define an Enrichment Rule - Scenario” on page 214

This dialog box contains the following areas:

- “Attributes Area” on page 230
- “Set Attributes Area” on page 230


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	(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.

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>
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 Attributes area of the Node Definition dialog box. 2 In the Set Attributes area, select Advanced and then click the Advanced button.
Included in Tasks	<p>“Define an Enrichment Rule - Scenario” on page 214</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.
<The column that appears between the Value and Regular Expression columns>	(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 the entry inside the RegExp Group column, click the  button, and enter the group number. 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 the entry inside the Regular Expression column, click the  button, and enter the regular expression pattern in the Editing Regular Expression dialog box that opens.

GUI Element (A-Z)	Description
Type	<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>
Use first attribute with value	<p>Use the first attribute value listed in this dialog box that is not empty.</p>
Value	<ul style="list-style-type: none"> ▶ If you select Simple in the Type column, click the entry inside the Value column, click the Add Value ... button, and enter the required value in the Editing Simple dialog box. ▶ If you select By Attribute in the Type column, click the entry inside the Value column, and select the required element from the list.

8

Topology Query Language

This chapter provides information on Topology Query Language (TQL).

This chapter includes:

Concepts

- ▶ Topology Query Language (TQL) Overview on page 236
- ▶ Topology Query Language on page 236
- ▶ The Roles of TQL on page 237
- ▶ Where TQL Queries Are Created on page 237
- ▶ Viewing TQL Query Results on page 238
- ▶ The Join Relationship on page 238

Tasks

- ▶ Define a TQL Query on page 239
- ▶ Add Nodes and Relationships to a TQL Query on page 240
- ▶ Add Enrichment Nodes and Relationships to an Enrichment TQL Query on page 241

Reference

- ▶ Context Menu Options on page 243
- ▶ Attribute Operator Definitions on page 248
- ▶ TQL Logs on page 250
- ▶ TQL Parameters on page 255
- ▶ Topology Query Language User Interface on page 263

Troubleshooting and Limitations on page 311

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 17.

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 139.
- ▶ **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 211.
- ▶ **Query Manager.** Create TQL queries that can be used in other managers. For details, see “Query Manager” on page 197.

- ▶ **Report Manager.** Create a report definition based on either a Report TQL query from within the 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 “Report Manager” on page 163.
- ▶ **View Manager.** Create a pattern view either based on a TQL query from within the View Manager, or on an existing query. For details, see “View Manager” on page 99.

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 485.

The 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 “Sample Join Relationship” on page 277. For details on working with joins, see “Add Join Relationship Dialog Box” on page 274.

Define a TQL Query

This task describes how to create a TQL query.

1 Create a TQL Query

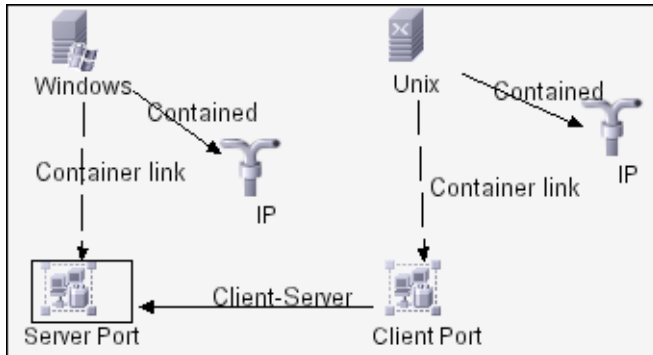
Create a new query by giving the query a unique name in the relevant manager. For details about in which managers you can create a TQL query, see “Where TQL Queries Are Created” on page 237. In this task, you create a TQL query in the Query Manager. For details, see “Create New TQL/TQL Properties Dialog Box” on page 200.

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 240. For details on the CI Type Manager, see “CI Type Manager” in *CI Attribute Customization*.

Example

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 311.

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 Report Manager.

Note: For TQL queries to be valid, they must comply with certain restrictions. For details, see “Troubleshooting and Limitations” on page 311.

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 a 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 Add Relationship dialog box opens. For details, see “Add/Edit Relationship Dialog Box” on page 278.

- 4** Click **OK**. The selected nodes are linked by the relationship you have selected.

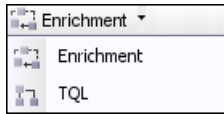
Add Enrichment Nodes and Relationships to an Enrichment TQL Query

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 211.

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 “Create New Enrichment Rule/Properties Dialog Box” on page 218.

- 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 278.


- 6 Click **OK**. The selected nodes are linked by the relationship you have selected.

Context Menu Options

This section includes a list of TQL context menu options (listed alphabetically):


GUI Element (A–Z)	Description
Add Compound Relationship	Enables you to define the connection between two nodes using a compound relationship. For details, see “Add Compound Relationship Dialog Box” on page 268.
Add Join Relationship	Enables you to define join relationships, which is created by defining an attribute for each node, whose values are used for comparison. For details, see “Add Join Relationship Dialog Box” on page 274.
Add Relationship	Enables you to create a relationship for your nodes by selecting it from a predefined list. Displays the Add Relationship dialog box. For details, see “Add/Edit Relationship Dialog Box” on page 278. 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 211. Added relationships are displayed by an added  indicator.

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 106.</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 211.</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 Node Definition	<p>Deletes the report definition for the selected Report node. For details, see “Report Manager” on page 163.</p> <p>Note: Only relevant for Report Manager.</p>
Configure Subgraph	<p>Displays the Configure Subgraph dialog box, where you can create a graph that represents additional TQL query data related to a specific node. For details, see “Configure Subgraph Dialog Box” on page 280.</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: This 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 148.</p> <p>Note: Only relevant for Correlation Manager.</p>
Delete	<p>Deletes the selected node/relationship/CI.</p>
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 211.</p> <p>Deleted nodes are displayed by a removed  indicator.</p> <p>Note: Only relevant for Enrichment Manager.</p>

GUI Element (A–Z)	Description
Edit Relationship Type	<p>Displays the Edit Relationship Type dialog box. For details, see “Add/Edit Relationship Dialog Box” on page 278.</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 194.</p> <p>Note: Only relevant for Report 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 287.</p>
Node/Relationship Definition	<p>Displays the Grouping dialog box which enables you to group CIs in the topology map. For details, see “Grouping Dialog Box” on page 119.</p> <p>Note: Only relevant for View Manager.</p>
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 299.</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 106.</p> <p>Note: Only relevant for View Manager.</p>
Remove Subgraph	<p>Only appears if you have defined a dependency graph. For details, see “Configure Subgraph Dialog Box” on page 280.</p>

GUI Element (A–Z)	Description
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 192.</p> <p>Note: Only relevant for 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 148.</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 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 127.</p> <p>Note: Only relevant for View Manager and System 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 282.</p>
Straighten	<p>Straightens the relationship between two nodes. This option is only available for relationships that have angles.</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 302.</p>

GUI Element (A–Z)	Description
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 229. This is applicable for both regular and Enrichment nodes. Updated nodes are displayed 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.
Great 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.

Operator	Description
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.
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 Universal CMDB 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**.
-

TQL Logs

This section contains definitions for TQL parameter log files.

This section includes the following topics:

- ▶ “Pattern Log” on page 245
- ▶ “Pattern Statistics Log” on page 246
- ▶ “Audit Short/Detailed Log (TQL Perspective)” on page 247
- ▶ “Incremental Statistics Log” on page 247
- ▶ “Incremental Splitter Log” on page 248
- ▶ “Incremental Detailed Log” on page 249

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
Basic Troubleshooting	Check if a TQL query has the same status for a long time: <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	The following information is given for each TQL: <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.

Log File	Description
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.
Error Level	Not available.

Log File	Description
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.

TQL Parameters

This section describes the TQL parameters needed for configuring the CMDB.

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
<code>tql.threads.pool.size</code>	Defines the number of threads to limit concurrent calculation of TQLs. This is done to prevent high CPU consumption.	integer		N

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
tql.scheduler.timer.time	Defines the interval of time to wait between wake up calls to the TQL State Machine manager.	long	Value is in milliseconds.	N
tql.scheduler.statistics.logupdate.interval.time.millisecond	The interval between updates of <code>cldb.pattern.statistics.log</code> .	long	Value is in milliseconds.	N
tql.resultrepository.timer.time	The length of time the ad hoc TQL results reside in memory before the results are purged from memory.	long	Value is in milliseconds.	N
tql.resultutils.pattern takeover.timeout			10000	
tql.resultutils.adhoc.validate	Defines whether to perform pattern validation of ad hoc TQLs.	boolean	<ul style="list-style-type: none"> ► true. Perform pattern validation. ► false. Do not perform pattern validation. 	N
tql.resultutils.chunk.maxresults	The maximum number of CIs and relationships in a TQL result that can be retrieved together without dividing them into chunks for separate retrievals.	integer	100000	N

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
tql.resultutils.chunk.maxnotificationsize	The maximum number of CIs and relationships in a TQL result that can be sent to external clients, the applications that get notification service from CMDB. If this number is exceeded, a message is sent.	integer	50000	N
tql.resultutils.chunk.keepingperiod.seconds	The length of time that a chunk of TQL results is resident in memory until the next chunk is received in memory.	integer	Value is in seconds.	N
tql.conditionstatistics.refresh.seconds	The time interval in which the total number of objects of each type in the CMDB is updated.	integer	Value is in seconds.	N
tql.statemachine.fail.retries	Number of times to recalculate a TQL before the status is set to Fail .	integer		N
tql.statemachine.fail.recover.time	Time interval to wait between a pattern calculation failure and the next attempt to recalculate.	integer	Value is in seconds.	N

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
tql.scheduler.statistics.maxcalculation	The maximum number of a TQL's recent calculations stored in the Scheduler statistics.	integer		N
tql.group.all.active.count	Maximum number of active TQLs permitted per customer in the appropriate group: all, collectors, view, topology, report, server data, path manager, and internal enrichment. The name of the group is found in the name of the parameter after tql.group.	integer		N
tql.group.collectors.active.count				
tql.group.view.active.count				
tql.group.topology.active.count				
tql.group.report.active.count				
tql.group.serverdata.active.count				
tql.group.pathmanager.active.count				

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
tql.group.all.result.size	The maximum number of CIs held in a TQL result before the TQL is deactivated.	integer	Values are assigned according to TQL group: all, collectors, view, topology, report, server data, path manager, and internal enrichment.	N
tql.group.collectors.result.size				
tql.group.view.result.size				
tql.group.topology.result.size				
tql.group.report.result.size				
tql.group.serverdata.result.size				
tql.group.pathmanager.result.size				
EXPRESS_PRIORITY.Min.CalculationTimeInterval	Minimum length of time to wait until a full calculation is performed for some TQL query. The results are updated after calculation.	long	<ul style="list-style-type: none"> ➤ Value is in milliseconds. ➤ Value is defined for each TQL priority. 	N
HIGH_PRIORITY.Min.CalculationTimeInterval				
MED_PRIORITY.Min.CalculationTimeInterval				
LOW_PRIORITY.Min.CalculationTimeInterval				

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
EXPRESS_PRIORITY.Max.CalculationTimeInterval	<p>Maximum length of time to wait until a full calculation is performed for a TQL query.</p> <p>The results are updated after calculation.</p>	long	<ul style="list-style-type: none"> ▶ Value is in milliseconds. ▶ Value is defined for each TQL priority. 	N
HIGH_PRIORITY.Max.CalculationTimeInterval				
MED_PRIORITY.Max.CalculationTimeInterval				
LOW_PRIORITY.Max.CalculationTimeInterval				
EXPRESS_PRIORITY.Min.EventArrivalTimeInterval	<p>The minimum length of time to wait after the last event arrives before starting a full calculation. A full calculation is not started if the elapsed time from the last event is less than this value.</p>	long	<ul style="list-style-type: none"> ▶ Value is in milliseconds. ▶ Value is defined for each TQL priority. 	N
HIGH_PRIORITY.Min.EventArrivalTimeInterval				
MED_PRIORITY.Min.EventArrivalTimeInterval				
LOW_PRIORITY.Min.EventArrivalTimeInterval				

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
EXPRESS_PRIORITY.Max.EventArrivalTimeInterval	The maximum length of time to wait after the last event arrives before starting a full calculation. A full calculation is started if this value is reached.	long	<ul style="list-style-type: none"> ➤ Value is in milliseconds. ➤ Value is defined for each TQL priority. 	N
HIGH_PRIORITY.Max.EventArrivalTimeInterval				
MED_PRIORITY.Max.EventArrivalTimeInterval				
LOW_PRIORITY.Max.EventArrivalTimeInterval				
EXPRESS_PRIORITY.Max.EventArrivalTimeIntervalForImmediate	The maximum length of time to wait after the last event arrives before starting an immediate calculation. An immediate calculation is started no later than this value.	long	<ul style="list-style-type: none"> ➤ Value is in milliseconds. ➤ Value is defined for each TQL priority. 	N
HIGH_PRIORITY.Max.EventArrivalTimeIntervalForImmediate				
MED_PRIORITY.Max.EventArrivalTimeIntervalForImmediate				
LOW_PRIORITY.Max.EventArrivalTimeIntervalForImmediate				

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
EXPRESS_PRIORITY.Min.PendingEventsAmount	Minimum number of events to accumulate to start a full calculation. A full calculation is not started if the number of pending events for some TQL is less than this value.	integer	Value is defined for each TQL priority.	N
HIGH_PRIORITY.Min.PendingEventsAmount				
MED_PRIORITY.Min.PendingEventsAmount				
LOW_PRIORITY.Min.PendingEventsAmount				
EXPRESS_PRIORITY.Max.PendingEventsAmount	Maximum number of events to accumulate to start a full calculation. A full calculation starts when the number of pending events for a TQL equals, or is greater than, the value defined in this parameter.	integer	Value is defined for each TQL priority.	N
HIGH_PRIORITY.Max.PendingEventsAmount				
MED_PRIORITY.Max.PendingEventsAmount				
LOW_PRIORITY.Max.PendingEventsAmount				

Parameter Name	Parameter Description	Type	Value Description	Change Value? (Y/N)
EXPRESS_PRIORITY.Max.PendingEventsAmountForImmediate	Maximum number of events to accumulate to start an immediate calculation. An immediate calculation starts when the number of pending events for a TQL equals, or is greater than, the value defined in this parameter.	integer	Value is defined for each TQL priority.	N
HIGH_PRIORITY.Max.PendingEventsAmountForImmediate				
MED_PRIORITY.Max.PendingEventsAmountForImmediate				
LOW_PRIORITY.Max.PendingEventsAmountForImmediate				


Topology Query Language User Interface

This section describes:

- Add Compound Relationship Dependency Dialog Box on page 264
- Add Dependency Dialog Box on page 267
- Add Compound Relationship Dialog Box on page 268
- Add Join Relationship Dialog Box on page 274
- Add/Edit Relationship Dialog Box on page 278
- Configure Subgraph Dialog Box on page 280
- Element Instances Dialog Box on page 282
- Filter CI Instances Dialog Box on page 284
- Join Relationship Condition Dialog Box on page 285
- Layout Settings Dialog Box on page 286
- Node/Relationship Properties Dialog Box on page 287

- Refine Node Type Dialog Box on page 299
- Subgraph Condition Definition Dialog Box on page 300
- TQL Node Wizard on page 302
- User Preferences Dialog Box on page 310

Add Compound Relationship Dependency Dialog Box

Description	<p>Enables you to create a compound relationship definition.</p> <p>To access: In the Add Compound Relationship dialog box, click the Add  button.</p>
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule - Scenario” on page 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287

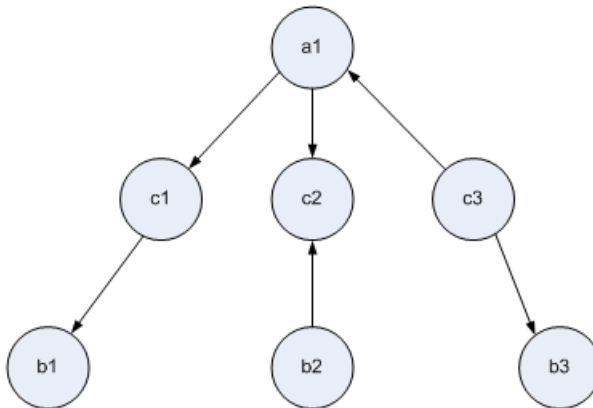
The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
Relationship	Select an available relationship connecting the two nodes. The list of available relationships appears only after defining both nodes.
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 265 below.</p> <p>Note: The Relationship list remains empty until you have selected a source and target.</p>

GUI Element (A-Z)	Description
Source	Select the required source node.
Target	Select the required target node.

Setting Different Relationship Directions for Compound Definitions

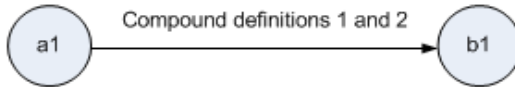
You can achieve different TQL results by setting different relationship directions. For example, in your business world, as illustrated below, you want to create a compound relationship that connects between a node of the CIT **a** and a node of the CIT **b**. Depth is defined at 5 (for details, see “Depth” on page 281).



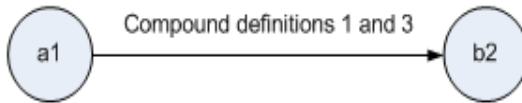
In the Add Compound Relationship Dependency dialog box, you can create compound definitions to link nodes **a** and **b** using different relationship directions.

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

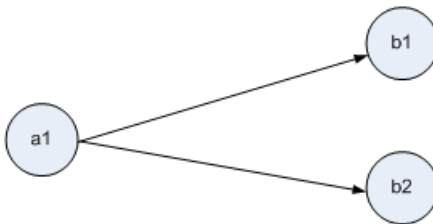
- Compound definitions 1 and 2 result in the following query:




- Compound definitions 1 and 3 result in the following query:




- Compound definitions 1, 2, and 3 result in the following query:




Add Dependency Dialog Box

Description	<p>Enables you to create a dependency graph definition. Select the nodes and relationships to be included in the dependency graph.</p> <p>To access: In the Configure Subgraph dialog box, click  Add.</p>
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule - Scenario” on page 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287

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>Note: The Condition button is enabled only after you select a node from the Source or Target lists.</p>
Relationship	<p>Select an available relationship connecting the source and target nodes. The list of available relationships appears only after defining both the required source and target nodes.</p>
Source	<p>Select the desired source node.</p>
Target	<p>Select the required target node.</p>

Add Compound Relationship Dialog Box

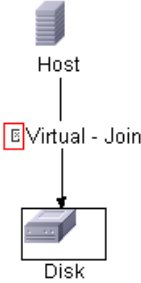
<p>Description</p>	<p>Enables you to define the connection between two nodes using a compound relationship. A compound relationship represents a path in the topological graph. You use a compound relationship to define the allowed steps in the path between the source and the target CIs.</p> <p>Each row represents one of the allowed steps in the path leading from the source CI to the target CI in the topology map.</p> <table border="1" data-bbox="574 522 1213 586"> <thead> <tr> <th>Source</th> <th>Relationship</th> <th>Target</th> </tr> </thead> <tbody> <tr> <td>Host</td> <td>Contained</td> <td>IP</td> </tr> <tr> <td>Network</td> <td>Member</td> <td>Host</td> </tr> </tbody> </table> <p>Note: For an example of a compound definition, see “Sample Compound Relationship” on page 271.</p> <p>To access in Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager:</p> <p>Right-click the required node in the Editing pane in 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. 	Source	Relationship	Target	Host	Contained	IP	Network	Member	Host
Source	Relationship	Target								
Host	Contained	IP								
Network	Member	Host								

Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule - Scenario” on page 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287
Important Information	You can create as many compound definitions as necessary.

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 Compound Relationship Dependency dialog box.
	Delete the selected compound definition.
	Edit the selected compound definition. Opens the Add Compound Relationship Dependency dialog box.
Max steps	The longest path allowed between the two CIs in the CMDB to be included in the DDM process. Default is: 5
Min steps	The shortest path allowed between the two CIs in the CMDB to be included in the DDM 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.


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.
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="582 933 1206 1229" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> </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, 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>  <pre> graph TD Host[Host] --> VirtualJoin[Virtual - Join] VirtualJoin --> Disk[Disk] </pre>

Sample Compound Relationship

This section describes how to define the allowed steps that form a Compound relationship between a **Network** and an **IP** CI.

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 Compound Relationship Dependency dialog box and do the following:
 - From the **Source** list, select **Host**.
 - From the **Target** list, select **IP**.
 - From the **Relationship** list, select **Contained**.

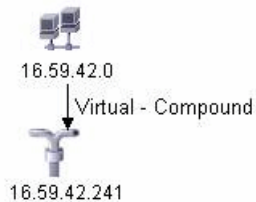
- Select the required **Relationship** direction.
- 4** Click **OK** to save your changes.
-  **5** Click the **Add** button to open the Add Compound Relationship Dependency dialog box and do the following.
 - From the **Source** list, select **Network**.
 - From the **Target** list, select **Host**.
 - From the **Relationship** list, select **Member**.
 - Select the required **Relationship** direction.
- 6** Click **OK** to save your changes.

The definitions in the Compound Relationship dialog box now look like this.

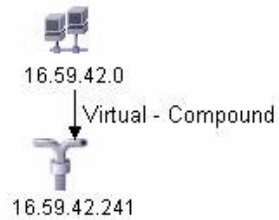
Source	Relationship	Target
Host	Contained	IP
Network	Member	Host

- 7** Click **OK** to save your changes.

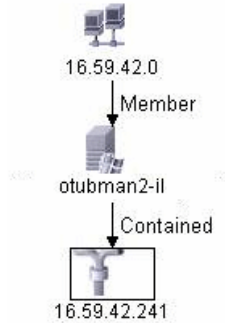
The TQL query in the Editing pane now looks like this:



Go to the required view in IT Universe to view the results.




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 this example, the **16.59.42.0** (Network) CI is linked to the **16.59.42.241** (IP) CI through the **Otubman2-il** (Host) CI.

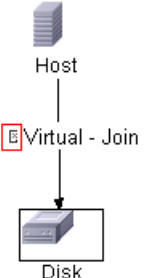
Add Join Relationship Dialog Box

Description	<p>Enables you to define join relationships.</p> <p>To access in Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager:</p> <p>Right-click the required nodes in the Editing pane in 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.
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule - Scenario” on page 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287
Useful Links	“The Join Relationship” on page 238

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.


GUI Element (A-Z)	Description
	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 248.
Relationship Direction	The direction of the relationship that indicates which node is dependent on the other.

GUI Element (A-Z)	Description
<p>Relationship Restrictions</p>	<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.
<p>Visible</p>	<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 relationship's name in the Editing pane. Any query results pertaining to the relationship are not displayed in the topology map.</p> <div style="text-align: center;">  <pre> graph TD Host[Host] --> VirtualJoin[Virtual - Join] VirtualJoin --> Disk[Disk] </pre> <p>The diagram illustrates a topology map. At the top is a 'Host' node represented by a server rack icon. A vertical arrow points down from the Host to a 'Virtual - Join' relationship, which is represented by the text 'Virtual - Join' with a small square checkbox to its left. From the 'Virtual - Join' relationship, another vertical arrow points down to a 'Disk' node, represented by a disk drive icon.</p> </div>

Sample Join Relationship

This section explains how to define a join relationship that links **Host** CIs to **IP** CIs whose **Created by** attribute values are equal.

To define a join relationship that links all IP and Host CIs whose Created by attribute values are equal:

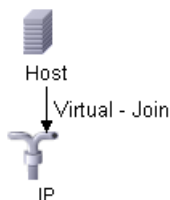
- 1 Create a TQL query and drag the following nodes from the CI Type Selector onto the Editing pane:
 - Host
 - IP
- 2 Select the **Host** and **IP** nodes and right-click to open the Add Join Relationship dialog box.
- 3  Click the **Add** button to open the Join Relationship Condition dialog box and 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.

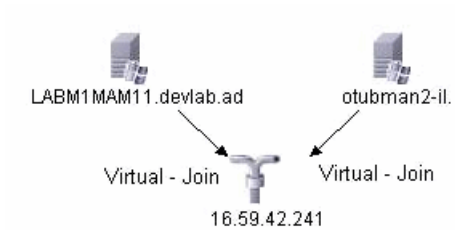
Host	Operator	IP
Created By	Equal	Created By

- 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.



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 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 Report Manager, Enrichment Manager, Correlation Manager, Query Manager, View Manager and select Add Relationship. <p>or</p> <ul style="list-style-type: none"> ▶ 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.
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Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule - Scenario” on page 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287
Important Information	This option does not appear when two selected nodes (or a single selected node) do not have a valid relationship between them.

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 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.

Configure Subgraph Dialog Box


<p>Description</p>	<p>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 dependency graph definitions. The query recursively retrieves all the related CIs by a defined depth.</p> <p>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 300.</p> <p>The DDM job retrieves data that meets the criteria that is defined in the dependency graph.</p> <p>To access in Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: In the Editing pane, right-click the required node and select Configure Subgraph.</p> <p>Note: If you are using Enrichment Manager, select TQL mode at the top of the Editing pane to display the Configure Subgraph 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 Configure Subgraph.
<p>Important Information</p>	<p>The following icon is displayed next to the icon for which you define a subgraph:</p> <div style="text-align: center;">  </div>

Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule - Scenario” on page 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287
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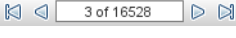
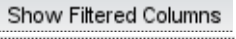

The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
	Add a dependency definition to the Dependencies area. Opens the Add Dependency dialog box.
	Delete a dependency definition from the Dependencies area.
	Edit a dependency definition. Opens the Add Dependency dialog box.
Depth	A number that represents the longest path (that is, the most connecting nodes) allowed between two CIs in the CMDB that should be included in the DDM process. Default: 5
Node1	The required node selected in the Add Dependency dialog box.
Node2	The required node selected in the Add Dependency dialog box.
Relationship	The relationship selected in the Add Dependency dialog box connecting <node1> to <node2>.



Element Instances Dialog Box

<p>Description</p>	<p>Display all of the CI instances found for the selected TQL node in a table.</p> <p>To access in 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 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” in <i>CI Attribute Customization</i>.</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” in <i>CI Attribute Customization</i>.</p>
<p>Included in Tasks</p>	<ul style="list-style-type: none"> ➤ “Define a Report Rule - Scenario” on page 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287

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.
	Hide or display specific columns. Opens the Columns dialog box.
	Update the table.
	Determine the number of CI instances that appear on a page. Opens the Set Rows Per Page dialog box.
	Click to navigate through the results page by page or to jump to the first or last page.
 	Toggle between hiding and displaying columns.
<CI type attributes>	The attributes of the CIT of the selected CI.
<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> .
CI Type	The CIT of the selected CI.
Display Label	The name of the CI instance as it appears in the topology map.


Filter CI Instances Dialog Box

Description	<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 elements 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.
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule - Scenario” on page 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287

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

GUI Element (A-Z)	Description
Condition	Select the required operator. For details, see “Attribute Operator Definitions” on page 248.
Display Name	The display name of the Configuration Item type to which the CI belongs.
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 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287

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>.
<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 “Working with the HP Universal CMDB API” on page 101 in <i>Reference Information</i>.</p> <p>To access: Click the Advanced layout settings link 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 164 ▶ “Define a Correlation Rule - Scenario” on page 141 ▶ “Define an Enrichment Rule - Scenario” on page 214 ▶ “Define a TQL Query” on page 199 ▶ “Pattern View Workflow” on page 113 ▶ “Implement a Pattern” on page 287


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 Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: 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 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287

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 CIT 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 CIT type in the TQL query.</p>
Include subtypes	<p>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 Visible 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 1216" 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>



This dialog box contains the following tabs:





- “Attribute Tab” on page 299
- “Cardinality Tab” on page 303.
- “Qualifier Tab” on page 307
- “Identity Tab” on page 310

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 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287

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.

GUI Element (A-Z)	Description
	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.
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 286. <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 Report Manager, a Set parameters values option is displayed at the top right of a generated System report, enabling you to edit the predefined parameters of node conditions in a System report. For details, see “System Report” on page 573.







GUI Element (A-Z)	Description
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	<p>Select the required operator. For details, see “Attribute Operator Definitions” on page 248.</p>
Update	<p>Update an attribute condition that has been modified.</p>
Value	<p>Enter or select the value of the attribute. The Value options vary according to the attribute type you select.</p>

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 294.</p> <p>To access: Click the Cardinality tab in the Node/Relationship Properties dialog box.</p>
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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 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287

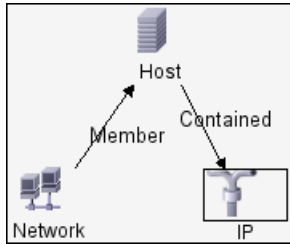
The following elements are included (unlabeled GUI elements are shown in angle brackets>):

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.

GUI Element (A-Z)	Description
Min	<p>Enter the value that defines the lower limits for including the node at the other end of the relationship in the query results.</p> <p>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.</p>
Node	<p>Select the required relationship to which the selected node is attached. The list contains all the relationships that are linked to the selected node.</p>
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>
Update	<p>Update a cardinality definition that has been modified.</p>

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 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287






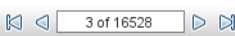
The following elements are included (unlabeled GUI elements are shown in angle brackets):

GUI Element (A-Z)	Description
<Qualifiers>	<p>Following are the qualifier definitions:</p> <ul style="list-style-type: none"> ➤ ABSTRACT_CLASS. You cannot create instances of this CIT. ➤ BLE_LINK_CLASS. Relevant to HP Business Availability Center only. ➤ 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 536. ➤ 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. ➤ ProtocolDialog. For internal use only. ➤ READ_ONLY_CLASS. This CIT cannot be edited. ➤ TRACK_LINK_CHANGES. Changes that occur on the specified relationship appear in Change reports. For details, see “Change Report” on page 547. <p>Important: Multiple selection links the conditions with the Or operator.</p>
Negate Qualifiers	Multiple selection links the conditions with the AND operator.

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 TQL node instances pane on the left to the to the Filtered TQL results pane on the right to define what you want included in the TQL results using the double right arrows.</p> <p>To access: Click the Element ID tab in the Node Properties dialog box.</p>
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule - Scenario” on page 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287

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.
	Hide or display specific columns. Opens the Select Columns dialog box.
	Update the table.
	Determine the number of CI instances that appear on a page. Opens the Set Rows Per Page dialog box.
	Click to navigate through the results page by page or to jump to the first or last page.

GUI Element (A-Z)	Description
<Left pane>	Displays all the instances found for the selected TQL node. For details, see “<Left Pane>” on page 298.
ID Condition pane	Displays the elements that are used to define what should be included in the TQL results. For details, see “ID Condition Pane” on page 298.

<Left Pane>

Description	Displays all the instances found for the selected TQL node in a table. To access: Click the Element 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.

ID Condition Pane

Description	Displays the elements that are used to define what should be included in the TQL results. To access: Click the Element tab in the Node/Relationship 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	<p>Enables you to change the CI type of the TQL node after you have created a TQL query.</p> <p>To access: Right-click the required node and select Refine Node Type.</p> <p>Note: If you are using Enrichment Manager, select TQL mode at the top of the Editing pane to display the Refine Node Type option.</p>
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule - Scenario” on page 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287
Important Information	<p>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.</p>






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.

Subgraph Condition Definition Dialog Box



Description	<p>Creates an expression defining conditions that restrict the number of nodes that appear in the query.</p> <p>Enables you to:</p> <ul style="list-style-type: none"> ➤ Define attribute conditions for nodes and relationships. ➤ Filter the query results. For details, see “Attribute Tab” on page 289. <p>To access: Click Condition  in the Add Dependency dialog box.</p>
Included in Tasks	<ul style="list-style-type: none"> ➤ “Define a Report Rule - Scenario” on page 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287

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.
Attribute name	Choose an attribute from the list.

GUI Element (A-Z)	Description
 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 248.
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.

TQL Node Wizard

<p>Description</p>	<p>Enables you to build a TQL query.</p> <p>To access in 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 164 ➤ “Define a Correlation Rule - Scenario” on page 141 ➤ “Define an Enrichment Rule - Scenario” on page 214 ➤ “Define a TQL Query” on page 199 ➤ “Pattern View Workflow” on page 113 ➤ “Implement a Pattern” on page 287

Useful Links	“Topology Query Language” on page 236
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 302.
Useful Links	“Topology Query Language (TQL) Overview” on page 236
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 291.</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*.
Element name	<p>(Optional) Contains the name of the selected node. By default, the CIT 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 CIT 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>
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 CIT type 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>

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






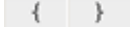
The following elements are included (unlabeled GUI elements are shown in angle brackets):

GUI Element (A-Z)	Description
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 Relationship hierarchy tree>	Select the required relationship. The node you select appears in the Relationship Type box.


TQL Node Properties Page

Description	Enables you to create an expression defining conditions that restrict the number of nodes that appear in the query. <ul style="list-style-type: none"> ▶ Add an attribute condition to a node or relationship. ▶ Filter the query results.
Useful Links	“Topology Query Language (TQL) Overview” on page 236
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 the attribute definition.
	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.



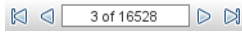
GUI Element (A-Z)	Description
Fixed value	<p>Select one of the following options:</p> <p>Fixed value. You cannot change the value of the parameter.</p> <p>Parameterized value. Enables you to change the value of the parameter.</p> <ul style="list-style-type: none"> ▶ When a parameterized value is selected 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 127. <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 Report Manager, a Set parameters values option is displayed in a generated System report, enabling you to edit the predefined parameters of node conditions in a System report. For details, see “System Report” on page 573.
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 248.
Update	Update an attribute condition that has been modified.

GUI Element (A-Z)	Description
<p>Value</p>	<p>Enter or select the value of the attribute. The Value options vary according to the attribute type you select.</p>
<p>Visible</p>	<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="582 458 901 749" data-label="Diagram"> <pre> graph TD IP[IP] -- Contained --> Windows[Windows] 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” in <i>CI Attribute Customization</i>.</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” in <i>CI Attribute Customization</i>.</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>

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

GUI Element (A-Z)	Description
	Update the table.
	Determine the number of CI instances that appear on a page. Opens the Set Rows Per Page dialog box.
	Click to navigate through the results page by page or to jump to the first or last page.
<CI type attributes>	The attributes of the CIT of the selected CI.
<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
CI Type	The CIT of the selected CI.
Display Label	The name of the CI instance as it appears in the topology map.

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
Description area	A description of the selected warning message.
Preferences list	The list of warning messages and their user-selected preferences.
Reset	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.

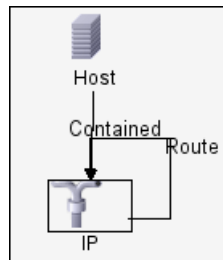
This section includes the following topics:

- “Understanding Validation Restrictions” on page 334
- “Correlation TQL Validation” on page 336
- “Enrichment TQL Validation” on page 337

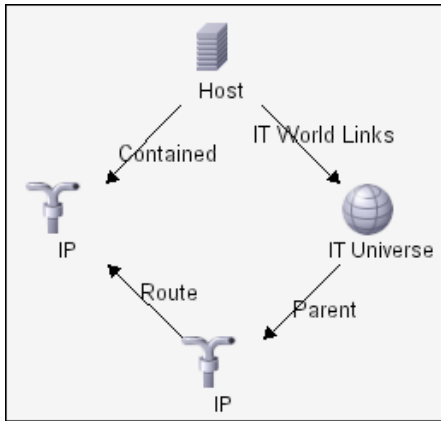
Understanding Validation Restrictions

For Correlation, Enrichment, and DDM TQL types to be valid, they must comply with the following restrictions:

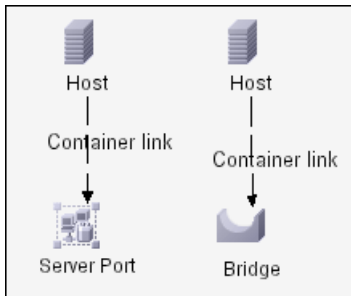
- **Self Relationships.** A TQL must not contain self relationships, that is, a relationship must not lead from a node to itself, as the following example illustrates:



- **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:

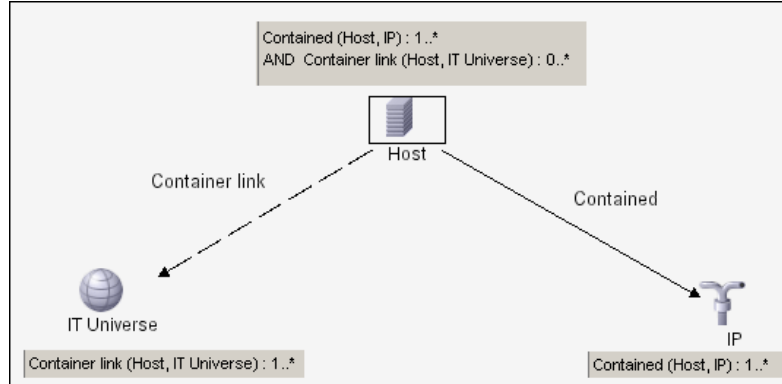


Note: This restriction also applies to Report TQLs.

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 291. 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.

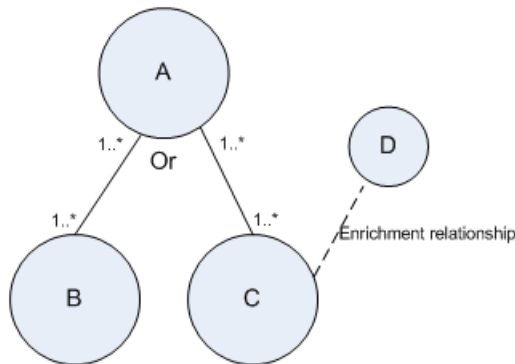
- **The connection between trigger and affected nodes.** The trigger node and affected nodes you define must be connected by a path of relationships from the triggered node to the affected nodes.

Enrichment TQL Validation

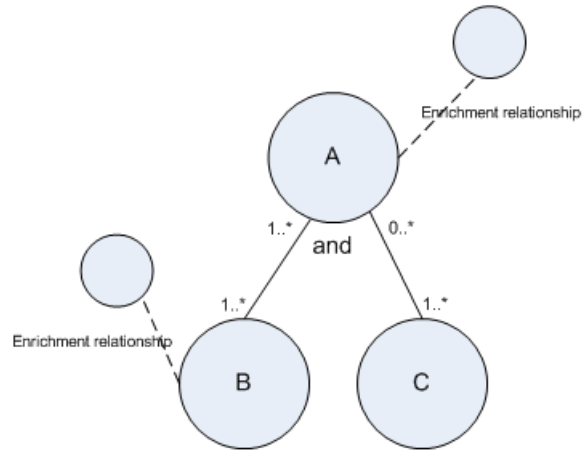
Enrichment TQL queries must comply with the following restriction:

- **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 241.



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.



Part II

Settings

9

Infrastructure Settings Manager

This chapter includes the pages and dialog boxes that are part of the Infrastructure Settings Manager user interface.

This chapter includes:

Concepts

- ▶ Infrastructure Settings Manager Overview on page 319

Reference

- ▶ Infrastructure Settings Manager User Interface on page 320

Infrastructure Settings Manager Overview

HP Universal CMDB enables you to define the value of many settings that determine how HP Universal CMDB and its applications run.

Important: Modifying certain settings can adversely affect the performance of HP Universal CMDB. It is highly recommended not to modify any settings without first consulting HP Software Support or your HP Services representative.

In the Infrastructure Settings Manager, you can select different contexts from which to view and edit settings. These contexts are split into two groups:

► **Applications**

This list includes those contexts that determine how the various applications running within HP Universal CMDB behave.

► **Foundations**

This list includes those contexts that determine how the administration tools of HP Universal CMDB run.

Descriptions of the individual settings appear in the **Description** column of the table on the Infrastructure Settings page.

Infrastructure Settings Manager User Interface


This section describes:

- Infrastructure Settings Manager Window on page 320
- Edit Setting Dialog Box on page 321

Infrastructure Settings Manager Window

Description	Enables you to view and edit infrastructure settings. To access: Select Admin > Settings > Infrastructure Settings Manager .
--------------------	---

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

GUI Element (A-Z)	Description
	Click the Edit Setting button to open the Edit Settings dialog box which enables you to edit an infrastructure setting.
All	Displays all the infrastructure settings.
Applications	Displays the infrastructure settings connected with the Applications.
Description	A description of the infrastructure setting.
Foundations	Displays the infrastructure settings connected with the Administration tools.
Name	The name of the infrastructure setting.
Value	The value of the infrastructure setting.

Edit Setting Dialog Box

Description	Enables you to change the value of an infrastructure setting. To access: In Infrastructure Settings Manager, click the Edit Setting button next to the infrastructure setting to be edited.
--------------------	---

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

GUI Element (A-Z)	Description
Description	A description of the infrastructure setting.
Name	The name of the infrastructure setting.

GUI Element (A-Z)	Description
Restore Default	Click to restore the default value of the infrastructure setting.
Value	The value of the infrastructure setting.

10

Package Manager

This chapter provides information on Package Manager.

This chapter includes:

Concepts

- ▶ Package Administration Overview on page 324
- ▶ Package Contents and Structure on page 325

Tasks

- ▶ Package Creation on page 326
- ▶ Package Deployment on page 328
- ▶ Package Export on page 328

Reference

- ▶ Package Resources on page 329
- ▶ Using the JMX Console to Perform Package Manager Tasks on page 331
- ▶ Package Manager User Interface on page 335

Troubleshooting and Limitations on page 348

Package Administration Overview

A package is a subset of resources grouped together by certain defined criteria. It is intended to enable actions such as the discovery of specific IT infrastructure assets, modeling of the infrastructure, and moving groups of resources from one system to another.

There are two types of packages:

- ▶ **Factory package.** Contains resources that are deployed with the installation and are used to initialize HP Universal CMDB.

By default, factory packages are located in: **<HP Universal CMDB root folder>\UCMDBServer\root\lib\factory_packages.**

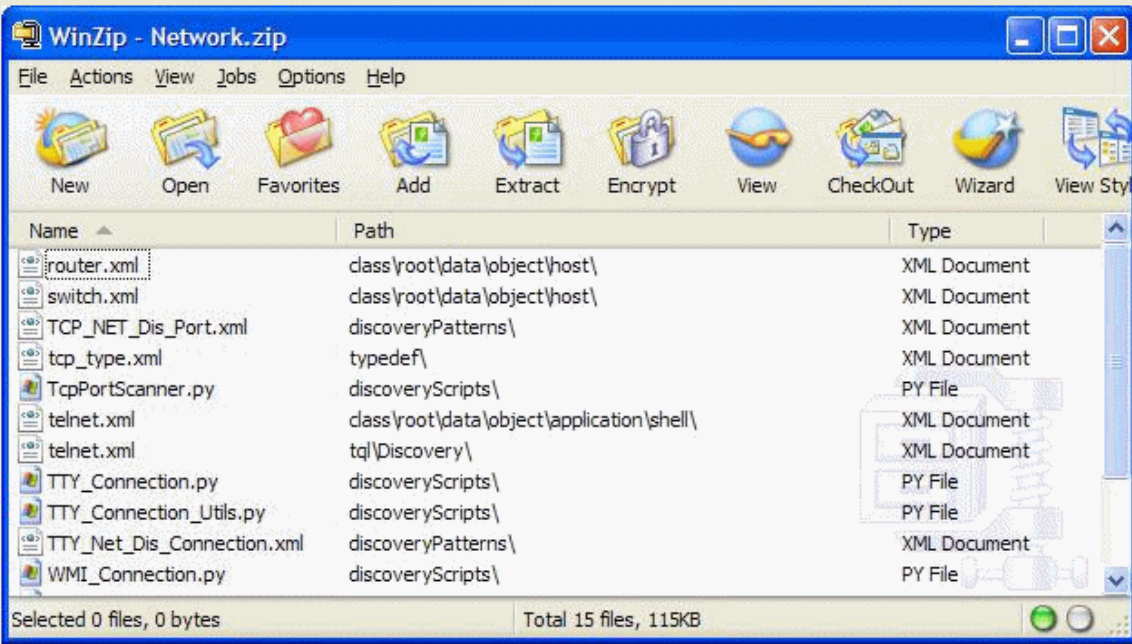
- ▶ **Custom package.** A package that is user created. For details, see “Create New Package/Edit Package Wizard” on page 336.

Important: If you want to create custom packages for the resources or tools you develop, do not place them in the **<HP Universal CMDB root folder>\UCMDBServer\root\lib\factory_packages** folder. This folder is only for factory packages.

You can optionally save your custom packages in: **<HP Universal CMDB root folder>\UCMDBServer\root\lib\customer_packages.**

Package Contents and Structure

A package is a zip file that contains resources, which are structured in subdirectories. See an illustration below.



Most of the files are in XML format. Each XML file describes the attributes, parameters, and values of the resources contained in the package.

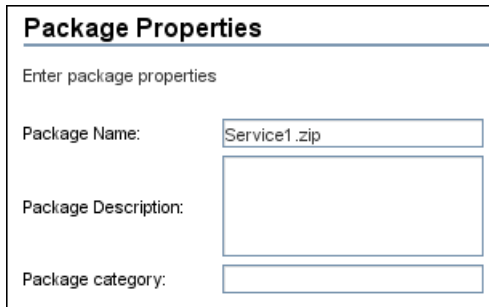
For example, in the package Network.zip, the **router.xml** file contains a CIT resource for the Router CIT and the **Switch.xml** file contains a CIT resource for the Switch CIT.

Package Creation

You can create a new package or edit an existing one. For details, see “Create New Package/Edit Package Wizard” on page 336.

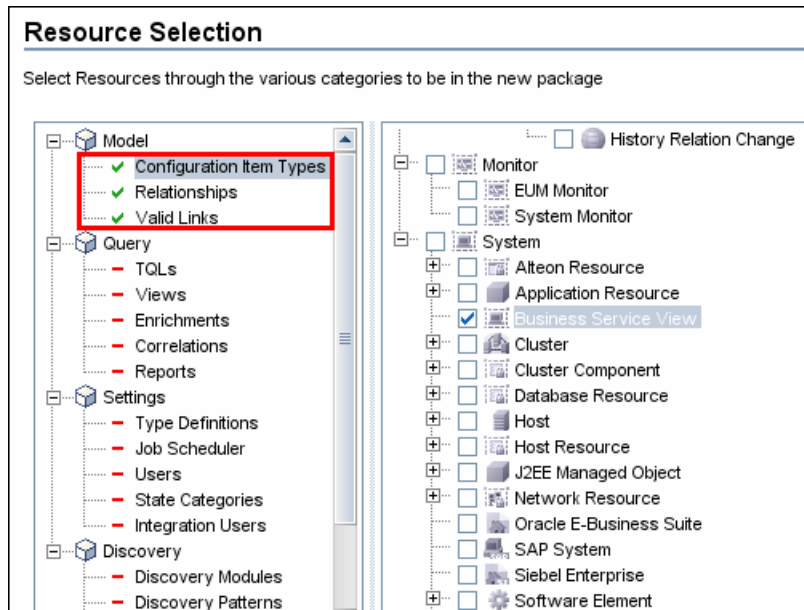
Example

A package has been created called **Service1.zip**, as seen in the following illustration:



The screenshot shows a dialog box titled "Package Properties" with the instruction "Enter package properties". It contains three input fields: "Package Name" with the value "Service1.zip", "Package Description" (empty), and "Package category" (empty).

In the Resource Selection page, you select the resources you want to include in the package, as shown in the following illustration:



The screenshot shows a "Resource Selection" dialog box with the instruction "Select Resources through the various categories to be in the new package". It features a tree view on the left and a list of resources on the right. The tree view includes categories like Model, Query, Settings, and Discovery. The "Model" category is expanded, and "Configuration Item Types", "Relationships", and "Valid Links" are checked and highlighted with a red box. The right-hand list includes resources such as Monitor, System, Application Resource, Business Service View (checked), Cluster, Database Resource, Host, Host Resource, J2EE Managed Object, Network Resource, Oracle E-Business Suite, SAP System, Siebel Enterprise, and Software Element.

The summary page 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:

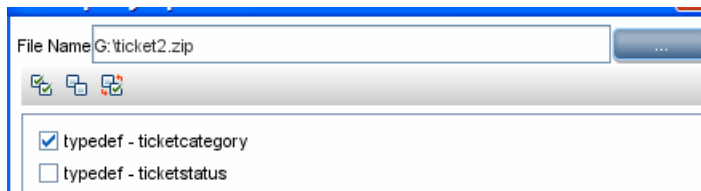
Business Service View

Package Deployment

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 344.

Example


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:

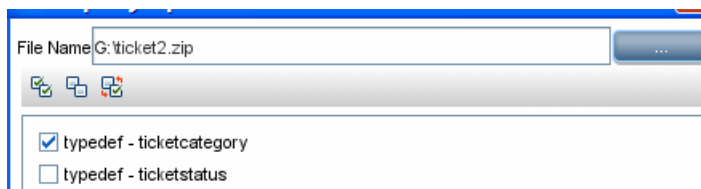


Package Export

You can export some or all of a package's resources from the Package Manager to your local directory. For details, see “Package Manager Window” on page 344.

Example

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

Packages can contain any of the following resources:

- ▶ **acl.** The definition of a role such as Administrator or Guest. For details, see “User Manager” on page 639.
- ▶ **adapter.** Contains a description and the capabilities of the deployed federated adapter.
- ▶ **categories.** Contains the State definitions used by Correlation Manager. For details on States, see “State Manager” on page 479. For details on Correlation Manager, see “Correlation Manager” on page 139.
- ▶ **class.** CI type descriptions, such as host, file, switch, and so on. For details, see “CI Type Manager” in *CI Attribute Customization*.
- ▶ **correlation.** Correlation rule definitions. For details, see “Correlation Manager” on page 139.
- ▶ **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 discovery 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 211.
- ▶ **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 “Report Manager” on page 163.
- ▶ **schedulerJobs.** Tasks that have been defined to run in the Scheduler. For details, see “Scheduler” on page 351.
- ▶ **tql.** TQL query definitions. For details, see “Query Manager” on page 197.
- ▶ **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 37 in *CI Attribute Customization*.
- ▶ **users.** The definition of a user and the user’s role. For details, see “Security Manager User Interface” on page 652.
- ▶ **validlinks.** All predefined, valid connections (relationships) between CITs.

- **view.** View Manager definitions. For details, see “View Manager” on page 99.

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 331
- “View Package Deployment History” on page 332
- “Undeploy a Package” on page 333
- “Display Currently Deployed Packages” on page 333
- “Export Packages” on page 334

1 Deploy a Package

Follow these steps to deploy a package using the JMX console.

- 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 Universal CMDB is installed.
- Under **MAM**, click **service=MAM Packaging Services** to open the JMX MBEAN View page.
- Locate **java.lang.String deployPackages**.
- 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.
- g** The rules for entering a package name are as follows:
- h** Wildcard characters (*) are not supported.
- i** The package name is case sensitive.
- j** The package name must have a **.zip** extension.
- k** Select **True** to override DDM job configurations changed in the Discovery user interface. For details, see the *Discovery and Dependency Mapping Guide*.
- l** Click **Invoke** to deploy the package.

2 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 Universal CMDB 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.

3 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 Universal CMDB 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.

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.
- f** Click **Invoke** to undeploy the package.

4 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 Universal CMDB 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.

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.

f Click **Invoke** to display the packages that are currently deployed.

5 Export Packages

Follow these steps to export resources from the CMDB to the server on which HP Universal CMDB 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 Universal CMDB 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 **packagesName**, enter the name of the package you want to export.

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.
- f** In the **ParamValue** box for the parameter **outputDir**, enter the name of the folder on the HP Universal CMDB 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 Manager User Interface

This section describes:

- ▶ Choose Resources to Export Dialog Box on page 335
- ▶ Create New Package/Edit Package Wizard on page 336
- ▶ Export Package Dialog Box on page 341
- ▶ Filter Dialog Box on page 342
- ▶ Find Dialog Box on page 343
- ▶ Package Manager Window on page 344
- ▶ Undeploy Package Resource Wizard on page 346



Choose Resources to Export Dialog Box

Description	Select the resources you want to export to your local directory. To access: Select Export resources in the Export Package dialog box.
--------------------	--

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

GUI Element (A-Z)	Description
<List of resources >	Displays the list of resources contained in the package. Select the resources you want to export to your local directory.

Create New 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	“Package Creation” on page 326
Wizard Map	The Create New 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 New 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 subsystems. Note: You can make multiple selections from each subsystem.
Wizard Map	The Create New 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 subsystem resource has been added to the package.
-	Appears in the left pane. Indicates that no subsystem resource has been added to the package.

GUI Element (A-Z)	Description
<subsystems in the left pane>	<p>Contains the subsystems from which you can choose the required resources to add to the package.</p> <p>For details of a list of the available subsystems and their descriptions, see “Subsystems” on page 338.</p> <p>Note: A green dot appears on the subsystem icon when one or more of its resources are selected to be included in the package.</p>
<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 CIT or Relationship resource when one or more of its children in the resource tree are included in the package. ▶ A folder’s check box has a faded check when some of its resources are included in the package. (This does not apply to Configuration Item Types and 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 and Relationships).

Subsystems

Following is a list of the available subsystems and their descriptions:

- ▶ **Configuration Item Types.** The CITs defined in the CI Type Manager. For details, see “CI Types Overview” in *CI Attribute Customization*.
- ▶ **Correlations.** The Correlation rules defined in the Correlation Manager. For details, see “Correlation Manager” on page 139.
- ▶ **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.** External resources include all resources external to HP UCMDB/HP BAC that are needed in Discovery, for example, a Visual Basic file, a credentials file, and so on. 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 discovery 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 211.
- ▶ **Job Scheduler.** Tasks that have been defined to run in the Scheduler. For details, see “Scheduler” on page 351.
- ▶ **Relationships.** The relationships defined in the CI Type Manager. For details, see “CI Type Relationships” in *CI Attribute Customization*.
- ▶ **Reports.** Report rules definitions, as described in “Report Manager” on page 163.
- ▶ **State Categories.** The states defined in the State Manager. For details, see “State Manager” on page 479.
- ▶ **TQLs.** The TQL queries defined in the Query Manager. For details, see “Query Manager” on page 197.
- ▶ **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” in *CI Attribute Customization*.
- ▶ **Users.** The definition of a user and the user’s role. For details, see “Security Manager User Interface” on page 652.

- ▶ **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 99.


Selection Summary Page

Description	Enables you to view the resources to be included in the package.
Wizard Map	The Create New 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.
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 Manager 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>
--------------------	---

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 “Working with Tables” in <i>Reference Information</i> .
<right-click a column header>	For details, see “Working with Tables” in <i>Reference Information</i> .
Condition	Click inside the box and select the required operator. For details, see “Attribute Operator Definitions” on page 248.
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 344.
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 “Subsystems” on page 338. To access: Click the Find  button in the Package Manager window.
--------------------	--







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 “Subsystems” on page 338.

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 > Settings > Package Manager.</p>
--------------------	---


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 New 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.</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>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>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>Reference Information</i>. ▶ For details on how to work with reports, see “Working in Reports - Overview” in <i>Reference Information</i>.

GUI Element (A-Z)	Description
Category	The free text you want to associate with the package, as displayed in the Package Properties page of the Create New Package Wizard.
Description	The description of the package, as displayed in the Package Properties page of the Create New Package Wizard.
Package Name	The name of the package.

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 > Summary Selection 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 > Summary Selection 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.

Summary Selection 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 > Summary Selection 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 348
- “Additional Information on Package Deployment Failure” on page 348
- “Package Creation and Deployment in a Non-English Locale” on page 349

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.

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 Universal CMDB root directory>\UCMDBServer\j2f\log\mam.
- The **cmdb.classmodel.log** file is located in: <HP Universal CMDB root directory>\UCMDBServer\j2f\log\cmdb.
- The **mam.log** file is located in: <HP Universal CMDB root directory>\UCMDBServer\j2f\log\mam.
- The **cmdb.log** file is located in: <HP Universal CMDB root directory>\UCMDBServer\j2f\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.

11

Scheduler

This chapter provides information on Scheduler.

This chapter includes:

Concepts

- Scheduler Overview on page 351

Tasks

- Define Tasks that Are Activated on a Periodic Basis on page 352

Reference

- Cron Expressions on page 353
- Scheduler User Interface on page 354

Scheduler Overview

You can define tasks to run periodically. For example, you can define a schedule for automatic backup of generated reports, and determine how many backups are saved.

Define Tasks that Are Activated on a Periodic Basis

This task describes how to run jobs on a periodic basis.

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 358.

Example

The illustration below shows that two Enrichment rules are set to run — one at a set interval and one on a daily basis.

Name	Job Definition	Schedule	Last Run Time	Next F
SiteScope Hosts and Monitors		Interval	Sun Aug 26 2007 03:22 PM IDT	Sun Au

2 Choose an Action

Select the actions that you want the Scheduler to run. For details, see “Action Definition Dialog Box” on page 355.

3 Schedule a Task

Set the schedule for activating a task in the Scheduler pane. For details, see “Job Definitions Dialog Box” on page 358.

Example

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: Canada/Central Reset server time zone

Invocation hour: 01:00, 00:00 >>

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 355
- Filter Dialog Box on page 357
- Job Definitions Dialog Box on page 358
- Job Scheduler Window on page 361

- Select Days Dialog Box on page 363
- Select Hours Dialog Box on page 363

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 352

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 “Working with Tables” on page 75.
<right-click a column header>	For details, see “Working with Tables” on page 75.
Actions	For a list of actions that can be run by the Scheduler, see “Scheduler Actions” below.

Scheduler Actions

This section contains a list of actions that can be run by the Scheduler.

- ▶ **Generate and save a Gold Master report.** Generate a Gold Master report and save it to the CMDB according to its set schedule. Click **Next** to display a list of the available Gold Master reports and select the required ones. For details, see “Gold Master Report Pane” on page 180.
- ▶ **Generate and save a System report.** Generate a System report and save it to the CMDB according to its set schedule. Click **Next** to display a list of the available System reports and select the required ones. For details, see “Report Manager” on page 163.
- ▶ **Run an Enrichment rule.** Activate 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 211.
- ▶ **Run a Replication job.** Federate data stores from different sources to a single, central database according to its set schedule. Click **Next** to display a list of the data stores and select the required ones. For details, see “Federated UCMDB User Interface” on page 462.
- ▶ **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 197.
- ▶ **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 99.
- ▶ **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 515.


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 352

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 “Working with Tables” on page 75.
<right-click a column header>	For details, see “Working with Tables” on page 75.
Condition	Click inside the box and select the required operator. For details, see “Attribute Operator Definitions” on page 248.
Display Name	Filters the task list according to one of the following: <ul style="list-style-type: none"> ▶ Is 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: Click the Add  button in the Job Scheduler window.
Included in Tasks	“Choose an Action” on page 352 “Schedule a Task” on page 352





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 352

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.





GUI Element (A-Z)	Description
	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 352
Useful Links	“Cron Expressions” on page 353

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 353.
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 353.
Daily	Runs a task on a daily basis.







GUI Element (A-Z)	Description
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.
End by	(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. Note: This step is optional. If you do not want to specify an ending date, leave the End by check box unselected.
Interval	Activates the action at a set time interval.
Invocation Hour	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. 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. 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. For example: 11:15 AM is 11:15 11:15 PM is 23:15 Note: This box is only available when you want to schedule a task to run on a daily, weekly, or monthly basis.
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.

GUI Element (A-Z)	Description
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.
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 System report on a daily basis at 3:00 PM. To access: Click Admin > Settings > Scheduler .
Included in Tasks	“Define Tasks that Are Activated on a Periodic Basis” on page 352

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.
	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 “Working with Tables” in <i>Reference Information</i> .
<right-click a column header>	For details, see “Working with Tables” in <i>Reference Information</i> .
Is 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 359.


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 352

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 352

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	<p>Choose all the required time by selecting the required check box. You can select multiple times.</p> <p>The selected hours appear in the Invocation hour box. For details, see “Invocation Hour” on page 360.</p>

12

Federated CMDB

This chapter provides information on the Federated CMDB functionality.

This chapter includes:

Concepts

- ▶ Federated CMDB – Overview on page 366

Tasks

- ▶ Work with Federated Data on page 366
- ▶ The HP ServiceCenter/Service Manager Adapter on page 367
- ▶ The Database Adapter on page 390
- ▶ The Federated Adapter on page 437
- ▶ View KPIs in External Applications on page 461

Reference

- ▶ Federated UCMDB User Interface on page 462
- ▶ Federated CMDB Reference on page 476

Troubleshooting and Limitations on page 477

Federated CMDB – Overview

This section explains how to set up adapters to work with data that is federated from different CMDB sources, using the HP Universal CMDB API.

You use federated CMDB to answer the following questions: Which hosts in a specific application (for example, SAP) had more than X changes in a certain time period? Which application names had more than X changes in a certain time period? Which hosts in the model had more than X changes in a certain time period?

Work with Federated Data

This section explains how to set up and work with data that is federated from different CMDB sources, using the HP Universal CMDB application.

1 Create a Data Store

Access **Admin > Settings > Federated CMDB > Data Stores** tab. Click the **Add** button to open the Data Store dialog box. For details, see “Data Store Dialog Box” on page 463.

2 Federate the Data Store

Access **Admin > 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 471.

3 Build a View

For details, see Chapter 3, “View Manager.”

4 View Instances in IT Universe Manager

For details, see Chapter 2, “IT Universe Manager.”

5 View Reports

For details, see Chapter 5, “Report Manager.”

The HP ServiceCenter/Service Manager Adapter

This section provides information on the HP ServiceCenter/Service Manager Adapter, version 1.0. The Adapter is compatible with HP Universal CMDB, version 7.0 or later, HP ServiceCenter, version 6.2, and HP Service Manager, version 7.0 (following changes to the WSDL configuration).

Note: This Adapter is a specific configuration of the ServiceDesk Adapter.

Adapter Usage

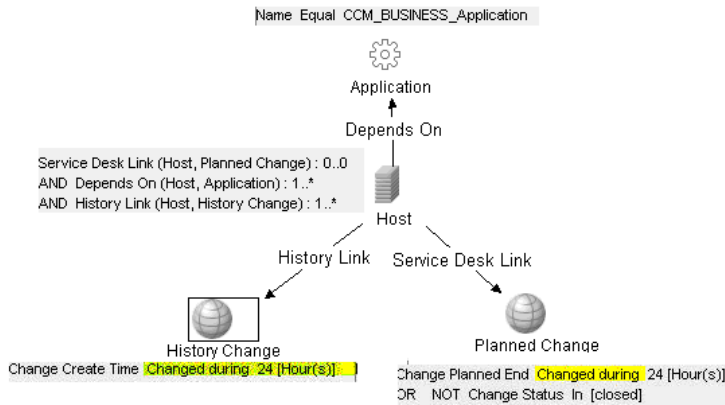
The ServiceCenter/Service Manager Adapter supports the retrieval of data from HP ServiceCenter and HP Service Manager. This adapter connects to, and receives data from, ServiceCenter/Service Manager using the Web Service API. Every request to ServiceCenter/Service Manager to calculate a federated query 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 372). Note that there are no internal relationships between Adapter-supported CITs.

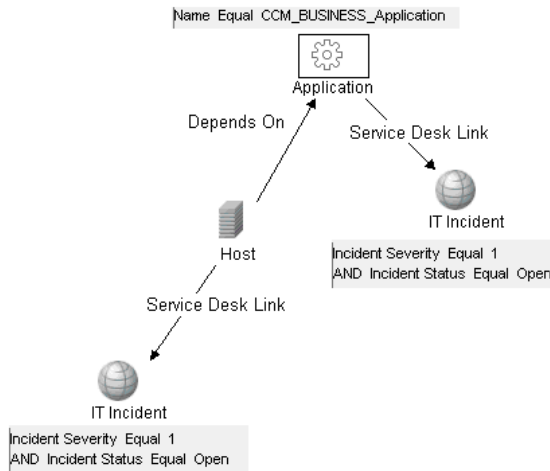
The modeling of the supported CITs and virtual relationships is supplied with the Adapter. You can add attributes to a CIT (for details, see “Add an Attribute to the ServiceCenter/Service Manager CIT” on page 382).

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 Universal CMDB root directory>\UCMDBServer\j2f\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 369.
- 2** The second part, defined by the `reconciliationClassConfigurations` element, contains reconciliation data information for appropriate UCMDDB CITs. For details, see “Reconciliation Data Configuration” on page 372.
- 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 376.

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 UCMDDB 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 UCMDDB class model name.
- The `attributeMappings` element contains `attributeMapping` elements.

The `attributeMapping` element defines the mapping between the UCMDDB 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 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.servi
ceCenterConnector.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>RetrieveIncidentKeysListRequest</request_name>
        <response_name>RetrieveIncidentKeysListResponse</response_name>
      </keys_action_info>
      <properties_action_info>
        <request_name>RetrieveIncidentListRequest</request_name>
        <response_name>RetrieveIncidentListResponse</response_name>
      </properties_action_info>
    </class_configuration> ]]>
  </classConnectorConfiguration>
</ucmdbClassConfiguration>

```

Adding an Attribute to a CIT

When adding an attribute to the UCMDB model for a 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>SerialNumber</reconciliationById>
```

In this example, the ServiceDesk field `SerialNumber` 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.

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 `&`).

Adapter Deployment

This section describes a typical deployment of the Adapter.

This section includes the following topics:

- 1** “Deploy the ServiceDesk Adapter” on page 377
 - a** “Extract the Adapter Implementation Files and Deploy the Package” on page 377
 - b** “Add a ServiceCenter/Service Manager External Data Source” on page 377
 - c** “Configure HP ServiceCenter 6.2” on page 377 (when connecting to HP ServiceCenter)
 - d** “Configure HP Service Manager 7.0” on page 380 (when connecting to HP Service Manager)
- 2** “Add an Attribute to the ServiceCenter/Service Manager CIT” on page 382
 - a** “Add an Attribute to the HP Universal CMDB Model” on page 383
 - b** “Export Attributes from HP ServiceCenter by Changing the Configuration” on page 384 (when connecting to HP ServiceCenter)
 - c** “Export Attributes from HP Service Manager by Changing the Configuration” on page 386 (when connecting to HP Service Manager)

- d “Modify the Adapter Configuration File” on page 388
- e “Load the Changes” on page 389

Deploy the ServiceDesk Adapter

This section explains where to place the files needed for deployment.


Extract the Adapter Implementation Files and Deploy the Package

- 1 Verify the location of the following folder and file:
 - ServiceDeskAdapter
 - serviceDeskAdapter.zip
- 2 Move the **serviceDeskAdapter.zip** package to the following directory:
<HP Universal CMDB root directory>\UCMDBServer\root\lib\packages.
- 3 Deploy the serviceDeskAdapter.zip package: Log in to HP Universal CMDB and access the Package Manager (**Admin > Settings > Package Manager**). Select the package and click the **Deploy** button.

For details on deploying packages, see “Deploy a Package” in *Model Management*.

- 4 Move the **ServiceDeskAdapter** folder to the following directory:
<HP Universal CMDB root directory>\UCMDBServer\j2f\fcmdb\CodeBase

Add a ServiceCenter/Service Manager External Data Source

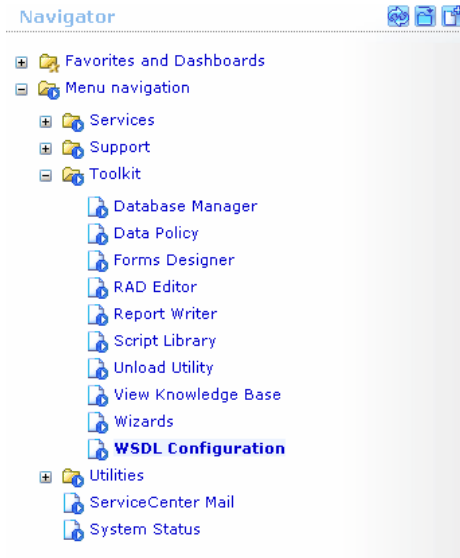
- 1 In HP Universal CMDB, access the Federated CMDB window: **Admin > Settings > Federated CMDB**.
- 2  Click the button to add a data store. In the Data Store dialog box that opens, choose the **ServiceDeskAdapter** and fill in the mandatory fields.
For help with this dialog box, see “Data Store Dialog Box” on page 463.
- 3 Continue to “Configure HP ServiceCenter 6.2” on page 377 or “Configure HP Service Manager 7.0” on page 380.

Configure HP ServiceCenter 6.2

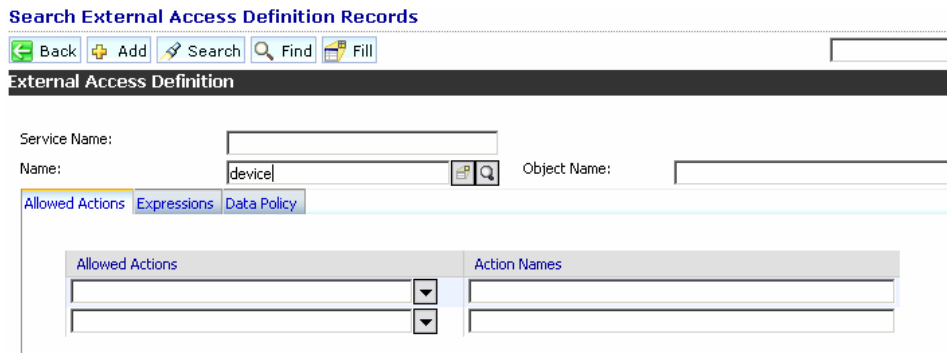
If you are connecting to HP ServiceCenter, perform the following procedure.

- 1 Open HP ServiceCenter, then the ServiceCenter client.

2 Display WSDL Configuration in the Navigator (Main Menu > Menu navigation > Toolkit):



3 In the Name field, enter device and press Enter:



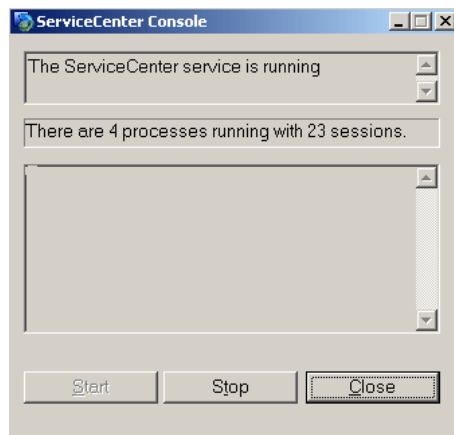
- 4 Select the **Data Policy** tab and ensure that the `network.name` attribute is not empty (its value should be **NetworkName**). Change the value to **false**. Save your changes.

Service Name: ConfigurationManagement
 Name: device Object Name: Device

Allowed Actions Expressions **Data Policy**

mac.address		true	
manufacturer		true	
model	Model	false	
mtbf		true	
network.address		true	
network.name	NetworkName	false	
nm.id		true	
nondevice		true	
objid		true	
operating.system		true	
order.line.item		true	

- 5 Restart ServiceCenter: Select **Start > Programs > ServiceCenter 6.2 > Server > Console** to open the ServiceCenter Console.

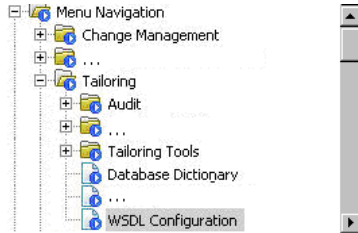


- 6 Click **Stop** and then **Start**.
- 7 Continue to “Add an Attribute to the HP Universal CMDB Model” on page 383.

Configure HP Service Manager 7.0

If you are connecting to HP Service Manager, perform the following procedure.

- 1 Open the HP Service Manager client.
- 2 Display **WSDL Configuration** in the Navigator (**Main Menu > Menu navigation > Tailoring**):



- 3 In the Object Name field, enter **Device** and press ENTER.

External Access Definition

Service Name:

Name: Object Name:

◆ Allowed Actions ◆ Expressions ◆ Fields

Allowed Actions	Action N...	Action Type

- 4 Select the **Fields** tab and ensure that the `network.name` attribute appears in the Field list with **NetworkName** as its caption. If this attribute does not appear in the Field list, add it and save your changes.

object.name

Device

DeviceParent

OK Cancel Previous Next Add Save Delete Find Fill

Field	Caption	Type
dept	Department	
device.severity	Critical	BooleanType
floor	Floor	
is.down	SystemDown	BooleanType
istatus	Status	
location	Location	
location.code	LocationCode	
logical.name	ConfigurationItem	
model	Model	
parent	ParentDevice	
part.no	PartNumber	
room	Room	
serial.no.	SerialNumber	
subtype	ConfigurationItem...	
type	ConfigurationItem...	
updated.by	UpdatedBy	
vendor	Vendor	
network.name	NetworkName	

- 5 To support Problem federation, access **WSDL Configuration** in the Navigator (**Main Menu > Menu navigation > Tailoring**) and enter **Problem** in the Object Name field. Press ENTER.

External Access Definition

Service Name:

Name: Object Name:

Allowed Actions Expressions Fields

Allowed Actions	Action N...	Action Type

6 Click the **Fields** tab, add the following fields, and save your changes:

Field	Caption	Type
id	id	
brief.description	brief.description	
status	status	
expected.resolution.time	expected.resolution.time	DateTimeType
category	category	
initial.impact	initial.impact	
severity	severity	
priority.code	priority.code	
assignment	assignment	
logical.name	logical.name	
affected.ci(ci.device.name)	ci.device.name	

7 Restart the HP Service Manager 7.00 Server service.

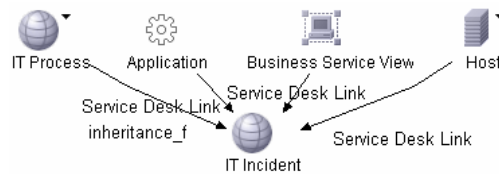
8 Continue to “Add an Attribute to the HP Universal CMDB Model” on page 383.

Add an Attribute to the ServiceCenter/Service Manager CIT

This section explains how to retrieve additional data from ServiceCenter/Service Manager by adding an attribute.

Add an Attribute to the HP Universal CMDB Model

- 1 Add the new attribute to HP Universal CMDB: Edit the Incident CIT: Select **Admin > Modeling > CI Type Manager**. In View Explorer, select **IT Process > IT Incident**. Right click and choose **Edit CIT**.

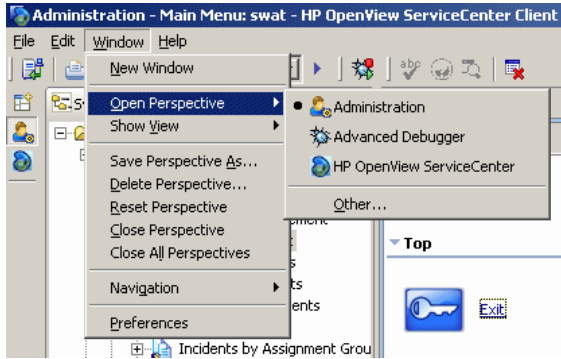


- 2 Select the Attribute tab and add the new attribute:

- 3 Continue to “Export Attributes from HP ServiceCenter by Changing the Configuration” on page 384 or “Export Attributes from HP Service Manager by Changing the Configuration” on page 386.

Export Attributes from HP ServiceCenter by Changing the Configuration

- 1 In HP ServiceCenter, open the ServiceCenter client.
- 2 Select **Window > Open Perspective > Administration:**



- 3 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 HP Universal CMDB.

- 4 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 displays the ServiceCenter interface. On the left, the 'Incident Title' is 'this is my first fed'. Below it, the 'Alert Status' is 'updated', 'Category' is 'security', and 'Subcategory' is 'virus infection'. The main area shows an XML view with the following code:

```
<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" />
```

The 'Find/Replace' dialog box is open on the right. The 'Find' field contains 'myclass'. The 'Replace With' field is empty. The 'Direction' is set to 'Forward' and the 'Scope' is set to 'All'. The 'Options' section includes checkboxes for 'Case Sensitive', 'Wrap Search', 'Whole Word', 'Incremental', and 'Regular expressions', all of which are currently unchecked. The 'Find' and 'Replace/Find' buttons are visible.

- 5 Display **WSDL Configuration** in the Navigator (**Main Menu > Menu navigation > Toolkit**). Locate the Object Name field, enter **Incident** and press **Enter**.
- 6 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.
- 7 Restart ServiceCenter: Select **Start > Programs > ServiceCenter 6.2 > Server > Console** to open the ServiceCenter Console.
- 8 Click **Stop** and then **Start**.
- 9 Continue to “Modify the Adapter Configuration File” on page 388.

- 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 HP Incident Management console. At the top, there's a table of incidents:

Incident...	Open Time	Update Time	Alert Status	Category	Brief Description
IM10...	11/29/07 03:5...	11/29/07 03:5...	open	security	012
IM10...	12/04/07 02:0...	12/04/07 02:0...	open	network	test1
IM10...	12/05/07 07:2...	12/04/07 07:2...	DEADLINE AL	business appl	3

Below the table is a search form with the following fields:

- Incident Number: IM10002
- Ticket Status: Open
- Incident Title: test1

The 'Incident Details' tab is active, showing the following information:

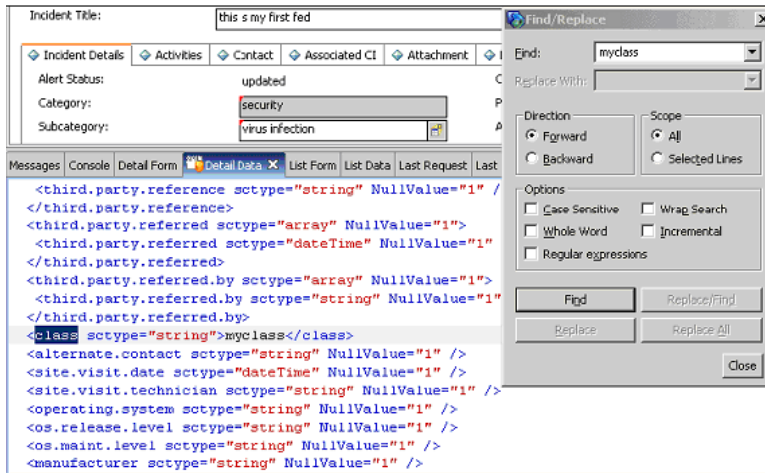
- Alert Status: open
- Category: network
- Subcategory: remote communications
- Product Type: remote communications
- Problem Type: dial-in
- Manufacturer: Unknown
- Class: myclass
- Owner: falcon
- Primary Asgn Group: LAN SUPPORT
- Assignee Name: (empty)
- Second Asgn Group: TELCOM SUPPORT
- Hot Ticket:
- Total Loss of Service:
- Initial Impact Assessment: 1 - Enterprise
- Urgency: 4 - Low

The bottom pane shows the following XML snippet:

```
<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>
</instance>
</model>
```

Note: Verify that the value in the Class field is the one that you want to report to HP Universal CMDB.

- 3 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.



- 4 Display **WSDL Configuration** in the Navigator (**Main Menu > Menu Navigation > Tailoring**). Locate the Object Name field, enter **Incident** and press ENTER.
- 5 Select the **Data Policy** tab.
- 6 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.
- 7 Restart the HP Service Manager 7.00 Server service.
- 8 Continue to “Modify the Adapter Configuration File” on page 388.

Modify the Adapter Configuration File

- 1 Edit the **ServiceDeskConfiguration.xml** file in

```
<HP Universal CMDB root directory>\UCMDBServer\j2f\fcmdb\CodeBase
\ServiceDeskAdapter
```

- 2 Add the new attribute line under the Incident area: Locate the following marker:

```
<ucmdbClassConfiguration ucmdbClassName="it_incident">
<attributeMappings>
```

- 3 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 valued defined in ServiceCenter/Service Manager
- 4 Continue to “Load the Changes” on page 389.

Load the Changes

- 1 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 HP Universal CMDB is installed.

You may have to log in with the administrator’s user name and password.

- 2 Click the **Topaz > service=Fcmdb Config Services** link.
- 3 In the JMX MBEAN View page, locate the following operation: **loadOrReloadCodeBaseForAdapterId()**.
- 4 In the customerID field, enter **1**. In the AdapterId field, enter the name of the Adapter folder (ServiceDeskAdapter). Click **Invoke**.

The Database Adapter

This section includes the following topics:

- “Introduction” on page 390
- “Supported TQLs” on page 390
- “Reconciliation” on page 391
- “Hibernate as JPA Provider” on page 393
- “Limitations” on page 395
- “How To Verify That the Database Adapter Can Be Used” on page 396
- “Deployment” on page 398
- “Deployment Example” on page 400
- “The Configuration Files” on page 404
- “OOB Converters” on page 421
- “Configuration Examples” on page 424
- “External References” on page 437

Introduction

This section describes the generic database adapter functionality, usages, and deployment in HP Universal CMDB.

The purpose of this adapter is to enable integration with any kind of relational database and to run a federated TQL against the database.

This version of the database adapter implementation is based on a JPA (Java Persistence API) standard with the Hibernate ORM library as a provider.

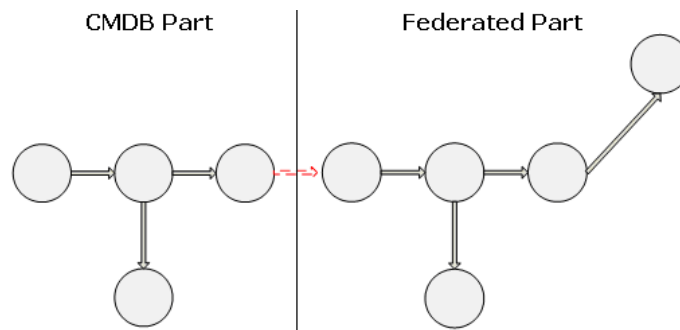
Supported TQLs

The TQL calculation (on the federated side) is based on the database TQL calculator and therefore several pattern definitions are not supported.

TQL is supported by every graph as long as all the requested nodes appear in its definition.

The following limitations and features exist on the federated CMDB only:

- Subgraph is not supported
- Compound links are not supported
- Cycles or cycle parts on the federated side are not supported (the cycle includes the CMDB side)
- Function layout is not supported
- 0..0 cardinality is not supported
- The Joinf link is not supported
- Many conditions are supported, except for qualifier conditions
- To connect between two CIs, a link in the shape of a table/foreign key must exist in the federated database.



Reconciliation

Reconciliation is carried out as part of the TQL calculation on the adapter side. For this to occur, the CMDB side is mapped to a federated entity called **multinode**.

Mapping. Each attribute on the CMDB side is mapped to a column on the federated side.

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 CMDB and federated sides, an appropriate association must exist in the database. For details, see “How To Verify That the Database Adapter Can Be Used” on page 396.

Reconciliation with CMDB id is also supported.

Reconciliation rules are in 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 sides (CMDB and federated) have `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 one of the sides is missing `host_name`, the `ip_address` is checked.

- ▶ **Regular match.** If there is equality in one of the OR sub-expressions, both sides 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 links (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 external side 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 on the CMDB side and a ticket on the federated side.

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		DB Ticket	
PK	<u>host_id</u>	PK	<u>ticket_id</u>
	ex_host_name ex_ip_address		host_id

Note: Both tables must be part of the federated database 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 (Oracle, Microsoft SQL Server, and so on). For details, see “Functional Limitations” on page 395.

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).

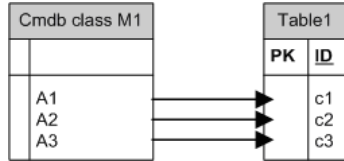
Other supported features include mapping a class to several tables, support for collections, and associations of types one-to-one, one-to-many, and many-to-one. For details, see “Associations” on page 395.

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.

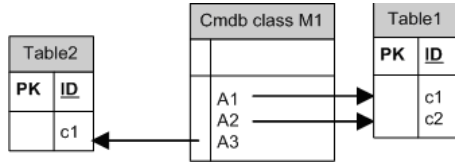
Example of OR Mapping

1 CMDB Class 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.

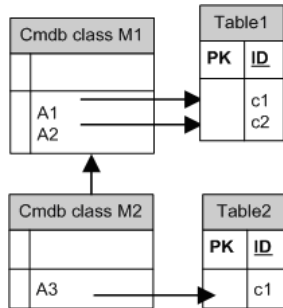


1 CMDB Class to 2 Database Tables



Inheritance

This case is used today in the CMDB, where each class has its own database table.



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. These associations are 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 rich, a streamlined XML file is provided to ease definitions.

Use case for using this XML file: Federated data is modeled into one federated class and this class has many-to-one relations to the non-federated CMDB class. In addition, there is only one possible relation type between the federated class and the non-federated class.

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 link 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

- ▶ Supported databases: Oracle, Microsoft SQL Server, MySQL.
- ▶ The creation of a manual link between the CMDB and federated objects is not allowed. To be able to define virtual links, a special relation logic must be defined (it can be based on properties of the federated class).

- Properties from the CI type list are not supported.
- Inheritance on the database side is not supported. To add inheritance, map all the attributes for each class you use. For example, if the database is the CMDB database, you should map root, data, and CI attributes for each CIT.
- Using a class qualifier in a condition is not supported.
- Subgraphs are not supported.
- Compound links 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.
- A discriminator is not supported.

How To Verify That the Database Adapter Can Be Used

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 391.

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

ID	HOST_NAME	IP_ADDRESS
116	CUT	16.59.41.214
117	labm1hp4.devlab.ad	16.59.60.182

- To correlate two CITs with a link, 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 393.

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

Deployment

Deploying a New Adapter

- 1 Create relevant CITs (to add to the CMDB class model).
- 2 Add appropriate valid links (to add to the CMDB class model).
- 3 Create an adapter definition XML file. Make sure to change the adapter ID to your adapter name. Place it inside a package under the adapter folder and deploy it. For details, see “Package Deployment” in *Model Management*.
- 4 Copy the generic database adapter folder under the `j2f\fcmdb\codebase` folder and rename it to the name of your adapter (the adapter ID created in step 3).

- 5 Edit the configuration files under the <HP Universal CMDB root directory>\UCMDBServer\j2f\fcmdb\CodeBase\GenericDBAdapter\META-INF folder (choose between a simplified XML and advanced configuration files).
- 6 In HP Universal CMDB, add an adapter: Fill in the database details and mark the CITs that you want to associate with the adapter. For details, see “Data Store Dialog Box” on page 463.

Note: Make sure that the URL field is in the format of:
key1=value1;key2=value2;...

- a The keys can be dbtype, dbname, or sid.
- b The value of dbtype can be mysql, oracle, or sqlserver.
- c When defining a generic database adapter, you must add dbtype.
- d If you choose the oracle database type, you must add sid.
- e If you choose mysql and sqlserver, you must add dbname.

Adding CITs to an Existing Adapter

Perform the following procedure:

- 1 Create relevant CITs. For details, see “Create a CI Type” in *CI Attribute Customization*.
- 2 Add appropriate valid links.
- 3 Update the configuration files under the <HP Universal CMDB root directory>\UCMDBServer\j2f\fcmdb\CodeBase\GenericDBAdapter\META-INF folder with the new CITs.
- 4 In HP Universal CMDB, edit the adapter: Mark the additional CITs that you want to associate with the adapter. For details, see “Data Store Dialog Box” on page 463.

Deployment Example

This example shows how to create a new adapter. This procedure is similar when updating an existing adapter.

To create an adapter:

- 1 Create the relevant CITs: Add the `host_card` class with the definition:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- edited with XMLSPY v5 rel. 3 U (http://www.xmlspy.com) by Mercury (Mercury Interactive) -->
<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>
```


- 2** Add an appropriate valid link: the link is a contained CIT and connects the new `host_card` CIT and the other host:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- edited with XMLSPY v5 rel. 3 U (http://www.xmlspy.com) by Mercury (Mercury
Interactive) -->
<Valid-Links>
  <Valid-Link>
    <Class-Ref class-name="contained"/>
    <End1 class-name="host"/>
    <End2 class-name="host_card"/>
  </Valid-Link>
</Valid-Links>
```

- 3** Create an adapter definition XML file. Make sure to change the adapter ID to your adapter name. Place it inside a package under the adapter folder and deploy it. In the following example, the adapter ID is `EDDBAdapter`. I put this XML file inside a package under adapter folder and deploy it:

```
<adapter-config adapter-id="EDDBAdapter">
  <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>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>
```

- 4 Copy the generic database adapter folder under the <HP Universal CMDB root directory>\UCMDBServer\j2f\fcmdb\codebase folder. Rename the file to the name of your adapter (the adapter ID you created in step 3). In this case the folder under codebase is named **EDDBAdapter**.
- 5 Edit the configuration files under the <HP Universal CMDB root directory>\UCMDBServer\j2f\fcmdb\CodeBase\GenericDBAdapter\META-INF folder (choose between the simplified XML and advanced configuration files). In this case the simplified XML is used:

```
<?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>
      <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)"/>
    </reconciliation-by-single-node>
  </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>
```

- 6 In HP Universal CMDB, add an adapter: Fill in the database details and mark the CITs that you want to associate with the adapter. For details, see “Data Store Dialog Box” on page 463.

In the following example, the EDDBAdapter is selected:

Data Store

Choose the adapter and fill in the connection properties (fields in red are mandatory). Click "Test Connection" to verify that the properties are correct.

Properties

Adapter: EDDBAdapter

Name: ed1

CustomerID: 1

Host: labm1mam15

Port: 8108

User: itmanager

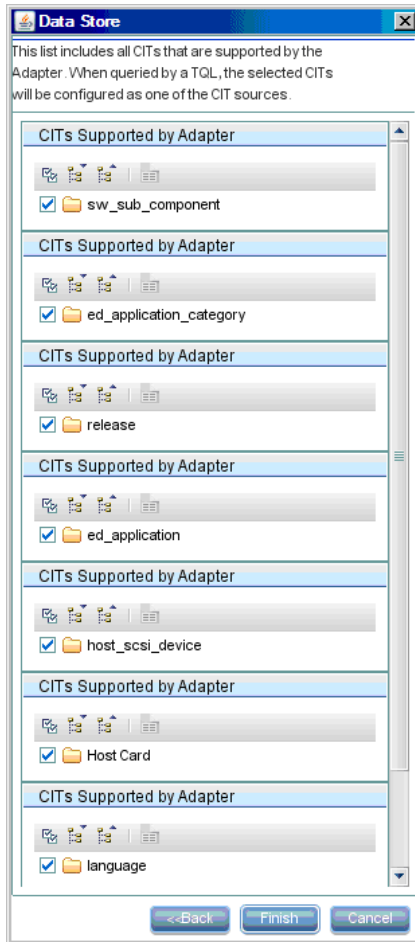
Password: *****

URL: dbtype=mysql,dbname=aggregate,sid=a

Test connection

<<Back Next>> Cancel

Its supported CITs are associated with the adapter:



The Configuration Files

The following files exist under the <HP Universal CMDB root directory>\UCMDBServer\j2f\fcmdb\CodeBase\GenericDBAdapter\META-INF folder:

General Configuration

- **adapter.conf.** The adapter configuration file. For details, see “The adapter.conf File” on page 405.

Advanced Configuration

- **orm.xml.** The OR mapping file in which you map between CMDB classes and database tables. For details, see “The orm.xml File” on page 413.
- **reconciliation_rules.txt.** Contains the reconciliation rules. For details, see “The reconciliation_rules.txt File” on page 418.
- **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 419.

Hibernate Configuration

- **persistence.xml.** Used to override out of the box hibernate configurations. For details, see “The persistence.xml File” on page 420.

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 406.

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 Universal CMDB root directory>\UCMDBServer\j2f\fcmbd\CodeBase\GenericDBAdapter\META-INF folder.

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:complexType>

```

```

    </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: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 classes 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]"/>
  </cmdb-class>
</generic-db-adapter-config>

```

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 link type needed in the reconciliation TQL.

link-direction. The direction of the link 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 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 from the main class (the multinode), use the **attribute** tag, otherwise use the **connected-node-attribute** tag.

ignore-case. true: when values are compared on both sides, 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.fcmdb.adapters.dbAdapter.dal.transform.FcmdbDalTransformerFromExternalDB`
- ▶ `com.mercury.topaz.fcmdb.adapters.dbAdapter.dal.transform.FcmdbDalTransformerToExternalDB`

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.fcmdb.adapters.dbAdapter.dal.transform.impl.GenericE  
numTransformer(generic-enum-transformer-example.xml)" to-cmdb-  
converter="com.mercury.topaz.fcmdb.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 only to map one node TQLs (on the database side). 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 editing is located in the **<HP Universal CMDB root directory>\UCMDBServer\j2f\fcmdb\CodeBase\GenericDBAdapter\META-INF** folder.

For details on naming conventions, see “Naming Conventions” on page 418.

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 CMDB CIT name. This is the multinode entity.

Make sure that **name** is the same as **class** and that **class** includes a **generic_db_adapter.** prefix.

```
<entity name="host" 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>
```

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.

Note: The convention for multinode attribute names is **className_attributeName**. In this example, the class name is **host** and the attribute name is **host_hostname**.

The expression is located in the reconciliation_rules.txt file:

```

    <basic name="host_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>
<entity name="[cmdb_class_name]"
class="generic_db_adapter.[cmdb_class_name]">
  <table name="[default_table_name]"/>
  <secondary-table name=""/>

```

If there is more than one primary key column, add this tag. The convention is `generic_db_adapter.IdClass[num of primary key columns]PK_[cmdb_class_name]`

```
<id-class class="generic_db_adapter.IdClass3PK_[cmdb_class_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>
```

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>
```

If you used the **id-class** tag, add this entity.

In this definition you declare which columns are the primary key columns:

id1, **id2**, and **id3** must match the corresponding definitions in the entity that has this tag.

```
<entity class="generic_db_adapter.IdClass3PK_host_card"
name="IdClass3PK_host_card">
  <table name="[default_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>
```

This is a link 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>
```

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 links 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 link 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>
```

Naming Conventions

- In each entity, the class property must match the name property with the prefix of `generic_db_adapter`.
- Primary key columns must have names of the form **idX** where **X = 1, 2, ...**, according to the number of primary keys in the table.
- Attribute names in the multinode entity take the form `className_attributeName`.
- If an entity has more than one primary key column, there is a need to add an **id** class as separate entity. The name takes the form `IdClassXPK_cmdbClassName` where **X** is replaced with the number of primary key columns and `className` is replaced with the entity name with which this id class is associated.
- Entity names must match class names even as regards case.
- Attribute names must match class attributes names even as regards case.
- Link name takes the form `end1Type_linkType_end2Type`.

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 class name that is connected to the federated class in the TQL).

This expression includes the logic that decides whether two multinodes are equal (one multinode from the CMDB side and the other from the federated adapter side).

The expression is composed from ORs of 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.

Use the control sign (^) sign when you want to ignore case during a comparison.

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.fcmdb.adapters.dbAdapter.dal.transform.impl.GenericEnumTransformer(
generic-enum-transformer-example.xml)]
from_db_class[com.mercury.topaz.fcmdb.adapters.dbAdapter.dal.transform.impl.GenericEnumTransform
er(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.fcmdb.adapters.dbAdapter.dal.transform.FcmdbDalTransformerToExternalDB`. 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.fcmdb.adapters.dbAdapter.dal.transform.FcmdbDalTransformerFromExternalDB` 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 “OOB Converters” on page 421.

The persistence.xml File

This file is used to override the default hibernate settings and to add support in 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>
```

OOB Converters

The GenericEnumTransformer

This transformer 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.

The input file XSD

```
<?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="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: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:complexType>
  </xs:element>
</xs:schema>
```

```

    </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 Transforming sys Value to System Value

In this example, sys value in the CMDB is transformed to value System and value System in the federated database is transformed to sys.

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 value.

There are two implementations:

- ▶ **com.mercury.topaz.fcmbd.adapters.dbAdapter.dal.transform.impl.AdapterToCmdbAddSuffixTransformer** . Adds the suffix (given as input) when converting from federated value to CMDB value and removes the suffix when converting from CMDB value to federated value.
- ▶ **com.mercury.topaz.fcmbd.adapters.dbAdapter.dal.transform.impl.AdapterToCmdbRemoveSuffixTransformer**. Removes the suffix (given as input) when converting from federated value to CMDB value and adds the suffix when converting from CMDB value to federated value.

The BytesToString Transformer

This transformer is used to convert byte arrays from the CMDB side to their string representation on the Federated side.

The converter is:

`com.mercury.topaz.fcmbd.adapters.dbAdapter.dal.transform.impl.CmdbToAdapterBytesToStringTransformer`.

Configuration Examples

Use case. A TQL is:

```
host > (container_f) > host_card
```

where:

host_card is the federated entity

host is the CMDB entity

container_f is the link between them

The example is run against the ED database. ED hosts are kept in the Device table and `host_card` is kept in the `hwCards` table. In the following examples, `host_card` is always mapped in the same manner.

Example of a Single Node Reconciliation

In this example the reconciliation is according to the `host_hostname` property.

simplifiedConfiguration 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 link mapping. For details, see the definition section in “The orm.xml File” on page 413.

```
<?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>
    </attributes>
  </entity>
</entity-mappings>
```

```

        </id>
        <basic name="host_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 418.

```
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 Nodes Reconciliation

In this example, reconciliation is done according to the `host_hostname` and `ip_address` properties with different variations.

The reconciliation TQL is `host > (contained) > ip`.

simplifiedConfiguration 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.

```

<?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_host_hostname">
      <column name="Device_Name"/>
    </basic>
    <basic name="ip_ip_address">
      <column name="Device_PreferredIPAddress"/>
    </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 418.

```
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:

simplifiedConfiguration 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 need to map between each column in the foreign key to a column in the primary key.

For details, see “The orm.xml File” on page 413.

```
<?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_host_hostname">
      <column name="Device_Name"/>
    </basic>
  </attributes>
</entity>
<entity class="generic_db_adapter.host_card" name="host_card">
  <table name="hwCards"/>
  <id-class class="generic_db_adapter.IdClass3PK_host_card"/>
  <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.IdClass3PK_host_card" name="IdClass3PK_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>
</attributes>
</entity>
<entity class="generic_db_adapter.host_contained_host_card" name="host_contained_host_card">
  <table name="hwCards"/>
  <id-class class="generic_db_adapter.IdClass3PK_host_card"/>
  <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 XML mapping file is `generic-enum-transformer-example.xsd`.

```
<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>
```

simplifiedConfiguration 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.fcmdb.adapters.dbAdapter.dal.transform.impl.GenericE
numTransformer(generic-enum-transformer-example.xml)" to-cmdb-
converter="com.mercury.topaz.fcmdb.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. 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.fcmdb.adapters.dbAdapter.dal.transform.impl.Generic
EnumTransformer(generic-enum-transformer-example.xml)]
from_db_class[com.mercury.topaz.fcmdb.adapters.dbAdapter.dal.transform.impl.Gener
icEnumTransformer(generic-enum-transformer-example.xml)]

```

External References

JPA spec:

<http://jcp.org/aboutJava/communityprocess/final/jsr220/index.html>

The Federated Adapter

Note:

- ▶ The term **relationship** is equivalent to the term **link**.
 - ▶ The term **CI** is equivalent to the term **object**.
 - ▶ For a glossary of definitions and terms, see “Federated CMDB Reference” on page 476.
-

This section includes the following topics:

- ▶ “Introduction to Federation Framework” on page 437
- ▶ “Adapter and Mapping Interaction with Federation Framework” on page 440
- ▶ “Add an Adapter for a New External Data Store” on page 451
- ▶ “Adapter Capabilities” on page 460

Introduction to Federation Framework

The federated TQL (FTQL) provides two main capabilities:

- ▶ **Federation on the fly.** All queries are run over original data stores and results are built on the fly in HP Universal CMDB.
- ▶ **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.

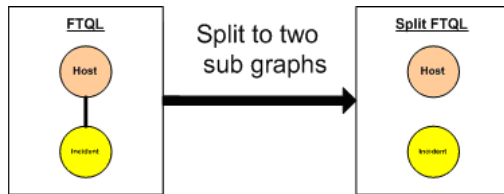
Federation on the Fly

Federated TQL enables data retrieval from any external data store without replicating its data.

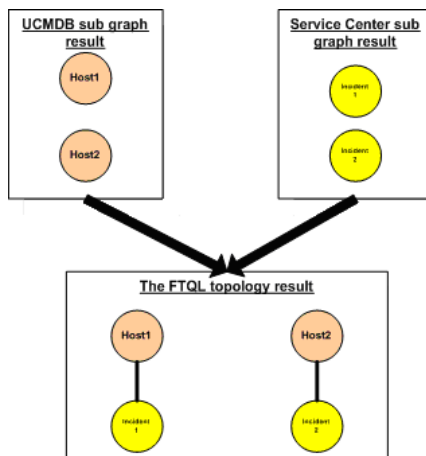
A federated query uses adapters that represent external data stores, to create appropriate external relationships between different external data store CIs and UCMDB CIs.

The following workflow illustrates federation on the fly:

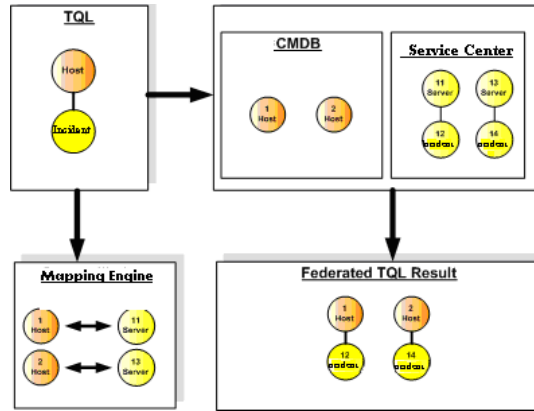
- 1 The Federation Framework splits Federated TQL (FTQL) into several subgraphs, where all nodes in a subgraph refer to the same data store. Each subgraph is connected to the other subgraphs by a virtual relationship (but contains no virtual relationships).



- 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.



- After the FTQL topology is calculated, the Federation Framework retrieves a layout for the topology result.



Data Replication

You may need to 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, which means that data synchronized between the source data store and target data store is retrieved by a query name in the source data store. For example, in HP Universal CMDB, 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, and there is no other query that 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 contains the following steps:

- Get the topology result with signatures from the source data store.

- 2 Compare the new results with the previous results.
- 3 Get a full layout (all CI properties) of CIs and relationships only for changed results.
- 4 Update the target data store with the received full layout of CIs and relationships. If any CIs or relationships were deleted in the source data store and the query is exclusive, remove the CIs or relationships in the target data store as well.

Adapter and Mapping Interaction with Federation Framework

An adapter is an entity in the Federated CMDB that represents external data (data that is not saved in HP Universal CMDB). All interactions in federated flows with external data sources are performed through adapters. The Federation Framework interaction flow and adapter interfaces are different for replication and for FTQL.

Adapter Life Cycle

An adapter instance is created for each external data store. The adapter begins its life cycle 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 life cycle 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 help add external data store configurations. These methods are outside the adapter life cycle and create a new adapter each time the method is 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.

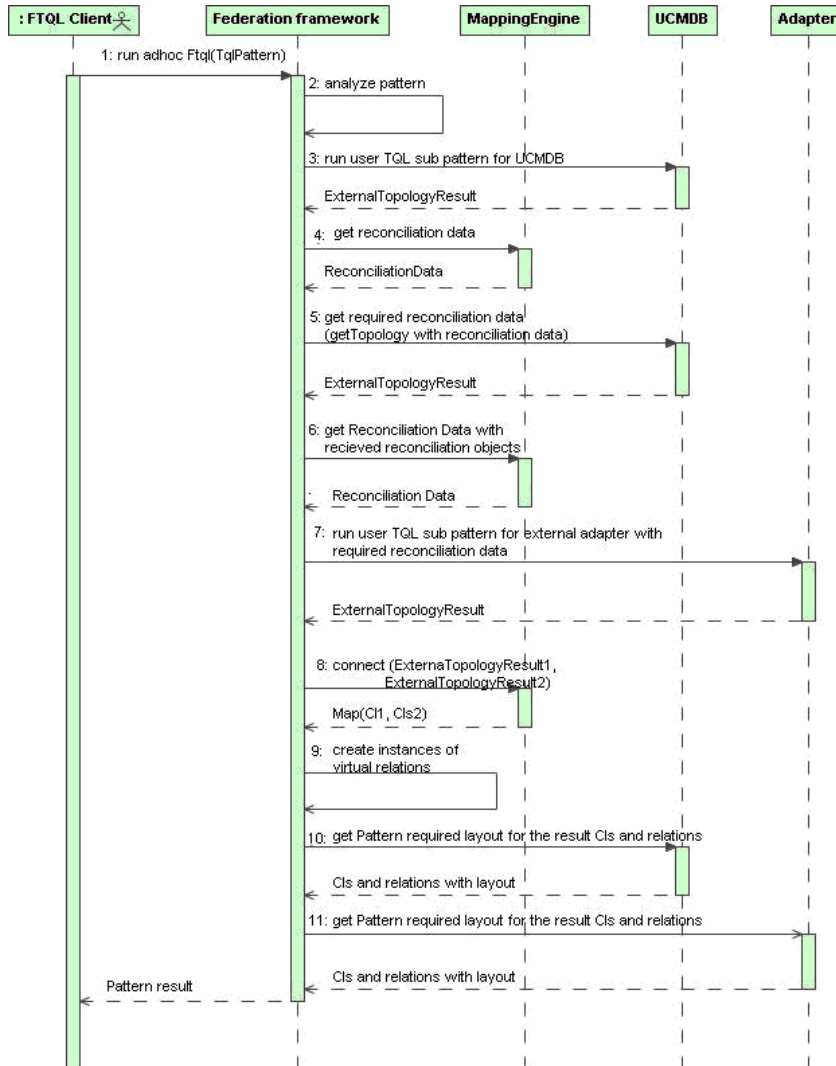
All these methods are used when you create new data store configurations.

Federation Framework Flow for FTQL

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 requests reconciliation data from the two data stores for mapping the end nodes of the virtual relationship.

One end of the virtual relationship must refer to HP Universal CMDB. For the calculation of the two subgraphs, a virtual relationship can start from any end node.

The following sequence diagram illustrates the interaction between the Federation Framework, HP Universal CMDB, the adapter, and the Mapping Engine. The FTQL in the example diagram has only one virtual relationship, so that only HP Universal CMDB and one external data store are involved in the FTQL. We assume that the calculation starts from HP Universal CMDB.



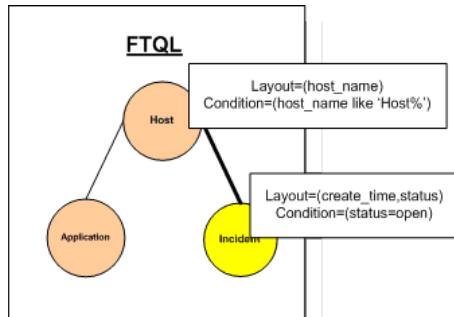
1 The Federation Framework receives a call for a FTQL calculation.

- 2** The Federation Framework analyzes the pattern, finds the virtual relationship, and divides the original TQL into two sub-patterns—one for HP Universal CMDB and one for the external data store.
- 3** The Federation Framework requests the topology of the sub-TQL from HP Universal CMDB.
- 4** After receiving the topology results, the Federation Framework calls the appropriate Mapping Engine for the current virtual relationship and receives reconciliation data. This reconciliation data defines what data is needed to reconcile between the reconciliation CIs and connects between the results of the two data stores, as follows:
 - ▶ **IdReconciliationData.** Reconciliation is done by ID
 - ▶ **PropertyReconciliationData.** Reconciliation is done by properties of one CI.
 - ▶ **TopologyReconciliationData.** Reconciliation is done by 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 on page 443 from HP Universal CMDB.
- 6** The Federation Framework calls the Mapping Engine to run the reconciliation data on an external data store. In this state, the Mapping Engine receives the the reconciliation objects from step 5 on page 443 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 the definition of the required reconciliation data from the external data store.
- 8** The Federation Framework calls the Mapping Engine to connect between the received results. The Mapping Engine returns a map where External CI ID from the first data store (HP Universal CMDB in our case) is mapped to the External CI IDs from the second 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.

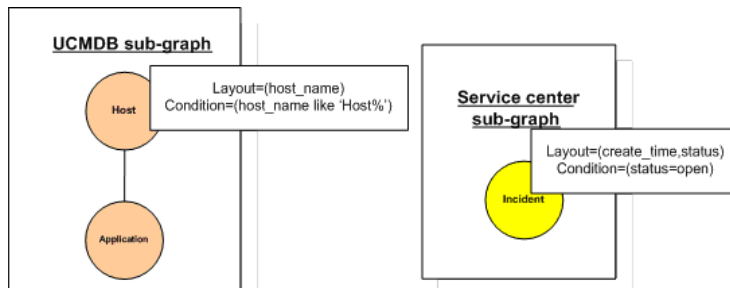
Example for Federation Framework Flow for FTQL

In this example, the ServiceCenter data store is the external data store. Use case: the ability to see all open incidents on specific hosts. The host instances are stored in HP Universal CMDB, and the incident instances are stored in ServiceCenter. We assume 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 HP Universal CMDB.

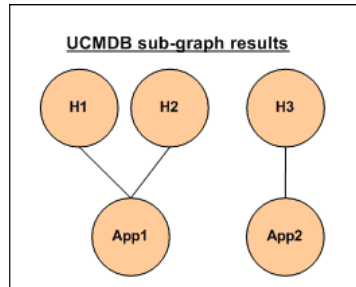
The example workflow uses the following FTQL:



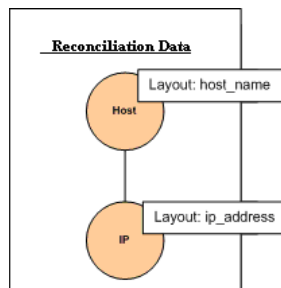
- 1 After analyzing the pattern, the Federation Framework recognizes the virtual relationship between Host and Incident and splits the FTQL into two subgraphs:



- 2** The Federation Framework runs the HP Universal CMDB subgraph to request the topology, and receives the following results:

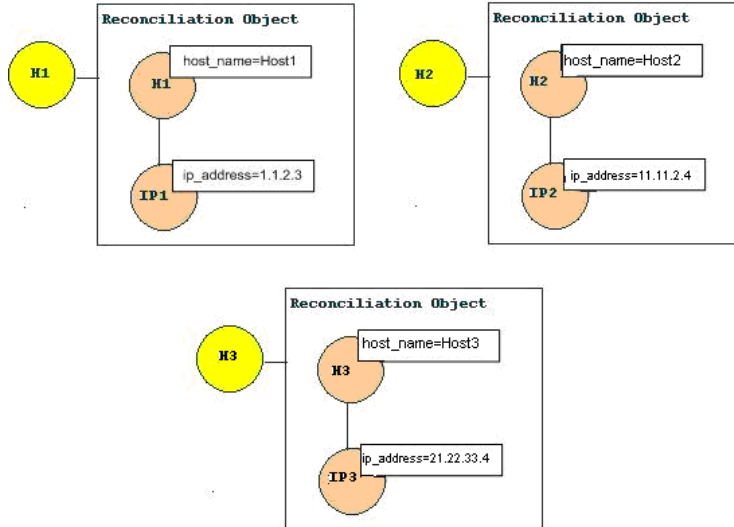


- 3** The Federation Framework requests from the appropriate Mapping Engine the reconciliation data for the first data store (HP Universal CMDB) that contains the information to connect between received data from two data stores. The reconciliation data in this case is:

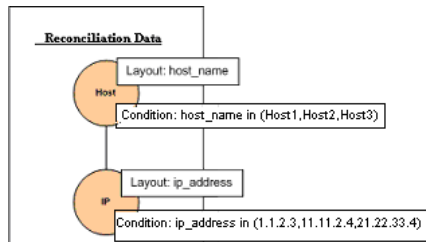


- The Federation Framework creates one node topology query with Host node and ID conditions on it from the previous result (host_id in H1, H2, H3), and runs this query with required reconciliation data on HP Universal CMDB. The result includes Host CIs that are relevant to the ID condition and the appropriate reconciliation object for each CI:

result of getTopology with ReconciliationData

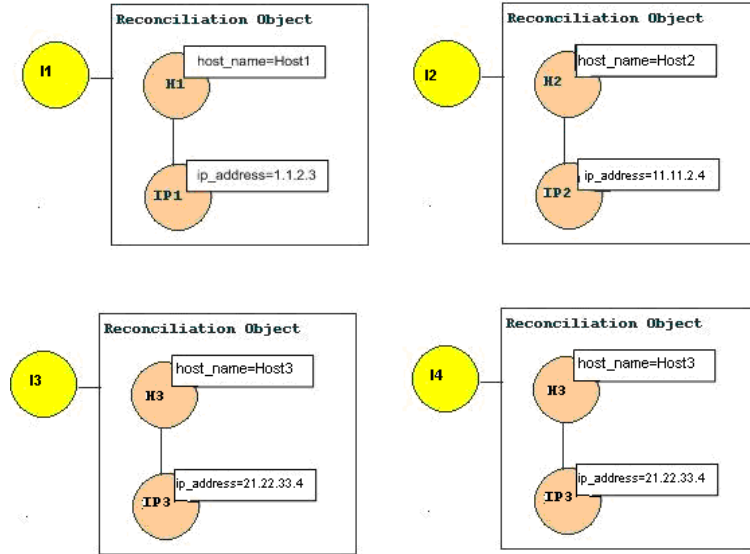


- The reconciliation data for ServiceCenter should contain a condition for host_name and ip_address that is derived from the reconciliation objects received from HP Universal CMDB:

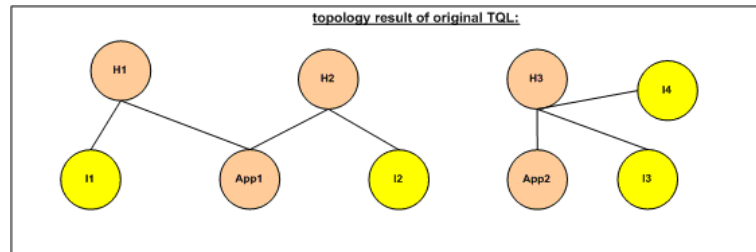


- 6 The Federation Framework runs the ServiceCenter subgraph with the reconciliation data to request the topology and appropriate reconciliation objects, and receives the following results:

ServiceCenter Result of getTopology with Reconciliation Data



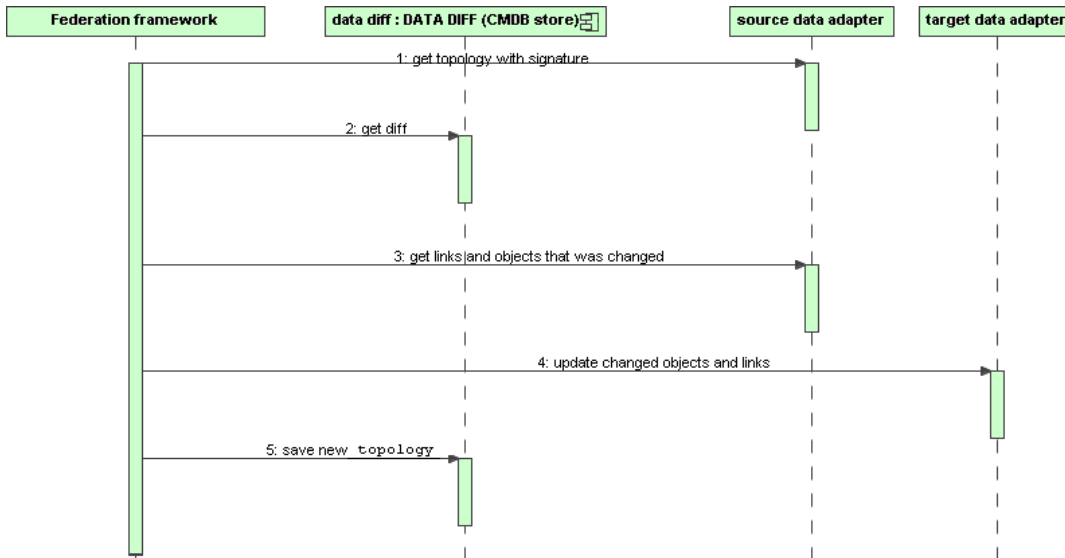
- 7 The result after connection in Mapping Engine and creating virtual relationships is:



- 8 The Federation Framework requests the original TQL layout for received instances from HP Universal CMDB and ServiceCenter.

Federation Framework Flow for Replication

The following sequence diagram illustrates the interaction between 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 it represents with the received data.
- 5** After the update, the Federation Framework saves the last query result.

Adapter Interfaces

Use the appropriate adapter interface for each adapter, as follows.

Adapter Interfaces for Replication

- **SourceDataAdapter.** Use for source adapters in replication jobs.
- **TargetDataAdapter.** Use for target adapters in replication jobs.

Adapter interfaces for FTQL

- **PatternTopologyIdReconciliationDataAdapter.** Use if the adapter supports a complex query (more than one node) and the reconciliation between data stores is done by ID. A complex query relates to the subgraph of the user query. This means that after the user query is split into subgraphs, each of the queries relates to one data store and the subgraph is a query with more than one federated node.
- **PatternTopologyPropertyReconciliationDataAdapter.** Use if the adapter supports a complex query (more than one node) and the reconciliation between data stores is done by one node properties. A complex query relates to the subgraph of the user query. This means that after the user query is split into subgraphs, each of them relates to one data store and the subgraph is a query with more than one federated node.
- **PatternTopologyDataAdapter.** Use if the adapter supports a complex query (more than one node) and the reconciliation between data stores is done by topology. A complex query relates to the subgraph of the user query. This means that after the user query is split into subgraphs, each of them relates to one data store and the subgraph is a query with more than one federated node.
- **OneNodeTopologyIdReconciliationDataAdapter.** Use if the adapter supports only a single-node TQL and the reconciliation between data stores is calculated by ID. A single-node query relates to the subgraph of the user query. This means that after the user query is split into subgraphs, each of them relates to one data store and the subgraph that relates to the adapter is a query with one federated node.

- ▶ **OneNodeTopologyPropertyReconciliationDataAdapter.** Use if the adapter supports only a single-node TQL and the reconciliation between data stores is done by one CI properties. Single-node queries relate to the subgraph of the user query. This means that after the user query is split into subgraphs, each of them relates to one data store and the subgraph that relates to the adapter is a query with one federated node.
- ▶ **OneNodeTopologyDataAdapter.** Use if the adapter supports only a single-node TQL and the reconciliation between data stores is done by topology. Single-node queries relate to the subgraph of the user query. This means that after the user query is split into subgraphs, each of them relates to one data store and the subgraph that relates to the adapter is a query with one federated node.

Note: All `OneNode...` interfaces are created for simplicity; you can always use the `PatternTopology...` interfaces.

- ▶ **SortResultDataAdapter.** Use if you can sort the result CIs in the external data store.
- ▶ **FunctionalLayoutDataAdapter.** Use if you can calculate the functional layout in the external data store.

Add an Adapter for a New External Data Store

To add a new adapter to support new external data store, do the following:

1 Model supported adapter classes for CIs and relationships in the CMDB class model.

As an adapter developer, you should have knowledge of the hierarchy of the HP Universal CMDB CI types to understand how external classes are related to the HP Universal CMDB classes. You should model the external classes in the CMDB class model. You should add the definitions for new CI classes and their relations. You should define valid relationships in the CMDB class model for the valid relationships between adapter inner classes. The classes can be placed at any level of the CMDB class model tree. Modeling should be the same regardless of federation type (on the fly or replication). For details on adding new class definitions to the CMDB class model, see “CI Type Manager” in *CI Attribute Customization*.

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 HP Universal CMDB 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.

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 460.
- ▶ **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 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>
    </support-federated-query>
    <support-replicatioin-data>
      <source/>
      <target/>
    </support-replicatioin-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 Implement the Mapping Engine.

If your adapter supports federated query, you should support a Mapping Engine implementation for each virtual relationship. The implementation class should implement the Mapping Engine interface.

6 Add jars required for implementation to the class path.

To implement your classes, add the following classes to your class path:

- ▶ federation_api.jar

7 Deploy the adapter.

- a Deploy an adapter package. The package should contain the following entities:

- ▶ New CI type definition (optional):

Used only if adapter supports new CI types that do not yet exist in the UCMDB.

The new CI type definitions are located in the `class` folder inside the package.

- ▶ New data type definition (optional):

Used only if the new CI types require new data types.

The new data type definitions are located in the `typedef` folder inside 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 inside 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.

- ▶ Adapter configuration definition XML file should be located in the `adapter` folder inside 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).
- Put your compiled classes (normally a jar) together with all your based-on *.jar files in the <HP Universal CMDB root directory>\UCMDBServer\j2f\fcmdb\CodeBase\<<adapter> folder.

Note: The adapter id folder name has the same value as in the adapter configuration.

- If you create own configuration, you should also use the <HP Universal CMDB root directory>\UCMDBServer\j2f\fcmdb\CodeBase\<<adapter> folder as your root folder.

8 Redeploy the adapter.

The adapter definitions and implementation may become altered as a result of external class definition, 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 were altered, create an updated adapter package and redeploy it using the package mechanism. For details, see “Package Deployment” in *Model Management*.

b Redeploy your code.

If your implementation code or private configuration was altered, do the following:

- Create updated *.jar or configuration files, and place them in the <HP Universal CMDB root directory>\UCMDBServer\j2f\fcmdb\CodeBase\<<adapter id> folder.
- Call the next JMX with the appropriate customer ID and adapter ID:
FCmdb Config Services > loadOrReloadCodeBaseForAdapterId.

Example of Adding a New Adapter

This example illustrates how to add an adapter for ServiceCenter.

- 1** The relevant ServiceCenter entities are Incident, Problem, and RFC. For each entity, create the CIT definition. Decide where to place these definitions in the HP Universal CMDB class model hierarchy. The entities refer to IT processes, so it makes sense to put them under the IT Process CIT. Moreover, 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** Determine to which CITs in HP Universal CMDB you want to relate 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 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 it is ServiceCenterAdapter and its class implementation is adapter.ServiceCenterAdapterImpl. The configuration adapter beginning looks like this:

```
<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 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-topolgy/ >
</topology>

```

- For simplicity's sake, assume that ServiceCenter does not support sorting. Therefore, the capability should not contain the element result.
- 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>
```

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-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>
</topology>
<one-node-topolgy/>
</topology>
</<support-federated-query>
</adapter-capabilities>
  <fields-to-connect>
    <field>host</field>
    <field>port</field>
    <field>user</field>
  </fields-to-connect>
</adapter-config>

```

- 4 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 the reconciliation is done by topology.

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. 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.

View KPIs in External Applications

You can 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.

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 Store Dialog Box” on page 463.

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, e.g., Availability, Performance.
- ▶ **kp_source**. The origin of the KPIs, e.g., HP Business Availability Center.
- ▶ **numeric_value**. The numeric value of the KPI as calculated by the KPI business logic rule. (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. (This value is optional.)

3 Create a TQL

Create a TQL using the **Real Time KPI** CIT. For details, see “Define a TQL Query” on page 239.

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.

Federated UCMDB User Interface

This section describes:

- ▶ Data Store Dialog Box on page 463
- ▶ Data Stores Tab on page 469
- ▶ Federated CMDB Window on page 471
- ▶ Replication Job Dialog Box on page 471
- ▶ Replication Job Statistics on page 472
- ▶ Replication Jobs Tab on page 474

Data Store Dialog Box

Description	Enables you to configure an adapter that accesses external data sources. To access: Admin > Settings > Federated CMDB > Data Stores tab > click Add.
Important Information	Mandatory fields are labeled in red.
Included in Tasks	“Work with Federated Data” on page 366
Wizard Map	Depending on the adapter’s function, use one of the following workflows to define a data store: <ul style="list-style-type: none"> ▶ If the adapter supports federated replication only and can be used as a source, fill in the Data Store Properties dialog box and the Queries Supported by Adapter dialog box. Click Finish. ▶ If the adapter supports federated TQL queries only, fill in the Data Store Properties dialog box and the CITs Supported by Adapter dialog box. Click Finish. ▶ If the adapter supports both federated replication and federated queries, fill in the Data Store Properties dialog box, the CITs Supported by Adapter dialog box, and the Queries Supported by Adapter dialog box. Click Finish. ▶ If the adapter supports federated replication only and can be used as a target, fill in the Data Store Properties dialog box. Click Finish.


Data Store Properties Dialog Box

Description	Enables you to select the type of adapter, and to define the connection information for the external data store you are defining.
Important Information	Mandatory fields are labeled in red.
Included in Tasks	<ul style="list-style-type: none"> ▶ “Work with Federated Data” on page 366 ▶ “View KPIs in External Applications” on page 461

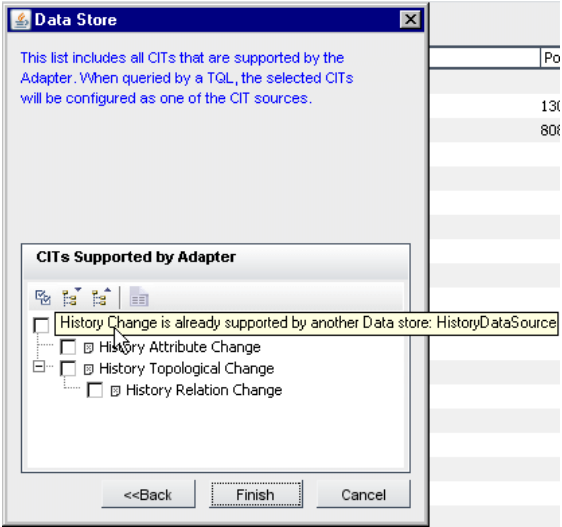
The following elements are included (unlabeled GUI elements are shown in angle brackets>):

GUI Element (A-Z)	Description
Adapter	<p>Choose the adapter to bring the external data from a data store that you configure. The following adapters are predefined:</p> <ul style="list-style-type: none"> ▶ 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 “View KPIs in External Applications” on page 461. ▶ CmdbHistoryAdapter. Select to define an adapter that brings data from a CMDB History database. Note: the History Adapter does not support replication, that is, you cannot use this adapter to define a replication job (to bring data from one data store to another one). ▶ CmdbRmiAdapter. Select to define an adapter that uses an RMI API to bring data from an external CMDB data store. Note: This adapter supports federated replication only by default. To support federated queries, contact HP Software Support.


GUI Element (A-Z)	Description
Adapter <i>(cont'd)</i>	<ul style="list-style-type: none"> ▶ CmdbSoapAdapter. Select to define an adapter that uses a SOAP API to bring 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 “The HP ServiceCenter/Service Manager Adapter” on page 367. ▶ GenericDBAdapter. Platform for configuring a database adapter that integrates with any type of relational database and enables running federated TQLs against the databases.
Customer ID	For HP Universal CMDB, enter 1 . For HP Software-as-a-Service, enter the customer ID number.
Host	Enter the name of the machine to which the adapter must connect. For the BACKPIsAdapter , enter the name of the Business Availability Center Gateway server.
Name	Enter a name to identify the data store. The name must be unique in the HP Universal CMDB version.

GUI Element (A-Z)	Description
<p>Next button</p>	<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>
<p>Password</p>	<p>Enter the password needed to access the external data store to which you want to connect.</p>
<p>Port</p>	<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>
<p>Test connection</p>	<p>Click to test that you have entered valid information.</p>
<p>URL</p>	<p>Use this field to define a specific URL to connect to the external data store.</p>
<p>User</p>	<p>Enter the user name needed to access the external data store to which you want to connect.</p>

CITs Supported by Adapter Dialog Box

Description	<p>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.</p>
Important Information	<ul style="list-style-type: none"> ▶ This page is displayed when the selected adapter supports federated queries. ▶ A CIT can be used by one data store only. CITs that are already being used by a data store are marked as such. Hold the pointer over a CIT to display a tool tip with the name of the data store that is using the CIT: 
Included in Tasks	<p>“Work with Federated Data” on page 366</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 CITs in the list and click again to clear all CITs. ▶ Expand All. Click to expand the list of CITs and display all levels. ▶ Collapse All. Click to collapse the list of CITs and display the top level only. ▶ Show Selected. Click to open the Supported CITs dialog box that displays a list of CITs in hierarchical format that are supported by the adapter.
<List of CITs>	<p>This list includes all CITs that are supported by the adapter. When queried by an FTQL, the CITs you select here are configured to bring the data from this external data store. Select the CITs to be supported by this data store.</p> <p>For BACKPIsAdapter, select Real Time KPI.</p>

Queries Supported by Adapter Dialog Box

Description	Enables you to choose which queries should be supported by this data store for data replication.
Important Information	This page is displayed when the adapter is selected that supports federated replication and can be used as a source.
Included in Tasks	"Work with Federated Data" on page 366



The Queries Supported by Adapter dialog box includes the following elements:







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>

Data Stores Tab

Description	<p>Enables you to create a data store.</p> <p>To access: Admin > Settings > Federated CMDB > Data Stores tab.</p>
Included in Tasks	“Work with Federated Data” on page 366

The Data Stores window includes the following elements:

GUI Element (A-Z)	Description
	Add a data store.
	Edit an existing data store.

GUI Element (A-Z)	Description
	Delete a data store.
	Synchronizes federation configuration, such as defined adapters, data stores, and replication jobs.
	<p>Filter the list to display only those data stores in which you are interested:</p> <p>Click the Filter button to open the Customize Filter dialog box. Build a query by choosing a condition and a value.</p> <p> To enter a regular expression, click the button and enter the text in the Editing dialog box.</p>
	Clear the filter to display all data stores.
	Select to display or hide columns and to change the order of the columns in the table. Opens the Columns dialog box.
<List of Defined Adapters>	<p>Name. The name you give to the data store.</p> <p>Adapter. The type of adapter for this data store.</p> <p>Host Name. The name of the host to which the adapter connects.</p> <p>Port. The port to which the adapter connects.</p>
<Right-click menu>	Duplicate Data Store. Select to clone a data store. Give a new, unique name to the new store and make any changes as are necessary.

Federated CMDB Window

Description	Enables you to define external data stores and create replication jobs. To access: Admin > Settings > Federated CMDB.
Important Information	<ul style="list-style-type: none"> ▶ For details on creating Data Stores, see “Data Stores Tab” on page 469. ▶ For details on creating Replication Jobs, see “Replication Jobs Tab” on page 474.

Replication Job Dialog Box

Description	Enables you to replicate data between two data stores. To access: Admin > Settings > Federated CMDB > Replication Jobs. Click the Add button.
Important Information	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).
Included in Tasks	“Work with Federated Data” on page 366

The Replication Job dialog box includes the following elements (listed alphabetically):

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.
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>
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

Description	<p>Enables you to view statistics for a selected replication job to verify whether replication is successful.</p> <p>To access: Admin > Settings > Federated CMDB > Replication Jobs tab. Select a replication job and click the Statistics icon in the toolbar.</p>
Important Information	Click a row to view error messages for a specific replication job.

The Replication Job Statistics dialog box includes the following elements (listed alphabetically):









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 bring 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.
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 fcldb.synchronizer.log file, located in the <HP Universal CMDB root directory>\UCMDBServer\j2f\fcldb folder. ▶ 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.


GUI Element (A-Z)	Description
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 > Settings > Federated CMDB > Replication Jobs tab.
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The Replication Jobs tab includes the following elements (listed alphabetically):

GUI Element (A-Z)	Description
	Click to add a replication job. For details, see “Replication Job Dialog Box” on page 471.
	Click to edit an existing replication job. For details, see “Replication Job Dialog Box” on page 471.
	Click to delete a replication job.
	<p>Click to test that replication is successful:</p> <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 “Scheduler User Interface” on page 354.</p>
	Click to view replication job statistics about the selected replication job. For details, see “Replication Job Statistics” on page 472.
	Synchronizes federation configuration, such as defined adapters, data stores, and replication jobs.
	<p>Filter the list to display only those replication jobs in which you are interested: Click the Filter button to open the Customize Filter dialog box. Build a query by choosing a condition and a value.</p> <p>To enter a regular expression, click the button and enter the expression in the Editing dialog box.</p>
	Clear the filter to display all replication jobs.

GUI Element (A-Z)	Description
	Select to display or hide columns and to change the order of the columns in the table. Opens the Columns dialog box.
<right-click menu>	Duplicate Replication Job.
Tasks Table	<p>Name. The name you give to the replication job.</p> <p>Source Data Store. The ID of the source data store.</p> <p>Target Data Store. The ID of the target data store.</p> <p>Queries. The queries that are used for replication in this replication job.</p>

Federated CMDB Reference

The following definitions are used in Federated CMDB (FCMDB).

Adapter. A component in FCMDB responsible for retrieving and updating data in a data store. The adapter is aware of how specific data in the data store is modeled and knows the vendor-specific protocol for communication with the data store.

Data Store. Any data storage system, such as CMDB, database, and so on, where external CIs and relations are located.

External Class. A class defined in the HP Universal CMDB class model whose instances are stored in external data stores and not in HP Universal CMDB.

Federated TQL (FTQL). A TQL that includes external CITs in its definition.

Mapping Engine. A component that identifies links between CIs from different data stores that have virtual relationships between them. The identification is performed by reconciling HP Universal CMDB CIs and external CIs.

Reconciliation. The process of resolving data from two or more sources, either by resolving to a common naming schema or resolving data overlap differences within the records to a single answer.

Signature. 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 detect whether a CI has changed without the need to retrieve and compare all CI properties. Both the CI and CI signature are provided by the appropriate adapter. The adapter is responsible for changing the CI signature when the CI properties are altered.

Virtual Relationship. A relationship between two graph nodes that come from different data stores. The instances of these relationships do not exist in any data store and are created during FTQL calculation.

Troubleshooting and Limitations

This section includes troubleshooting and limitations for the Federated CMDB functionality.

- ▶ 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” in *Model Management*.
- ▶ 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 UCMD 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 using the RMI adapter, the version of the CMDB running on the configured host must be the same as the version of the UCMDB.
- ▶ When configuring a replication job between two CMDBs, verify that the class model is the same in the two CMDBs.

13

State Manager

This chapter provides information on State Manager.

This chapter includes:

Concepts

- ▶ State Manager Overview on page 479

Tasks

- ▶ Define an Attribute State on page 480

Reference

- ▶ State Manager User Interface on page 480

State Manager Overview

A state is based on an Enumeration definition, which is designed to be used as a severity value list by states.

The 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 485. 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 “Correlation Manager” on page 139. 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” in *CI Attribute Customization*.

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 the System Type Manager. For details, see “System Type Manager Dialog Box” in *CI Attribute Customization*.

You can also click the **New Enumeration** button to create a new Enumeration definition. For details, see “State Manager Dialog Box” on page 481.

Alternatively, you can create an Enumeration definition in the System Type Manager. The Enumeration definition you create in the System Type Manager appears in the State Manager.

State Manager User Interface




This section describes:

- ▶ State Manager Dialog Box on page 481

State Manager Dialog Box

Description	Enables you to create a state based on a severity list (Enumeration definition). To access: Admin > 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 not recommended to define states without first consulting with HP Software Support.
Included in Tasks	“Define an Attribute State” on page 480
Useful Links	“Enumeration Definition” on page 39

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.
	Create an Enumeration definition. Opens the Create Enumeration Definition dialog box. For details, see “Create/Update List/Enumeration Definition Dialog Box” in <i>CI Attribute Customization</i> .
Description	(Optional) Click in the row and enter a description of the state.
Name	Click in the row and enter a unique name for the state.
Type Definition	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. Note: The Type Definition list only displays the Enumeration definitions (and not List definitions) that are defined in the System Type Manager.

Part III

Application

14

Topology View Application

This chapter provides information on the Topology View application.

This chapter includes:

Concepts

- ▶ Topology View Overview on page 486

Tasks

- ▶ Retrieve Correlation Results - Scenario on page 486
- ▶ Take a Snapshot of a View on page 495
- ▶ Print and Save a Topology Map to File on page 496

Reference

- ▶ Topology View Application User Interface on page 496

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 “Topology Map” on page 597.

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 139. You can run the Correlation rule you defined in the Correlation Manager. For details, see “Retrieve Correlation Results - Scenario” on page 486.
- ▶ **Take a snapshot of a view.** HP Universal CMDB 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 495.

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 each step in this task.

This task includes the following steps:

- “Create an Enumeration Definition” on page 487
- “Define a State” on page 488
- “Define a Correlation TQL Query” on page 489
- “Define a Correlation Rule” on page 490
- “Create a TQL of the Type View in Query Manager” on page 492
- “Create a View in View Manager” on page 492
- “Get Correlation Results” on page 492

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 479).

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” in *CI Attribute Customization*.

Note: Alternatively, you can create an Enumeration definition in the System Type Manager. For details, see “System Type Manager” in *CI Attribute Customization*. The Enumeration definition you create appears in the State Manager.

Example

Select **Admin > 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

<input type="checkbox"/>	10% load	Value: <input type="text" value="50% load"/>
<input type="checkbox"/>	20% load	Key: <input type="text" value="2"/>
<input checked="" type="checkbox"/>	50% load	

Color

- Green
- Light Olive
- Yellow
- Orange
- Red
- 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 > Settings > State Manager** to open the State Manager. For details on defining a new state, see “State Manager Dialog Box” on page 481.

Example

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	cpu_usage
		Change States
		Operation States
		Test States
		Status Accounting
		concrete_synch_config_status
		synch_config_unit_status
		synch_unit_state
		cpu_usage

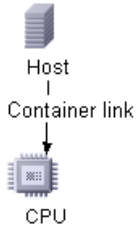
3 Define a Correlation TQL Query

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 > 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 240.

Example

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 149.

Example

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: CPU usage

Conditions

State:

Operator:

Value comparison:

Scope

Any

All

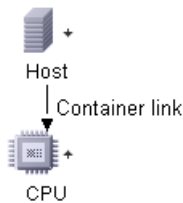
Range % - %

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 > 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 202.

6 Create a View in View Manager

Create a view in View Manager (select **Admin > Modeling > View Manager**) based on the TQL query of the type View you created in Query Manager in the previous task. For details, see “Create New View/View Properties Dialog Box” on page 115.

7 Get Correlation Results

Select **Application > 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 498.

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 149.

Example

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 divided into three main sections:

- Description:** A text box containing "CPU usage".
- Conditions:** A section with three dropdown menus:
 - State:** Set to "cpu_usage".
 - Operator:** Set to "Not equal".
 - Value comparison:** Set to "10% load".
- Scope:** A section with three radio button options:
 - Any:** Selected with a radio button.
 - All:** Unselected.
 - Range:** Unselected, with input fields for "0" and "100" followed by a percentage sign and a minus sign.
- Affected Severity:** A section with two radio button options:
 - Fixed severity:** Selected with a radio button, and a dropdown menu set to "50% load".
 - Severity relative to trigger severity (%):** Unselected, with an input field containing "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.

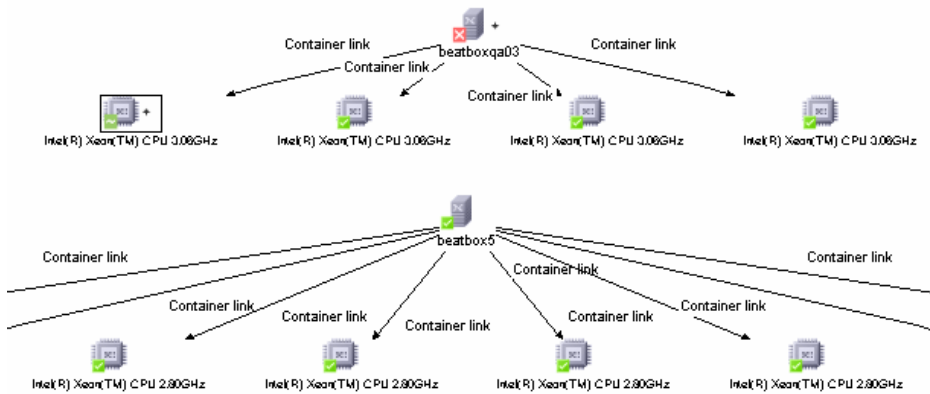
The screenshot shows the "Run Correlation" dialog box. It contains two dropdown menus and four buttons:

- State:** A dropdown menu with "cpu_usage" selected and highlighted in blue.
- Triggers Severity:** A dropdown menu with "20% load" selected.
- Buttons:** "Show in Views", "Show Map", "Generate Report", and "Cancel".

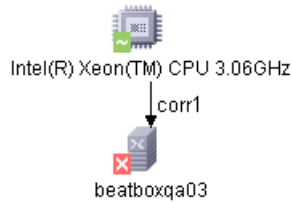
To see results, click one of the following:

- **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.



- **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 498.

Note: Optionally, you can generate an Impact Analysis report by building a URL that opens an Impact Analysis report directly in your browser. For details, see “Generate an Impact Analysis Report Using a URL” in *Reference Information*.

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 > Compliance > Compare Snapshots**. For details on how to take a snapshot of a view, see “Save Snapshot Dialog Box” on page 501. For details on how to view actual differences in the compared views, see “Compare Snapshots Window” on page 518.

Print and Save a Topology Map to File

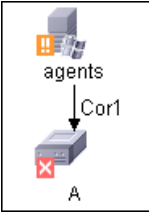
You can print the content of any topology map and then save it to file. Before printing, it is recommended to define your print settings and arrange the contents of the topology map according to your requirements. For details on how to define print settings, see “Print Setup Dialog Box” on page 623. For details on how to preview the content of the topology map before printing see “Print Preview Dialog Box” on page 622. For details on how to print the content of a topology map, see “Print Dialog Box” on page 622. For details on how to save a topology map to file, see “Run Correlation Dialog Box” on page 498.

Topology View Application User Interface

This section describes:

- ▶ Correlation Rules Window on page 497
- ▶ Run Correlation Dialog Box on page 498
- ▶ Save Snapshot Dialog Box on page 501
- ▶ Topology View Window on page 502

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="615 413 762 626" style="border: 1px solid black; padding: 5px; text-align: center;">  </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 139. ▶ 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 486




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 149.
<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 41.

 **Run Correlation Dialog Box**

Description	<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 500. ▶ Simulate how the statuses of the affected CIs are impacted. For details, see “Show in Views” on page 499. ▶ 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 499. <p>To access: Select Application > Topology View. Right-click a trigger node in the Topology Map and select Run Correlation.</p>
Important Information	<p>This dialog only appears if a Correlation rule is defined for that view. For details, see “Correlation Manager” on page 139.</p>
Included in Tasks	<p>“Retrieve Correlation Results - Scenario” on page 486</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 106. ▶ 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>Reference Information</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>Reference Information</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 41.</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 497.</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 479.</p>
Triggers 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” in <i>CI Attribute Customization</i>.</p> <p>For example, you can create a Correlation rule in the Correlation Manager (see the “Correlation Definition Dialog Box” on page 149), 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: 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 > Compliance > Compare Snapshots . For details, see “Compare Snapshots Window” on page 518.
Included in Tasks	“Take a Snapshot of a View” on page 495

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 > 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 587. ▶ Topology Map. Displays the CIs of a selected view. ▶ Information Pane. Displays properties and history for the selected CI. <p>Note: The Topology View window shares the same functionality as the IT Universe Manager topology map, with the exception of the context menu options and some toolbar options.</p>
Included in Tasks	<p>“Retrieve Correlation Results - Scenario” on page 486</p> <p>“Take a Snapshot of a View” on page 495</p>
Useful Links	<p>“Save Snapshot Dialog Box” on page 501</p> <p>“Set View Parameters/Set View Element Parameters Dialog Box” on page 127</p>

The Topology View window includes the following elements (listed alphabetically):


GUI Element (A-Z)	Description
<Node>	The nodes in the topology map represent CIs. Hold the pointer over a node to display its tooltip which describes the type of the CI.
<Relationship>	The links in the topology map represent relationships. Hold the pointer over a relationship to display its tooltip, which describes the type of the relationship.
<Toolbar>	For details, see “ Toolbar Options ” on page 625

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
CI History	Displays the CI/Relationship History dialog box for the selected CI. For details, see “ CI/Relationship History Dialog Box ” on page 75.
Properties	Displays the Properties dialog box for the selected CI. For details, see “ Properties Dialog Box ” on page 91. Note: The Properties dialog box is not editable from the Topology View Application.
Run Correlation	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 139. Note: You can only see Correlation results if you defined a Correlation rule for that view in Correlation Manager.

GUI Element (A-Z)	Description
<p>Show Impact</p>	<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 139). ▶ 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
Show Root Cause	<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 139). ▶ 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="615 913 762 1124" style="border: 1px solid black; padding: 5px; margin: 10px 0;">  <pre> graph TD agents[agents] -- Cor1 --> A[A] style agents fill:#fff,stroke:#333,stroke-width:1px style A fill:#fff,stroke:#333,stroke-width:1px </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>

15

CI Lifecycle

This chapter provides information on the main concepts and tasks of the CI Lifecycle application.

This chapter includes:

Concepts

- ▶ CI Lifecycle Overview on page 508

Tasks

- ▶ Generate CI Lifecycle Data and Filter the Results on page 508

Reference

- ▶ CI Lifecycle User Interface on page 509

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. When the aging mechanism is enabled for a CI or relationship, it becomes marked for deletion if it is not accessed for a specified period of time (by default, 14 days). The CI or relationship is actually deleted after a fixed period of time since it was last accessed (by default, 28 days). You can set the time period before a CI becomes a candidate for deletion or before it is actually deleted for each CIT in the CIT Manager. For details regarding the aging mechanism, see “Removing Out of Date CIs Using the Aging Mechanism” on page 60.

Note: The aging mechanism is disabled by default.

The CI Lifecycle results include the Display Label, CI Type, Last Access Time, Actual Delete Time and Updated By information for each CI. For relationships, CI Lifecycle also displays the CIs at the two ends of the relationship. Once you have generated CI Lifecycle data, you can select the columns to be displayed and filter the results by any of the columns. You can also select specific CIs or relationships and postpone their deletion or mark them as deletion-proof. For details, see “CI Lifecycle Window” on page 511.

Generate CI Lifecycle Data and Filter the Results

This task describes the steps to follow to generate CI lifecycle data and filter the results.

This task includes the following steps:

- ▶ “Generate CI Lifecycle Data” on page 509
- ▶ “Filter the CI Lifecycle Results” on page 509

1 Generate CI Lifecycle Data

To generate CI Lifecycle results, select either the CI 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**. If no results are generated, try extending the time period further into the future. For details, see “CI Lifecycle Window” on page 511.

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 514.

CI Lifecycle User Interface

This section describes:

- CI Lifecycle Report on page 510
- CI Lifecycle Window on page 511
- Filter Dialog Box on page 514

 **CI Lifecycle Report**

Description	Enables you to present filtered CI Lifecycle results in report format and print or export them. To access: Click Report Export from the CI Lifecycle window.
Important Information	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. For details on working with reports, see Working in Reports in <i>Reference Information</i> .

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






GUI Element (A-Z)	Description
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 (only relevant for relationships).
End2	The node at the second end of the relationship (only relevant 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 just discovered by the DDM process.


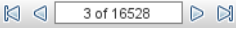



GUI Element (A-Z)	Description
To	Indicates the end of the period for the generation of the report. Click the link to open a calendar that enables you to change the date and time.
View	Sets the time period of the report from the beginning time. Select a time period from the drop-down list.
Updated By	The administrator or process that updated the CI or relationship.

CI Lifecycle Window

Description	Enables you to filter CIs and relationships which are candidates for deletion. To access: Select Application > CI Lifecycle .
Included in Tasks	“Generate CI Lifecycle Data and Filter the Results” on page 508

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

GUI Element (A-Z)	Description
	Click Postpone Deletion to delay the deletion of a CI. It disappears from the list of candidates for deletion.
	Click Mark as Deletion Proof to prevent a CI or relationship from being deleted. It disappears from the list of candidates for deletion.
	Click Delete to delete a selected CI or relationship.
	Click Select/Clear All to select or clear all rows of data on the current page.
	Click Refresh to update the data displayed.

GUI Element (A-Z)	Description
	Click Set Rows Per Page to define the number of rows of data per page.
	Click to navigate through the results page by page or to jump to the first or last page.
	Click Filter to open the Filter dialog box, which enables you to customize the filter. For details, see “Filter Dialog Box” on page 514.
	Click Clear to clear the filter and display the full results.
	Click Customize Columns 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> .
<Right-click a column header>	For details, see “Customizing Columns” in <i>Reference Information</i> .
Actual Delete Time	The date and time when the CI or relationship is deleted.
CIs tab	Select to see lifecycle results for CIs.
CI Type	The type of the CI or relationship.
Display Label	The name of the CI or relationship as it appears in the Topology Map.
End1	The node at one end of the relationship (only relevant for relationships).
End2	The node at the second end of the relationship (only relevant for relationships).
From	Use the drop-down calendar to select the beginning date and time for the CI Lifecycle report.
Generate	Click Generate to generate the data for the selected period.
Last Access Time	The last time that the CI or relationship was accessed, whether it was updated or just discovered by the DDM process.

GUI Element (A-Z)	Description
Relationships tab	Select to see lifecycle results for relationships.
Report Export	Click Report Export to open the CI Lifecycle Report dialog box, which presents the data in the format of a report.
Select	Click the box in the Select column for a CI to select a CI or relationship before performing an operation on it (such as Delete or Postpone Deletion).
To	Use the drop-down calendar to select the end date and time for the CI Lifecycle report.
Updated By	The administrator or process that updated the CI or relationship.


The following options are available by right-clicking a CI or relationship in the results table (listed alphabetically):

Menu Item	Description
CI/Relationship History	Opens the CI/Relationship History dialog box. For details, see “CI/Relationship History Dialog Box” on page 75.
Properties	Displays the Properties page for the selected CI. For details, see “Properties Dialog Box” on page 91.

 **Filter Dialog Box**

Description	Enables you to customize the filter. To access: Click Filter from the CI Lifecycle screen.
Included in Tasks	“Generate CI Lifecycle Data and Filter the Results” on page 508

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 one of the options from the drop-down list.
Display Name	The attribute columns displayed for the CIs or relationships.
Value	Click in the Value column to set a value for the selected attribute. Depending on the attribute 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 for a given attribute before entering a value.

16

Compare Snapshots

This chapter provides information on Compare Snapshots.

This chapter includes:

Concepts

- ▶ Snapshot Comparison Overview on page 515

Tasks

- ▶ Snapshot Comparison on page 516

Reference

- ▶ Compare Snapshots User Interface on page 517

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 518.

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.

1 Take a Snapshot of a View

Select **Applications > 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 501.

2 Save Snapshots on a Periodic Basis

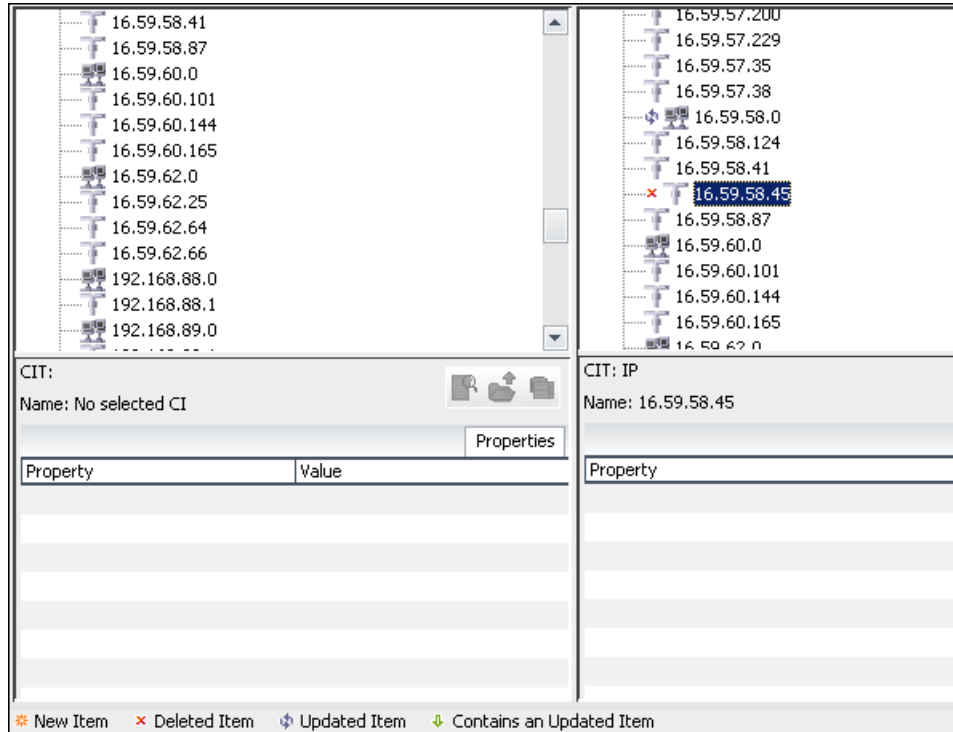
Optionally, you can schedule snapshots to be taken of a certain view at specific times by defining a task. For details, see “Job Scheduler Window” on page 361.

3 Compare Snapshots

Compare the snapshots of a view taken at different times. Select **Applications > 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 518.

Example

In the following example, the **Deleted Item** icon next to the CI **16.59.58.45** in the right pane, indicates that the CI has been deleted in the newer view.



Compare Snapshots User Interface









This section describes:


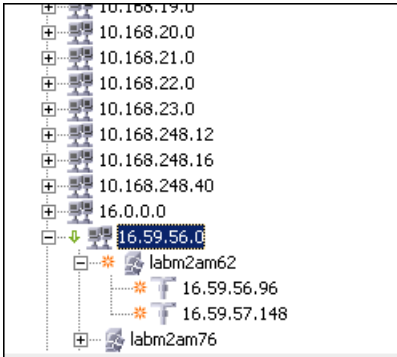

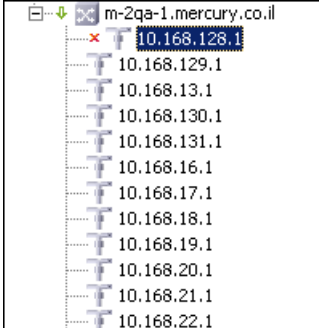
- Compare Snapshots Window on page 518
- Find CI by Label Dialog Box on page 523
- Snapshots of <View> Dialog Box on page 524


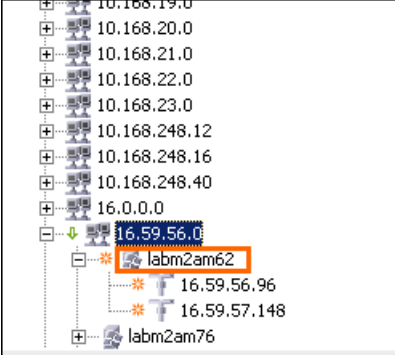

 **Compare Snapshots Window**

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 > 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 549. 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 547), 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 351. ▶ Snapshots of views that are marked as Track Changes (for details, see “Track Changes” on page 117), are created on a daily basis.
Included in Tasks	“Snapshot Comparison” on page 516

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 "Properties Dialog Box" on page 91.</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 on page 522.</p>
<At top of panes>	<p>The Compare Snapshots window is divided into two panes. Each side displays a 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>
CIT	<p>The name of the CIT to which the CI belongs as defined in the CI Type Manager, as described in <i>CI Attribute Customization</i>.</p>
Name	<p>The name of the CI as defined in the CI's label.</p>
Properties pane	<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

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	
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 516

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 501.
Included in Tasks	“Snapshot Comparison” on page 516

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 501.
Note	The note you wrote for the view in “Save Snapshot Dialog Box” on page 501.
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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Overview Reports

This chapter provides information on Overview reports, located in **Applications > Overview Reports**.

This chapter includes:

Concepts

- ▶ Overview Report Overview on page 525

Reference

- ▶ Overview Reports User Interface on page 526

Overview Report 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 Universal CMDB 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.

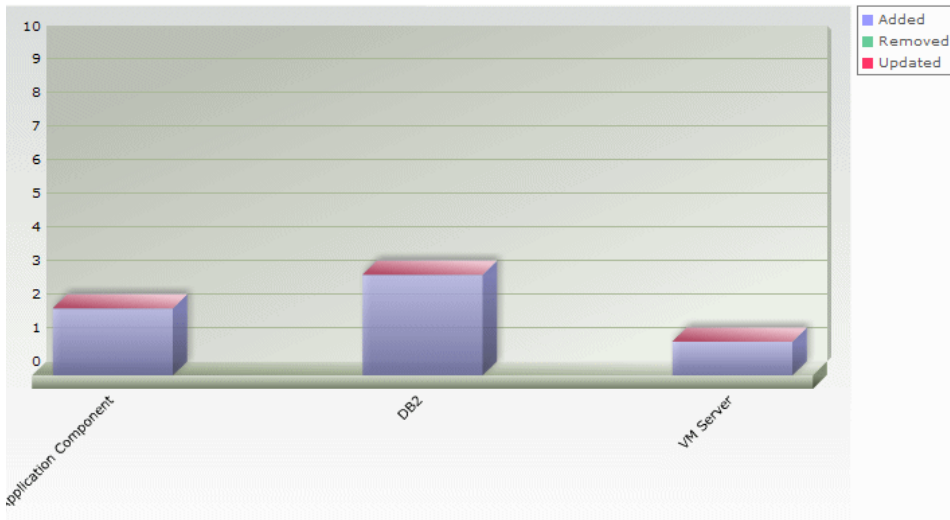
Note: You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see “Viewing Reports with Adobe Flash Player” in *Reference Information*.

Overview Reports User Interface

This section describes:

- ▶ Changed Applications Report on page 527
- ▶ Changed Views Report on page 529
- ▶ CMDB Utilization Report on page 530
- ▶ Database Breakdown Report on page 531
- ▶ Delete Candidates Overview Report on page 533
- ▶ Host OS Breakdown Report on page 534
- ▶ Major Application Type Breakdown Report on page 536
- ▶ Network Device Breakdown Report on page 538
- ▶ Number of Changes Report on page 540

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.

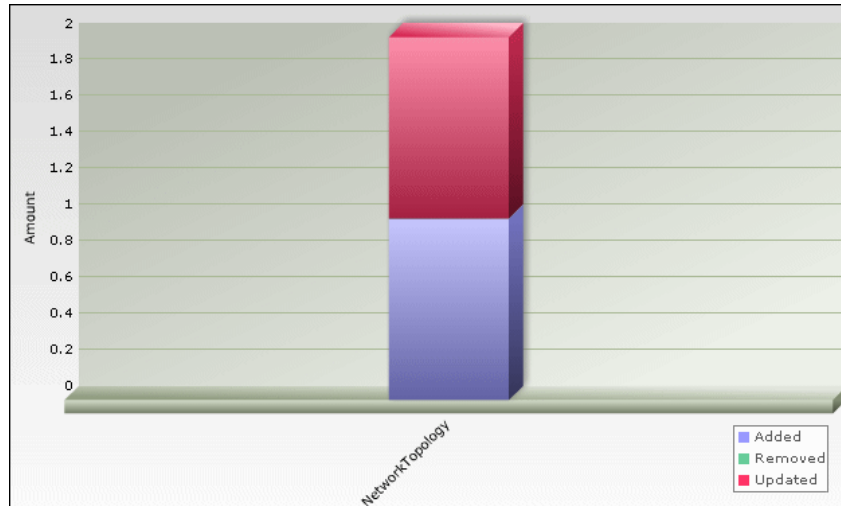
You can display the number of each type of change that occurred by moving the cursor over the related color. The tooltip that appears displays the relevant number of changes that occurred.

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 > Overview Reports > Changed Applications**.

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>Reference Information</i>.▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reference Information</i>.
Useful Links	For details on how to work with reports, see “Working in Reports” in <i>Reference Information</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.

Click a bar to open the Save Snapshot window and display the differences between the views. For details, see “Compare Snapshots” on page 515.

To access: Select **Applications > Overview Reports > Changed Views**.

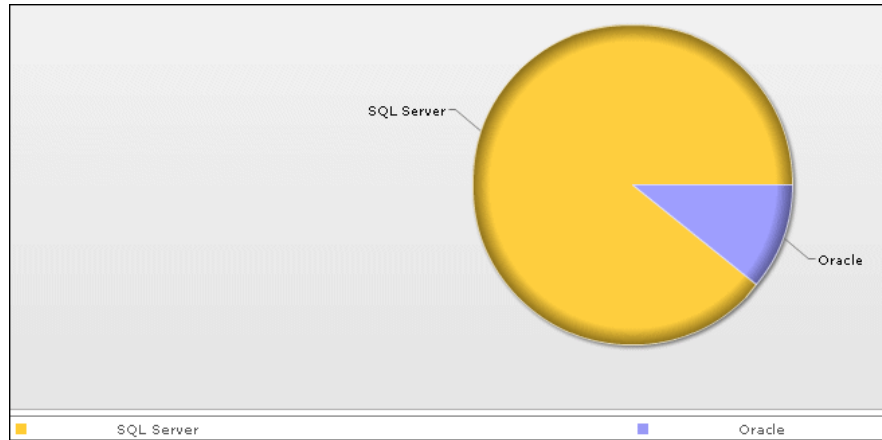
<p>Important Information</p>	<ul style="list-style-type: none"> ▶ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see “Viewing Reports with Adobe Flash Player” in <i>Reference Information</i>. ▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reference Information</i>.
<p>Useful Links</p>	<ul style="list-style-type: none"> ▶ For details on how to work with reports, see “Working in Reports” in <i>Reference Information</i>. ▶ For details on Change reports, see “Change Report” on page 547.

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

<p>Description</p>	<p>This report displays general CMDB statistics. 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 > Overview Reports > CMDB Utilization.</p>
<p>Useful Links</p>	<p>For details on how to work with reports, see “Working in Reports” in <i>Reference Information</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.

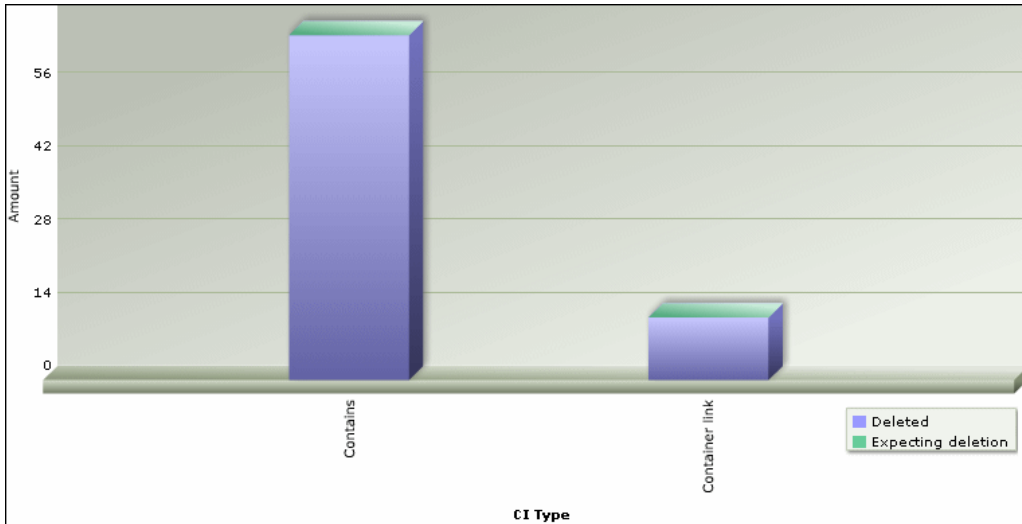
To verify the database versions, use the legend below the pie chart. You can display the number of each database version by moving the cursor over the related color. The tooltip that appears displays the relevant number.

Click a pie slice to drill down to see a Show CI Instances report for each database version.

To access: Select **Applications > Overview Reports > Database Breakdown**.

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>Reference Information</i>.▶ For information about limitations on formatting reports, see “Formatting a Report” on page 73 in <i>Reference Information</i>.
Useful Links	For details on how to work with reports, see “Working in Reports” in <i>Reference Information</i> .

Delete Candidates Overview Report



Description

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.

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.

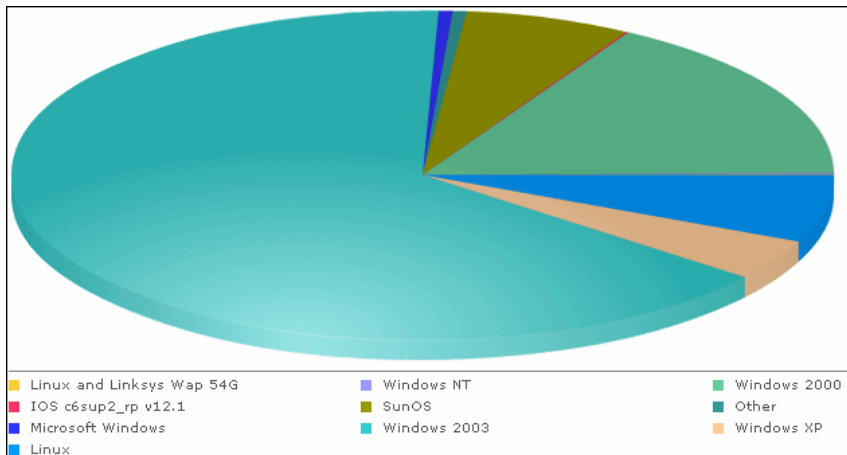
You can display the number of CIs and relationships that were deleted and the ones that are about to be deleted by moving the cursor over the related color in the bar. The tooltip that appears displays the relevant number.

Click a bar to drill down to see a Show CI Instances report displaying the CITs and relationships that were deleted.

To access: Select **Applications > Overview Reports > Delete Candidates Overview**.

<p>Important Information</p>	<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>Reference Information</i>. ▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reference Information</i>.
<p>Useful Links</p>	<p>For details on how to work with reports, see “Working in Reports” in <i>Reference Information</i>.</p>

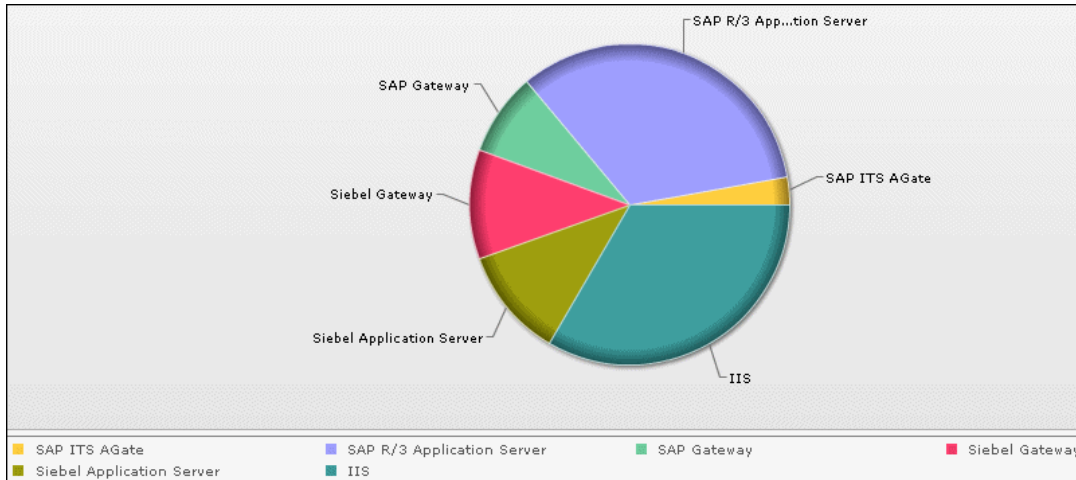
Host OS Breakdown Report



<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 > Overview Reports > Host OS 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>Reference Information</i>.▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reference Information</i>.
Useful Links	For details on how to work with reports, see “Working in Reports” in <i>Reference Information</i> .

Major Application Type Breakdown Report



Description

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” in *CI Attribute Customization*.

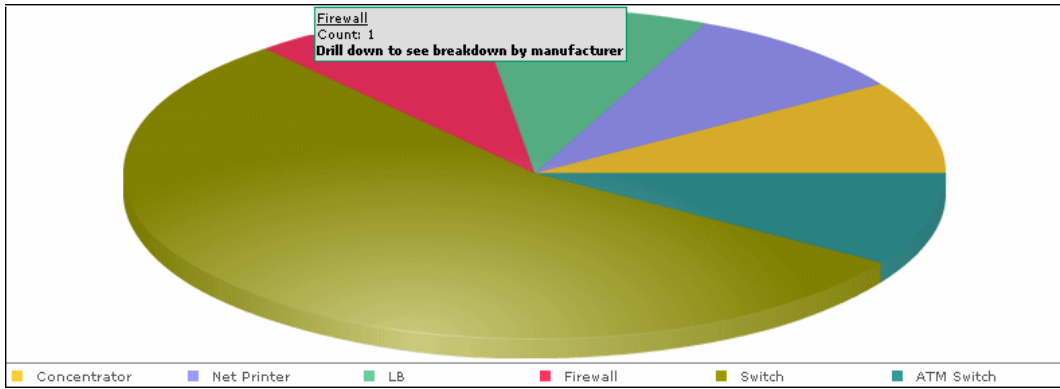
You can view data for all applications deployed in the system, or only those at a specific location. Choose the country, state, and city for which you want to view application breakdown data, or select **All** to show the entire application breakdown.

- Use the legend below the pie chart to verify an application.
- Click a segment to view a specific application sorted by version.
- Use the legend below the pie chart to verify the different versions.
- Click a pie segment to drill down to see a Show CI Instances report for each application version.

To access: Select **Applications > Overview Reports > Application Breakdown**.

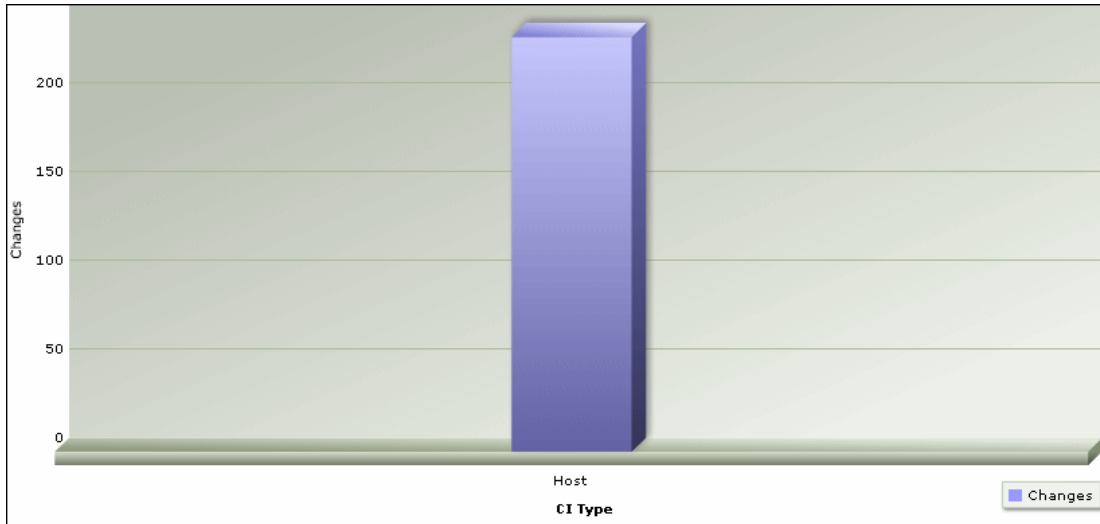
Important Information	<ul style="list-style-type: none">▶ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see “Viewing Reports with Adobe Flash Player” in <i>Reference Information</i>.▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reference Information</i>.
Useful Links	For details on how to work with reports, see “Working in Reports” in <i>Reference Information</i> .

Network Device Breakdown Report



<p>Description</p>	<p>Displays a breakdown of network devices. Only the network devices that meet the following conditions appear in the report:</p> <ul style="list-style-type: none"> ▶ The CIT of the network device has been assigned the qualifier NETWORK_DEVICES. For details, see “Qualifiers Page” in <i>CI Attribute Customization</i>. ▶ 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 289 . <p>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.</p> <p>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.</p> <p>Click a segment to view a specific network device sorted by manufacturer.</p> <p>Click a segment to generate a Show CI Instances report, displaying the details of the CI instances of that network device for that manufacturer.</p> <p>To access: Select Applications > Overview Reports > Network Device Breakdown.</p>
<p>Important Information</p>	<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>Reference Information</i>. ▶ For information about limitations on formatting reports, see “Formatting a Report” on page 73 in <i>Reference Information</i>.
<p>Useful Links</p>	<p>For details on how to work with reports, see “Working in Reports” in <i>Reference Information</i>.</p>

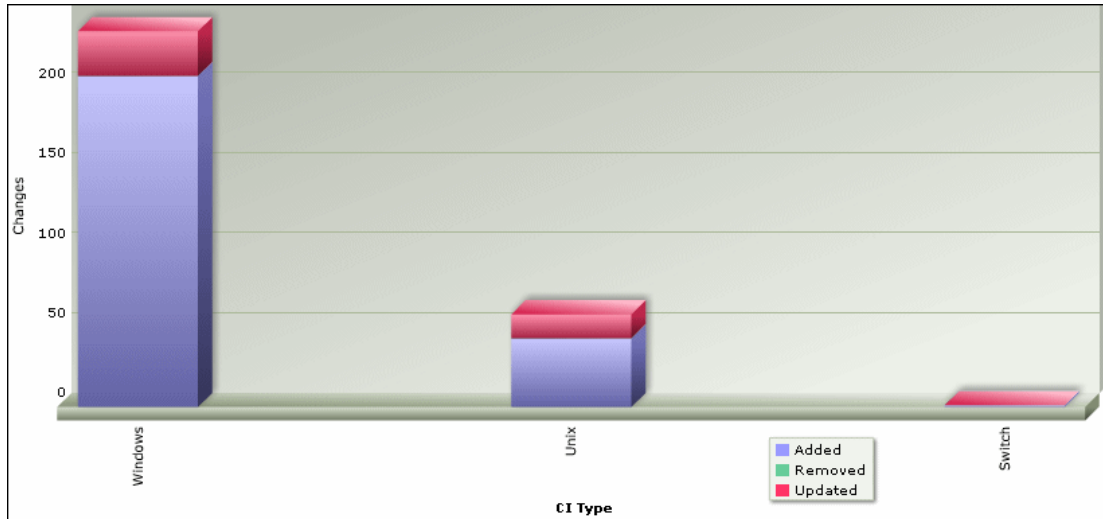
Number of Changes Report



<p>Description</p>	<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 > Overview Reports > Number of Changes.</p>
<p>Important Information</p>	<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>Reference Information</i>. ▶ For information about limitations on formatting reports, see “Formatting a Report” in <i>Reference Information</i>.
<p>Useful Links</p>	<p>For details on how to work with reports, see “Working in Reports” in <i>Reference Information</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.

18

Asset Report

This chapter provides information on Asset reports.

This chapter includes:

Concepts

- ▶ Asset Report Overview on page 543

Reference

- ▶ Asset Report User Interface on page 543

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 544

 **Asset Report Page**

Description	<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” in <i>CI Attribute Customization</i>.</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 > Reports > Asset Report.</p>
Important Information	<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>Reference Information</i>. ▶ For information about limitations on the size of reports produced in .pdf format, see “Publishing a Report” in <i>Reference Information</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>

GUI Element (A-Z)	Description
Selected view	Select the required view.
Views	Includes only information about the CIs and their attributes contained in this view.

19

Change Report

This chapter provides information on Change reports.

This chapter includes:

Concepts

- ▶ Change Report Overview on page 547

Reference

- ▶ Change Report User Interface on page 547

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 troubleshooting issue could have been caused by the fact that no changes occurred to the CI when they were actually supposed to have occurred.

Change Report User Interface

This section describes:

- ▶ Change Report Page on page 548
- ▶ CI History Report Page on page 552

 **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” in <i>CI Attribute Customization</i>.</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 defined with the CONTAINER qualifier. For information about qualifiers, see “Qualifiers Page” in <i>CI Attribute Customization</i>. ▶ 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” in <i>CI Attribute Customization</i>. <p>To access: Select Applications > Reports > Change Report.</p>
Useful Links	<p>For details on how to work with reports, click see “Working in Reports” in <i>Reference Information</i>.</p>

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 “View Explorer” on page 581.
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	Opens the Compare Snapshots dialog box. Enables you to perform a snapshot comparison. For details about snapshots, see “Compare Snapshots” on page 515. 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.
View Statistics	The statistics include the following: <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

The Change Report page includes the following areas:

- “CI Changes Area” on page 550
- “Relationship Changes Area” on page 551

CI Changes Area

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

GUI Element (A-Z)	Description
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.
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 552.
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.
<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.

Relationship Changes Area

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

GUI Element (A-Z)	Description
Change Date & Time	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	<p>The label of the path from the root to the container CI.</p> <p>A backslash (\) in a CI name indicates a parent-child relationship with the format: <parent_CI>\<child_CI>. For example, the entry 16.59.63.0Windows provides change information for the Windows CI which is the child of the dancer.hp.com CI.</p> <p>Note: Double-click an item to view the change history of the container CI. For details, see "CI History Report Page" on page 552.</p>
Event type	<p>You can have one of the following values:</p> <ul style="list-style-type: none"> ▶ Added CI. A contained CI was added to the container CI using a Container link relationship. ▶ Removed 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 552.</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	Make sure that popups are not blocked in your browser.

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

GUI Element (A-Z)	Description
Change Date & Time	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.

20

Comparing CIs

This chapter provides information on Compare CIs.

This chapter includes:

Concepts

- ▶ CI Comparison Overview on page 553

Tasks

- ▶ CI Comparison on page 554

Reference

- ▶ Compare CIs User Interface on page 555

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 denote:

- ▶ A CI on one side does not match any corresponding CI on the other side.
- ▶ 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” in *CI Attribute Customization*. 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 556.

CI Comparison


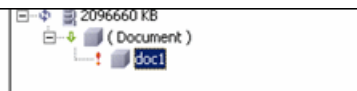
This task explains how to compare the hierarchies of two compound CIs, view a CI’s configuration file, and show the difference between two configuration files.

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 559.

Example

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 left side is **20**.

																									
CIT: Document Name: doc	CIT: Document Name: doc1																								
<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	<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																									
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Property	Value																								
Document Checksum																									
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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 556.

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 556.

Compare CIs User Interface





This section describes:







- Compare CIs Window on page 556
- Find CI by Label Dialog Box on page 558
- Select CI Dialog Box on page 559

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 an 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 > 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 554


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 557 and "Has a Non-Matching Child" on page 557.

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 557 and “Has a Non-Matching Child” on page 557.
	<p>Show the difference between the content of the two configuration files. Configuration files use the .xml, .txt or .ini extensions.</p> <p>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.</p>
	<p>View the content of a Configuration File CI. Select a CI of the Configuration File CI and click the Open button.</p> <p>Note: This button is only enabled if you selected a CI of the CIT Configuration File from the tree.</p>
	Display the selected CI’s properties. For details, see “Properties Dialog Box” on page 91.
 No Matching CI	Indicates that a CI on one side does not match any corresponding CI on the other side.
 Has a Non-Matching Child	Indicates that the child of the CI does not have a matching child on the other side.
<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 the CI Type Manager, see <i>CI Attribute Customization</i> .
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 Wizard” in <i>CI Attribute Customization</i> .
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 554

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.

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.
--------------------	--





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 559 below.
Search tab	Search for a CI for comparison. For details, see “Search Tab” on page 560.

Browse Tab

Description	Search for and display a view, and browse through the view to locate a particular CI. To access: Click Select CI to open the Select CI dialog box and click the Select CI tab.
--------------------	---



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	Search for a CI either in the entire CMDB. You can also filter the list of CIs that is displayed. To access: Click Select CI to open the Select CI dialog box and click the Search tab.
--------------------	---

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.

GUI Element (A-Z)	Description
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.

21

Gold Master Report

This chapter provides information on Gold Master reports.

This chapter includes:

Concepts

- ▶ Gold Master Report Overview on page 563

Reference

- ▶ Gold Master Report User Interface on page 563

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 the Report Manager. For details, see “Gold Master Report Pane” on page 180.

Gold Master Report User Interface

This section describes:

- ▶ Gold Master Report Page on page 564

Gold Master Report Page

Description	Specifies which of the selected CIs are configured differently from the Gold Master CI. To access: Select Applications > 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>Reference Information</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 the Report Manager. For details, see “Gold Master Report Pane” on page 180.

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 351.</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>Reference Information</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” in <i>CI Attribute Customization</i>), 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 is 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 567.</p>
<p>Important Information</p>	<p>For details on how to work with reports, see “Working in Reports” in <i>Reference Information</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.

GUI Element (A-Z)	Description
Attributes	The CI attribute.
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 - labm1ccm14
Report Date - Sun May 4, 2008 10:13 AM

Compared CI - labm1mam13

Element Type - Windows, # in Gold Master - 1, # in Compared CI - 1

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.

22

Host Dependency Report

This chapter provides information on Host Dependency reports.

This chapter includes:

Concepts

- ▶ Host Dependency Report Overview on page 569

Reference

- ▶ Host Dependency Report User Interface on page 570

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 570

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 > 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>Reference Information</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 (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.

23

System Report

This chapter provides information on System reports.

This chapter includes:

Concepts

- ▶ System Report Overview on page 573

Reference

- ▶ System Reports User Interface on page 573

System Report Overview

A System report is based on a specific Report TQL query, defined in the Report Manager. It gives you information about the selected Report nodes in the TQL on which it is based.

You can 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 the Report Manager. For details, see “Report Manager” on page 163.

System Reports User Interface

This section describes:

- ▶ Set Parameter Values Dialog Box on page 574

► System Report Page on page 575

Set Parameter Values Dialog Box

Description	<p>Enables you to edit the predefined parameterized values of node conditions defined for the selected Report definition in the 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 System Report page.</p>
Important Information	<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 Report Manager. For details, see “Attribute Tab” on page 289.</p>

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

GUI Element (A-Z)	Description
Element name	The node for which the condition was defined using parameterized values.
<Attribute>	The attribute used for the attribute condition definition.
<Operator>	The operator used for the attribute condition definition.

System Report Page

Description	A System report is based on a specific Report TQL query defined in the Report Manager. Each report is customized to display specific information, as defined in the relevant Report TQL. For details, see “Report Manager” on page 163. To access: Select Applications > Reports > System Report .
Important Information	<ul style="list-style-type: none"> ▶ For details on how to work with reports, see “Working in Reports” in <i>Reference Information</i>. ▶ For information about limitations on the size of reports produced in .pdf format, see “Publishing a Report” in <i>Reference Information</i>.

The System Report page includes the following panes:

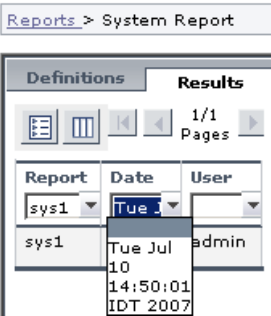
- ▶ “Left pane” on page 575
- ▶ “Right pane” on page 576

Left pane

Description	Select the required System 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 the hierarchical tree structure of the System reports defined in the Report Manager. For details, see “Report Manager” on page 163.

GUI Element (A-Z)	Description
<p>Results tab</p>	<p>The System 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 System report on a periodic basis, you can produce a System 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 351.</p>  <p>From the:</p> <ul style="list-style-type: none"> ➤ Report list, select the required System 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>Reference Information</i>.</p>

Right pane

<p>Description</p>	<p>Contains the information that was defined in the 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 “Report Manager” on page 163.</p>
<p>Important Information</p>	<p>For details on how to work with reports, see “Working in Reports” in <i>Reference Information</i>.</p>

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

GUI Element (A-Z)	Description
Set parameter values	<p>A link that opens the Set parameters values dialog box. Enables you to edit the predefined parameters of node conditions.</p> <p>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 the Report Manager. For details, see “Attribute Tab” on page 289.</p>
Set view-specific report	<p>(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.</p> <p>Note: Click Clear to run the report based on the entire CMDB.</p>

Part IV

View Explorer

24

View Explorer

This chapter provides information on View Explorer.

Note: In IT Universe Manager and the Topology View Application, View Explorer is called CI Selector.

This chapter includes:

Concepts

- View Explorer Overview on page 582

Tasks

- Display a View in Browse Mode on page 582
- Search for CIs in Search Mode on page 583
- Modify View Explorer Display Options on page 586

Reference

- View Explorer User Interface on page 587

Troubleshooting and Limitations on page 593

View Explorer Overview

View Explorer presents the elements of the IT universe model in HP Universal CMDB through the medium of views. HP Universal CMDB displays View Explorer in the left pane of 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 have been added to it (for an instance view), or if no CIs were found matching the TQL query (for a pattern view). For details on pattern and instance views, see “Instance Views and Pattern Views” on page 100.

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.

For information on the components of View Explorer, see “View Explorer User Interface” on page 587.

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 588.

This task includes the following steps:

- “Prerequisites” on page 582
- “Select a View to Display” on page 583

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 Universal CMDB.

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 591.

This task includes the following steps:

- “Prerequisites” on page 583
- “Search by CI Name” on page 583
- “Filter the Scope of the Search” on page 584
- “Search by Related Configuration Item” on page 584
- “Search by Configuration Item Type” on page 585
- “Run the Search and Sort the Results” on page 585

1 Prerequisites

In the View Explorer pane, select **Search** mode. (In IT Universe Manager or Topology View, select **CMDB Search**.)

2 Search by CI Name

When searching for CIs by name, you enter a string in the **Search for** 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).

When using this search option, note the following:

- The search by CI name option is not case sensitive.
- You can use the wildcard character asterisk (*) as follows:
 - If you enter `serv`, all CIs containing the string `serv` are returned.
 - If you enter `serv*`, only CIs with names beginning with `serv` are returned.

Note: The wildcard character asterisk is not relevant in search mode in IT Universe Manager or Topology View.

3 Filter the Scope of the Search

All searches in View Explorer must specify the locations in which to search (this option is not available in IT Universe Manager):

- **The current view only.** This option includes the view currently selected in Browse mode.
- **All views.** This option searches in the most recently accessed views. It does not include any views that are unavailable in the current application. For information on unavailable views, see “Unavailable Views and CIs” on page 593.
- **The entire CMDB.** This option enables you to find CIs that are not included in any view, or that are part of a view that is unavailable in IT Universe Manager. This option is only available if you are working in Change Report or in the Instance View Editor in View Manager.

Note: In IT Universe Manager, the search is always run on the entire CMDB.

4 Search by Related Configuration Item

You can search for CIs using the **Related to** box (this option is not available in IT Universe Manager or Topology View). This search returns CIs that have defined relationships to the CI specified in the **Related to** box.



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 Universal CMDB remembers your selection until you move to a different application, or until you define a different value. The selection is shown inactive: you activate it again for a search by selecting the check box.

5 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 manually enter a CIT in the **CI type** box.

After defining a CI in the **CI type** box, HP Universal CMDB remembers your selection until you move to a different application, or until you define a different value.

6 Run the Search and Sort the Results

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.

Modify View Explorer Display Options

You can modify the display options for View Explorer. These options are configured in the Infrastructure Settings Manager.

Important: Many of the settings in the Infrastructure Settings Manager should not be modified without first consulting HP Software Support or your HP Professional Services representative. Modifying certain settings can adversely affect the performance of HP Universal CMDB.

This task includes the following steps:

- “Prerequisites” on page 586
- “Modify Selected Settings” on page 586

1 Prerequisites

Access the Infrastructure Settings Manager by selecting **Admin > Settings > Infrastructure Settings Manager**. 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:

- View Explorer on page 587




View Explorer







Description	<p>Enables you to select views and to locate CIs.</p> <p>To access: Appears in the left pane of the IT Universe Manager window.Note: in IT Universe Manager and Topology View, View Explorer is called CI Selector.</p>
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<p>Important Information</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.
<p>Included in Tasks</p>	<p>“Display a View in Browse Mode” on page 582 “Search for CIs in Search Mode” on page 583</p>

Browse Mode

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



GUI Element (A-Z)	Description
 	<p>Click the Refresh button to refresh the list of CIs (if new CIs have been added to a view) or to refresh the View list (if views have been newly defined).</p> <p>Note: In IT Universe Manager and Topology View, only the CIs are refreshed.</p>
	<p>Click Rebuild View to rebuild the view by performing a full recalculation.</p> <p>Note: The recalculation may take a long time.</p> <p>Note: This button only appears in IT Universe Manager and Topology View.</p>


GUI Element (A-Z)	Description
	<p>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 127.</p> <p>Note: This button only appears in IT Universe Manager and Topology View.</p>
	<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 501.</p> <p>Note: This button only appears in IT Universe Manager and Topology View.</p>
	<p>Click Go to View Definition to go directly to View Manager for the current view.</p> <p>Note: This button only appears in IT Universe Manager.</p>
	<p>Click Asset Report to open the Asset report for the selected view. For details, see “Asset Report Overview” on page 543.</p> <p>Note: This button only appears in IT Universe Manager and Topology View.</p>
	<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 or Topology View.</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 or Topology View.</p>

GUI Element (A-Z)	Description
	<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 and Topology View.</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.
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 and Topology View.</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 Universal CMDB 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>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 or Topology View.</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 and Topology View.</p>
<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>

GUI Element (A-Z)	Description
<p>Find</p>	<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 button only appears in IT Universe Manager and Topology View.</p>
<p>Name filter box</p>	<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 or Topology View.</p>
<p>Related to</p>	<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 or Topology View.</p>
<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 584.</p>
<p>Search in</p>	<p>Specify the scope of your search. You can limit your search to the current view, search in the most recently accessed views (by selecting All views), or 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 584.</p> <p>Note: This is not relevant in IT Universe Manager or Topology View.</p>

GUI Element (A-Z)	Description
Search results count	The Search results count below the Find box displays the total number of CIs found in the search. Note: This feature only appears in IT Universe Manager and Topology View.
View filter box	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. Note: This is not relevant in IT Universe Manager or Topology View.

Context Menu Options

Menu Item	Description
<IT Universe Manager context menu options>	The regular context menu for the topology map in IT Universe Manager is also available from the View Explorer pane. For details on the menu options, see “IT Universe Manager Context Menu” on page 80.

Troubleshooting and Limitations

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 > Settings > User Manager**. For more information, see “User Manager User Interface” on page 641.
- 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 101.

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. Use the Refresh button to update the view.

Part V

Topology Map

25

Topology Map

This chapter provides information on Topology Map.

This chapter includes:

Concepts

- ▶ Topology Map Overview on page 597
- ▶ Handling Large Views on page 598

Reference

- ▶ Topology Map User Interface on page 598

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, it means that 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 solve this problem, use one of the following solutions:

- ▶ Change the TQL query in the view definition in View Manager by adding conditions to redefine the view. For details, see “Refine Node Type Dialog Box” on page 299.
- ▶ 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 113.
- ▶ 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 User Interface” on page 320.

Topology Map User Interface


This section describes:

- ▶ Export Map to Image Dialog Box on page 599
- ▶ Layout Properties Dialog Box on page 600
- ▶ Main Menu on page 620
- ▶ Print Dialog Box on page 622
- ▶ Print Preview Dialog Box on page 622
- ▶ Print Setup Dialog Box on page 623
- ▶ Toolbar Options on page 625

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 496

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 629.
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 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.

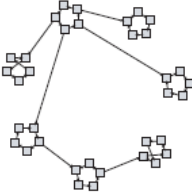


Layout Properties Dialog Box




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

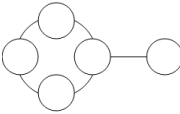
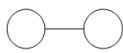
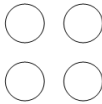
Description	<p>Enables you to group a graph's nodes into groups or clusters based on the grouping options you select. It is particularly suited for visualizing ring and star network topologies, and for link analysis.</p> <p>The Circular tab has the following areas:</p> <ul style="list-style-type: none"> ▶ 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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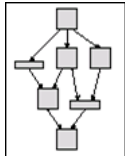
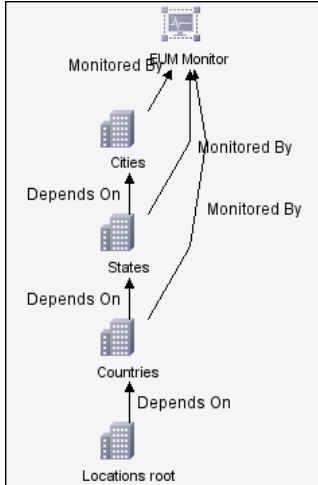
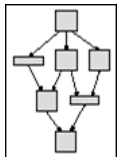
The following elements are included (unlabeled GUI elements are shown in angle brackets>):

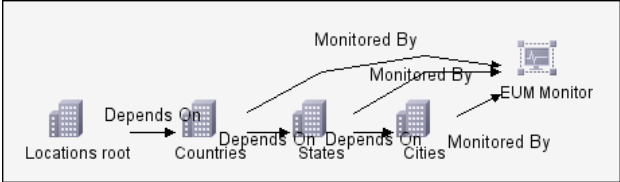
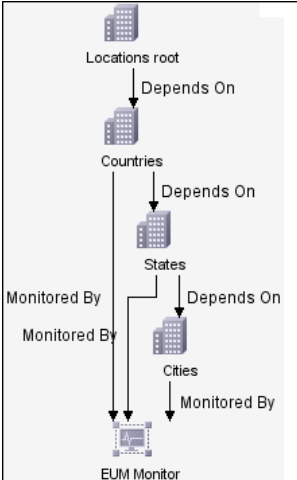
GUI Element (A–Z)	Description
Automatic	The layout is performed automatically.
Custom	Sets a specific aspect ratio. Default value: 1.0
Constant Spacing	Set constant spacing (horizontal and vertical) around each disconnected component. Default value: 20
Detect Components	Select this option to view the 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

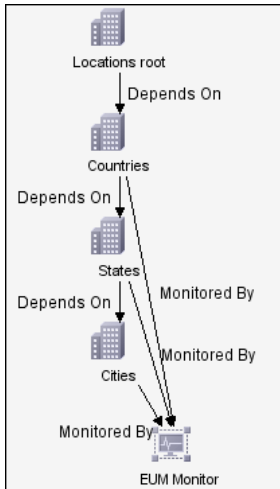
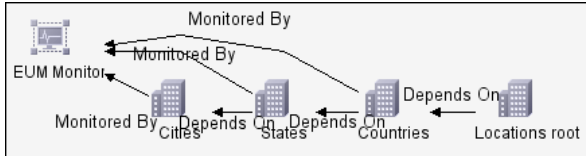
Hierarchical Tab

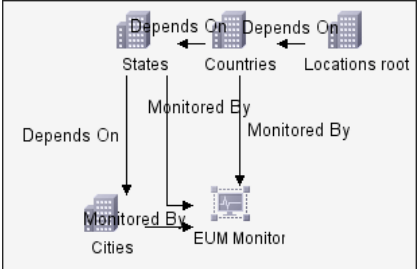
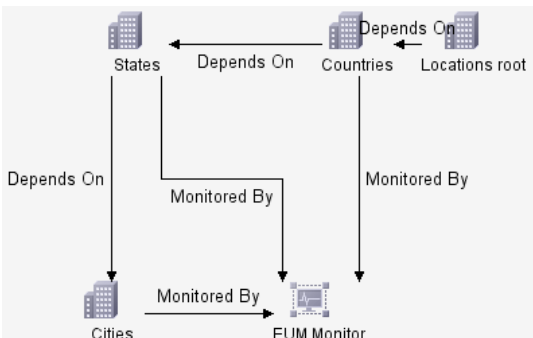
<p>Description</p>	<p>Shows the precedence relationships that can represent organizational or information management system dependencies, as well as process models, software call graphs, and work flows. The hierarchical layout emphasizes dependencies by placing the nodes at different levels.</p> <p>The 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 Routing area. Enables you to set the orientation of the hierarchy. ▶ 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. ▶ 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. ▶ 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>

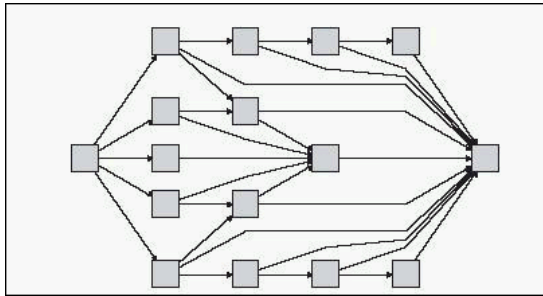
The following elements are included (unlabeled GUI elements are shown in angle brackets>):

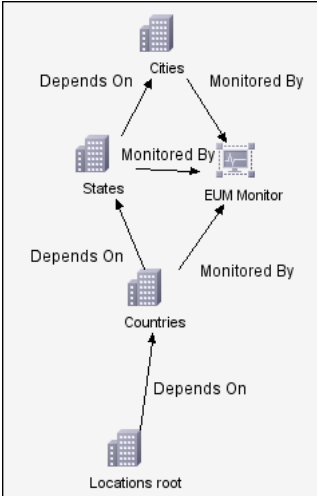
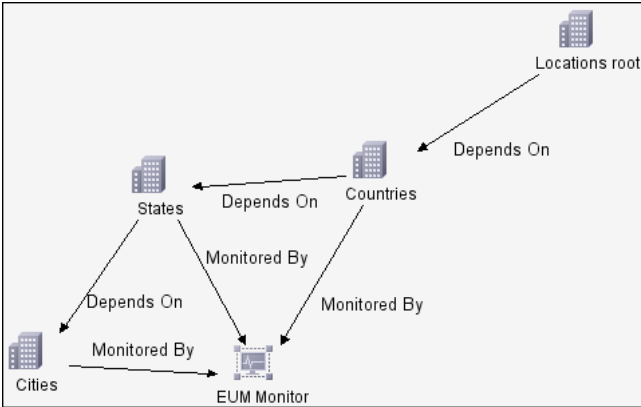
GUI Element (A-Z)	Description
Bottom	<p>This illustration shows that the bottom of the nodes at the same level of the hierarchy are aligned.</p> 
Bottom To Top	<p>The children are located below the parent (in the example, Alignment = Center).</p> 
Center	<p>This illustration shows that the center of the nodes at the same level of the hierarchy are aligned.</p> 
Default	Sets the layout to default quality.

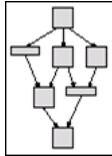
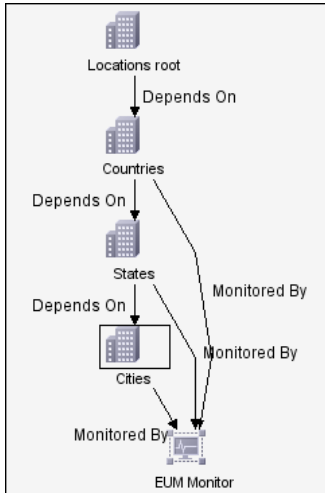
GUI Element (A-Z)	Description
Draft	Sets the layout to draft quality.
Left To Right	<p>The children are located to the left of the parent (in the example, Alignment = Center).</p> 
Minimum Backward Edges	Sets the number of number of backward relationships displayed in a layer to a minimum.
Optimize For 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> 

GUI Element (A-Z)	Description
<p>Polyline</p>	<p>For straight lines between nodes/CIs.</p> 
<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> 

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> 
<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 Ends (in the Horizontal Spacing area)</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> 

GUI Element (A–Z)	Description
<p>Spacing Between Nodes</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

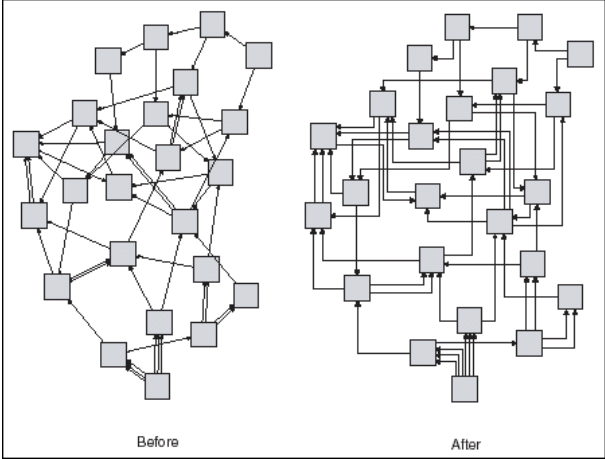
Description	<p>Enables you to set orthogonal layout route relationships horizontally and vertically. This results in relationships bending at 90-degree angles only.</p> <p>The Orthogonal tab has the following areas:</p> <ul style="list-style-type: none"> ▶ Aspect Ratio area. Enables you to set the layout's 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>):

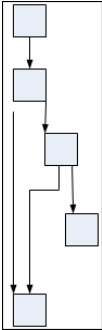
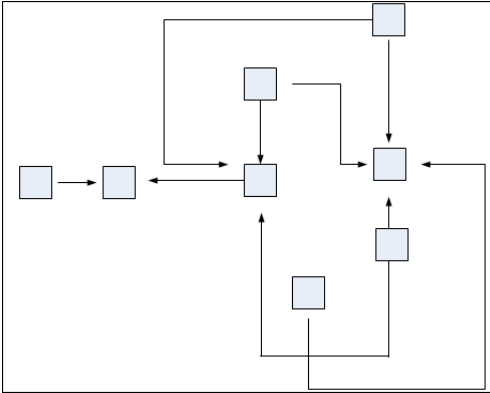
GUI Element (A–Z)	Description
Automatic	The layout is performed automatically.
Custom	Specify the aspect ratio. Default value: 1.0
Default	Set the layout to default quality.
Draft	Set the layout to draft quality.
Disabled	Disables the aspect ratio.
Proof	Set the layout to proof quality.
Spacing Between 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

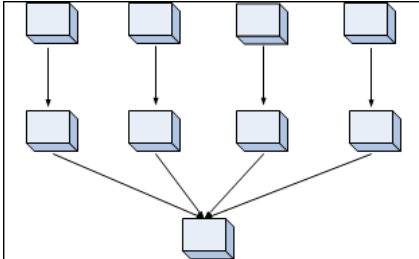
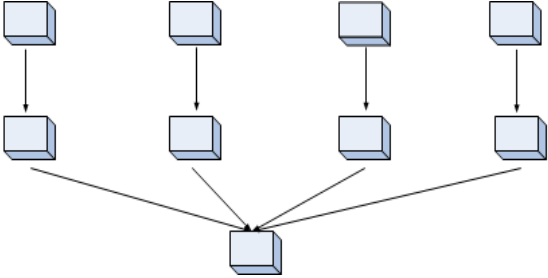
Routing Tab

<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="621 335 1220 795" style="border: 1px solid black; padding: 10px;">  </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>
--------------------	---

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="578 595 1136 852" style="border: 1px solid black; padding: 5px;"> </div>
<p>Proof</p>	<p>Set the layout to proof quality.</p>

Main Menu

<p>Description</p>	<p>Contains the options for working with the topology map.</p>
<p>Important Information</p>	<p>The specific options contained within the Main Menu drop-downs are detailed in “Toolbar Options” on page 625.</p>

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 Tipe 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 623. ▶ 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 629.. For details about layout properties, see “Layout Properties Dialog Box” on page 600..
Included in Tasks	“Print and Save a Topology Map to File” on page 496

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 496

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 622.
Print Setup	Define the print settings for the map. For details, see “Print Setup Dialog Box” on page 623.
Zoom	Focus on specific details of the map. For details, see “Interactive Zoom” on page 629.

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 496


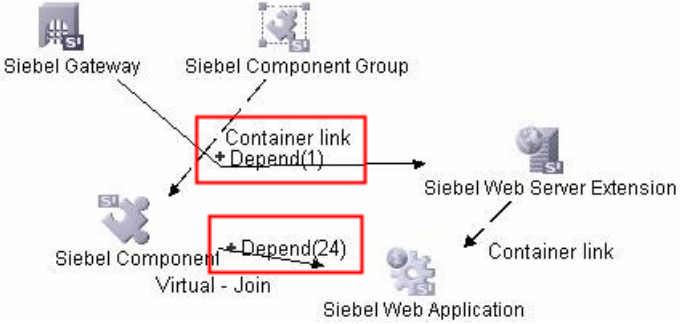


The following elements are included (unlabeled GUI elements are shown in angle brackets>):





GUI Element (A–Z)	Description
Actual Size	Print the view as it really is.
Color	Set the text color.
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.
Print Background	Print the background behind the view.






GUI Element (A–Z)	Description
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.
Position	Select the position of the caption from the Position list.
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.



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” in <i>Model Management</i>.</p> <p>To access: Select Layout > Add Background Image.</p> <p>Note: This option is only active in IT Universe Manager and the Topology View application.</p>
	Additions Count	<p>Enables you to 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>
	Candidates for Deletion	<p>Identify the CIs in the current view which are candidates for deletion.</p> <p>Note: This option appears in the toolbar in the Topology View application only.</p>






Button	Option Name	Use This Option to...
	Change Label Length	Enter the maximum number of characters that the labels should contain. To access: Select Layout > Change label length .
	Change Timeframe	Open the Change Timeframe dialog box, which enables you to set the period for the display of added or changed CI indicators. Note: This option appears in the toolbar in Topology View application only.
	CI Types Tree	Toggle between hiding and displaying the CI Type Selector at the right of the screen. To access: Select View > CI Types Tree .
	Clear Correlation	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 498. For details on Correlation rules, see “Correlation Manager User Interface” on page 147. Note: This option appears in the toolbar in the Topology Map in the Topology View application only.
	Create Relationship	Create a relationship between two existing TQL nodes. For details, see “Add Nodes and Relationships to a TQL Query” on page 240. Create a relationship between existing CIs. For details, see “Attaching Existing CIs” on page 65.
	Delete Selected Item(s)	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.
	Drag Map	Drag the view. To access: Open the drop-down menu in the Mode box or select View > Drag Map .


Button	Option Name	Use This Option to...
	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 66.</p> <p>Note: This option appears only in IT Universe Manager and the 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 599.</p> <p>To access: Select Operations > Export Map to Image.</p>
	Filter DB Results	<p>Opens 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 76.</p> <p>Note: This option appears only in IT Universe Manager and the Topology View application.</p>
	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 66.</p> <p>Note: This option appears only in IT Universe Manager and the Topology View application.</p>

Button	Option Name	Use This Option to...
	Hide All Inheritance From Map	Toggle between showing and hiding Inheritance_f relationships and their connecting node. To access: Select Layout > Hide All Inheritance From Map . Note: This option is only active in the toolbar in CI Type Manager.
	Hide All Node Labels	Toggle between showing or hiding the CI/CIT/node/pattern labels. To access: Select Layout > Hide All Node Labels .
	Hide All Relationship Labels	Toggle between showing or hiding the relationship labels. To access: Select Layout > Hide All Relationship Labels .
	Hide All Relationships	Toggle between showing and hiding the relationships in the displayed map. To access: Select Layout > Hide All Relationships .
	Hide Panes/Restore Panes	Toggle between the regular display and a full-screen display of the topology map.
	Information Pane	Toggle between hiding and displaying the Information Pane at the bottom center of the screen. To access: Select View > Information Pane .
	Insert CI	Define a new unrelated CI. For details, see “Working with CIs” on page 56. Note: This option appears in the toolbar in IT Universe Manager only.
	Insert CI and Relate	Define a new related CI. For details, see “Working with CIs” on page 56. Note: This option appears in the toolbar in IT Universe Manager only.

Button	Option Name	Use This Option to...
	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>
	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 600.</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: Click Save Layout to save the selected layout.</p> <p>For further details about each of the options, see "Layout Properties Dialog Box" on page 600.</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>

Button	Option Name	Use This Option to...
	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>
	Place in Center	<p>Places the selected CI/node/CIT/pattern in the center of the map.</p> <p>To access: Select Layout > Place in Center.</p>
	Print	<p>Print the contents of the topology map. For details, see “Print Dialog Box” on page 622.</p> <p>To access: Select Operations > Print...</p>
	Print Preview	<p>Preview the contents of the map before printing.</p> <p>To access: Select Operations > Print Preview.</p>
	Print Setup	<p>Define print settings for printing the topology map. For details, see “Print Setup Dialog Box” on page 623.</p> <p>To access: Select Operations > Print Setup...</p>
	Rediscover View Content	<p>Rediscover all the CIs in a selected view by manually starting the DDM jobs that originally discovered them.</p> <p>Note: This option appears in the toolbar in IT Universe Manager only.</p>
	Remove Enrichment Results	<p>Remove the instances created from an Enrichment rule from the CMDB.</p> <p>Note: This option appears in the toolbar in Enrichment Manager only.</p>

Button	Option Name	Use This Option to...
	Save Layout	<p>Save changes to the layout. To retrieve the layout you have saved, select Manual Layout.</p> <p>To access: Select Layout > Save Layout.</p> <p>Note: This option appears in the toolbar in IT Universe Manager and Topology View application only.</p>
	Select	<p>Select a CI/CIT/TQL node or multiple CIs/CITs/TQL nodes.</p> <p>To access: Open the drop-down menu in the Mode box or select View > Select.</p>
	Select All	<p>Select all the CIs and relationships in a selected layer.</p> <p>To access: Select Edit > Select All.</p>
	Select All Nodes	<p>Select all the nodes in a selected layer.</p> <p>To access: Select Edit > Select All Nodes.</p>
	Set Number of Hops	<p>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.</p> <p>Note: This option appears in the toolbar in IT Universe Manager and Topology View application only.</p>
	Show Changes in Map	<p>Display an indicator next to each CI that was added or changed within the selected period as follows:</p> <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 626.</p> <p>Note: This option appears in the toolbar in Topology View application only.</p>

Button	Option Name	Use This Option to...
	Show Schedule Info	<p>Display the scheduling information for the selected job. For details, see “Discovery Scheduler Dialog Box” in <i>Discovery and Dependency Mapping Guide</i>.</p> <p>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>.</p>
	Straighten All Selected Relationships	<p>Straightens any selected relationship between two nodes that has angles.</p> <p>To access: Select Layout > Straighten All Selected Relationships.</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 310.</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 VI

Users and Permissions

26

Role Manager

This chapter provides information on Role Manager.

This chapter includes:

Concepts

- ▶ Role Manager Overview on page 635

Tasks

- ▶ Define Roles on page 635

Reference

- ▶ Role Manager User Interface on page 636

Role Manager Overview

Roles enable you to assign permissions to users according to their responsibilities in the organization. For example, you could create a role that enables its users to create TQL queries, or you could create a role that enables its users to create views in View Manager but not to edit existing TQL queries.

Define Roles

A role is a group of users to whom you assign the same access rights. For details on how to define a role, see “Role Manager Window” on page 637.

Role Manager User Interface

This section describes:

- ▶ Role Dialog Box on page 636
- ▶ Role Manager Window on page 637

Role Dialog Box

Description	Enables administrators to create and manage roles, and assign permissions to each role to perform specific actions. For example, a role named dba could have permissions to view all database views and to create new views. To access: Click the Add or Edit button in the Role Manager window.
Included in Tasks	“Define Roles” on page 635




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

GUI Element (A-Z)	Description
<Roles>	Contains the list of roles that appear in the Role list in the Role Manager window. Select the roles whose permissions you want to assign to the new role. Note: If you do not select a role from the Role List, you must assign permissions in the Security Manager, to enable access rights for the role. For details, see “Security Manager Window” on page 654.
Description	Enter a description of the role you are defining.
Name	Enter a unique name for the role.

 **Role Manager Window**

Description	Enables you to create, edit, and delete roles. For example, you can create a role that enables its users to create TQL queries, or you can create a role that enables its users to create views in the View Manager but not to edit existing TQL queries. To access: Admin > Settings > Role Manager
Included in Tasks	“Define Roles” on page 635

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

GUI Element (A-Z)	Description
	Click to add a new role.
	Click to delete an existing role.
	Click to edit an existing role.
<List of roles>	<p>Contains the list of default and custom roles.</p> <p>The default roles are:</p> <ul style="list-style-type: none"> ➤ Admin. Users with this role have unlimited access to all functions. ➤ Guests. Users with this role have permissions to display views in the Topology View. ➤ Web service roles. Users who are working with the HP Universal CMDB API or the Discovery and Dependency Mapping API to write data to the UCMDB must be given permissions to the UCMDB. <p>The following roles enable the API writer to work with the CMDB:</p> <ul style="list-style-type: none"> ➤ CmdbOpenApiClassModel. A user with this role can perform operations on CITs. ➤ CmdbOpenApiImpact. A user with this role can perform impact operations on the CMDB. ➤ CmdbOpenApiQuery. A user with this role can send queries to the CMDB and receive replies. ➤ CmdbOpenApiUpdate. A user with this role can update the CMDB with changes. <p>For details on writing APIs, see “Working with the HP Universal CMDB API” in <i>Reference Information</i>.</p>

27

User Manager

This chapter provides information on User Manager.

This chapter includes:

Concepts

- ▶ User Manager Overview on page 639

Tasks

- ▶ Set Up Users on page 640
- ▶ Change a User's Password on page 641

Reference

- ▶ User Manager User Interface on page 641

User Manager Overview

When you create a user or role, you define which actions the user or role can perform. You can assign administrator or guest access rights to these users or roles, and if necessary, specify additional permissions in the Security Manager, for example, which views a user can display. For details, see “Security Manager” on page 651.

Note: User Manager is available only to those logged in with admin or administrator access rights.

Set Up Users

Use the following procedures to set up users in your system:

1 Define Roles

A role is a group of users to whom you assign the same access rights. For details, see “Role Manager Overview” on page 635 and “Role Manager Window” on page 637.

2 Assign Access Rights to the Roles

You assign permissions for roles to access HP Universal CMDB. For details, see “Set Up Security” on page 652 and “Security Manager Window” on page 654.

Note: From a best practices point of view, it is preferable to assign access rights to roles only, and to associate users with a role that has the appropriate access rights.

For details on assigning access rights to Web service users, see “Role Manager Window” on page 637.

Example – Create a Role Hierarchy

One team maintains the Oracle databases in your organization and another maintains the Microsoft SQL Server databases. The team leader needs to be familiar with both databases. You can create a role hierarchy:

- 1 Create two roles, `dba_oracle` and `dba_mssql`, and give the first role access rights to the Oracle view and the second role access rights to the SQL Server view. For details, see “Security Manager Window” on page 654 and “View Manager Window” on page 128.
- 2 Create another role, `dba`, and give it rights to both the Oracle and SQL Server views.

3 Define Users

For details on defining a user, see “User Manager Window” on page 644. When defining users, you associate a user with one or more roles. For details, see “User Manager Overview” on page 639.

4 Define a Profile for a User

You can set preferences, such as time zone and locale, for a specific user. For details, see “User Profile” on page 647.

Change a User’s Password

For details on changing a password, see “Change Password Dialog Box” on page 643.

User Manager User Interface

This section describes:

- Add New User Wizard on page 641
- Change Password Dialog Box on page 643
- Edit User Properties Dialog Box on page 644
- User Manager Window on page 644

Add New User Wizard

Description	Enables you to create a user. To access: Admin > Settings > User Manager. Click the Add button.
Important Information	It is recommended to define roles prior to defining new users. For details, see “Role Manager Window” on page 637.

Included in Tasks	“Define Users” on page 641
Wizard Map	The Add New User wizard contains: User Name and Password Page > Add New User dialog box - Details > Add New User dialog box - Roles

User Name and Password Page

Description	Enables you to assign a name and password for the user.
Included in Tasks	“Define Users” on page 641
Wizard Map	The Add New User wizard contains: User Name and Password Page > User Details Page > Role List Page

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

GUI Element (A-Z)	Description
Confirm Password	Type in the password you entered in the Password box.
Old Password	Type in your old password. Note: This box appears only when you edit an existing user.
Password	Type in a password.
User Name	Type a unique user name.

User Details Page

Description	Enables you to add the details of the user.
Included in Tasks	“Define Users” on page 641
Wizard Map	The Add New User wizard contains: User Name and Password Page > User Details Page > Role List Page

Role List Page

Description	Associate a user with one or more roles.
Included in Tasks	“Define Users” on page 641
Important Information	If you do not select a role, you must assign permissions in the Security Manager to enable access rights for the user. For details, see “Security Manager Window” on page 654.
Useful Links	“Role Manager Window” on page 637
Wizard Map	The Add New User wizard contains: User Name and Password Page > User Details Page > Role List Page

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

GUI Element (A-Z)	Description
<List of roles>	Contains the list of default and custom roles. For details, see “Security Manager Window” on page 654.

Change Password Dialog Box

Description	Enables you to change your password; if you have admin permissions, you can change the password of other users. To access: <ul style="list-style-type: none"> ▶ For a user (on condition that the administrator has created a user name for you, and sent you the user name and password): Admin > Settings > User Profile and click the Change Password button. ▶ For an admin: Admin > Settings > User Manager. Select the user and click the Profile icon. In the User Profile dialog box, click the Change Password button.
Important Information	Passwords are case sensitive.



Edit User Properties Dialog Box



Description	<p>Enables you to edit an existing user.</p> <p>Contains the following tabs:</p> <ul style="list-style-type: none"> ▶ Security. Change the user's password. For details, see "User Name and Password Page" on page 642. You cannot change the user name. ▶ Details. Change the user details as required. For details, see "User Details Page" on page 642. ▶ Roles. Associate a user with different roles. For details, see "Role List Page" on page 643. <p>To access: Admin > Settings > User Manager. Select an existing user and click the Edit button.</p>
Included in Tasks	"Set Up Users" on page 640

User Manager Window

Description	<p>Enables you to define users.</p> <p>To access: Admin > Settings > User Manager</p>
Important Information	User names are case sensitive.
Useful Links	For details on the complete procedure for creating users and assigning roles and access permissions, see "Set Up Users" on page 640.

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

GUI Element (A-Z)	Description
	Opens the Add New User wizard.
	Select a user and click to remove the user name.

GUI Element (A-Z)	Description
	Click to open the Edit User Properties dialog box and edit an existing user.
	Click to open the User Profile window. For details, see “User Profile Dialog Box” on page 648.
Name	The name of the user.
<List of users>	<p>Contains the list of default and custom users.</p> <p>The default users are:</p> <ul style="list-style-type: none"> ▶ Administrator. Users and roles with Administrator access rights have unrestricted access to all functions. Administrators can edit the access rights of the default users and roles. ▶ admin. Users and roles with admin access rights have the same access rights as Administrators. ▶ guest. Users and roles with guest access rights have permissions to display views in the Topology View.

28

User Profile

This chapter provides information on User Profile.

This chapter includes:

Concepts

- ▶ User Profile Overview on page 647

Tasks

- ▶ Define User Preferences on page 648

Concepts

- ▶ User Profile User Interface on page 648

User Profile Overview

You can configure the preferences of the currently logged in user, such as the time zone, or the editor to use when editing configuration files. For details, see “User Profile Dialog Box” on page 648.

Note: Administrators can configure profiles for all users using the User Manager window. For details, see the “User Manager Window” on page 644.

Define User Preferences

Configure preferences for the currently logged in user. For details, see “User Profile Dialog Box” on page 648.

User Profile User Interface



This section describes:


- User Profile Dialog Box on page 648

User Profile Dialog Box

Description	Enables you to set preferences for the currently logged in user. To access: <ul style="list-style-type: none">➤ For admin users: Select a user and click the Profile button in the User Manager window. For details, see “User Manager Window” on page 644.➤ For non-admin users: Admin > Settings > User Profile.
Important Information	Non-admin users can change their own password here.
Included in Tasks	“Define User Preferences” on page 648

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

GUI Element (A-Z)	Description
	Click to browse to the executable file of the file editor you want to use when editing configuration files.
Change Password	Click to open the Change Password dialog box. Enter the old and new passwords and click OK .
Flags	<p>(Optional) Enter the necessary parameters to open the text editor appropriately.</p> <p>For example:</p> <ul style="list-style-type: none"> ▶ /m enables you to start Microsoft Word without running any AutoExec macros. ▶ -L "eng" :C:\temp_files signifies that the language is English and the location of the temporary file that is opened by the text editor is C:\temp_files. <p>Ensure that the parameters are entered in the correct order.</p>
Full path	Full path to the executable file of the file editor.
Label Transparency	<ul style="list-style-type: none"> ▶ Yes. If you drag one CI on top of another CI so that the text of one label overlaps the text of the other label, the text of both labels remains visible. ▶ No. The default. If you drag one CI on top of another CI so that the text of one label overlaps the text of the other label, the text of only one of the labels remains visible.
Max number of characters in a line	<p>Enter the maximum size (in characters) of item labels. In the following example, a maximum number of 15 characters is defined:</p> <div data-bbox="582 1211 753 1293" style="border: 1px solid black; padding: 5px; text-align: center;">  labm2am172.dowl </div>

GUI Element (A-Z)	Description
<p>Max number of lines</p>	<p>Enter the maximum number of lines for an item label. When the label is longer than the number of allocated characters, text flows to the next line. In the following example, a maximum number of 10 characters and three lines is defined:</p> <div data-bbox="546 407 682 578" style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;">  <p>labm1platf orm07.devl ab.ad</p> </div>
<p>Time zone</p>	<p>Select the appropriate time zone, according to the user's location.</p>

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Security Manager

This chapter provides information on Security Manager.

This chapter includes:

Concepts

- ▶ Security Manager Overview on page 651

Tasks

- ▶ Set Up Security on page 652
- ▶ Assign Access Rights on page 652

Reference

- ▶ Security Manager User Interface on page 652

Security Manager Overview

You assign role access rights to TQL queries, views, domain instances, configuration item types, and customize options. Once the roles are assigned access rights, you create users and associate them with a role or roles, thus assigning the access rights to the users.

You must also assign access rights to the appropriate manager (Correlation Manager, CI Type Manager, Query Manager, and so on). For example, to give a role permissions for a view, give the role access rights to the View Manager.

When users launch HP Universal CMDB, the actions for which you gave them permissions are available. For example, if a user is not assigned permissions to create a new role, the Role Manager option in the Settings tab is not available. If a user is not assigned permissions to view a certain manager, the manager does not appear in HP Universal CMDB.

Set Up Security

Choose the roles (recommended) or users for which you are assigning permissions. For details, see “Role and User Selector Dialog Box” on page 653.

Assign Access Rights


Enable permissions for a resource. For details, see “Security Manager Window” on page 654.

Security Manager User Interface







This section describes:

- Role and User Selector Dialog Box on page 653
- Security Manager Window on page 654

Role and User Selector Dialog Box

Description	Enables you to choose the roles or users for which you are assigning access rights. To access: Click the Add button  in the Roles/Users pane.
Important Information	The roles and users that appear are defined in the User and Role Managers. For details on the User Manager, see “User Manager” on page 639. For details on the Role Manager, see “Role Manager” on page 635 .
Included in Tasks	“Set Up Security” on page 652

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

GUI Element (A-Z)	Description
	Move the role or user to the Selected Roles and Users pane.
	Move the role or user back to the Defined Roles and Users pane.
	Move all the roles and user to the Selected Roles and Users pane.
	Move all the roles and users back to the Defined Roles and Users pane.
Defined Roles and Users pane	Contains the list of the roles and users that are defined in the User and Role managers.
Selected Roles and Users pane	The roles or users for which you are assigning permissions for the selected resource.
Description	A description of the role or user.
Name	The name of the role or user.
Type	 Represents a user.  Represents a role.

Security Manager Window

Description	Enables you to assign access rights to view, create, update, remove, or perform actions. To access: Select Admin > Settings > Security Manager .
Important Information	<ul style="list-style-type: none"> ▶ When assigning permissions, you must also assign access rights to the appropriate manager (CI Type Manager, TQL Builder, and so on). For example, to give a role permissions for a view, give the role access rights to the View Manager. ▶ Do not give regular users access to the Admin > Settings > User Manager menu option. This is because an administrator can override any user's password from this menu option. Users can change their own passwords through the Change Password option. For details, see "User Profile" on page 647. ▶ It is recommended to assign access rights to roles only, and to associate users with a role that has the appropriate access rights. ▶ You cannot select an item at the folder level. ▶ If you make a selection at the root level, the user or role receives access rights to all items contained in the root. ▶ Child resources inherit the permissions assigned to their parents or the nearest ancestor to which permissions are assigned. For example, if you assign permissions to host, its children (atwswitch, concentrator, and so on) inherit the permissions assigned to host.
Included in Tasks	"Assign Access Rights" on page 652

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

GUI Element (A-Z)	Description
TQLs tab	Give permissions to users to view, update, or delete the selected TQLs.
Views tab	Give permissions to users to view, update, or delete the selected views.

GUI Element (A-Z)	Description
Domain tab	Give permissions to users to edit the Discovery domain credentials and the range of network addresses for the Discovery probe.

GUI Element (A-Z)	Description
CI Types tab	Give permissions to users to perform a specific operation on the selected CI types.

GUI Element (A-Z)	Description
Customize tab	<p data-bbox="621 222 1263 314">Give permissions to users to view, update or perform specific operations in the CMDB Admin and Application menus.</p> <p data-bbox="621 331 778 357">CMDB Admin</p> <ul style="list-style-type: none"> <li data-bbox="621 374 1206 466">▶ Modeling. Give permissions to access IT Universe, View, Correlation, CI Type, Reports, Query, and Enrichment managers. <li data-bbox="621 475 768 501">▶ Discovery: <ul style="list-style-type: none"> <li data-bbox="649 510 1249 666">▶ View. View the configuration of the Discovery jobs in the Run Discovery tab, for example, which Discovery job is active, and information and statistics about all active jobs and errors discovered during a run. <li data-bbox="649 683 1249 805">▶ Execute. (Requires View permissions) Activate Discovery jobs, run the Discovery wizards, define a schedule for a Discovery job, override Discovery pattern behavior, and edit Discovery TQLs. <li data-bbox="649 822 1249 944">▶ Update. (Requires Execute permissions) Grants full permissions for all Discovery operations, including updating and creating new Discovery patterns, scripts, and configuration files. <p data-bbox="621 961 714 987">Settings</p> <p data-bbox="621 1005 1249 1065">Give permissions to users to view or perform operations in the selected application.</p> <p data-bbox="621 1083 749 1109">Application</p> <ul style="list-style-type: none"> <li data-bbox="621 1126 1220 1187">▶ Topology View. Give permissions to users to access Topology View Application. <li data-bbox="621 1196 1206 1256">▶ CI Lifecycle. Give permissions to users to access CI Lifecycle. <li data-bbox="621 1265 1263 1326">▶ Compliance. Give permissions to users to compare CIs, compare snapshots, and generate a Gold Master report. <li data-bbox="621 1334 1249 1395">▶ Reports. Generate Host Dependency, Change, System, Asset, and Overview reports. <li data-bbox="621 1404 1163 1430">▶ Overview reports. Generate Overview reports.

The Security Manager window includes the following panes:

- “Resources Pane” on page 658
- “Roles/Users Pane” on page 658
- “Permissions Pane” on page 659

Resources Pane

Description	Contains the resource tree for the selected tab.
--------------------	--




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

GUI Element (A-Z)	Description
<Resources for the selected tab>	Select the resource to which you want to assign access rights.

Roles/Users Pane

Description	Displays the users or roles for which you want to assign permissions for the selected resource.
--------------------	---

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

GUI Element (A-Z)	Description
	Choose users or roles to which you want to assign permissions for the selected resource.
	Remove the selected user or role for the selected resource.
	Remove all the users and roles for the selected resource.

Permissions Pane

Description	Enables you to apply permissions to roles and users for specific resources and instances of those resources that are defined in the system.
--------------------	---

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

GUI Element (A-Z)	Description
Permissions	<p>To enable permissions for a resource, you must first select the role or user to which you are assigning access rights. Then select the check box next the action that you want the user or role to perform.</p> <ul style="list-style-type: none">▶ View. The role or user can view the resource, but cannot make changes.▶ Create. The role or user can define new resources.▶ Update. The role or user can update an existing resource.▶ Remove. The role or user can delete a resource from the CMDB.▶ Execute. The role or user can perform actions, for example, running a script. <p>Note: Only those permissions that are relevant to the selected resource are enabled.</p>

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LDAP Manager

This chapter provides information on LDAP Manager.

This chapter includes:

Concepts

- ▶ LDAP Manager Overview on page 661

Tasks

- ▶ Synchronize User Groups With LDAP on page 662

Reference

- ▶ LDAP Manager User Interface on page 663

LDAP Manager Overview

The LDAP server can be used as a user repository for mapping user groups on the LDAP server to user groups in HP Universal CMDB. You can perform updates to users and groups in HP Universal CMDB via the LDAP server.

Synchronizing groups is done via the LDAP Manager in the Settings tab. The LDAP Manager is only enabled if:

- ▶ The LDAP setting in HP Universal CMDB Infrastructure settings is configured either to **Authentication** or **Mapping**.
- ▶ The user has the required permissions.

For details on synchronizing LDAP groups with HP Universal CMDB groups, see “Synchronize User Groups With LDAP” on page 662.

Synchronize User Groups With LDAP

This task describes how to synchronize LDAP user groups with HP Universal CMDB user groups:

This task includes the following steps:

- ▶ “Configure Infrastructure Settings to Set an LDAP Synchronization Strategy” on page 662
- ▶ “Create HP Universal CMDB Groups” on page 663
- ▶ “Map LDAP Groups to HP Universal CMDB Groups” on page 663

1 Configure Infrastructure Settings to Set an LDAP Synchronization Strategy

To set up an LDAP authentication synchronization, you must first modify the settings in the Infrastructure Settings Manager. Any changes you make remain in effect for all future Web sessions.

- a** In Infrastructure Settings Manager, select **Foundations > LDAP Configuration**.
- b** In the **LDAP server URL** setting, enter the url of the LDAP server in the following format:
`ldap://<ldapHost>[:<port>]/[<baseDN>][??scope`
- c** In the **Remote users repository mode** setting, select **Mapping** or **Authentication**.
- d** In the **Groups base DN setting**, enter the distinguished name of the general group.
- e** In the **Root groups base DN setting**, enter the distinguished name of the root group.
- f** Locate the **Enable User Synchronization** setting and verify that the value is set to **True**.

For details on Infrastructure Settings Manager, see “Infrastructure Settings Manager Overview” on page 319.

2 Create HP Universal CMDB Groups

You can create local HP Universal CMDB groups that can be assigned to the remote LDAP server.

3 Map LDAP Groups to HP Universal CMDB Groups

You map user groups on the LDAP server with groups in HP Universal CMDB to synchronization LDAP groups and HP Universal CMDB groups and enable management of your HP Universal CMDB groups via the LDAP server, as follows:

- a** From the **Settings** tab, select **LDAP Manager**.
- b** In the **Corporate Directory Remote Repository** pane, select a remote group and click **Assign Groups**.

The HP Universal CMDB groups synchronized with the selected LDAP group are displayed in the **Corporate Directory Local Repository for Remote Group: <group name>** pane.

Existing synchronization of all LDAP groups is displayed in the **Local Groups to Remote Group Mapping** pane.

Important: When defining mappings, make sure to map at least one LDAP group to an Admin group in the CMDB before logging out. If this is not done, you may not have any remaining group with administration permissions.

LDAP Manager User Interface

This section describes:

- LDAP Manager on page 664



LDAP Manager

Description	<p>Enables you to map groups configured in HP Universal CMDB to groups configured on the LDAP server.</p> <p>To access: Select Admin > Settings > LDAP Manager.</p>
Important Information	<p>The LDAP Manager consists of the following panes:</p> <ul style="list-style-type: none"> ▶ Corporate Directory Pane. For details, see “Corporate Directory Pane” on page 664. ▶ Corporate Directory Local Repository for Remote Group: <group name> Pane. For details, see “Corporate Directory Local Repository for Remote Group: <group name> Pane” on page 665. ▶ Local Groups to Remote Group Mappings. Displays a table of the LDAP groups and the HP Universal CMDB groups to which they are assigned. The LDAP groups are displayed in the Remote Group Name column, and the HP Universal CMDB Groups are listed in the Local Group Name column.

Corporate Directory Pane

Description	<p>Enables you to assign HP Universal CMDB groups to LDAP groups, and to list the users in the LDAP groups.</p>
Important Information	<ul style="list-style-type: none"> ▶ To synchronize LDAP groups with HP Universal CMDB groups, click Assign Groups to open the Select Local Groups for Remote Group dialog box. ▶ To view the list of users associated with the respective LDAP groups, click List Users. <p>You can also select either of these options by right clicking on the group.</p>

**Corporate Directory Local Repository for Remote Group:
<group name> Pane**

Description	Displays the HP Universal CMDB mapped to the LDAP group selected in the Corporate Directory Pane, and enables you to remove the mapped HP Universal CMDB groups.
Important Information	<ul style="list-style-type: none">▶ To remove groups, select the group you want to remove and click Remove Groups.▶ You can remove multiple groups at once by holding the Ctrl button while selecting groups.

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