HP Business Availability Center

for the Windows and Solaris operating systems

Software Version: 8.00

Model Management

Document Release Date: January 2009 Software Release Date: January 2009



Legal Notices

Warranty

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

The information contained herein is subject to change without notice.

Restricted Rights Legend

Confidential computer software. Valid license from HP required for possession, use or copying. Consistent with FAR 12.211 and 12.212, Commercial Computer Software, Computer Software Documentation, and Technical Data for Commercial Items are licensed to the U.S. Government under vendor's standard commercial license.

Third-Party Web Sites

HP provides links to external third-party Web sites to help you find supplemental information. Site content and availability may change without notice. HP makes no representations or warranties whatsoever as to site content or availability.

Copyright Notices

© Copyright 2005 - 2009 Mercury Interactive (Israel) Ltd.

Trademark Notices

 $Adobe \hbox{\tt \mathbb{R} and $Acrobat$\tt \mathbb{R} are trademarks of $Adobe Systems Incorporated.}$

Intel®, Pentium®, and Intel® XeonTM are trademarks of Intel Corporation in the U.S. and other countries.

JavaTM is a US trademark of Sun Microsystems, Inc.

Microsoft®, Windows®, Windows NT®, and Windows® XP are U.S registered trademarks of Microsoft Corporation.

Oracle® is a registered US trademark of Oracle Corporation, Redwood City, California.

Unix® is a registered trademark of The Open Group.

Documentation Updates

This guide's title page contains the following identifying information:

- Software Version number, which indicates the software version.
- Document Release Date, which changes each time the document is updated.
- Software Release Date, which indicates the release date of this version of the software.

To check for recent updates, or to verify that you are using the most recent edition of a document, go to:

http://h20230.www2.hp.com/selfsolve/manuals

This site requires that you register for an HP Passport and sign-in. To register for an HP Passport ID, go to:

http://h20229.www2.hp.com/passport-registration.html

Or click the New users - please register link on the HP Passport login page.

You will also receive updated or new editions if you subscribe to the appropriate product support service. Contact your HP sales representative for details.

Support

You can visit the HP Software Support web site at:

http://www.hp.com/go/hpsoftwaresupport

This web site provides contact information and details about the products, services, and support that HP Software offers.

HP Software Support Online provides customer self-solve capabilities. It provides a fast and efficient way to access interactive technical support tools needed to manage your business. As a valued support customer, you can benefit by using the HP Software Support web site to:

- · Search for knowledge documents of interest
- Submit and track support cases and enhancement requests
- Download software patches
- Manage support contracts
- Look up HP support contacts
- Review information about available services
- Enter into discussions with other software customers
- Research and register for software training

Most of the support areas require that you register as an HP Passport user and sign in. Many also require a support contract.

To find more information about access levels, go to:

http://h20230.www2.hp.com/new_access_levels.jsp

To register for an HP Passport ID, go to:

http://h20229.www2.hp.com/passport-registration.html

Table of Contents

| | Welcome to This Guide | 15 |
|-----------|---|-----|
| | How This Guide Is Organized | 15 |
| | Who Should Read This Guide | 17 |
| | Getting More Information | 17 |
| PART I: M | ODELING | |
| | Chapter 1: Configuration Management Database (CMDB) | 21 |
| | CMDB Overview | 22 |
| | Configuration Items (CI) | 23 |
| | Nodes and Relationships | 23 |
| | CMDB Log Files | 24 |
| | Log Severity Levels | |
| | CMDB Configuration Parameters | 33 |
| | Chapter 2: IT Universe Manager | 55 |
| | IT Universe Manager Overview | |
| | Working with Views in IT Universe Manager | 57 |
| | View Tree Structure | |
| | Working with CIs | 61 |
| | Working with Relationships | 65 |
| | Create CIs and Relationships in the CMDB | |
| | Check Status of Application Discovery (Rediscover a View) | 70 |
| | IT Universe Manager User Interface | 73 |
| | Chapter 3: IT Universe Manager – Dynamic Node Factory | 113 |
| | Working with Dynamic Node Factory Overview | |
| | DNode Definition Key Property | |
| | Define a Dynamic Node Factory CI | |
| | • | |

| Chapter 4: Modeling Studio | 131 |
|---|-----|
| Modeling Studio – Overview | 132 |
| Business CI Models | |
| Building a Perspective Based View | 134 |
| Revealed CIs and Watchpoints | 137 |
| Build a Business CI Model | 141 |
| Build a View Based on a Model | |
| Build a View Based on a Collection of CIs | 143 |
| Build a Business CI Model – Scenario | |
| Modeling Studio User Interface | 146 |
| Chapter 5: View Manager | 179 |
| View Manager Overview | |
| View Formats | |
| Templates and Perspectives | 182 |
| Predefined Folders and Views | |
| Building a Business View | 185 |
| Link Nodes to Application CI | 187 |
| The Role of Monitor CIs in a View | 190 |
| Grouping By Attribute Properties | 191 |
| Merge Identical Instances | 192 |
| Create a Parameterized Template | 193 |
| Create a Perspective | 195 |
| Create a Template Based View | 196 |
| Create a Pattern View | 198 |
| View Manager User Interface | 199 |
| Troubleshooting and Limitations | 232 |
| Chapter 6: Correlation Manager | |
| Correlation Manager Overview | |
| Define a Correlation Rule – Workflow | |
| Correlation Manager User Interface | 241 |

| Chapter 7: CI Type Manager | 261 |
|--|-----|
| CI Types Overview | |
| CI Type Attributes | |
| CI Type Relationships | |
| System Type Manager | |
| Create a CI Type | |
| Create a Relationship Type | |
| Create a Calculated Relationship Type | |
| Create List and Enumeration Definitions | |
| Enumeration Definition – Scenario | 269 |
| View Descriptions for CI Types and Relationships | 272 |
| CI Type Manager User Interface | |
| Chapter 8: Topology Report Manager | 299 |
| Topology Report Manager Overview | |
| Define a Report Rule – Scenario | |
| Compare a CI Configuration to a Gold Master Template | 310 |
| Topology Report Manager User Interface | 310 |
| Troubleshooting and Limitations | |
| Chapter 9: Query Manager | 337 |
| Query Manager Overview | |
| Create a TQL Query | |
| Query Manager User Interface | |
| Chapter 10: Enrichment Manager | 351 |
| Enrichment Manager Overview | |
| Define an Enrichment Rule – Scenario | |
| Enrichment Manager User Interface | |

| Chapter 11: Topology Query Language | 377 |
|---|-----|
| Topology Query Language (TQL) Overview | |
| Topology Query Language | |
| The Roles of TQL | |
| Where TQL Queries Are Created | 379 |
| Viewing TQL Query Results | 380 |
| Compound Relationship | |
| Join Relationship | |
| Subgraph Definition | 382 |
| Define a TQL Query | 382 |
| Add Nodes and Relationships to a TQL Query | |
| Add Enrichment Nodes and Relationships to an Enrichment | |
| TQL Query | 385 |
| Define a Compound Relationship - Scenario | 386 |
| Define a Join Relationship - Scenario | 389 |
| Create a Subgraph Definition - Scenario | |
| Context Menu Options | |
| Attribute Operator Definitions | |
| TQL Logs | |
| TQL Parameters | |
| Topology Query Language User Interface | 414 |
| Troubleshooting and Limitations | |
| Chapter 12: Impact Modeling | 467 |
| Impact Modeling Overview | |
| Impact Layer | 468 |
| Impact Rules | 468 |
| Propagation Reversal | 470 |
| Calculated Relationship Types | 472 |
| Creating Views Based on the Impact Model | 474 |
| Chapter 13: Best Practices for Modeling | 475 |
| Using Modeling Studio | 476 |
| Models and Perspectives | |
| Building Models | 477 |
| Model Dependencies on Other CIs in the CMDB | 481 |
| Modeling an Application with Software Elements | |
| Creating Views Using the Modeling Studio | |
| Working with Ungraded Views | |

PART II: MODEL MANAGEMENT SETTINGS

| | Chapter 14: Package Manager | 489 |
|-----------|--|-----|
| | Package Administration Overview | |
| | Package Zip File Contents and Format | 491 |
| | Packages for Federated CMDB Adapters | 492 |
| | Create a Custom Package | 493 |
| | Deploy a Package | 494 |
| | Export a Package | 494 |
| | Package Resources | 495 |
| | Using the JMX Console to Perform Package Manager Tasks | 497 |
| | Package Manager User Interface | 501 |
| | Troubleshooting and Limitations | 516 |
| | Chapter 15: Scheduler | 519 |
| | Scheduler Overview | |
| | Define Tasks that Are Activated on a Periodic Basis | 520 |
| | Cron Expressions | 521 |
| | Scheduler User Interface | 522 |
| | Chapter 16: State Manager | 533 |
| | State Manager Overview | |
| | Define an Attribute State | 534 |
| | State Manager User Interface | 534 |
| PART III: | APPLICATION | |
| | Chapter 17: Topology View Application | 539 |
| | Topology View Overview | 540 |
| | Retrieve Correlation Results – Scenario | 540 |
| | Take a Snapshot of a View | 549 |
| | Print and Save a Topology Map to File | 550 |
| | Topology View Application User Interface | 550 |
| | Chapter 18: CI Lifecycle | 559 |
| | CI Lifecycle Overview | |
| | Generate CI Lifecycle Data and Filter the Results | 560 |
| | CI Lifecycle User Interface | 561 |
| | Chapter 19: Gold Master Report | |
| | Gold Master Report Overview | |
| | Gold Master Report User Interface | 567 |

| Chapter 20: Compare Snapshots | 573 |
|--|-----|
| Snapshot Comparison Overview | |
| Snapshot Comparison | |
| Compare Snapshots User Interface | |
| Chapter 21: Compare Cls | 583 |
| CI Comparison Overview | |
| CI Comparison | |
| Compare CIs User Interface | |
| Chapter 22: Asset Report | |
| Asset Report Overview | |
| Asset Report User Interface | |
| Chapter 23: Host Dependency Report | 597 |
| Host Dependency Report Overview | |
| Host Dependency Report User Interface | |
| Chapter 24: Change Report | 601 |
| Change Report Overview | |
| Change Report User Interface | |
| Chapter 25: Topology Report | 607 |
| Topology Report Overview | |
| Generate and Send a Topology Report at Defined Intervals | |
| Topology Reports User Interface | |
| Chapter 26: Overview Reports | 613 |
| Overview Report Overview | |
| Overview Reports User Interface | |

PART IV: SOURCE MANAGER

| Chapter 27: Working with Source Manager | 633 |
|--|-----|
| Source Manager Overview | 634 |
| Source Adapter Activities | 635 |
| Source Adapter Templates | |
| Dynamic Node Factory Resource | |
| Predefined Monitoring Views | |
| Customize the Source Adapters | |
| When to Use Generic EMS | |
| When to Use the XML File Source Adapter | 639 |
| Business Process Monitoring Source Adapter Details | 639 |
| Real User Monitor Source Adapter Details | |
| SiteScope Source Adapter Details | 644 |
| Generic EMS Source Adapter Details | 646 |
| XML File Source Adapter Details | |
| Configure a Source Adapter – Workflow | 650 |
| Work with the SiteScope Source Adapter – Workflow | 653 |
| Modify an Adapter Template | 658 |
| Modify Relationships | 668 |
| Define Selectors | |
| Customize Dynamic Node Factory Definitions | |
| Change the Decay Timeout Value | |
| Source Manager User Interface | 674 |
| PART V: VIEW EXPLORER | |
| Chapter 28: Working with View Explorer | 697 |
| View Explorer Overview | |
| Display a View in Browse Mode | |
| Search for CIs in Search Mode | |
| Modify View Explorer Display Options | |
| View Explorer User Interface | |
| Troubleshooting and Limitations | |
| PART VI: TOPOLOGY MAP | |
| Chapter 29: Working with Topology Map | 721 |
| Topology Map Overview | |
| Handling Large Views | 722 |
| Topology Map User Interface | 722 |

PART VII: FEDERATION AND RECONCILIATION

| Chapter 30: Introduction to Federated CMDB | .759 |
|---|------|
| Federated CMDB – Overview | |
| Adapters | .760 |
| Retrieving Data from Multiple Data Stores | .761 |
| Retrieving Attributes from an External Data Store | |
| Mapping Information | |
| Work with Federated Data – Workflow | .764 |
| Change the Encrypted Password of a Federated Adapter | .765 |
| Federated CMDB User Interface | |
| Chapter 31: The Federation Framework SDK | .781 |
| Federation Framework – Overview. | |
| Adapter and Mapping Interaction with the Federation Framework | |
| Federation Framework Flow for FTQL | |
| Federation Framework Flow for Replication | .798 |
| The HP Release Control Federation Adapter | |
| Adapter Interfaces | .803 |
| Add an Adapter for a New External Data Store | .804 |
| Adapter Capabilities | .815 |
| Chapter 32: The HP ServiceCenter/Service Manager Adapter | .817 |
| Adapter Usage | |
| The Adapter Configuration File | |
| Deploy the Adapter | |
| Deploy the ServiceDesk Adapter | |
| Add an Attribute to the ServiceCenter/Service Manager CIT | |

| Chapter 33: The Generic Database Adapter | 845 |
|---|-----|
| Database Adapter – Overview | |
| Non-supported TQL Queries | 846 |
| Reconciliation | |
| Hibernate as JPA Provider | 850 |
| Deploy a Database Adapter – Minimal Method | 852 |
| Deploy a Database Adapter – Advanced Method | 859 |
| The Federated Database Configuration Files | 884 |
| The adapter.conf File | 885 |
| The simplifiedConfiguration.xml File | 885 |
| The orm.xml File | 893 |
| The reconciliation_rules.txt File | 897 |
| The transformations.txt File | |
| The persistence.xml File | 899 |
| The discriminator.properties File | |
| The replication_config.txt File | 902 |
| The fixed_values.txt File | 902 |
| Out of the Box Converters | 902 |
| Plugins | 906 |
| Configuration Examples | 906 |
| Federated Database Log Files | 919 |
| External References | |
| Troubleshooting and Limitations | 921 |
| Chapter 34: Viewing KPIs in External Applications | 923 |
| Set Up an Adapter to View KPIs in an External Application | |
| Chapter 35: Troubleshooting and Limitations | 927 |
| Federated CMDB Troubleshooting and Limitations | 927 |
| Chapter 36: Introduction to Reconciliation | 931 |
| Reconciliation – Overview | |
| Host Reconciliation Rules | 931 |
| Cluster Reconciliation Rules | 932 |
| Software Element Reconciliation Rules | |
| Index | 935 |

Table of Contents

Welcome to This Guide

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

This chapter includes:

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

How This Guide Is Organized

The guide contains the following chapters:

Part I Modeling

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

Part II Model Management Settings

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

Part III Application

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

Part IV Source Manager

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

Part V View Explorer

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

Part VI Topology Map

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

Part VII Federation and Reconciliation

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

Who Should Read This Guide

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

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

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

Getting More Information

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

Welcome to This Guide

Part I

Modeling

1

Configuration Management Database (CMDB)

This chapter provides information on CMDB.

This chapter includes:

Concepts

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

Reference

- ➤ CMDB Log Files on page 24
- ➤ Log Severity Levels on page 32
- ➤ CMDB Configuration Parameters on page 33

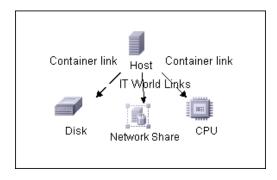
CMDB Overview

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

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

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

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



The CMDB also contains the TQL query definitions that are used to query and retrieve data from the CMDB, for presentation in the views; and the configuration item type (CIT) model, a repository for the CI types used to define the CIs and relationships. For information on TQL queries, see "Topology Query Language" on page 377.

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

Configuration Items (CI)

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

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

Nodes and Relationships

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

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

🙎 CMDB Log Files

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

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

This section includes the following topics:

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

CMDB Server Parameters

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

This section includes the following topics:

- ➤ "Lifecycle Log" on page 25
- ➤ "General CMDB Log" on page 25
- ➤ "Quota Log" on page 26

Lifecycle Log

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

| Log File | Description |
|--------------------------|---|
| Purpose | CMDB server lifecycle: |
| | ➤ all server tasks |
| | ➤ customer loading and unloading |
| | ➤ startup and shutdown of Task manager |
| | Contains information about any application that does not start up correctly. |
| Information Level | All lifecycle details. |
| Error Level | Startup errors of CMDB subsystems, primarily in the data access layer. |
| Debug Level | Not applicable |
| Basic Troubleshooting | If the CMDB client receives an exception that the customer does not exist, check that the customer is properly loaded. If the CMDB client receives an exception that it cannot find CMDB in a JNDI lookup, check that the CMDB server is bound in the JNDI tree. |
| | ➤ If the HA Controller does not load the CMDB customers, check that the CMDB server is registered in the HA controller. |

General CMDB Log

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

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

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

Quota Log

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

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

CI Type Model Log

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

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

| Log File | Description |
|--------------------------|--|
| Debug Level | Every CI Type update includes the following: |
| | ➤ 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: |
| | ➤ 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 | ➤ startup and shutdown of publishers |
| | ➤ register and unregister remote and internal listeners |
| Error Level | ➤ errors when messages are published |
| | ➤ errors when messages are received |
| Debug Level | ➤ 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 |

Chapter 1 • Configuration Management Database (CMDB)

| Log File | Description |
|--------------------------|---|
| Basic Troubleshooting | If an application does not receive a notification, check the following: |
| | ➤ 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 | Information about a CI Type operation: type of operation, data received as input, and what happened to the data in each CIT. |
| | Also contains information about the caller application, execution times, and persistency time. |
| Information Level | Operation details |
| Error Level | Not available. |
| Debug Level | Not available. |
| Basic Troubleshooting | If there are no changes when there should be, check the following: |
| | ➤ the operation exists |
| | ➤ the input is correct |
| | ➤ what happened to the data. There may have been a false update. |
| | This is especially useful when running DDM to trace the input. |

History Database Log

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

| Log File | Description |
|----------------------|---|
| Purpose | 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 | ➤ 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 | 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 | Enrichment definitions: adding, updating, removing, and calculating. |
| | Calculation results such as how many CIs were added, how many relationships were removed, and so forth. |
| | Supplies the reason for a calculation failure. Failure in a model update, however, is not included since it is an asynchronous execution. |
| Information Level | Add, update, and remove enrichment definitions. Add, update, and remove CIs or relationships to or from a model. |
| Error Level | Calculation failure. |

| Log File | Description |
|--------------------------|--|
| Debug Level | Traces the enrichment calculation process. |
| Basic Troubleshooting | 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 | ▶ 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 | ➤ connection pool errors ➤ database errors ➤ command execution errors |

| Log File | Description |
|--------------------------|---|
| Debug Level | ➤ all DAL commands executed➤ all SQL commands executed |
| Basic Troubleshooting | 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. |
| | Exception details and ID are entered into the log. The exception ID appears in the exception itself. |

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 | Statistics per operation including operation class name, caller application, and customer ID. Default of 10 worst operation instances. | | |
| Error Level | Disables the statistics feature. | | |
| Debug Level | Not available. | | |
| Basic Troubleshooting | Check when there is a performance slow down. | | |

🍳 Log Severity Levels

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

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

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

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

Changing Log Levels

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

To change the severity threshold level:

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

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

loglevel=ERROR

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

loglevel=DEBUG

4 Save the file.

🔍 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 34
- ➤ "Aging Parameters" on page 35
- ➤ "Configuration Item Type Parameters" on page 36
- ➤ "Configuration Item Type Setting Parameters" on page 38
- ➤ "Data Model Parameters" on page 38
- ➤ "General Server Parameters" on page 39
- ➤ "History Database Parameters" on page 42
- ➤ "History Database Purging Parameters" on page 44
- ➤ "Monitoring Parameters" on page 45
- ➤ "Notification Parameters" on page 46
- ➤ "Other Parameters" on page 47
- ➤ "Plug-in Parameters" on page 50
- ➤ "Quota Parameters" on page 50
- ➤ "System TQL Parameters" on page 53

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.

To modify a parameter, select **Admin > Platform > Setup and Maintenance > Infrastructure Settings**, choose **Foundations**, select **cmdb** and locate the parameter in the appropriate table. Click the **Edit** button and modify the parameter with the required value.

Aging Parameters

This section describes the aging parameters:

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|---|---|---------|---|---------------------------|
| model.aging.is.agi ng.enabled | Defines whether the aging mechanism is enabled. | Boolean | ➤ 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.sched uler.hour.of.first.ru n | The time when the aging parameter runs after startup. | integer | Default: 2:00 AM | N |
| model.aging.sched uler.interval.in.ho urs | 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 | Туре | Value Description | Change Value? (Y/N) |
|---|--|--------|---|------------------------|
| dal.classmodel.dao.type | Defines the storage type of the CI Type Model. | string | ▶ 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 Business Availability Center home directory. | N |
| dal.classmodel.deployme nt.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.deployme nt.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 _deployment.xml. | 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 |

| Parameter Name | Parameter Description | Туре | 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.hos t.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 | ➤ ORACLE Server ➤ SQL Server | Y |

Configuration Item Type Setting Parameters

This section describes the CI Type settings parameters:

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|---|--------------------------|------|-------------------|------------------------|
| classmodel.persistenc y.file=/cmdb/classmo del/persistency/class model.xml | | | | |

Data Model Parameters

This section describes the data model parameters:

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|-----------------------------|--|--------|---|------------------------|
| dal.datamodel. dao.type | Defines the type of continuous storage of a data model. | string | 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 | Туре | Value Description | Change Value? (Y/N) |
|---------------------------|---|---------|--|------------------------|
| dal.datamodel.s erver | 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.s id | 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 | ➤ ORACLE Server ➤ SQL Server | Y |

General Server Parameters

This section describes the general server parameters:

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|---------------------------------|---|---------|--|---------------------------|
| server.sync.sessio n.timeout | The default time-out for executing synchronous CMDB operations. Does not affect asynchronous operations. | integer | ➤ 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 | true. Perform an upgrade. false. Do not perform an upgrade. | N |

Chapter 1 • Configuration Management Database (CMDB)

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|--|---|---------|-------------------|---------------------------|
| upgrade.file=/cm db/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.modeltopol ogy | 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.tqlresultrep ository | 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.tqlnotificati on | The number of threads dedicated to TQL notification. | integer | 8 | |
| task.threads.pool .size.tqlresultsutil s | The number of threads dedicated to TQL results utilities. | integer | 20 | |
| task.threads.pool .size.tqlpatternsc ache | The number of threads dedicated to the TQL query cache. | integer | 6 | |
| task.threads.pool .size.tqlpatterns manager | 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 | Туре | 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.modelupdat e | The number of threads dedicated to updating the CMDB model. | integer | 1 | |
| task.threads.pool .size.tqlresultrep ositorycache | 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 | Туре | Value Description | Change Value? (Y/N) |
|---------------------------|--|---------|--|------------------------|
| dal.history.db.nam e | Defines the name of the History schema. | string | Relevant for Microsoft SQL Servers only. | Y |
| dal.history.host.na me | The IP address of the database host. | string | | Y |
| dal.history.user.na me | User name to log into History database. | string | In Oracle, it also denotes the schema name. | Y |
| dal.history.passwor d | 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 | ➤ ORACLE Server ➤ SQL Server | Y |

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|---------------------------------------|--|------|-------------------|------------------------|
| dal.history.data.tab lespace.name | This parameter is relevant for the Oracle database only. The DBA can define the tablespace for the History data. | | cmdbhistorydata | |
| dal.history.index.ta blespace.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 | Туре | Value Description | Change Value? (Y/N) |
|---|--|---------|--|------------------------|
| history.purging. days.to.save.bac k | 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.interv al.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 | Туре | Value Description | Change Value? (Y/N) |
|--|--|---------|--|------------------------|
| monitor.scheduler.lo ad.customer.number | Defines the number of customers to be monitored. | integer | If the value is -1, no customer is monitored. | N |
| | Relevant only for the Self-Alert Monitor of HP Business Availability Center with one customer installation. | | Values other than -1 define the number of monitored customers. | |
| monitor.performance .warning | The minimum threshold to define CMDB performance as Warning. | long | Value is in milliseconds. | N |
| | The maximum threshold to define CMDB performance as Good. | | | |
| monitor.performance .error | The minimum threshold to define CMDB performance as Error. | long | Value is in milliseconds. | N |
| | The maximum threshold to define CMDB performance as Warning. | | | |
| monitor.scheduler.ti mer.time | The interval of time to run a performance check. | long | Value is in milliseconds. | N |
| monitor.scheduler.de lay.time | The delay between system startup and the first performance check run. | long | Value is in milliseconds. | N |

Chapter 1 • Configuration Management Database (CMDB)

| Parameter Name | Parameter Description | Туре | 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 | Туре | 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/A | N/A | N |
| notification.topic.jndi.name | The JNDI name of the topic selected for notification. | N/A | N/A | N |

| Parameter Name | Parameter Description | Туре | 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 | Туре | Value Description | Change Value? (Y/N) |
|---|--|---------|------------------------------------|------------------------|
| dal.datamodel.da ta.tablespace.na me | The tablespace name for the data model. | string | Relevant for Oracle database only. | Y |
| dal.datamodel.in dex.tablespace.n ame | The tablespace name for indexes. | string | Relevant for Oracle database only. | Y |
| dal.in.clause.thre shold | The maximum number of values in a SQL IN clause. | integer | | N |

Chapter 1 • Configuration Management Database (CMDB)

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|---|--|---------|--|------------------------|
| dal.num.of.in.ch unks | 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. > 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 | ➤ 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.i nstead.temp.tabl e.low.threshold= | | | | |
| dal.use.memory.i nstead.temp.tabl e.high.threshold = | | | | |

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|---|--|---------|---|------------------------|
| dal.datamodel.m ax.name.length. allow | Maximum length of table and column names in database. | integer | | N |
| dal.classmodel.u se.idgen | Defines whether to use the HP sequence ID generator for the database. | Boolean | ➤ true. Use ID generator.➤ false. Do not use ID generator. | N |
| dal.datamodel.cr eatetime.attribut e.name | Name of the attribute with the creation time of the CI or relationship. | string | | N |
| dal.datamodel.u pdatetime.attrib ute.name | Name of the attribute with the last update time of the CI or relationship. | string | | N |
| dal.handle.statist ics.on.startup=tr ue | | | | |
| dal.statistics.start up.percentage.th reshold=5 | | | | |
| dal.statistics.start up.aging.thresho ld.hours=36 | | | | |

Plug-in Parameters

This section describes the plug-in parameters:

| Parameter Name | Parameter Description | Туре | 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 | Туре | Value Description | Change Value? (Y/N) |
|---------------------------------------|---|---------|---|------------------------|
| quota.name.custome r.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.custome r.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 | Туре | Value Description | Change Value? (Y/N) |
|-------------------------------------|--|---------|--|------------------------|
| quota.name.server.m odel.objects | The maximum number of CIs that the CMDB server can hold in a CIT for all customers combined. | integer | ➤ In HP Business Availability Center, the value must be the same as quota.name.cu stomer.model.o bjects. ➤ In HP Software- as-a-Service, the value must be greater than quota.name.cu stomer.model.o bjects. | N |
| quota.name.server.tq l.active | The maximum number of active TQLs that can run in the entire CMDB Server. | integer | ➤ In HP Business Availability Center, the value must be the same as quota.name.cu stomer.tql.activ e. ➤ In HP Software- as-a-Service, the value must be greater than quota.name.cu stomer.tql.activ e. | Z |

Chapter 1 • Configuration Management Database (CMDB)

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|----------------------------------|---|---------|--|------------------------|
| quota.scheduler.inter val.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.enabl | Defines if quota counts should be returned to the Self-Alert Monitor. This is relevant for HP Business Availability Center. | Boolean | ➤ 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 | ➤ 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 Business Availability Center 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 | Туре | 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 | ➤ true. System | 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 |

Chapter 1 • Configuration Management Database (CMDB)

| Parameter Name | Parameter Description | Туре | 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 |

IT Universe Manager

This chapter provides information on IT Universe Manager.

This chapter includes:

Concepts

- ➤ IT Universe Manager Overview on page 56
- ➤ Working with Views in IT Universe Manager on page 57
- ➤ View Tree Structure on page 59
- ➤ Working with CIs on page 61
- ➤ Working with Relationships on page 65

Tasks

- ➤ Create CIs and Relationships in the CMDB on page 69
- \blacktriangleright Check Status of Application Discovery (Rediscover a View) on page 70

Reference

➤ IT Universe Manager User Interface on page 73

IT Universe Manager Overview

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

- **Creating Cls without creating relationships.** You can define new CIs that are added to the CMDB individually, so that no new relationships are created. For details, see "Creating a Non-Related CI" on page 61.
- **Creating Cls with relationships for them.** You can define new Cls and attach them to existing CIs, so defining a new CI and a new relationship in the CMDB. For details, see "Creating a Related CI" on page 61.
- **Adding existing Cls and creating relationships for them.** You can attach Cls to an existing CI, so creating new relationships for existing CIs. For details, see "Attaching Existing CIs" on page 67.
- **Deleting Cls.** You can delete CIs from the CMDB. For details, see "Deleting" CIs" on page 62.

Populating the IT Universe Model

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

- **Source adapters**. Automatically creates CIs and relationships for the monitor objects in End User Management Administration and System Availability Management Administration. For details, see "Working with Source Manager" on page 633.
- **Discovery and Dependency Mapping (DDM).** Automatically creates CIs and relationships based on the discovered IT resources and topology in your company's infrastructure. For details, see "Discovery and Dependency Mapping – Overview" in Discovery and Dependency Mapping Guide.
- **Dynamic Node Factory tool.** Automatically creates CIs and relationships based on data from incoming samples. For details, see "IT Universe Manager Dynamic Node Factory" on page 113.

- ➤ 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 61.
- ➤ End User Management Administration and System Availability

 Management Administration. Enables you to manually create relationships between the CIs for monitor objects and CIs in the CMDB. For details, see "Integrating SiteScope Data with HP Business Availability Center's Configuration Items" in *Using System Availability Management*.
- ➤ Enrichment Manager. Enables you to add CIs and relationships to the CMDB by receiving data from the attributes of Enrichment nodes as defined in the Enrichment TQL query. For details, see "Enrichment Manager" on page 351.

\lambda Working with Views in IT Universe Manager

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

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

For information on the different view types and how they function, see "View Formats" on page 181.

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

CIs created by DDM or by Source Manager are automatically added to each view where the CIs (and their relationships) fit the TQL definition for the view. When you open a view in View Explorer, the TQL query for the view queries the CMDB for 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 added to your current view only if it meets the view's TQL specifications.

If the created CI and relationship do not meet the TQL requirements, then the CI and relationship are created in the CMDB but are not visible in the view. Similarly, if you attach an existing CI to a CI in the view, and the new pattern does not meet the TQL requirements, then the attached 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 - Overview" in *Platform Administration*.

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

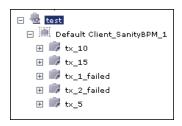
View Tree Structure

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

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

Chapter 2 • IT Universe Manager

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



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



The tree topology is determined by the folding rules defined for the view. In a pattern view, these are defined for the specific view. In a template based or a perspective based view, the folding rules are defined as part of the template or perspective. For details on defining folding rules, see **Add Rule** in "Context Menu Options" on page 393.

Working with Cls

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

This section includes the following topics:

- ➤ "Creating a Non-Related CI" on page 61
- ➤ "Creating a Related CI" on page 61
- ➤ "Deleting CIs" on page 62
- ➤ "CI Properties" on page 63
- ➤ "Removing Out of Date CIs Using the Aging Mechanism" on page 64

Creating a Non-Related CI



You can define a new CI in IT Universe Manager by clicking the **New CI** button in the toolbar. The New CI dialog box opens, which enables you to define the properties for the new CI. The CI is created in the CMDB. For details, see "New CI Dialog Box" on page 98.

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

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

Creating a Related CI

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

To define a new related CI:

1 Select the CI in your view to which you want to attach the new CI.



2 Click the **New Related CI** button in the toolbar.

3 In the New CI dialog box, define the properties and relationship for the CI. For details, see "New CI Dialog Box" on page 98.

The CI and relationship are created in the CMDB.

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

Deleting Cls

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

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

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

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

CI Properties

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

- ➤ The general properties of a CI are common to all CIs. Some general properties are defined automatically during CI creation; others can only be defined manually in the New CI dialog box.
- ➤ CIT-specific properties are created as part of the CIT definition in the CI Type Manager. The values for the CIT-specific properties are taken from the data samples for the source adapter CIs, or from the CIs discovered during DDM. The values can also be entered manually, when you manually create CIs to represent entities in your infrastructure. For details, see "CI Type Manager" on page 261.
- ➤ Key properties can be general or CIT-specific properties, which must be assigned a value to create an instance of the CI type.

You can access the Configuration Item Properties dialog box to view the CI properties from IT Universe Manager by right-clicking the CI and selecting **Properties** from the context menu or by clicking the Properties tab in the Information pane. You can edit the CI properties as well if you have the necessary permissions for editing CIs. For details on CI properties, see "Configuration Item Properties Dialog Box" on page 78.

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

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

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

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

Some of the CIT-specific properties for DDM CIs are set by default to be monitored for changes. When one of these properties has been modified, information on the change can be viewed in a change report, and in some cases, an icon is displayed in Dashboard. For more information, see "Change Report" on page 601.

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 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 > Platform > Setup and Maintenance > Infrastructure Settings, 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 setting the value of the **Enable Aging** field in the Configuration Item Properties dialog box. If the aging mechanism is disabled for the CMDB, the **Enable Aging** setting is ignored and no CIs are deleted.

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

Working with Relationships

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

This section includes the following topics:

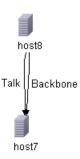
- ➤ "Creating Relationships" on page 66
- ➤ "Creating Hierarchical Relationships" on page 66
- ➤ "Attaching Existing CIs" on page 67
- ➤ "Adding Folding Rules to Relationships" on page 68
- ➤ "Deleting Relationships" on page 68

Creating Relationships

You can create relationships in IT Universe Manager by right-clicking a CI or multiple CIs in the View Explorer pane or the Topology Map and selecting **Relate to CI** from the context menu. In the Topology Map, you can define a relationship between two CIs in the view by drawing a line between the two, using the **Create Relationship** button from the toolbar. Either of these actions opens the Insert Relationship dialog box. For details, see "Insert Relationship Dialog Box" on page 85.

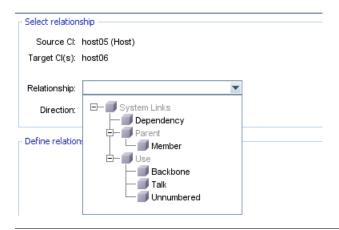


You can create as many relationships as necessary between a CI in the CMDB and other CIs. Each new relationship exists as its own entity in the CMDB, and has its own properties that can be edited in IT Universe Manager (as described in "Configuration Item Properties Dialog Box" on page 78). You can also create more than one relationship between the same two CIs, when each relationship is based on a different relationship type. In the following example, host7 has both a **Backbone** and a **Talk** relationship with host8.



Creating Hierarchical Relationships

By attaching one CI to another in IT Universe Manager or System Availability Management or End User Management Administration you create a hierarchical relationship (parent-child) between them, so that one CI is influenced by the other. Certain relationships defined in this way are restricted to the relationship type **Depends On** (if the relationship is between two non-monitoring CIs), or the relationship type **Monitored By** (if the child CI in the relationship is a monitor type CI); however, other relationship types are used between specific types of CIs. For example, if a relationship is defined between two Host CIs, there are several possible relationship types.



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

When performing status calculations, the Business Logic Engine only recognizes calculated relationships. For details on calculated relationships, see "Impact Rules" on page 468.

Attaching Existing Cls

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

- ➤ Selecting the CIs that you want to attach.
- ➤ Defining the relationship between the original CI and the CIs to attach. For information on relationships, see "Working with Relationships" on page 65.

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

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

Adding Folding Rules to Relationships

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

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

For details on adding folding rules, see **Add Rule** in "Context Menu Options" on page 393.

Deleting Relationships

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

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

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

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

Treate Cls and Relationships in the CMDB

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

This task includes the following steps:

- ➤ "Define a New Non-related CI" on page 69
- ➤ "Define a New Related CI" on page 69
- ➤ "Attach Existing CIs" on page 70

1 Define a New Non-related CI



Click the New CI button in the toolbar. In the New CI dialog box, select a CI type from the tree and define the properties for the new CI. For details, see "New CI Dialog Box" on page 98.

2 Define a New Related CI



Click the New Related CI button in the toolbar. In the New CI dialog box, select a CI type from the tree and define the properties for the new CI. On the Relationship page of the dialog box, select the type of relationship and define its properties. For details, see "New CI Dialog Box" on page 98.

3 Attach Existing Cls

Select a CI in a view. Right-click the CI and select **Relate to CI**. In the Insert Relationship dialog box, select a target CI. On the Relationship page of the dialog box, select the type of relationship and define its properties. For details, see "Insert Relationship Dialog Box" on page 85.

Theck Status of Application Discovery (Rediscover a View)

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

Note:

- ➤ Set up and configuration is performed by the UCMDB administrator. For details, see "Prerequisites" on page 71.
- ➤ Rediscovery is performed by the application owner/administrator. For details, see "Access the View" on page 72.
- ➤ You do not need any knowledge of Discovery and Dependency Mapping (DDM) to run this procedure.
- ➤ By default, you can run the rediscovery procedure on views that include less than 10,000 CIs. For details on changing this number, see "Important Information" on page 83.

This task includes the following steps:

- ➤ "Prerequisites" on page 71
- ➤ "Access the View" on page 72
- ➤ "View Results in the View" on page 72
- ➤ "Schedule the Rediscovery" on page 72

1 Prerequisites

Note: This step is performed by the UCMDB administrator.

- **a** In DDM, create a module that contains the jobs that must discover the application. For details, see "Run Discovery Advanced Mode Workflow" in *Discovery and Dependency Mapping Guide*.
- **b** Activate the module and all the jobs. The jobs must remain activated.
- **c** Verify that the module has run without errors. For details, see "Manage Errors" and "Discovery Status Pane" in *Discovery and Dependency Mapping Guide*.
- **d** Correct any errors in the application and confirm that DDM finds no errors during the next run.
 - **Important:** The application owner cannot rediscover a view if DDM is reporting errors. You must set an error-free baseline.
- **e** In View Manager, define a view that includes the application CI or CIs to be rediscovered. These are the CIs that are created when you activate the jobs that discover the application. For details, see "View Manager Overview" on page 180.
- **f** Notify the application owner of the name of the view.

2 Access the View

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

In IT Universe Manager, access the view that includes the application CIs to be rediscovered. For details, see "Search for CIs in Search Mode" on page 700.

3 View Results in the View

(4)

a You need to check the complete application. You click the Rediscover View Content button in the CI Selector toolbar. The Show Discovery Status and Changes of View dialog box is displayed. The dialog box displays information about which jobs and trigger CIs discovered the CIs in the view, on the last occasion that DDM ran the discovery for the jobs. For details, see "Discovery and Changes Summary Dialog Box" on page 83.

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

b You need to check specific components of your application. You select the component's CI in the Topology Map pane and display the Discovery tab in the Information pane. For details, see "Discovery and Changes Summary Dialog Box" on page 83.

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

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

4 Schedule the Rediscovery

You can schedule how often the rediscovery procedure should run. In the Job Definition window, choose the **Run Discovery on View** action. For details, see "Job Scheduler Window" on page 529.

🙎 IT Universe Manager User Interface

This section describes:

- ➤ Add Background Image Dialog Box on page 74
- ➤ CI/Relationship History Dialog Box on page 75
- ➤ Configuration Item Properties Dialog Box on page 78
- ➤ Discovery and Changes Summary Dialog Box on page 83
- ➤ Get Related CIs Report on page 84
- ➤ Insert Relationship Dialog Box on page 85
- ➤ IT Universe Manager Window on page 90
- ➤ New CI Dialog Box on page 98
- ➤ Related CIs in View/Database Map on page 106
- ➤ Selector Expression Dialog Box on page 111

Add Background Image Dialog Box

| Description | Enables you to add an image as a background to a view as a navigational aid. |
|--------------------------|--|
| | To access: In IT Universe Manager, select Layout > Add Background Image from the toolbar. |
| Important Information | 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. |
| | You can add additional background images to the existing list by inserting image files (of .gif type) to the following location: |
| | <pre><hp availability="" business="" center="" directory="" root=""> \AppServer\webapps\site.war\images\gui\mam_images \gui\images\backgrounds.</hp></pre> |
| | Tip: Before copying this URL to a browser, copy to a text editor and remove the break markups (br/>). |
| | Note: This option is only active when Manual Layout is selected as the layout for the view. |

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

CI/Relationship History Dialog Box

| Description | Displays a list of attributes in which changes have occurred as well as the differences between two configuration files. |
|-------------|---|
| | 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. |
| | ➤ In Discovery and Dependency Mapping, in the Discovered by [Module or Job Name] Cls dialog box, right-click a CI and choose CI History. |

| GUI Element (A–Z) | Description |
|-------------------|---|
| 9 | Click Refresh to refresh the data in the table. |
| | 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. |

| GUI Element (A–Z) | Description |
|-------------------|---|
| €1 | Choose the export format for the table data. The available options are: |
| | Excel. The table data is formatted as an .xls (Excel) file that can be displayed in a spreadsheet. PDF. The table data is exported in PDF format. RTF. The table data is exported in Rich Text Format. CSV. The table data is formatted as a comma-separated values (CSV) text file that can be displayed in a spreadsheet. Note: For the CSV formatted table data to display correctly, the comma (,) must be defined as the list separator. In Windows, to verify or modify the list separator value, open Regional Options from the Control Panel, and on the Numbers tab ensure that the comma is defined as the List Separator value. In Solaris, you can specify the list separator in the application that opens the CSV file. |
| | ➤ XML. The table data is formatted as an XML file that can be opened in a text or XML editor. Tip: To extract HTML code from the report: ➤ Save the file as HTML ➤ Open the file in an HTML editor ➤ Copy the relevant table into the target file |
| Attribute | The name of the attribute. |
| Change Date | The date when the last change occurred. |
| Filter by | Filter the data in the table by one or more of the following filters: Time Range. Select the time period for which the CI history is displayed. Change Type. Select the type of changes displayed in |
| | the table.Attribute. Select the attribute types displayed in the table. |

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

Q Configuration Item Properties Dialog Box

| Description | Enables you to view and edit basic information for an existing CI or relationship. |
|--------------------------|---|
| | To access: Select Admin > Universal CMDB > Modeling > IT Universe Manager and use one of the following: |
| | 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. |
| Important Information | The Configuration Item Properties dialog box contains two types of properties: |
| | ➤ General properties, which include general information about the CI or relationship. These properties are common to all CITs and are documented below. |
| | ➤ CIT-specific properties, which include properties specific to that CI. These properties vary according to the type of CI or relationship and are not documented except in the case of Dynamic Node Factory CIs. For details about CIT-specific properties for Dynamic Node Factory, see "CIT-Specific Properties for Dynamic Node Factory" on page 100. |
| | 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. |
| | You can view a description of the selected property in the Description Area at the bottom of the dialog box. Click the Show/Hide Description Area button to display the Description Area. |
| | When accessing the Configuration Item Properties dialog box from within certain applications, the fields are not editable. |
| | Mandatory fields are denoted by an asterisk. |

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

| GUI Element (A–Z) | Description |
|---------------------------|---|
| Export ▼ | Choose the export format for the table data. The available options are: |
| | Excel. The table data is formatted as an .xls (Excel) file that can be displayed in a spreadsheet. PDF. The table data is exported in PDF format. RTF. The table data is exported in Rich Text Format. CSV. The table data is formatted as a comma-separated values (CSV) text file that can be displayed in a spreadsheet. Note: For the CSV formatted table data to display correctly, the comma (,) must be defined as the list separator. In Windows, to verify or modify the list separator value, open Regional Options from the Control Panel, and on the Numbers tab ensure that the comma is defined as the List Separator value. In Solaris, you can specify the list separator in the application that opens |
| | the CSV file. XML. The table data is formatted as an XML file that can be opened in a text or XML editor. Tip: To extract HTML code from the report: Save the file as HTML Open the file in an HTML editor Copy the relevant table into the target file |
| Actual Deletion Period | The number of days after which the CI or relationship is deleted. |
| Allow CI Update | 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. When this option is cleared, the CI or relationship properties are not overridden by the DDM process. |
| Apply | Click Apply to save the changes made to the CI or relationship properties. |

| GUI Element (A–Z) | Description |
|------------------------------|---|
| 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. |
| | Note: This field does not appear for relationships. |
| СІ Туре | The type of the CI or relationship (read-only value). For information about CITs in HP Business Availability Center, see "CI Type Manager" on page 261. |
| Country | The country in which the CI is located. Select an option from the list. You must define a geographical location—country, state (if applicable), and city—if you want the CI to appear on the Geographical Map in Dashboard. For more information, see "Geographical Map" in <i>Using Dashboard</i> . Note: This field does not appear for relationships. |
| 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. |
| 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 64. |
| ID | The internal ID of the CI or relationship in the CMDB (read-only value). |
| 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 only displayed for certain CIs. |
| | This parameter is used by the aging mechanism – for details, see "Removing Out of Date CIs Using the Aging Mechanism" on page 64. |

| GUI Element (A–Z) | Description |
|-------------------|--|
| Name | The name of the CI or relationship. |
| Note | Enables you to enter other information about the CI or relationship. |
| Origin | An ID for the source that automatically created the CI or relationship, or the application where the CI or relationship was created (read-only value). |
| Reset | Click the Reset button to restore the original property settings of the CI or relationship. |
| State | 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. |

Context Menu

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

Discovery and Changes Summary Dialog Box

| Description | Enables you to find recent changes, for example, to an application, by rediscovering the CIs and jobs in a view. |
|--------------------------|---|
| | To access: In IT Universe Manager: |
| | ➤ To rediscover all CIs of a view, click the Show Discovery and Changes Summary button in the CI Selector toolbar. The Discovery and Changes Summary dialog box is displayed. |
| | ➤ To rediscover one CI or several CIs in a view, select the CI and display the Discovery tab. |
| | To rediscover CIs, you can also select Operations > Rediscover View Content . |
| Important Information | By default, you can run the rediscovery procedure on views that include less than 10,000 CIs. |
| | To increase the number of CIs that you can rediscover in a view: 1 Access the Infrastructure Settings Manager (Admin > Universal CMDB > Settings > Infrastructure Settings Manager. 2 Select the Foundations context, choose MamAutoDiscovery from the list, and locate the Max CIs in view supported to rediscover entry in the MamAutoDiscovery - General table. 3 Click the Edit button and change the number. 4 Restart the server for the change to take effect. For details on working with the Infrastructure Settings Manager, see Chapter 13, "Infrastructure Settings Manager." |
| Included in Tasks | "Check Status of Application Discovery (Rediscover a View)" on page 70 |
| Useful Links | "Discovery Status Pane" in <i>Discovery and Dependency</i> Mapping Guide |

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

| GUI Element (A-Z) | Description |
|--------------------------------------|---|
| | Click to refresh the status of the selected CIs. This button is disabled when there is no data to be reloaded. |
| • | Click to rerun the discovery. |
| Discovery Progress Status on View | For details, see "Discovery Status Pane" in <i>Discovery and Dependency Mapping Guide</i> . |
| History Changes on View | For details, see "CI/Relationship History Dialog Box" on page 75. |

Q Get Related Cls Report

| Description | Enables you to view the CIs related to a specified CI in a tree format. To access: In IT Universe Manager, click Generate Related CIs Report from the toolbar. |
|--------------------------|---|
| Important Information | For information about limitations on the size of reports produced in .pdf format, see "Troubleshooting and Limitations" in <i>Reports</i>. For details on how to work with reports, see "Working in Reports - Overview" in <i>Reports</i>. |

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

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

😢 Insert Relationship Dialog Box

| Description | 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 or View Explorer, and select Relate to CI from the context menu. |
|--------------------------|---|
| Important Information | To create a relationship between two CIs, select the source CI in View Explorer or the Topology Map and then select Relate to CI from the context menu. On the first page of the dialog box (the CI Selection page), you select the target CI(s). Then click Relationship , to select the relationship type on the second page of the dialog box. |
| | You can also create a relationship between two CIs graphically by clicking the Create Relationship button in the toolbar and drawing a line between the two CIs. In this case, a smaller version of the Insert Relationship dialog box opens, which contains the following tabs: |
| | ➤ Select Relationship. Displays a tree with the available relationship types. Select the required relationship. Note: You can double-click the relationship you select to save using the default properties. |
| | ➤ Relationship Definition. Displays the properties of the selected relationship. You can edit the properties as described in "Define Relationship Properties Pane" on page 87. |

| Included in Tasks | "Create CIs and Relationships in the CMDB" on page 69 |
|-------------------|---|
| Useful Links | "View Explorer" on page 705 |

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

| GUI Element (A–Z) | Description |
|-------------------|---|
| \Rightarrow | Click to add the selected CIs in the left pane to the Target CIs pane. |
| (| Click to remove selected CIs from the Target CIs pane (this does not delete the CIs from the CMDB). |
| Select target CIs | Select a view to display in the view tree and select CIs to move to the Target CIs pane. |
| | The Select target CIs pane follows the standard View Explorer functionality. For details, see "View Explorer" on page 705. |
| Source CI | The CI you selected as the source CI. |
| Target CIs | Displays the CIs you have selected as target CIs for the relationship. |

Relationship Page

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

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

Select Relationship Pane

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

Define Relationship Properties Pane

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

| GUI Element (A–Z) | Description |
|--------------------------------|--|
| Destination Network Address | Defined only for route links. Indicates the destination network address to which this route is configured. |
| Enable Aging | (Only displayed for certain CIs.) When the value is set to true, 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 64. |
| Last Access Time | The time that the relationship was last accessed, whether when being updated or being discovered by DDM. This field is displayed only for certain CIs. |
| Must | When the value is set to true, the child CI is dominant when the percentage rule is used to calculate status for the parent CI. If the CI has low status, the parent must take the child CI status, if necessary overriding the percentage rule calculation. This is useful to give emphasis to an important CI. For example, you might want to define Must for a database CI, so that status is critical all the way up the subtree if the database falls, regardless of the status of the other CIs in the subtree. The must status defined for a relationship applies for that relationship only – it is not used in any other relationships of the child CI. For details, see "Understanding the Percentage Rule" in <i>Using Dashboard</i> . |
| 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. |
| 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 | When a weight value is entered, the child CI is given more weight in percentage calculations, when percentage rule is used to calculate status for the parent CI. For example, if a child CI is given a weight of 3, then it has three times more impact on the parent status calculation than its unweighted siblings. |
| | The weight defined for a relationship applies for that relationship only – it is not used in any other relationships the child CI may have. For more details, see "Understanding the Percentage Rule" in <i>Using Dashboard</i> . |

IT Universe Manager Window

| Description | Enables you to define and manage the CIs and relationships in your views. |
|--------------------------|--|
| | The IT Universe Manager window contains the following panes: |
| | ➤ 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 705. |
| | ➤ Topology Map. Displays the CIs of a selected view in Map mode or Text mode. |
| | ➤ Information Pane. Displays properties, history, and discovery data for the selected CI or view. |
| | To access: Select Admin > Universal CMDB > Modeling > IT Universe Manager. |
| Important Information | 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. |
| Useful Links | "Save Snapshot Dialog Box" on page 555 "Set View Parameters/Set View Element Parameters Dialog Box" on page 220 |

Topology Map

| Description | Displays the CIs of the currently selected view in graphical or table format. By default, the CIs are displayed in graphical format. ➤ Select the Map Mode tab to display the CIs in graphical format. ➤ Select the Text Mode tab to display the CIs in tabular format. To access: Select Admin > Universal CMDB > Modeling > IT Universe Manager. |
|--------------------------|--|
| Important Information | 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. You can customize the Topology Map context menu to include other commands (for example, ping, run a program, open a URL) from within CI Type Manager. For details, see "Create Configuration Item Type/Relationship/Calculated Relationship Wizard" on page 281. |
| | Note: For grouped CIs and the relationships between them, not all of the context menu options are active. Grouped CIs appear in parentheses in View Explorer and in the Topology Map. You can double-click a link to a grouped CI to open the Link Map, which displays the individual CIs and relationships. Right-click a CI or relationship in the Link Map to display the regular context menu. For details about grouping CIs, see "Node/Relationship Grouping Dialog Box" on page 216. |

| GUI Element (A–Z) | Description |
|---------------------------------|--|
| Show: View Results | Select the topology map mode from the Show window in the toolbar. |
| | Note: You can also select the modes from the Operations drop-down in the Main Menu. |
| | The following modes are available: |
| | ➤ 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. |
| Show Cl instances of: Network ▼ | Specify the CIT you want displayed in the table. The table also includes the children of the selected CIT. |
| | Note: This option is displayed in Text mode only. |

| GUI Element (A–Z) | Description |
|-------------------------------|---|
| Export ▼ | Choose the export format for the table data. The available options are: |
| | ➤ Excel. The table data is formatted as an .xls (Excel) file that can be displayed in a spreadsheet. |
| | ➤ PDF. The table data is exported in PDF format. |
| | ➤ RTF. The table data is exported in Rich Text Format. |
| | ➤ CSV. The table data is formatted as a comma-separated values (CSV) text file that can be displayed in a spreadsheet. |
| | Note: For the CSV formatted table data to display correctly, the comma (,) must be defined as the list separator. In Windows, to verify or modify the list separator value, open Regional Options from the Control Panel, and on the Numbers tab ensure that the comma is defined as the List Separator value. In Solaris, you can specify the list separator in the application that opens the CSV file. |
| | ➤ XML. The table data is formatted as an XML file that can be opened in a text or XML editor. |
| | Tip: To extract HTML code from the report: |
| | ➤ Save the file as HTML |
| | ➤ Open the file in an HTML editor |
| | ➤ Copy the relevant table into the target file |
| | Note: This option is displayed in Text mode only. |
| <main menu=""></main> | For details, see "Main Menu" on page 745. |
| <node></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></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. |
| | Note: When you select a calculated relationship, the Delete 💥 button in the toolbar is disabled. |

| GUI Element (A–Z) | Description |
|---------------------------------|---|
| <toolbar></toolbar> | For details, see "Toolbar Options" on page 749Note: When accessing the Topology map via direct links, the toolbar includes options from the Related CIs Map. For details, see "Related CIs in View/Database Map" on page 106. |
| <ci attributes="" type=""></ci> | The columns appearing in Text mode represent the CIT attributes of the selected CIs. |
| Map Mode | Click the Map Mode tab to display the selected layer of CIs in topology map format. |
| Text Mode | Click the Text Mode tab to display the attribute properties of the CIs in the selected layer in table format. For details on some of the toolbar icons in Text Mode, see "Element Instances Dialog Box" on page 429. |

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: |
| | ➤ Add CI to Discovery Job. Displays the Add CI to Discovery Job dialog box, which enables you to manually invoke a DDM job for the selected CI. You can use this option to discover additional information about the CI through one of the available DDM jobs. |
| | ➤ Remove CI from Discovery Job. Displays the Remove CI from Discovery Job dialog box, which enables you to manually remove a CI from the DDM job. |
| | ➤ Open Credentials Information. Displays the Protocol Parameters dialog box, which enables you to enter credentials for the selected CI. This option is only relevant for CIs that require credentials to be viewed. For details, see "Domain Credential References" in Discovery and Dependency Mapping Guide. |
| 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. |
| | 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. |
| Generate Direct Link to CI | Enables you to create a direct link to the selected CI using the Direct Links Wizard. For details, see "Direct Link Dialog Box" on page 44. |

| Menu Item | Description |
|-----------------|---|
| Get Related CIs | The following options are available: |
| | ➤ From View. Opens the Related CIs in View Map. |
| | ➤ From Database without Filter. Opens the Related CIs in Database without Filter Map. |
| | ➤ From Database with Filter. Opens a dialog box that displays the number of related CIs by type. Select the CI type you want to display in the Related CIs Map and click OK. |
| | ➤ Reveal From Database without Filter. Adds to the existing map the immediate neighbors of the selected CI in the CMDB. This option is only active within the Related in DB mode of the Topology Map. |
| | ➤ Reveal From Database with Filter. Opens a dialog box which displays the number of related CIs by type. Select the CI type you want to display in the Topology Map results. Adds to the existing map the immediate neighbors of the selected CI that match the CI type selected. This option is only active within the Related in DB mode of the Topology Map. |
| | ➤ Reveal from View. Adds to the existing map the immediate neighbors of the selected CI in the view. This option is only active within the Related in View mode of the Topology Map. |
| Label | Select one of the following options: |
| | ➤ 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 | Select one of the following options: |
| | Add Note. Opens an editing box where you can add a note to the CI. Delete Note. Deletes all text saved in a note for the |
| | selected CI. |
| Open | Appears only for configuration file CIs. Opens the configuration file in a popup window. |

| Menu Item | Description |
|-----------------------|--|
| Properties | Displays the Properties page for the selected CI or relationship. For details, see "Configuration Item Properties Dialog Box" on page 78. |
| Relate to CI | Opens the Insert Relationship dialog box. For details, see "Insert Relationship Dialog Box" on page 85. |
| 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

| GUI Element (A–Z) | Description |
|-------------------|---|
| Discovery tab | Displays the DDM run status for the selected CIs. For details, see "Discovery and Changes Summary Dialog Box" on page 83 and "Discovery Status Pane" in <i>Discovery and Dependency Mapping Guide</i> . |
| 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 "Configuration Item Properties Dialog Box" on page 78. |

New CI Dialog Box

| Description | Enables you to define a new CI. |
|--------------------------|---|
| | To access: In IT Universe Manager, click the New CI icon in the toolbar to create a non-related CI. Select a CI in the topology map and click the New Related CI icon to create a related CI. |
| Important Information | To define a new CI, select the CI type from the tree at the top of the dialog box. The CI types in the tree that are available to be instantiated appear in black. The CI types in faded text cannot be instantiated. |
| | Edit the properties in the Define new CI properties area. The table below includes the properties which are common to all CIs. In addition, there are other properties specific to each CI. |
| | If you are creating a related CI, click the Relationship button to go to the relationship mode of the dialog box. Select a relationship and edit its properties. |
| Included in Tasks | "Create CIs and Relationships in the CMDB" on page 69 |
| Useful Links | "View Explorer" on page 705 |

| GUI Element (A–Z) | Description |
|---------------------------|--|
| Actual Deletion Period | The period after which the CI is deleted when the aging mechanism is enabled. |
| Allow CI Update | When the value is set to true, this option enables the DDM process to automatically update the CI properties with information that it discovers. If you change the value of a property supplied by the DDM process, the value is overridden by the discovered value. When the value is set to false, the CI properties are not overridden by the DDM process. |

| GUI Element (A–Z) | Description |
|------------------------------|--|
| City | The name of the city. The list is automatically updated when you select a country (or state, when applicable). Select an option from the list. |
| Country | The country in which the CI is located. Select an option from the list. You must define a geographical location – country, state (if applicable), and city – if you want the CI to appear on the Geographical Map in Dashboard. For more information, see "Geographical Map" in <i>Using Dashboard</i> . |
| Created By | The user name of the administrator who manually created the CI, where applicable. |
| Create Time | The date and time when the CI was created. |
| Deletion Candidate Period | The period after which the CI becomes a candidate for deletion when the aging mechanism is enabled. |
| Description | A description of the CI. |
| Display Label | The label that appears for the CI in the topology map. |
| Enable Aging | When the value is set to true, 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 64. |
| | Default value: false. |
| | Note: This field is only displayed for certain CIs. |
| Last Access Time | 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. |
| | This parameter is used by the aging mechanism. For details, see "Removing Out of Date CIs Using the Aging Mechanism" on page 64. |
| 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. |

| GUI Element (A–Z) | Description |
|-------------------|--|
| Relationship | For a related CI, click Relationship to go to the relationship mode of the dialog box. |
| State | The name of the state – when applicable for the selected country. The list is automatically updated when you select a country. Select an option from the list. |
| Select CI Type | Enables you to select the CI type from the tree for the new CI. The CI types that are available for the selected CI or view appear active in the CI type tree. The other CI types appear in faded text and cannot be selected. |
| | To limit the CI type tree to CI types from the current view, select CI Types from the current view on the right. To display all CI types in the tree, select All CI Types . |
| 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. |

CIT-Specific Properties for Dynamic Node Factory

| GUI Element (A–Z) | Description |
|--|--|
| Create CI if groupBy value missing | Defines how to handle samples that are missing the grouping (groupBy) key. When the value is set to true, a CI is still created for the sample. Select true or false from the drop-down list. Default value: true |
| DNode definition key | Defines how the received data samples are processed to generate the hierarchy. For details, see "DNode Definition Key Property" on page 118. The default DNode definition key is for a Business Process Monitor source. |

| GUI Element (A–Z) | Description |
|------------------------|---|
| DNode ID | Appears in the Key Properties section of the CI Properties pane. The DNode ID is automatically assigned and cannot be edited. |
| Enable DNode | Select true or false from the drop-down list. When the value is set to true, the Dynamic Node Factory hierarchy is updated as required based on the incoming samples. If the value is set to false, the hierarchy is not updated (but the KPIs for the CIs still receive status updates in Dashboard). Default value: true |
| KPI status for removal | Select a value from the drop-down list. Defines at which KPI status the generated CIs can be considered for removal from the CMDB (default is Nodata). If all KPIs for a CI have held this status for at least 24 hours (default period), the CI is eligible to be removed from the CMDB, if it was created by this Dynamic Node Factory. Once an hour, the Dynamic Node Factory cleaner removes the CIs that are marked as removable. This option enables automatic cleaning of CIs that have not received corresponding data samples for 24 hours. You can select a different status from the KPI status for removal list according to the characteristics of the generated CIs. For example, you may have generated ticket CIs that change to status green (OK) when the ticket is closed; after 24 hours at OK status these CIs are considered no longer relevant for your views. Note: This applies to monitor (leaf) CIs. When a leaf CI is removed, the CIs above it in the hierarchy are also removed if they have no other children. |

| GUI Element (A–Z) | Description |
|--------------------------------|---|
| Max number of Cls to create | Defines the limit for creating CIs in the Dynamic Node Factory hierarchy, default is 1000 . When a sample is received and the number of CIs in the hierarchy is below 1000, then the Dynamic Node Factory adds new CIs to the hierarchy as required by the sample, even if the number of CIs then exceeds 1000. However, if the hierarchy already has more than 1000 CIs when a sample is received, no new CIs are created. |
| | If you think that the number of CIs might be close to or exceeding the defined limit, check the <hp availability="" business="" center="" directory="" root="">\log\EJBContainer\Trinity.log file. If there is a problem, either change the limit in the Max number of CIs to create property, or modify the selector expression to narrow down the definition. (Also take into consideration the overall CI limit for IT Universe Manager.)</hp> |

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

🦎 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. |
|-------------|---|
| | To access: Click the Relationship button from the New Related CI dialog box. |

| GUI Element (A–Z) | Description |
|-------------------|--|
| Allow CI Update | When the value is set to true, the DDM process automatically updates the relationship. |
| CI Definition | Click CI Definition to return to the CI properties mode of the dialog box. |
| Created By | The user name of the administrator who manually created the relationship, where applicable. |
| Create Time | The date and time when the relationship was created. |
| Description | A description of the relationship. |
| Direction | Select the relationship direction from the drop-down box. |
| Enable Aging | 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 | When the value is set to true, the child CI is dominant when the percentage rule is used to calculate status for the parent CI. If the CI has low status, the parent must take the child CI status, overriding the percentage rule calculation if necessary. This is useful to give emphasis to an important CI. For example, you might want to define Must for a database CI, so that status is critical all the way up the subtree if the database falls, regardless of the status of the other CIs in the subtree. |
| | The Must status defined for a relationship applies to that relationship only – it is not used in any other relationships of the child CI. |
| Name | The name of the CI. |
| Network Address | Defined only for route links. Indicates the destination network address to which this route is configured. |
| Note | Enables you to enter other information about the CI. |
| Origin | An ID for the source that automatically created the relationship, or the application where the relationship was created. |
| Relationship | Enables you to define the type of relationship that is created between the two CIs. For most relationships, only the Depends On option is available. |
| Source CI | The name of the CI on the first side of the relationship. This is the CI that you selected in the view. |
| Target CI | The name of the CI on the second side of the relationship. This is the new CI that you are creating. |
| Updated By | The user name of the administrator who updated the relationship properties. |
| Update Time | The date and time when the CI properties were last updated. |

| User Label Enables you to define a display label for the relationship Weight When a weight value is entered, the child CI is given m weight in percentage calculations, when the percentage is used to calculate status for the parent CI. For example, | |
|--|------------------------------------|
| weight in percentage calculations, when the percentage | ip. |
| child CI is given a weight of 3, then it has three times me impact on the parent status calculation than its unweight siblings. The weight defined for a relationship applies to that relationship only – it is not used in any other relationship. | e rule e, if a more thted |

Related Cls in View/Database Map

| Description | Enables you to view the CIs related to a specified CI in the view or the CMDB in map or table format. To access: In IT Universe Manager, right-click the required CI and select Get Related CIs > From View or From Database with Filter or From Database without Filter. |
|--------------------------|---|
| Important Information | When you select From View , the Related CIs Map displays related CIs in the current view. When you select From Database without Filter , the Related CIs Map displays related CIs in the CMDB. When you select From Database with Filter , you first select the CI types you want to see in the map, which then displays related CIs of those types in the CMDB. |
| | The related CIs can be viewed in map mode or in text mode. The text mode format of the map includes the icons found in the Element Instances dialog box. For details, see "Element Instances Dialog Box" on page 429. |

| GUI Element (A–Z) | Description |
|-------------------|--|
| + * *+ | Click Place in Center to place the map in the center of the window. |
| × | Click Fit to Window to fit the map to the size of the window. |
| 2. | Click Export Map to Image to save the map to a file. |
| © | Click Print to open the Print Preview dialog box, which enables you to preview or print the map. |
| 800 | Click Layout Properties to open the Layout Properties dialog box which enables you to modify the layout. |
| | Click CI Properties to open the Configuration Item Properties dialog box. |
| & | Click CI History to open the CI History dialog box for the selected CI. |
| Q | Select a different CI in the map and click Reveal from Database without Filter to add the related CIs in the CMDB for the new CI to the existing map. |
| | Note: This option is only available from the Related CIs from Database map. |
| ব | Select a different CI in the map and click Reveal from Database with Filter to select the CI types you want to see in the map and add the related CIs in the CMDB for the new CI to the existing map. |
| | Note: This option is only available from the Related CIs from Database map. |
| Q | Select a different CI in the map and click Reveal from View to add the related CIs in the view for the new CI to the existing map. |
| | Note: This option is only available from the Related CIs from View map. |

| GUI Element (A–Z) | Description |
|-------------------|--|
| 0 | Select a different CI in the map and click Refocus on CI without Filter to redraw the Related CIs map with the new CI as the focus without using a CI type filter. |
| | Note: This option is only available from the Related CIs from Database map. |
| € | Select a different CI in the map and click Refocus on CI with Filter to select the CI types to appear in the Related CIs map and redraw the map with the new CI as the focus. |
| | Note: This option is only available from the Related CIs from Database map. |
| 60 | Select a different CI in the map and click Refocus on CI from View to redraw the Related CIs map with the new CI as the focus. |
| | Note: This option is only available from the Related CIs from View map. |
| 0 | Click Reset Focus to restore the focus of the Related CIs map to the original state. |
| × | Click Delete to delete the selected CI or relationship. |
| * | Click New Related CI to open the New Related CI dialog box, which enables you to define a new related CI. For details, see "New CI Dialog Box" on page 98. |
| Î | Click Relate to CI to open the Insert Relationship dialog box, which enables you to create a relationship between two CIs. For details, see "Insert Relationship Dialog Box" on page 85. |
| Per | Click Add CI to Discovery Job to display the Add CI to Discovery Job dialog box, which enables you to manually invoke a DDM job for the selected CI. You can use this option to discover additional information about the CI through one of the available DDM jobs. |

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

Context Menu

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

| Menu Item | Description |
|--|---|
| <it universe<br="">Manager context menu options></it> | The following context menu options from the main IT Universe Manager window are also available in the Related CIs Map: |
| | ➤ Properties ➤ CI History ➤ Delete ➤ Insert Relationship For details, see "IT Universe Manager Window" on page 90. |
| New Related CI | Opens the New Related CI dialog box, which enables you to define a new related CI. For details, see "New CI Dialog Box" on page 98. |
| Get Related CIs > Refocus on CI without Filter | Select a different CI in the map and select Get Related CIs > Refocus on CI without Filter to redraw the Related CIs map with the new CI as the focus. Note: This option is only available from the Related CIs from Database map. |

Chapter 2 • IT Universe Manager

| Menu Item | Description |
|---|--|
| Get Related CIs > Refocus on CI with Filter | Select a different CI in the map and select Get Related CIs > Refocus on CI with Filter to select the CI types to appear in the Related CIs map and redraw the map with the new CI as the focus. |
| | Note: This option is only available from the Related CIs from Database map. |

| Menu Item | Description |
|---|--|
| Get Related CIs > Refocus on CI from View | Select a different CI in the map and select Get Related CIs > Refocus on CI from View to redraw the Related CIs map with the new CI as the focus. Note: This option is only available from the Related CIs from View map. |
| Get Related CIs > Reset Focus | Select Reset Focus to restore the focus of the Related CIs map to the original state. |

Selector Expression Dialog Box

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

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

| GUI Element (A–Z) | Description |
|--------------------------------------|---|
| × | Click to delete the row of the filter. |
| <sample field="" window=""></sample> | From the sample field drop-down list, select the appropriate sample field or select Custom to enter a custom field. |
| Add 'OR' Expression | Click to add a row for a new 'or' condition in the filter. |
| And | Click to add a row for a new 'and' condition in the filter. |

Chapter 2 • IT Universe Manager

| GUI Element (A–Z) | Description |
|-------------------|--|
| Field | Select a field from the drop-down list or, if Custom is selected in the Sample field window, enter a field name. |
| Operator | Select an operator from the drop-down list. |
| Value | Enter a value for the filter condition. |

IT Universe Manager – Dynamic Node Factory

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

This chapter includes:

Concepts

- ➤ Working with Dynamic Node Factory Overview on page 113
- ➤ DNode Definition Key Property on page 118

 Tasks
- ➤ Define a Dynamic Node Factory CI on page 129

\lambda Working with Dynamic Node Factory Overview

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

This section includes the following topics:

- ➤ "Understanding Dynamic Node Factory" on page 114
- ➤ "How Dynamic Node Factory Works" on page 115
- ➤ "When to Use Dynamic Node Factory" on page 116

Understanding Dynamic Node Factory

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

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

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

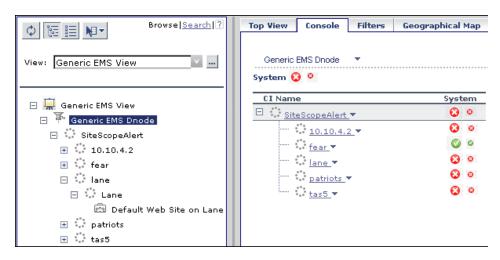
➤ Automatically, by a source adapter. Some of the HP Business Availability Center custom source adapters, for example, Real User Monitor, include a Dynamic Node Factory definition. When the source is added in Source Manager, the Dynamic Node Factory CI is added to the out-of-the-box view for Real User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

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

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

After a Dynamic Node Factory CI is added to a view, the CI properties can be edited in IT Universe Manager. For details on creating a Dynamic Node Factory CI and editing its properties, see "CIT-Specific Properties for Dynamic Node Factory" on page 100.

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



How Dynamic Node Factory Works

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

Dynamic Node Factory CIs use the **DNode definition key** property, which defines how the samples are processed by providing example values for the XML file. These values are used as the template for the dynamic hierarchy in the CMDB. When required, you can customize the DNode definition key to produce a hierarchy that displays the information you need. For details, see "DNode Definition Key Property" on page 118.

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

Once a CI is created, the CI definitions are stored as for any other CI, and it receives update samples from the Dashboard matcher based on the selector for the Dynamic Node Factory CI. The Dynamic Node Factory hierarchy is rebuilt only as necessitated by the sample contents. (You can also define additional composite selectors for the Dynamic Node Factory XML definitions, so that the generated CI is updated independently from the Dynamic Node Factory generators. For details, see "Defining Composite Selectors in the DNode Definition Key" on page 127.)

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

When to Use Dynamic Node Factory

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

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

You should take into consideration the following points:

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

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

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

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

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

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

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

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

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

DNode Definition Key Property

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

This section contains the following topics:

- ➤ "About the DNode Definition Key" on page 118
- ➤ "Components of the DNode Definition Key" on page 120
- ➤ "Defining Composite Selectors in the DNode Definition Key" on page 127

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



\lambda About the DNode Definition Key

The DNode definition key defines the properties for the CIs created by the received samples. This includes generators to determine how to group the incoming samples, how many CI levels to create, and which templates to use when creating each CI (KPIs, business rules, and so forth). Each different data type needs an appropriate definition in the Dynamic Node Factory file. You can customize the definitions in the DNode definition key to make them relevant for a specific data source and to build the hierarchy structure you require. This customization can be done by:

- ➤ Editing the Dynamic Node Factory CI in IT Universe Manager (recommended method). For information on editing a Dynamic Node Factory CI, see "CIT-Specific Properties for Dynamic Node Factory" on page 100.
- ➤ Editing the template for the source adapter in Source Manager (only relevant for predefined Dynamic Node Factory CIs). For information on editing adapter templates, see "Source Adapter Templates" on page 635.

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

```
🏂 XML type
  1 k2xml version="1.0" encoding="UTF-8"?><dnode><Generator groupBy="szSessionName" itemTemplate=
                      <ItemTemplate template="profile" namespace="Mercury" class-name="bp_group">
                             <Attributes><Attribute name="data name" ref value="szSessionName"/><Attri</pre>
                            <KPI><Attributes><Attribute name="type" value="6"/><Attribute name="rule"</pre>
                            <KPI><Attributes><Attribute name="type" value="7"/><Attribute name="rule"</pre>
                            <!--Specify objectives only if you want to override the default values fo

</
  8
                           <Attributes><Attribute name="bp_step_id" ref_value="u_iTransactionId"/><A</pre>
 10
                            <KPI>Attributes><Attribute name="type" value="6"/>Attribute name="rule"
                             <KPI><Attributes><Attribute name="type" value="7"/><Attribute name="rule"</pre>
                 <KPI><attributes</pre>

<pre
 13
 14
 15
                            <KPI><Attributes><Attribute name="type" value="6"/><Attribute name="rule"</pre>
                             <KPI><Attributes><Attribute name="type" value="7"/><Attribute name="rule"</pre>
                  </ItemTemplate>
 17
                     <LinkTemplate template="depends_on" namespace="Mercury" class-name="depends c</pre>
 18
 19
                             <Attributes><Attribute name="weight" value="1"/></Attributes>
  4
                                                   OK Cancel
```

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

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

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



Components of the DNode Definition Key

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

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

Generators

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

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

```
<Generator groupBy="szSessionName" itemTemplate="profile"</p>
linkTemplate="depends on">
<Generator groupBy="szTransactionName" itemTemplate="transaction"</p>
linkTemplate="depends on">
<Generator groupBy="szLocationName" itemTemplate="tx_location"</p>
linkTemplate="monitored by"/>
</Generator>
</Generator>
```

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

Note: If samples are missing this key, a CI is still created for the sample if the **Create CI if groupBy value missing** is selected for the parent Dynamic Node Factory CI. For more information, see "CIT-Specific Properties for Dynamic Node Factory" on page 100.

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

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

CI Templates

The second part of the DNode definition key contains the **ItemTemplates**, the templates for creating the CIs. Each template defines attributes, KPIs, and business rules to be used for each generated CI. (If required, you can also add a composite selector to a monitor ItemTemplate. For details, see "Defining Composite Selectors in the DNode Definition Key" on page 127.)

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

```
<ItemTemplate template="profile" namespace="Mercury" class-name="bp_group">
                      <Attributes>
                                        <a href="data"></a> name ref="value="szSessionName"/>
                                        <a href="Attribute name="id" ref=value="u=iSessionId"/>
                                        <a href="Attribute name="app id" value="-1"/>
                     </Attributes>
                     <KPI>
                                        <Attributes>
                                                           <a href="https://example.com/september/"></a> <a href="https://example.com/september/"><a href="https://example.com/september/"><a href="https://example.com/september/"><a href="https://example.com/september/"><a href="https://example.com/september/"><a href="https://example.com/september/"><a href="https://example.com/september/"><a href="https://example.com/september/"><a href="https://example.com/september/">Attribute name="https://example.com/september/"><a href="https://example.com/september/">Attribute name="https://example.com/september/"><a href="https://example.com/september/">Attribute name="https://example.com/september/">Attribute nam
                                                           <a href="Attribute name="rule" value="1"/>
                                        </Attributes>
                     </KPI>
                     <KPI>
                                        <Attributes>
                                                           <a href="Attribute name="type" value="7"/>
                                                           <a href="Attribute name="rule" value="1"/>
                                       </Attributes>
                     </KPI>
                      <!--Specify objectives only if you want to override the default values for objectives-
  </ltemTemplate>
```

Item Template Line

The first line of the ItemTemplate defines the following parameters:

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

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

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

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

Attributes Section

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

The Attributes section defines the following parameters:

```
<a href="https://doi.org/10.1007/j.pubmes/">
<a href="https://doi.
```

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

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

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

Note: The Business Process Group CI template includes the static value attribute . This app_id attribute corresponds to the Business Process Monitor source adapter, and is only required for Business Process Monitor hierarchies.

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

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

```
<a href="https://www.nee.gov.enu"/> <a href="https://www.nee.gov.enu"/> <a href="https://www.nee.gov.enu"/> <a href="https://www.nee.gov.enu"/> <a href="https://www.nee.gov.enu"// total.com/"> <a href="https://www.nee.gov.enu"/> total.com/"> <a href="https://www.nee.gov.enu"/> total.com/</a> <a href="https://www.nee.gov.enu"/> https://www.nee.gov.enu"/> total.com/</a> <a href="https://www.nee.gov.enu
```

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

KPI Section

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

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

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

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

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

If required, you can define additional parameters in the KPI section. Attributes can use **value** or **ref_value**, as described in the "Attributes Section" on page 123.

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

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

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

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

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

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

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

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

Relationship Templates

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

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

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

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

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

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

Defining Composite Selectors in the DNode Definition Key

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

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

Chapter 3 • IT Universe Manager – Dynamic Node Factory

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

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

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

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

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

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

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

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

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

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

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

🦒 Define a Dynamic Node Factory Cl

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

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

This task includes the following steps:

- ➤ "Create a Dynamic Node Factory CI" on page 130
- ➤ "Define Selectors for the Dynamic Node Factory" on page 130
- ➤ "Define KPIs for the Dynamic Node Factory CI" on page 130

1 Create a Dynamic Node Factory CI

Open the New CI dialog box in IT Universe Manager and select **Dynamic Node Factory** as the Configuration Item type. Define the properties in the Define New CI properties area. These properties apply only to the Dynamic Node Factory CI, not to the CIs that are created in the hierarchy. For details, see "New CI Dialog Box" on page 98.

2 Define Selectors for the Dynamic Node Factory

Define the specific properties for Dynamic Node Factory, including the selector expression. For details, see "CIT-Specific Properties for Dynamic Node Factory" on page 100.

3 Define KPIs for the Dynamic Node Factory CI

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

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

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

Modeling Studio

This chapter provides information on the Modeling Studio.

Tip: For more information about using Modeling Studio in HP Business Availability Center, see "Best Practices for Modeling" on page 475.

This chapter includes:

Concepts

- ➤ Modeling Studio Overview on page 132
- ➤ Business CI Models on page 132
- ➤ Building a Perspective Based View on page 134
- ➤ Revealed CIs and Watchpoints on page 137

Tasks

- ➤ Build a Business CI Model on page 141
- ➤ Build a View Based on a Model on page 143
- ➤ Build a View Based on a Collection of CIs on page 143
- ➤ Build a Business CI Model Scenario on page 144

Reference

➤ Modeling Studio User Interface on page 146

Modeling Studio – Overview

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

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

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

Business CI Models

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

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

Building a Model

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

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

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

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

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

Building a Perspective Based View

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

The Content pane of the View Editor displays the models or CIs you have selected to serve as the basis of your view. The Perspective pane displays the selected perspective. The Preview pane displays the resulting view based upon your content and perspective selections. When you make a change in the content or perspective selections, the view is updated accordingly in the Preview pane. For details, see "View Editor" on page 172.

This section includes the following topics:

- ➤ "Content" on page 134
- ➤ "Perspectives" on page 135
- ➤ "Including and Excluding Child CIs" on page 135

Content

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

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

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

Perspectives

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

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



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

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

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

Including and Excluding Child Cls

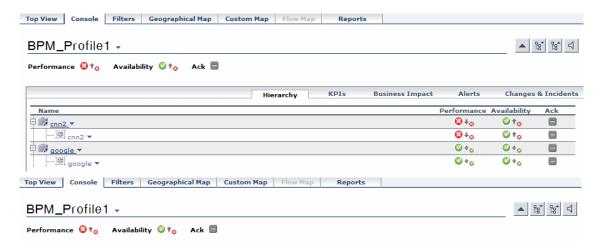
When adding CIs that have children to a view, the CI and its children are only included in the view if the pattern of the perspective includes children for the selected CI type. In that case, children are included for all CIs of that type. After creating a view, you can hide specific CIs from the view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

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

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

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

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



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



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

Revealed Cls and Watchpoints

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

This section includes the following topics:

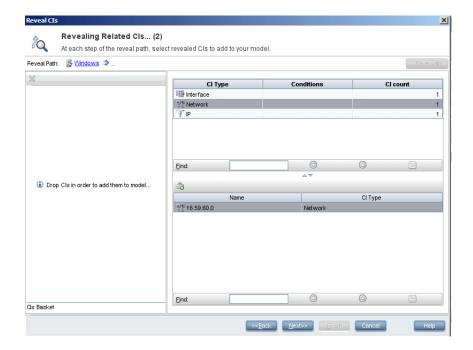
- ➤ "Revealing CIs" on page 137
- ➤ "Watchpoints" on page 140

Revealing Cls

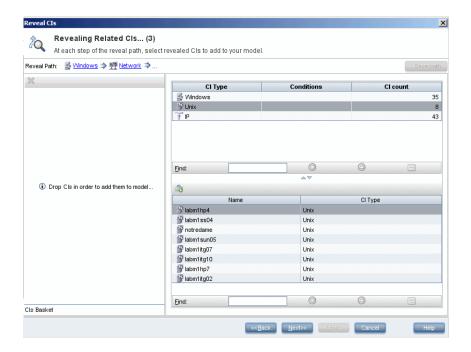
One approach to building a model is to add CIs related to the CIs in the model. The Modeling Studio provides a tool to help you reveal those CIs. The process of revealing related CIs involves constructing a reveal path, which is a chain of CI types that are related to each other. The first item in your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

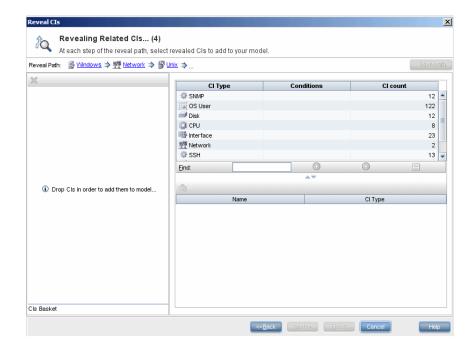
Chapter 4 • Modeling Studio

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



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





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

In this case, a reveal path of **Windows** > **Network** > **Unix** was constructed. At each step, you have the option of adding any of the revealed related CIs to your model. For details on revealing CIs, see "Reveal CIs Dialog Box" on page 169.

It is also possible to construct a reveal path without revealing CIs. For details, see "Create/Edit/Save Reveal Path Dialog Box" on page 151.

Watchpoints

Another method of locating related CIs to add to the model is by defining a watchpoint for a selected CI in the model. A watchpoint is a mechanism which is triggered when a new related CI of a specified type is created. Every watchpoint is defined in connection with a reveal path. If a new related CI of any CI type included in the path is created, the watchpoint is triggered and an indicator appears next to the model. For details on defining a watchpoint, see "New Watchpoint Dialog Box" on page 164.

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

All the related CIs detected by the watchpoint are displayed in the Watchpoints Updates dialog box. The dialog box enables you to select the ones to add to your model and the ones to suppress, or exclude from your model. For details, see "Watchpoints Updates Dialog Box" on page 176.

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

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

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

Build a Business CI Model

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

This task includes the following steps:

- ➤ "Create the New Model" on page 142
- ➤ "Add CIs to the Model Manually" on page 142

- ➤ "Reveal CIs" on page 142
- ➤ "Define Watchpoints for CIs in the Model" on page 142

1 Create the New Model

In the Modeling Studio, click the **New** button and select **New Model** to open the New Model dialog box. Select a CI type and enter the values for its properties. For details, see "New Model Dialog Box" on page 164.

2 Add CIs to the Model Manually

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

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

3 Reveal CIs

Select a CI in the model and reveal its related CIs along a reveal path. Add selected CIs from among the revealed CIs to your model. When you are done, save the model. For details, see "Reveal CIs Dialog Box" on page 169.

4 Define Watchpoints for CIs in the Model

Right-click a CI in the model and select **Watchpoint** > **Add Watchpoint**. The New Watchpoint dialog box opens. Select a reveal path and click **OK**. A small icon appears next to the CI indicating that a watchpoint is defined for it. For details, see "New Watchpoint Dialog Box" on page 164.

🏲 Build a View Based on a Model

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

This task includes the following steps:

- ➤ "Open the Model" on page 143
- ➤ "Select a Perspective" on page 143
- ➤ "Save the View" on page 143

1 Open the Model

In the Modeling Studio, click the **Open** button and select **Open Model** to open the relevant model. For details, see "Open Model Dialog Box" on page 165.

2 Select a Perspective

In the Model Editor, right-click the model and select **Generate View for selected model**. The Creating New View dialog box opens. Select a perspective to apply to the model. For details, see "Creating New View Dialog Box" on page 152.

3 Save the View

The View Editor opens with your new view. Rename the view and save it in the correct folder. For details, see "View Editor" on page 172.

Build a View Based on a Collection of Cls

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

This task includes the following steps:

- ➤ "Create the New View" on page 144
- ➤ "Add CIs to the View" on page 144

➤ "Select a Perspective and Save the View" on page 144

1 Create the New View

In the Modeling Studio, click the **New** button and select **New View** to open the View Editor. For details, see "View Editor" on page 172.

2 Add CIs to the View

In the CI Selector, search for the CIs you want to include in your view. Select them and drag them into the view. For details on the CI Selector, see "View Explorer" on page 705.

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

3 Select a Perspective and Save the View

In the Perspective pane, select a perspective to apply to your CI collection. Rename the view and save it in the correct folder. For details, see "View Editor" on page 172.

🦒 Build a Business CI Model – Scenario

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

This task includes the following steps:

- ➤ "Create a Model" on page 145
- ➤ "Create Application CI Models Within Your Model" on page 145
- ➤ "Add System CIs to Your Model" on page 145
- ➤ "Add CIs to Your Model as Related CIs" on page 145

1 Create a Model

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

Select Admin > Universal CMDB > Modeling > Modeling Studio to open the Modeling Studio. For details about how to create a model, see "New Model Dialog Box" on page 164.

Example of a Business CI Model

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

2 Create Application Cl Models Within Your Model

You can create models within your model by clicking the New Model icon in the Model Editor. For details, see "Model Editor" on page 155.

Example of Application CI Models

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

3 Add System CIs to Your Model

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

Example of System CI Models

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

4 Add CIs to Your Model as Related CIs

Add the CIs that are to be related to the CIs in the model but are not included in the model. For details, see "Model Editor" on page 155.

Example of Related Cls

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

🍳 Modeling Studio User Interface

This section describes:

- ➤ Choose Operation for Selected Item Dialog Box on page 147
- ➤ CI Conditional Search Dialog Box on page 148
- ➤ Conditions of Related CIs Dialog Box on page 150
- ➤ Create/Edit/Save Reveal Path Dialog Box on page 151
- ➤ Creating New View Dialog Box on page 152
- ➤ Hidden CIs Dialog Box on page 153
- ➤ Manage CI Watchpoints Dialog Box on page 154
- ➤ Model Editor on page 155
- ➤ Modeling Studio on page 162
- ➤ New Model Dialog Box on page 164
- ➤ New Watchpoint Dialog Box on page 164
- ➤ Open Model Dialog Box on page 165
- ➤ Open Saved Reveal Path Dialog Box on page 166
- ➤ Open View Dialog Box on page 167
- ➤ Reveal CIs Dialog Box on page 169
- ➤ Software Elements Search Dialog Box on page 171
- ➤ View Editor on page 172
- ➤ View Properties Dialog Box on page 175
- ➤ Watchpoints Updates Dialog Box on page 176

Choose Operation for Selected Item Dialog Box

| Description | Enables you to create models and views from selected CIs. To access: In the Modeling Studio, drag CIs from the CI Selector onto the empty canvas. |
|--------------------------|--|
| Important Information | You can drag individual CIs or multiple CIs onto the canvas. You can select ordinary CIs and/or models to drag onto the canvas. Use the CTRL key while selecting CIs to select multiple CIs. |
| Useful Links | "Best Practices for Modeling" on page 475 |

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

Q CI Conditional Search Dialog Box

| Description | Enables you to search for CIs by attribute conditions, by related CIs and by attribute conditions of related CIs. |
|--------------|--|
| | To access: In the CI Selector in the Modeling Studio, click Advanced Search in Search mode and select CI Conditional Search. |
| Useful Links | "Best Practices for Modeling" on page 475 |

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

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

Q Conditions of Related CIs Dialog Box

| Description | Enables you to define conditions for the CI types in a reveal path. |
|--------------|--|
| | To access: Click the Add Condition or Edit Condition buttons from the Conditions column of the Reveal CIs dialog box. |
| Useful Links | "Best Practices for Modeling" on page 475 |

| GUI Element (A-Z) | Description |
|-------------------|---|
| + | Add the attribute condition you have defined. |
| × | Delete an attribute condition. |
| ↑ | Move a selected row up. |
| U | Move a selected row down. |
| Q | View the condition definition. |
| And/Or | Click inside the And/Or field and select either And or Or to link multiple conditions. |
| Attribute name | Select an attribute from the list. |
| Brackets | Click inside the Brackets box to display a list of brackets you can use to build more complex, logical statements. |
| Criteria | Contains the attribute condition definition as defined in the Element Instances dialog box. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| Not | Select NOT if you want the condition statement to do the opposite of what is defined. |
| | Note : If you select NOT , query results do not include data from the CI instances that were not assigned a value. For example, your system contains three hosts: Host1 is assigned the value A, Host2 is assigned the value B and Host3 is not assigned a value. You create a query to retrieve all hosts that are equal to A and select NOT ; the results of your query only include Host2 because Host3 is not assigned a value. |
| Operator | Select the required operator. For details, see "Attribute Operator Definitions" on page 400. |
| Value | Enter or select the value of the attribute. The Value options vary according to the attribute type you select. |

№ Create/Edit/Save Reveal Path Dialog Box

| Description | Enables you to define a new reveal path or edit an existing path. To access: To define a new reveal path, click the Reveal button from the Model Editor, and select Create |
|--------------|---|
| | Reveal Path. To edit an existing reveal path, select a path from the Open Saved Reveal Path dialog box and click Edit. |
| | To save a reveal path, click Save Path from the Reveal CIs dialog box. |
| Useful Links | "Best Practices for Modeling" on page 475 |

Chapter 4 • Modeling Studio

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

| GUI Element (A-Z) | Description |
|-------------------|--|
| Description | Enter a description of the path. |
| Name | Enter the name of the path. |
| Preview | Opens the Reveal CIs dialog box displaying the related CIs in the path. |
| | Note: This button does not appear in the Save Reveal Path dialog box. |
| Reveal Path | Build the path by clicking the discont to open a dialog box with a CI type tree. Select the CI type for the next item in the path. |
| | When you hold the pointer over a reveal path item, the following options are available: |
| | ➤ Delete. Deletes the item from the reveal path. |
| | ➤ Add condition. Opens the Conditions of Related CIs dialog box, which enables you to set conditions for the reveal path item. |
| | ➤ Refine Node Type. Opens a CI type tree, which enables you to change the CI type of the reveal path item. |

Creating New View Dialog Box

| Description | Enables you to select a perspective to create a view from a model. |
|-------------------|--|
| | To access: In the Modeling Studio, right-click a model in the Model Editor, View Editor, or CI Selector and select Generate view for selected Model or click the Generate view for selected model icon from the Model Editor. |
| Included in Tasks | "Build a View Based on a Model" on page 143 |
| Useful Links | "Best Practices for Modeling" on page 475 |

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

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

4 Hidden CIs Dialog Box

| Description | Enables you to restore hidden CIs to a view. |
|--------------|--|
| | To access: From the View Editor, click the Show Hidden CIs icon from the toolbar of the View Results pane. |
| Useful Links | "Best Practices for Modeling" on page 475 |

| GUI Element (A-Z) | Description |
|------------------------|--|
| <check box=""></check> | Select the check boxes for the CIs you want to restore. |
| СІ Туре | The CI type of the excluded CI. |
| Name | The name of the excluded CI. |
| Restore | Click Restore to include the selected CIs in the view. |
| Select All | Click Select All to select all the CIs in the list for inclusion in the view. |
| Unselect All | Click Unselect All to clear the check boxes of all the CIs in the list. |

Manage CI Watchpoints Dialog Box

| Description | Enables you to add or remove watchpoints for a CI in a model. |
|-------------|--|
| | To access: From within a model in the Model Editor, click the Watchpoint button and select Manage CI Watchpoints or right-click a CI in the model and select Watchpoint > Manage CI Watchpoints. |

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

Model Editor

| Description | Enables you to create and edit models. To access: In the Modeling Studio, click the New button and select New Model to create a new model or click |
|--------------|---|
| | the Open button and select Open Model to edit an existing model. |
| Important | The Model Editor contains the following panes: |
| Information | ➤ Content pane. Lists the CIs and models contained in the model. |
| | ➤ Information pane. Displays the properties, related CIs and watchpoints for the selected CI or model. |
| | You can drag CIs from the CI Selector into the Content pane of an existing model to add them to the model. However, you cannot drag in a CI that is already included in the model. |
| | You can drag CIs from the CI Selector into the Related CIs tab of the Information pane provided that the selected source and target CI can be related by one of the triplets that includes an Impacted By (Potentially) relationship. |
| Useful Links | "Best Practices for Modeling" on page 475 |

Content Pane

| GUI Element (A-Z) | Description |
|-------------------|--|
| Text Mode 🔻 | Select Text Mode to display the CIs in a list. Select Map Mode to display the CIs as icons in a diagram. |
| | Click CI Properties to open the Configuration Item Properties dialog box for the selected CI. |
| 69 | Click Open selected model in a new tab to open the selected model in a separate Model Editor tab. |

| GUI Element (A-Z) | Description |
|--|--|
| € | Click New Model to open the New Model dialog box which enables you to define a new model within the existing model. |
| THE PART OF THE PA | Click Generate view for selected model to create a view based on the current model. The Creating New View dialog box opens, which enables you to select a perspective to apply. |
| × | Click to remove a selected CI from the model (it remains in the CMDB). |
| 點 | Click Expand All to expand the model hierarchy. |
| ₩ | Click Collapse All to collapse the model hierarchy. |
| âq | Click Reveal for the following options: |
| | ➤ Start Revealing. Opens the Reveal CIs dialog box. For details, see Reveal CIs dialog box. |
| | ➤ Create Reveal Path. Opens the Create Reveal Path dialog box. For details, see Create Reveal Path dialog box. |
| | ➤ Open Reveal Path. Opens the Open Saved Reveal Path dialog box. For details, see Open Saved Reveal Path dialog box. |
| Q. | Click Watchpoint for the following options: |
| | ➤ Watchpoints Updates. Display the watchpoint results and select CIs to add to the model. For details, see Watchpoints Updates dialog box. |
| | ➤ Add Watchpoint. Define a new watchpoint for the selected CI. For details, see New Watchpoint dialog box. |
| | ➤ Manage CI Watchpoints. Add new watchpoints to the CI or remove existing ones. For details, see Manage CI Watchpoints dialog box. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| | Click Grouping to group CIs in a group model under a model. Select one of the following options: |
| | ➤ Insert New Group. Create a new empty group. After creating the group, you can drag CIs into it from the CI Selector, the related CIs tab, or from the model itself. |
| | ➤ Join to Group. Select a CI or several CIs in the model and join them to an existing group or form a new group. |
| | ➤ Ungroup. Select a group and ungroup it. Its CIs remain directly under the main model. |
| Q | Click Find to toggle between displaying and hiding the Find box and arrow controls. |
| | Note: This button only appears in Text mode. |
| 2 | Click to refresh the map and optimize the map layout. |
| 6666 | Note: This button only appears in Map mode. |
| ⊠ | Click Fit to Window to resize the map to fit the size of the window. |
| | Note: This button only appears in Map mode. |
| N Select ▼ | Select the functionality of the cursor from the Mode drop-down. The following options are available: |
| | ➤ Select |
| | ➤ Drag Map |
| | ➤ Zoom |
| | Note: This feature only appears in Map mode. |
| - | Select a CI and click Show External Relationships to display the related CIs for that CI. |
| | Note: This button only appears in Map mode. |
| 7 | Click Hide External Relationships to hide the related CIs. |
| | Note: This button only appears in Map mode. |
| 0 | Indicates that watchpoints are defined for the current CI. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| 0 | Indicates that the watchpoints have detected new CIs related to the current model. Click it to open the Watchpoints Updates dialog box. |
| CI Type column | Displays the type of each CI in the model. |
| Find | Enter a CI name or a portion of a CI name in the Find box to locate a CI in the model. |
| Find Next | Click to go to the next occurrence of the selected search phrase in the model. |
| Find Previous | Click to go to the previous occurrence of the selected search phrase in the model. |
| Highlight | Click to highlight all occurrences of the search phrase in the model. |
| Name column | Displays the name of each CI in the model. |

Context Menu Options

| Menu Item | Description |
|----------------------------------|---|
| Fit to Window | Resizes the map to fit the size of the window. |
| | Note: This option only appears in Map mode. |
| Generate view for selected model | Select to create a view based on the current model. The Creating New View dialog box opens which enables you to select a perspective to apply. |
| Grouping | Click Grouping to group CIs in a group model under a model. Select one of the following options: |
| | ➤ Insert New Group. Create a new empty group. After creating the group, you can drag CIs into it from the CI Selector, the related CIs tab, or from the model itself. |
| | ➤ Join to Group. Select a CI or several CIs in the model and join them to an existing group or form a new group. |
| | ➤ Ungroup. Select a group and ungroup it. Its CIs remain directly under the main model. |

| Menu Item | Description |
|--------------------------------------|--|
| Hide External | Hides the related CIs from the map. |
| Relationships | Note: This option only appears in Map mode. |
| Insert New Model | Opens the New Model dialog box which enables you to create a new model within the existing model. |
| Open selected model in a new tab | Opens the selected model in a separate Model Editor tab. |
| Properties | Opens the Configuration Item Properties dialog box for the selected CI. |
| Refresh Layout | Refreshes the map and optimizes the map layout. |
| | Note: This option only appears in Map mode. |
| Reveal | The following options are available: |
| | ➤ Start Revealing. Opens the Reveal CIs dialog box. For details, see Reveal CIs dialog box. |
| | ➤ Open Reveal Path. Opens the Open Saved Reveal Path dialog box. For details, see Open Saved Reveal Path dialog box. |
| Remove Selected CI(s) from the Model | Deletes the selected CIs from the model (it remains in the CMDB). |
| Select | Select the functionality of the cursor. The following options are available: |
| | ➤ Select |
| | ➤ Drap Map |
| | ➤ Zoom |
| | Note: This option only appears in Map mode. |
| Show External | Displays the related CIs for the selected CI. |
| Relationships | Note: This option only appears in Map mode. |

| Menu Item | Description |
|------------|--|
| Watchpoint | The following options are available: |
| | Watchpoints Updates. Display the watchpoint results and select CIs to add to the model. For details, see Watchpoints Updates dialog box. Add Watchpoint. Define a new watchpoint for the selected CI. For details, see New Watchpoint dialog box. |
| | ➤ Manage CI Watchpoints. Add new watchpoints to the CI or remove existing ones. For details, see Manage CI Watchpoints dialog box. |
| Zoom | Select the size of the map from the list of percents. Note: This option only appears in Map mode. |

Information Pane - Properties Tab

| Description | Displays the properties of the selected CI. |
|-------------|---|
| | This pane is identical to the Properties tab of the Information pane in IT Universe Manager. For details, see |
| | "Configuration Item Properties Dialog Box" on page 78. |

Information Pane - Related CIs Tab

| Description | Displays the CIs related to the model by depends on |
|-------------|---|
| | relationships. |

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

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

Information Pane - Watchpoints Tab

| Description | Displays the watchpoints defined for the selected CI. |
|-------------|---|
|-------------|---|

| GUI Element (A-Z) | Description |
|-------------------|---|
| 0 | Click to open the Manage CI Watchpoints dialog box, which enables you to edit the watchpoint. |
| Automated | Indicates whether the new CIs found by the watchpoint are automatically added to the view. |
| Source CI | Displays the CI forming the beginning of the reveal path. |
| Watchpoint Name | The name of the reveal path associated with the watchpoint. |
| Watchpoint Path | Displays the reveal path of the watchpoint. |

Nodeling Studio

Tip: For more information about using Modeling Studio in HP Business Availability Center, see "Best Practices for Modeling" on page 475.

| Description | Enables you to create and edit models and views. The Modeling Studio window contains the following panes: CI Selector. Enables you to browse views or search for CIs. For details, see "View Explorer" on page 705. Editor pane. Displays the CIs of a selected view or model. Information Pane. Displays properties, watchpoints, and related CIs for the selected CI. To access: Select Admin > Universal CMDB > Modeling > |
|--------------------------|---|
| | Modeling Studio. |
| Important Information | The Editor pane is a blank canvas before any views or models are opened. When you open a view, the View Editor appears there. When you open a model, the Model Editor appears there. Multiple views and models can be open at the same time, each within a separate tab. |
| Useful Links | Model Editor, View Editor |

| GUI Element (A-Z) | Description |
|-------------------|--|
| * | Click the click the New button to select one of the following options: |
| | ➤ New Model. To create a new model. |
| | ➤ New View. To create a new view. |
| = | Click the Open button to select one of the following options: |
| | ➤ Open Model. To open an existing model. |
| | ➤ Open View. To open an existing view. |
| H | Click Save to save the changes to your view or model. |
| | For views, a dialog box opens which enables you to rename your view and save it in the appropriate folder. |
| 5 | Click Undo to reverse the last change you made. |
| 2 | Click Redo to repeat the last action you took. |
| | Click Maximize Workspace to toggle between the regular display and a full-screen display of the editor. |
| <menu></menu> | The following drop-downs are available: |
| | ➤ Resource . Enables you to create a new view or model, open an existing view or model, and save a view or model. |
| | ➤ Edit. Enables you to undo or redo an action. |
| | ➤ Tools. Includes the options from the right-click menu in the Editor. |
| | ➤ View. Enables you to select the panes to display. |

New Model Dialog Box

| Description | Enables you to define a reusable model containing a collection of CIs. |
|-------------------|--|
| | To access: Click the New button and select New Model or drag a CI from the tree in the CI Selector onto the editing pane and select Create a new model. |
| Included in Tasks | "Build a Business CI Model" on page 141 |
| Useful Links | "Best Practices for Modeling" on page 475 |

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

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

New Watchpoint Dialog Box

| Description | Enables you to define a watchpoint for a CI in a model. |
|--------------------------|--|
| | To access: From within a model in the Model Editor, click the Watchpoint button and select Add Watchpoint or right-click a CI in the model and select Watchpoint > Add Watchpoint. |
| Important Information | If no reveal paths are found for the selected CI, no watchpoints can be defined. |
| | You cannot define watchpoints for CIs in a new model until you save the model. |
| Included in Tasks | "Build a Business CI Model" on page 141 |

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

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

🙎 Open Model Dialog Box

| Description | Enables you to open an existing reusable model containing a collection of CIs in the Editor pane. |
|-------------------|--|
| | To access: Click the Open 🔁 button in the Modeling Studio and select Open Model . |
| Included in Tasks | "Build a View Based on a Model" on page 143 |
| Useful Links | "Best Practices for Modeling" on page 475 |

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

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

Open Saved Reveal Path Dialog Box

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

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

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

Q Open View Dialog Box

| Description | Enables you to open an existing view in the Editor pane. |
|--------------|---|
| | To access: Click the Open 🔁 button in the Modeling Studio and select Open View . |
| Useful Links | "Best Practices for Modeling" on page 475 |

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

Chapter 4 • Modeling Studio

| GUI Element (A-Z) | Description |
|-----------------------|---|
| Ø | Click Refresh to refresh the view tree. |
| × | Click Delete to delete the view. |
| 74 | Click Disconnect view from perspective to detach a perspective based view from its template. It becomes a pattern view and is no longer affected by changes made to the perspective. |
| • | Go directly to IT Universe Manager for the current view. |
| \bigcirc | Click to go to the next occurrence of the selected search phrase in the list of views. |
| 0 | Click to go to the previous occurrence of the selected search phrase in the list of views. |
| <view tree=""></view> | Displays the existing views in a tree format. |
| Find | Enter a CI name or a portion of a CI name in the Find box to locate a CI in the list of views. |

Reveal Cls Dialog Box

| Description | Enables you to search for CIs related to the CIs in a model and add them to the model. |
|--------------------------|--|
| | To access: In the Model Editor of the Modeling Studio, select a CI, click the Reveal open button, and select Start Revealing or right-click a CI in the model and select Reveal > Start Revealing. |
| Important Information | The upper pane displays the CI types of the CIs related to the selected CI. The lower pane displays the CIs of the type selected in the upper pane. |
| | The first step in the reveal path is the CI type of the CI you began with. When you select a CI type from the list in the upper pane, that CI type becomes the second step in the path. Click Next to display the CI types available for the next step of the path. |
| | The number at the top of the box in parentheses indicates the length of the constructed path thus far. |
| Included in Tasks | "Build a Business CI Model" on page 141 |

| GUI Element (A-Z) | Description |
|-------------------------|--|
| × | Click to delete a selected item from the CIs basket. |
| a | Click to add a selected CI from the lower pane to the CIs basket. |
| \bigcirc | Click to go to the next occurrence of the selected search phrase in the list of CIs. |
| 0 | Click to go to the previous occurrence of the selected search phrase in the list of CIs. |
| <lower pane=""></lower> | Displays a list of related CIs of the type selected in the upper pane. |
| CI count | Indicates how many related CIs of each type were found. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| CIs Basket | Displays the related CIs you selected to include in the model. |
| СІ Туре | Displays a list of CI types of the CIs related to the selected CI. |
| Conditions | A check mark indicates that conditions were defined for the selected CI type. Click the Conditions column for the CI type you want to select and click the Add Condition or Edit Condition button to open the Conditions of Related CIs dialog box. This enables you to define and edit conditions for the CI type. |
| Find | Enter a CI name or a portion of a CI name in the Find box to locate a CI in the list of CIs. |
| Finish | Click Finish when you have finished adding CIs to the CI basket. |
| Next | Click Next to display the CI types available for the next step of the path. |
| Reveal Path | Displays the reveal path being constructed. |
| | Clicking the blue arrows in the path \Rightarrow displays a drop-down list of the CI types available for the next step of the path. |
| | Clicking the CI types in the path displays the following options: |
| | ➤ Jump to page. Refreshes the table with the available CI types for the selected step of the path. |
| | ➤ Edit Condition. Opens the Conditions of Related CIs dialog box. |
| | ➤ Delete Selected Item(s). Deletes the selected CI type from the reveal path (the path ends at the previous CI type). |
| Save Path | Opens the Save Reveal Path dialog box which enables you to save the path. This option is only active when a unique reveal path has been constructed. |

Software Elements Search Dialog Box

| Description | Enables you to search for hosts by the applications running on them and for applications by the host on which they are running. |
|--------------|---|
| | To access: In the CI Selector in the Modeling Studio, click Advanced Search in Search mode and select Software Elements Search. |
| Useful Links | "Best Practices for Modeling" on page 475 |

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

View Editor

| Description | Enables you to create and edit views. To access: In the Modeling Studio, click the New button and select New View to create a new view or drag CIs from the CI Selector onto the blank canvas and select Create new view with selected CIs. Click the Open button and select Open View to edit an existing view. |
|--------------------------|---|
| Important Information | The View Editor contains the following panes: Content pane. Drag CIs and/or models onto this pane to include them in your view. Perspective pane. Select a perspective to apply to the content to build a view. View Results pane. Displays a topology map with a preview of the current view. |
| Included in Tasks | "Build a View Based on a Model" on page 143, "Build a View Based on a Collection of CIs" on page 143 |
| Useful Links | "Best Practices for Modeling" on page 475 |

Content Pane

| GUI Element (A-Z) | Description |
|-------------------|--|
| • | Go directly to IT Universe Manager for the current view. |
| 0 | Click Edit View Properties to open the View Properties dialog box which enables you to set properties for the view. |
| A | Click CI Properties to open the Configuration Item Properties dialog box for the selected CI. |
| 60 | Click Open selected model in a new tab to open the selected model in a separate Model Editor tab. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| 7.4 | Click Generate view for selected model to create a view based on the selected model. The Creating New View dialog box opens which enables you to select a perspective to apply. |
| × | Click to remove a selected CI from the view. |
| Q | Click Find to toggle between displaying and hiding the Find box and arrow controls. |
| CI Type column | Displays the type of each CI in the view. |
| Find | Enter a CI name or a portion of a CI name in the Find box to locate a CI in the view |
| Find Next | Click to go to the next occurrence of the selected search phrase in the view. |
| Find Previous | Click to go to the previous occurrence of the selected search phrase in the view. |
| Highlight | Click to highlight all occurrences of the search phrase in the view. |
| Name column | Displays the name of each CI in the view. |

Context Menu Options

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

Perspective Pane

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

View Results Pane

| GUI Element (A-Z) | Description |
|-------------------|---|
| Ü | Click Hide CI from View to hide the selected CI from the view. This option is only relevant for CIs that were added to the view via the perspective. You cannot hide CIs from the original view content from the view. Note: Hidden CIs can be restored from the Hidden CIs dialog box. |
| | Click Show Hidden CIs to open the Hidden CIs dialog box which enables you to restore CIs that were hidden from the view manually. |
| 7.0 | Click Show tree view to toggle between displaying and hiding a tree layout of the view on the left side of the pane. |
| | Click Expand preview display to display the preview in a separate window. |

| GUI Element (A-Z) | Description |
|------------------------------|--|
| <topology map=""></topology> | The topology map in the View Results pane follows the layout of the topology map in IT Universe Manager. For details, see "Topology Map" on page 91. |
| <tree view=""></tree> | The tree view on the left of the View Results pane displays the CIs of the view in tree format. This enables you to easily see the structure of the view and its different layers. |

Context Menu Options

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

♦ View Properties Dialog Box

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

Chapter 4 • Modeling Studio

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

| GUI Element (A-Z) | Description |
|------------------------------|--|
| Description | Enter a description of the view (optional field). |
| Merge Identical Instances | When the check box is selected, identical instances that appear on the same layer in this view are automatically merged into one symbol in the editing pane. This helps you remove redundant information and sharpen the view's focus. For details, see "Merge Identical Instances" on page 192. |
| Persistent View | Defines whether you want the selected view to always remain in the system memory. You should use this option only for views that are used frequently. |
| View Name | The name of the view. |

[∞] Watchpoints Updates Dialog Box

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

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

Chapter 4 • Modeling Studio

View Manager

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

This chapter includes:

Concepts

- ➤ View Manager Overview on page 180
- ➤ View Formats on page 181
- ➤ Templates and Perspectives on page 182
- ➤ Predefined Folders and Views on page 183
- ➤ Building a Business View on page 185
- ➤ Link Nodes to Application CI on page 187
- ➤ The Role of Monitor CIs in a View on page 190
- ➤ Grouping By Attribute Properties on page 191
- ➤ Merge Identical Instances on page 192

Tasks

- ➤ Create a Parameterized Template on page 193
- ➤ Create a Perspective on page 195
- ➤ Create a Template Based View on page 196
- ➤ Create a Pattern View on page 198

Reference

➤ View Manager User Interface on page 199

Troubleshooting and Limitations on page 232

Name of the William States of the William S

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

The IT universe model in the configuration management database can be very large, holding thousands of configuration 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.

The views are used to display performance status in Dashboard, and for setting up SLAs in Service Level Management. HP Business Availability Center supports three view formats, pattern views, template based views, and perspective based views, which are populated through different processes. For details, see "View Formats" on page 181.

View Formats

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

- ➤ Pattern views are built from a Topology Query Language (TQL) query that defines the structure of the view. You can create the TQL query as you build the view from within View Manager or based on an existing query. The view displays only those CIs and relationships that satisfy the query definition. When the view is displayed or refreshed, View Manager queries the CMDB for all elements that fit the query, and automatically updates the view with those elements.
- ➤ Template based views are based on a TQL query, to which a template is then applied. The template is a reusable view that includes parameters, folding rules, and other settings, which are saved as part of the template. This enables you to build multiple views with the same settings without having to re-enter the setting information. The view displays only those CIs and relationships that satisfy the query definition and the conditions of the template. For details on templates, see "Templates and Perspectives" on page 182.
- ➤ Perspective based views are built by selecting a collection of individual CIs and applying a special type of template, known as a perspective, to it. Instance views, which no longer exist, are replaced by perspective based views. Perspective based views cannot be viewed or edited in View Manager. When you select a perspective based view in View Manager, you are given the option to open the view in Modeling Studio, where you can edit it. For details, see "Modeling Studio Overview" on page 132.

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

Templates and Perspectives

The templates and perspectives which are used to build template based and perspective based views, respectively, are also defined and edited in View Manager. You can create a template using the New Template wizard. For details, see "New Template/Template Properties/Save As Template Wizard" on page 206. To create a perspective, use the New Perspective wizard. For details, see "New Perspective/Perspective Properties/Save As Perspective Wizard" on page 202.

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

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

Perspectives are a type of template designed to be applied to a specific collection of CIs. You create and edit perspectives in View Manager, but you can only apply them to content to build a view in the Modeling Studio. Perspective based views appear in the views tree in View Manager, but you must go to the Modeling Studio to edit them. For details, see "Building a Perspective Based View" on page 134.

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

- > pattern views
- ➤ templates
- ➤ template based views
- perspectives
- perspective based views

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

You can filter the tree to select the types of views or templates to display. For details, see "View Manager Window" on page 221.

Predefined Folders and Views

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

- ➤ "Predefined Folders" on page 183
- ➤ "Factory Views" on page 183
- ➤ "Predefined Perspectives" on page 184

Predefined Folders

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

Factory Views

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

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

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

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

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

For details on source adapters, see "Working with Source Manager" on page 633.

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

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

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

Predefined Perspectives

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

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

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

\lambda Building a Business View

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

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

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

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

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

The usual hierarchical format of a view is as follows:

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

In some cases, you can choose to use the Dynamic Node Factory CI type to dynamically build a hierarchy for you. For details, see "Working with Dynamic Node Factory Overview" on page 113.

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

Link Nodes to Application CI

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

When you select **Add to Applications** from the context menu for a node in View Manager, a new CI of type application is created. All instances of the selected node in any corresponding view are then linked to the new CI with **Contains** links. This CI is actually a model of type application which can be viewed in the Modeling Studio. The CIs in the model appear in read-only format. For details on models, see "Business CI Models" on page 132.

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

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

This section includes the following topics:

- ➤ "Linking a Node to an Application CI" on page 187
- ➤ "Removing the Link between a Node and the Application CI" on page 190

Linking a Node to an Application CI

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

Chapter 5 • View Manager

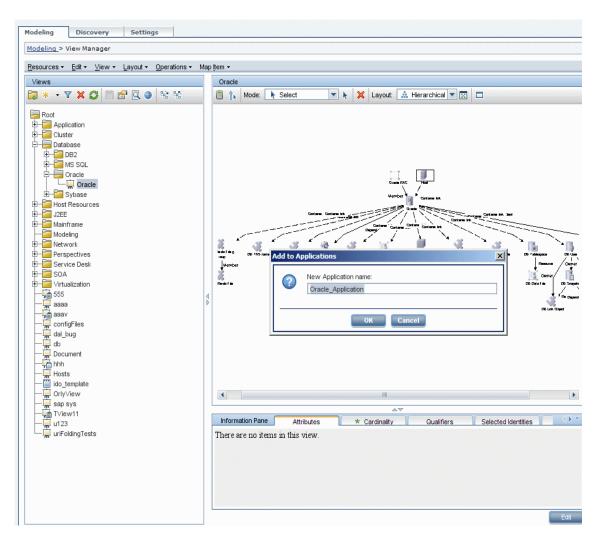


A small black briefcase icon appears to the right of the node. The creation of the application CI and the links occurs when you save the view.

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

Example

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



Removing the Link between a Node and the Application CI

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

A The Role of Monitor Cls in a View

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

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

- ➤ Location CI -> monitor leaf CI
- ➤ Location CI -> group CI -> group CI -> monitor leaf CI

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

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

- ➤ By attaching a monitor CI (or a subtree containing a monitor CI) to the parent CI in IT Universe Manager. For details, see "Attaching Existing CIs" on page 67.
- ➤ By making an association between a monitor CI and an existing CI. The monitor CI is automatically attached to the selected CI. For details, see "Integrating SiteScope Data with HP Business Availability Center's Configuration Items" in *Using System Availability Management*.
- ➤ By using the Monitor Deployment Wizard to create a new SiteScope monitor for a specific CI. The created monitor generates a new monitor CI in the CMDB, with an automatic attachment to the selected CI. For details, see "Monitor Deployment Wizard User Interface" in *Using System Availability Management*.

Grouping By Attribute Properties

When grouping CIs in View Manager by attribute using **Node Grouping**, you can group CIs of different types in the Topology Map by using a regular expression as described in "Node/Relationship Grouping Dialog Box" on page 216. Enter the expression in the **Mask to group by** field in the Advanced Attribute Properties page of the dialog box. For details about regular expressions, see "Regular Expression Examples" in *Reference Information*.

Nested Groups

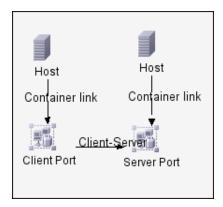
You can create nested groups (a node group inside another node group) to help fine-tune the TQL results that are displayed in the Topology Map.

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

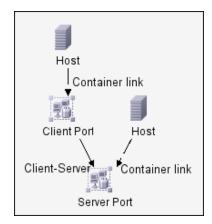
\lambda Merge Identical Instances

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

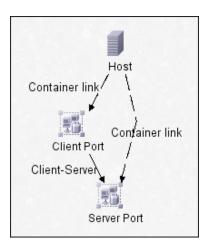
For example, if you want to discover and display hosts that are connected to other hosts in a server-client relationship, you can create the following TQL:



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



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



Tereate a Parameterized Template

This task describes how to define a new parameterized template.

This task includes the following steps:

- ➤ "Define a Template" on page 194
- \blacktriangleright "Define the Base TQL" on page 194
- ➤ "Set the Advanced Properties" on page 194
- ➤ "Add Nodes and Relationships to a TQL Query" on page 194
- ➤ "Add Folding Rules to Relationships" on page 194
- ➤ "Set Permissions" on page 195

1 Define a Template

You define a new template using the New Template wizard. Enter the template name and description on the General Attributes page of the wizard. For details, see "Template General Attributes Page" on page 206.

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

2 Define the Base TQL

The TQL is assigned the same name as the template. For details, see "Template Base TQL Page" on page 207.

3 Set the Advanced Properties

On the Advanced Properties page of the wizard, enter the viewing options for the template. For details, see "Advanced Properties Page" on page 208.

4 Add Nodes and Relationships to a TQL Query

Add the nodes and relationships that define the query. For details on how to add nodes and relationships to a TQL query, see "Add Nodes and Relationships to a TQL Query" on page 384.

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

5 Add Folding Rules to Relationships

You can add folding rules to selected relationships by right-clicking the relationship you want and selecting **Add Rule**. For details, see **Add Rule** in "Context Menu Options" on page 393.

6 Set Permissions

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

Create a Perspective

This task describes how to define a new perspective.

This task includes the following steps:

- ➤ "Define a Perspective" on page 195
- ➤ "Define the Base TQL" on page 195
- ➤ "Set the Advanced Properties" on page 196
- ➤ "Select a Contact Node" on page 196
- ➤ "Add Nodes and Relationships to a TQL Query" on page 196
- ➤ "Add Folding Rules to Relationships" on page 196
- ➤ "Set Permissions" on page 196

1 Define a Perspective

You define a new perspective using the New Perspective wizard. Enter the perspective name and description on the General Attributes page of the wizard. For details, see "Perspective General Attributes Page" on page 202.

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

2 Define the Base TQL

The TQL is assigned the same name as the perspective. For details, see "Perspective Base TQL Page" on page 203.

3 Set the Advanced Properties

On the Advanced Properties page of the wizard, enter the viewing options for the perspective. For details, see "Advanced Properties Page" on page 204.

4 Select a Contact Node

On the Contact Node page of the wizard, select a CI type from the tree to serve as a contact node of your perspective. For details, see "Contact Node Page" on page 203.

5 Add Nodes and Relationships to a TQL Query

Add the nodes and relationships that define the query. For details on how to add nodes and relationships to a TQL query, see "Add Nodes and Relationships to a TQL Query" on page 384.

6 Add Folding Rules to Relationships

You can add folding rules to selected relationships by right-clicking the relationship you want and selecting **Add Rule**. For details, see **Add Rule** in "Context Menu Options" on page 393.

7 Set Permissions

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

🦒 Create a Template Based View

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

This task includes the following steps:

- ➤ "Prerequisites" on page 197
- ➤ "Define a New Template Based View" on page 197
- ➤ "Select a Template" on page 197

- ➤ "Set the Advanced Properties" on page 197
- ➤ "Set Parameters" on page 197
- ➤ "Set Permissions" on page 198

1 Prerequisites

If you want to base your view on a new template, create the template first. For details, see "New Template/Template Properties/Save As Template Wizard" on page 206.

2 Define a New Template Based View

You define a new template based view using the New View wizard. Select **Template Based** as the view type on the General Attributes page of the wizard. For details, see "View General Attributes Page" on page 210.

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

3 Select a Template

On the Available Templates page of the wizard, select a template on which to base your view. For details, see "Available Templates Page" on page 211.

4 Set the Advanced Properties

On the Advanced Properties page of the wizard, enter the viewing options for the view. For details, see "Advanced Properties Page" on page 213.

5 Set Parameters

On the Set Parameters page, enter the parameter values for the view. A separate wizard page appears for each item in the template for which parameterized values were defined. For details, see "Set Parameters Page" on page 215.

6 Set Permissions

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

Create a Pattern View

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

This task includes the following steps:

- ➤ "Define a Pattern View" on page 198
- ➤ "Define the Base TQL" on page 198
- ➤ "Set the Advanced Properties" on page 199
- ➤ "Add Nodes and Relationships to a TQL Query" on page 199
- ➤ "Add Folding Rules to Relationships" on page 199
- ➤ "Define Multiple Relationship Rules" on page 199

1 Define a Pattern View

You define a new pattern view using the New View wizard. Select **Pattern** as the view type on the General Attributes page of the wizard. For details, see "View General Attributes Page" on page 210.

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

2 Define the Base TQL

If you are basing your view on a new TQL, the TQL is assigned the same name as the view. If you are basing your view on an existing TQL, select it from the drop-down list. For details, see "View Base TQL Page" on page 212.

3 Set the Advanced Properties

On the Advanced Properties page of the wizard, enter the viewing options for the view. For details, see "Advanced Properties Page" on page 213.

4 Add Nodes and Relationships to a TQL Query

Add the nodes and relationships that define the query. For details on how to add nodes and relationships to a TQL query, see "Add Nodes and Relationships to a TQL Query" on page 384.

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

5 Add Folding Rules to Relationships

You can add folding rules to selected relationships by right-clicking the relationship you want and selecting **Add Rule**. For details, see **Add Rule** in "Context Menu Options" on page 393.

6 Define Multiple Relationship Rules

You can define multiple relationship rules to define the structure between CITs in a view using the Relationship Folding Rules dialog box. For details, see "Relationship Folding Rules Dialog Box" on page 218.

💐 View Manager User Interface

This section describes:

- ➤ Add/Edit Relationship Folding Rule Dialog Box on page 200
- ➤ List of Dependent Views Dialog Box on page 201
- ➤ New Perspective/Perspective Properties/Save As Perspective Wizard on page 202
- ➤ New Template/Template Properties/Save As Template Wizard on page 206
- ➤ New View/View Properties/Save As View Wizard on page 210

- ➤ Node/Relationship Grouping Dialog Box on page 216
- ➤ Relationship Folding Rules Dialog Box on page 218
- ➤ Set View Parameters/Set View Element Parameters Dialog Box on page 220
- ➤ View Manager Window on page 221

🍳 Add/Edit Relationship Folding Rule Dialog Box

| Description | Enables you to add a new relationship folding rule or edit an existing relationship folding rule. To access: In View Manager, click Add or Edit from the |
|--------------------------|--|
| | Relationship Folding Rules dialog box. |
| Important Information | You can define sibling and child rules for the same relationship between two CITs. However, you cannot define parent and child rules for the same relationship, or left sibling and right sibling rules. |
| Included in Tasks | "Create a Pattern View" on page 198 |
| Useful Links | "Relationship Folding Rules Dialog Box" on page 218 |

| 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 68. |

List of Dependent Views Dialog Box

| Description | Enables you to disconnect a view from a template or perspective that has changed, delete the view, or reapply the template or perspective. |
|-------------|---|
| | To access: In View Manager, when saving a template or perspective with a change, the List of Dependent Views dialog box automatically opens. |

| GUI Element (A-Z) | Description |
|----------------------------|--|
| Invalid Dependent Views | For each dependent view listed, select one of the following options: |
| | ➤ Disconnect. Disconnects the view from the template or perspective. The views becomes an independent pattern view. ➤ Delete. Deletes the view from the CMDB. |
| | Delete. Deletes the view from the CMDb. |
| Valid Dependent Views | For each dependent view listed, select one of the following options: |
| | ➤ Reapply. Applies the changed template or perspective to the view and saves the view. |
| | ➤ Disconnect. Disconnects the view from the template or perspective. The views becomes an independent pattern view. |

New Perspective/Perspective Properties/Save As Perspective Wizard

| Description | Enables you to define a new perspective or edit the properties of an existing perspective. |
|--------------------------|--|
| | To access: In View Manager, click the downward arrow next to the New button and select New Perspective, or select New > New Perspective from the context menu in the Views pane. |
| | Click the Properties button for select Properties from the context menu to edit the properties of an existing perspective. |
| | Select Save As from the context menu or select Resources > Save As to save an existing perspective with a different name. |
| Important Information | TQL queries should only be created by administrators with an advanced knowledge of the TQL system. |
| | For more information on perspectives, see "Building a Perspective Based View" on page 134. |
| Included in Tasks | "Create a Perspective" on page 195 |
| Wizard Map | The New Perspective/Perspective Properties/Save As Perspective wizard contains: |
| | Perspective General Attributes Page > Contact Node Page > Perspective Base TQL Page > Advanced Properties Page |

Perspective General Attributes Page

| Description | Enables you to define the general attributes of the new perspective. |
|--------------------------|--|
| Important Information | For more information on perspectives, see "Building a Perspective Based View" on page 134. |
| Wizard Map | The New Perspective/Perspective Properties/Save As Perspective Wizard contains: |
| | Perspective General Attributes Page > Contact Node Page > Perspective Base TQL Page > Advanced Properties Page |

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

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

🙎 Contact Node Page

| Description | Enables you to select a contact node for a perspective. |
|--------------------------|--|
| Important Information | A perspective based view must have at least one contact node. |
| | For more information on perspectives, see "Building a Perspective Based View" on page 134. |
| Wizard Map | The New Perspective/Perspective Properties/Save As Perspective Wizard contains: |
| | Perspective General Attributes Page > Contact Node Page > Perspective Base TQL Page > Advanced Properties Page |

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

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



🍳 Perspective Base TQL Page

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

| Important Information | For more information on perspectives, see "Building a Perspective Based View" on page 134. |
|--------------------------|--|
| Wizard Map | The New Perspective/Perspective Properties/Save As Perspective Wizard contains: |
| | Perspective General Attributes Page > Contact Node Page > Perspective Base TQL Page > Advanced Properties Page |

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

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

🙎 Advanced Properties Page

| Description | Enables you to enter advanced properties for the perspective. |
|--------------------------|---|
| Important Information | For more information on perspectives, see "Building a Perspective Based View" on page 134. |
| Wizard Map | The New Perspective/Perspective Properties/Save As Perspective Wizard contains: Perspective General Attributes Page > Contact Node Page > Perspective Page TOL Page > Advanced Properties Page > |
| | Perspective Base TQL Page > Advanced Properties Page |

| GUI Element (A-Z) | Description |
|------------------------------|--|
| Assign View to | Select the check boxes for the applications in which you want the perspective you are creating to be visible: |
| | ➤ IT Universe. The perspective is visible in IT Universe Manager. Selected by default. |
| | ➤ Dashboard. The perspective is visible in Dashboard and Dashboard Administration. Selected by default. |
| | ➤ Service Level Management. The perspective is visible in Service Level Management. |
| | ➤ Service Level Management Administration. The perspective is visible in Service Level Management Administration. |
| | ➤ SOA . The perspective is visible in Business Availability Center for SOA. Selected by default only for perspectives in the SOA folder. |
| Merge Identical Instances | When the check box is selected, identical instances that appear on the same layer in this perspective are automatically merged into one symbol in the editing pane. This helps you remove redundant information and sharpen the perspective's focus. For details, see "Merge Identical Instances" on page 192. |
| Persistent View | Defines whether you want the selected perspective to always remain in the system memory. You should use this option only for perspectives that are used frequently. |
| 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 perspective. |

New Template/Template Properties/Save As Template Wizard

| Description | Enables you to define a new template or edit the properties of an existing template. |
|--------------------------|--|
| | To access: In View Manager, click the downward arrow next to the New button and select New Template, or select New > New Template from the context menu in the Views pane. |
| | Click the Properties button for select Properties from the context menu to edit the properties of an existing template. |
| | Select Save As from the context menu or select Resources > Save As to save an existing template with a different name. |
| Important Information | TQL queries should only be created by administrators with an advanced knowledge of the TQL system. |
| Included in Tasks | "Create a Parameterized Template" on page 193 |
| Wizard Map | The New Template/Template Properties/Save As Template wizard contains: |
| | Template General Attributes Page > Template Base TQL Page > Advanced Properties Page |

💐 Template General Attributes Page

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

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

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

🙎 Template Base TQL Page

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

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



Advanced Properties Page

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

| GUI Element (A-Z) | Description |
|------------------------------|--|
| Assign View to | Select the check boxes for the applications in which you want the template you are creating to be visible: |
| | ➤ IT Universe. The template is visible in IT Universe Manager. Selected by default. |
| | ➤ Dashboard. The template is visible in Dashboard and Dashboard Administration. Selected by default. |
| | ➤ Service Level Management. The template is visible in Service Level Management. |
| | ➤ Service Level Management Administration. The template is visible in Service Level Management Administration. |
| | ➤ SOA. The template is visible in Business Availability Center for SOA. Selected by default only for templates in the SOA folder. |
| Merge Identical Instances | When the check box is selected, identical instances that appear on the same layer in this template are automatically merged into one symbol in the editing pane. This helps you remove redundant information and sharpen the template's focus. For details, see "Merge Identical Instances" on page 192. |
| Persistent View | Defines whether you want the selected template to always remain in the system memory. You should use this option only for templates that are used frequently. |
| 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 template. |

New View/View Properties/Save As View Wizard

| Description | Enables you to define a new view or edit the properties of an existing view. |
|--------------------------|--|
| | To access: In View Manager, click the New button select New > New View from the context menu in the Views pane to create a new view. |
| | Click the Properties button for select Properties from the context menu to edit the properties of an existing view. |
| | Select Save As from the context menu or select Resources > Save As to save an existing view with a different name. |
| Important Information | TQL queries should only be created by administrators with an advanced knowledge of the TQL system. |
| Included in Tasks | "Create a Template Based View" on page 196, "Create a Pattern View" on page 198 |
| Wizard Map | The New View/View Properties/Save As View wizard contains: |
| | View General Attributes Page > (Available Templates Page) > (View Base TQL Page) > Advanced Properties Page > (Set Parameters Page) |

💘 View General Attributes Page

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

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

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

🔍 Available Templates Page

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

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



View Base TQL Page

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

| GUI Element (A-Z) | Description |
|----------------------------------|---|
| Base the view on a new TQL | Select to base your view on a new TQL. |
| Base the view on an existing TQL | Select to base your view on an existing TQL. |
| Base TQL Description | A description of the query. |
| Base TQL Name | If you are basing your view on an existing TQL, select the TQL query from the drop–down list. Only queries of type view appear in the list. If the query you want does not appear in the list, go to Query Manager and save it as a type view query. For details, see "Query Manager User Interface" on page 339. If you are basing your view on a new TQL, the query is |
| | defined by default with the same name as the view. |

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

Advanced Properties Page

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

Chapter 5 • View Manager

| 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 522. |
| Assign View to | Select the check boxes for the applications in which you want the view you are creating to be visible: |
| | IT Universe. The view is visible in IT Universe Manager. Selected by default. Dashboard. The view is visible in Dashboard and Dashboard Administration. Selected by default. Service Level Management. The view is visible in Service Level Management. Service Level Management Administration. The view is visible in Service Level Management Administration. SOA. The view is visible in Business Availability Center for SOA. Selected by default only for views in the SOA folder. |
| Merge Identical Instances | 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 192. |
| 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. |
| 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. |



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

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

Node/Relationship Grouping Dialog Box

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

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| Group By | Select the criteria by which to group the CIs. The following options are available: |
| | Configuration Item Type. Groups CIs in the Topology Map by their CI type. TQL Node. Groups all CIs of the same CI type that fulfill the node grouping criteria. By default, these CIs appear in the Topology Map under a folder containing the name of the selected TQL node and an automatically added identification number. |
| | ➤ Attribute. Groups CIs of multiple CI types in the Topology Map, according to the attribute selected from the list. A CI can be a member of multiple groups. |
| Group label | Enter the label of the group. |
| | Note: This field is optional. |
| Minimum in group | Enter the minimum number of matching CIs required to create the group. By default there must be at least one CI in the group. |
| | Note: This field is optional. |

Advanced Attribute Properties

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

| GUI Element (A-Z) | Description |
|-------------------|--|
| Group List | Define the specific groups of the selected attribute to be created. For example, to display two groups of IP addresses that end between 0 and 100, enter 0-50, 51-100. Any IPs that fall outside this group are placed automatically into the Others group. |
| Mask to group by | Enter a regular expression, as follows: |
| | In the first field, enter the regular expression pattern. This is the structure of the selected attribute. In the second field, enter the group number. This is the part of the regular expression pattern on which to focus when creating the group. For details, see "Grouping By Attribute Properties" on page 191. |

Relationship Folding Rules Dialog Box

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

| Included in Tasks | "Create a Pattern View" on page 198 |
|-------------------|--|
| Useful Links | "Add/Edit Relationship Folding Rule Dialog Box" on page 200 |

| GUI Element (A-Z) | Description |
|-------------------|---|
| ÷ | Opens the Add Rule dialog box where you can add a rule. For details, see "Add/Edit Relationship Folding Rule Dialog Box" on page 200. |
| 0 | Opens the Edit Rule dialog box where you can edit the selected rule. "Add/Edit Relationship Folding Rule Dialog Box" on page 200. |
| × | Deletes the selected rule. |
| n | Moves selected row up. |
| U | Moves selected row down. |
| Relationship | The type of relationship. |
| Rule | The relevant folding rule. |
| Source | The source node of the relationship. |
| Target | The target node of the relationship. |

Set View Parameters/Set View Element Parameters Dialog Box

| Description | Enables you to edit the predefined parameters of conditions of nodes in a view. 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. Note: This menu option is only available if a parameterized value has been set for an attribute of a node in the view. |
|--------------------------|--|
| Important Information | 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. |
| Included in Tasks | "Create a Template Based View" on page 196 |

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

💐 View Manager Window

| Description | Enables you to create, edit, and save a view. |
|-------------|---|
| | The View Manager window contains the following panes: |
| | ➤ 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. |
| | To access: Select Admin > Universal CMDB > Modeling > View Manager. |

Views Pane

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

| GUI Element (A-Z) | Description |
|-------------------|--|
| — | Create a new folder. |
| * | Click to define a new view. For details, see "New View/View Properties/Save As View Wizard" on page 210. |
| | Click the downward arrow to select the New Template wizard or the New Perspective wizard. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| 7 | Click Filter Tree to filter the types of views and templates that appear in the tree. |
| × | Delete the selected folder or view. |
| 8 | Click to refresh the data content of the hierarchical tree structure that may have been modified by other users. |
| H | Save the view to the CMDB. |
| | Opens the View Properties, Template Properties, or Perspective Properties wizard for the selected view, template, or perspective. |
| Q | Generate a preview of the existing views in the CMDB that match the pattern of the current view. |
| • | Click Show View Results in IT Universe to go directly to IT Universe Manager for the current view. |
| | Note: This feature is not relevant for templates or perspectives. |
| 略 | Click Expand All to expand all folders in the tree. |
| P65 | Click Collapse All to collapse all folders in the tree. |
| | Denotes a view folder. Double-click the icon to expand the folder. |
| in. | Denotes a pattern view. |
| ī,ē | Denotes a perspective based view. When you select a perspective based view in the view tree, a dialog box opens with the following options: |
| | Open in Modeling Studio. Opens the view in the Modeling Studio, where it can be edited. Delete. Deletes the view from the CMDB. Disconnect view from perspective. Disconnects the view from the perspective, turning it into a regular |
| | pattern view, which can be edited in View Manager. |

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

Context Menu Options

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

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

| Menu Item | Description |
|-------------------------------|---|
| New View | The following options are available: |
| | New View wizard, which enables you to define a new view. For details, see "New View/View Properties/Save As View Wizard" on page 210. New Template wizard, which enables you to define a |
| | new template. For details, see "New Template/Template Properties/Save As Template Wizard" on page 206. |
| | ➤ New Perspective wizard, which enables you to define a new perspective. For details, see "New Perspective/Perspective Properties/Save As Perspective Wizard" on page 202. |
| 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 | Opens the View Properties, Template Properties, or Perspective Properties wizard for the selected view, template, or perspective. |
| Relationship Folding Rules | Displays the Relationship Folding Rules dialog box which enables you to define multiple relationship rules. For details, see "Relationship Folding Rules Dialog Box" on page 218. |
| Rename Folder | Enables you to rename the view folder. |
| Save As | Opens the Save As View wizard which enables you to save the view to the CMDB after you have modified it. For details, see "New View/View Properties/Save As View Wizard" on page 210. |
| | Note : If you exit View Manager without saving, a confirmation dialog box is displayed, requesting that you save your view. |

| Menu Item | Description |
|----------------------------------|---|
| Set View Parameters | Appears if at least one node in the view has a parameterized node condition. Displays the Set View Parameters dialog box where you can edit the parameter of each condition. For details, see "Set View Parameters/Set View Element Parameters Dialog Box" on page 220. |
| Show View Results in IT Universe | Takes you to IT Universe Manager and opens the selected view. Note: This option does not appear for templates or perspectives. |

Editing Pane

| Description | Displays the selected view, which consists of nodes and the relationships between them. |
|--------------------------|--|
| | ➤ When you select a folder in the Views pane, the editing pane is empty. |
| | ➤ When you select a view in the Views pane, the editing pane displays the selected view. The name of the view appears at the top of the pane. |
| Important Information | After defining a view in the editing pane, you save it by clicking the Save button in the Views pane or by selecting Save from the context menu in the Views pane. |
| Useful Links | For information on defining a TQL query, see "Add Nodes and Relationships to a TQL Query" on page 384. |

| GUI Element (A-Z) | Description |
|--|--|
| <context menu="" options=""></context> | For details, see "Context Menu Options" on page 393. |
| <main menu=""></main> | For details, see "Main Menu" on page 745. |

| GUI Element (A-Z) | Description |
|-------------------------------|---|
| <node></node> | A component from which TQL queries are built. |
| <relationship></relationship> | The entity that defines the relationship between two nodes. |
| <toolbar></toolbar> | For details, see "Toolbar Options" on page 749. |
| <tooltip></tooltip> | Hold the cursor over a node or relationship to view its tooltip. |
| | The tooltips contain the following information: |
| | ➤ Element name. The name of the node. |
| | ➤ CI Type. The CIT of the CI as defined in the CI Type Manager. For details, see "CI Type Manager User Interface" on page 272. |
| | ➤ 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 | Displays a hierarchical tree structure of the CI Types found in the CMDB. For more details, see "CI Type Manager User Interface" on page 272. |
|--------------------------|--|
| | Note : The number of instances of each CIT in the CMDB is displayed to the right of each CIT. |
| | 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> . |
| Important Information | The CI Type Selector is part of the following managers: View Manager, Enrichment Manager, Query Manager, Correlation Manager, Topology Report Manager, and Trigger TQL Editor. |
| Included in Tasks | ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Define a TQL Query" on page 382 ➤ "Create a Pattern View" on page 198 ➤ "Define a Report Rule – Scenario" on page 300 |

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

| GUI Element (A-Z) | Description |
|-----------------------------|---|
| ₩. | Click Collapse All to collapse the subtrees within the CI type tree. |
| <search window=""></search> | 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 | The Information pane appears in the lower part of the window in the following managers and user interfaces: View Manager, Correlation Manager, Query Manager, Topology Report Manager, Enrichment Manager, Discovery Input TQL Editor, and Discovery Trigger TQL Editor. A small green indicator ** appears next to the tabs in which a change occurred. |
|--------------------------|---|
| Included in Tasks | "Define a Correlation Rule – Workflow" on page 235 "Define an Enrichment Rule – Scenario" on page 354 "Define a TQL Query" on page 382 "Create a Pattern View" on page 198 "Define a Report Rule – Scenario" on page 300 |

Chapter 5 • View Manager

| GUI Element (A-Z) | Description |
|-------------------|--|
| 4 Þ | If the window is not wide enough to display all the tabs, use the left and right arrows to move to the required tab. |
| ▼ | Click Show List to display a list of the available tabs for the current manager. You can select a tab from the list. |
| Affected Nodes | Displays which node is affected by the changes that occur in the selected trigger node. If required, you can click Edit to open and modify the Affected Nodes dialog box. For details, see "Affected Nodes Dialog Box" on page 242. |
| | 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 438. |
| 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 440. |
| Details | Displays the following information: 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 | 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 372. |
| | Note: This tab appears only in Enrichment Manager. |
| Folding Rule | Displays the folding rule defined for the selected relationship. For details about folding rules, see "Adding Folding Rules to Relationships" on page 68. |
| | Note: This tab appears only when a relationship is selected in View Manager. |
| Grouping | Displays the different CI groupings for the selected node, as defined in the Grouping dialog box. |
| | Note: This tab appears only in View Manager. |
| Node Definition | 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 330. |
| | Note: This tab appears only in Topology Report Manager. |
| Qualifiers | Displays the qualifier conditions defined for the node or the relationship. For details, see "Qualifier Tab" on page 443. |
| Rule | Displays the report folding rule defined for the selected relationship. For details about folding rules, see "Editing Pane" on page 324. |
| | Note: This tab appears only when a relationship is selected in Topology Report Manager. |
| Selected Identities | Displays the element instances that are used to define what should be included in the TQL results. For details, see "Identity Tab" on page 445. |

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()

Correlation Manager

This chapter provides information on Correlation Manager.

This chapter includes:

Concepts

➤ Correlation Manager Overview on page 233

Tasks

➤ Define a Correlation Rule – Workflow on page 235

Reference

➤ Correlation Manager User Interface on page 241

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 377.

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

You then run the Correlation rules in the Topology View tab (go to **Applications** > **Universal CMDB** > **Topology View**) to simulate how the changes impact your system and discover the root causes of the changes (for details, see "Run Correlation Dialog Box" on page 552). 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 551.

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 187.

P Define a Correlation Rule – Workflow

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

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

This task includes the following steps:

- ➤ "Create an Enumeration Definition" on page 236
- ➤ "Define a State Optional" on page 238
- ➤ "Create a Correlation TQL Query" on page 239
- ➤ "Define a Correlation Rule" on page 239

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 533.

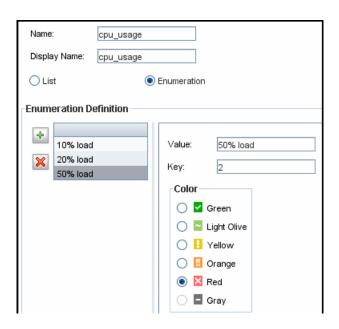
A state is based on an Enumeration definition. Enumerations are designed to be used as severity value lists by states. You can either base a state on an existing Enumeration definition in the State Manager or, if required, create one by clicking the **New Enumeration** button. For details on creating Enumeration definitions, see "Create/Update List/Enumeration Definition Dialog Box" on page 295.

Note: Alternatively, you can create an Enumeration definition in the System Type Manager. For details, see "System Type Manager" on page 264. The Enumeration definition you create appears in the State Manager.

Example of an Enumeration Definition

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

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



2 Define a State — Optional

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

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

To define a new state, select **Admin > Universal CMDB > Settings > State Manager** to open the State Manager. For details on defining a new state, see "State Manager Dialog Box" on page 535.

Example of a New State

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

| Name | Description | Type Definition |
|-----------|-----------------|------------------------------|
| change | Change State | Change States |
| operation | Operation State | Operation States |
| cpu_usage | CPU usage | cpu_usage |
| | | Change States |
| | | Operation States |
| | | Test States |
| | | Status Accounting |
| | | concrete_synch_config_status |
| | | synch_config_unit_status |
| | | synch_unit_state |
| | | cpu_usage |
| | | |

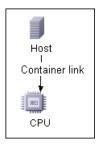
3 Create a Correlation TQL Query

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

Select Admin > Universal CMDB > Modeling > Correlation Manager to open the Correlation Manager. For details about how to create a Correlation TQL query, see "New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard" on page 255. For details about how to add nodes and relationships to a query, see "Add Nodes and Relationships to a TQL Query" on page 384.

Example of a Correlation TQL Query

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



Note: A Correlation TQL query is subject to certain validation restrictions. For details, see "Troubleshooting and Limitations" on page 462.

4 Define a Correlation Rule

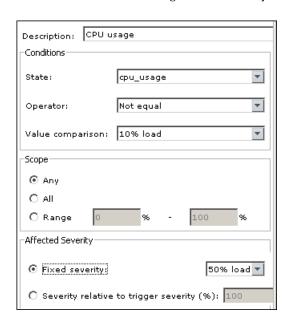
When you define a Correlation rule, you must specify the required causal relationship between the nodes. Define one node as the trigger, or the node that represents the changes you want to make to the system, and another node as the one that is affected.

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 243.

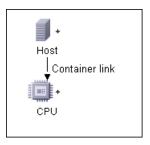
Example of a Correlation Rule

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

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



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 540.

💘 Correlation Manager User Interface

This section describes:

- ➤ Affected Nodes Dialog Box on page 242
- ➤ Correlation Definition Dialog Box on page 243
- ➤ Correlation Manager Window on page 245
- ➤ Details Dialog Box on page 254
- ➤ New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard on page 255

Affected Nodes Dialog Box

| Description | Define which node in the TQL query is the trigger Correlation node and which nodes are affected by the changes that occurred in the system. |
|--------------------------|---|
| | To access: Right-click the node or relationship that functions as a trigger and select Define Affected . The Affected Nodes dialog box opens to display the nodes in the TQL. |
| Included in Tasks | "Define a Correlation Rule – Workflow" on page 235. |
| Important Information | Before creating the TQL, you must know which node in the TQL query is the trigger Correlation node and which are affected by the changes beforehand. The definition is performed here. |

| 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. |

Q Correlation Definition Dialog Box

| Description | ➤ In the Conditions area, set conditions for defining affected nodes. When this condition is met, the simulated change in the system is triggered. For example, you can define a Correlation condition that states that the operational state of the node is other than Normal. When the operational state of the node instance changes and is no longer Normal, the condition is met and the simulated changes in the system are triggered. |
|-------------------|---|
| | ➤ In the Scope area, define how many instances of the trigger node should fulfill the conditions for triggering the changes in the system. |
| | You can apply the trigger conditions not only to one of the instances of a trigger node, but also to a certain percentage of the trigger instances, or to all of them. |
| | For example, you can define that impact is calculated when at least 10% of the system's hosts are down. |
| | ➤ In the Affected Severity area, define the severity of the Correlation impact. |
| | To access: Click Add in the Details dialog box. |
| Included in Tasks | "Define a Correlation Rule – Workflow" on page 235 |

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

| GUI Element (A-Z) | Description |
|--|---|
| 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. |
| 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. |
| 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. |
| 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 533. |
| 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 400. |
| Value Comparison | Select the required attribute. |

Q Correlation Manager Window

| Description | Define Correlation rules. To access: Select Admin > Universal CMDB > Modeling > | |
|--------------------------|---|--|
| | Correlation Manager. | |
| Important Information | When selecting nodes to function as Correlation triggers, they must comply with certain restrictions. For details, see "Troubleshooting and Limitations" on page 462. | |
| Included in Tasks | "Define a Correlation Rule – Workflow" on page 235 | |
| Useful Links | "Correlation Manager Overview" on page 233 | |

Correlation Rules Pane

| Description | Displays a hierarchical tree structure of predefined folders and Correlation rules. Each Correlation rule is associated with a TQL query. |
|-------------|---|
| | You can create your own query, or work with the default queries provided with your HP Business Availability Center installation. |
| | The predefined folders are provided for the default queries; you can modify these folders, or add additional folders according to your organization's requirements. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| | Create a new folder. |
| * | Creates a Correlation rule. Opens the New Correlation Rule Wizard. |
| * | (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. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| × | Deletes the selected folder or Correlation rule. |
| 8 | Refreshes the data content of the hierarchical tree structure that may have been modified by other users. |
| | Opens the Correlation Rule Wizard. Enables you to change the description of the rule. |
| Q | Generates a preview of the results of the selected Correlation rule. |
| | Represents a folder. |
| C Log | Represents a Correlation rule. |

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

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

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

Editing Pane

| Description | Displays the selected Correlation rule, which consists of nodes that are defined in the TQL query and the relationships between them. |
|--------------------------|--|
| | ➤ 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 384 |
| Important Information | When selecting nodes to function as Correlation triggers, they must comply with certain restrictions. For details, see "Troubleshooting and Limitations" on page 462. |

| 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. |
| Ī | Indicates nodes that are both affected and trigger nodes. |

| GUI Element (A-Z) | Description |
|--|---|
| <main menu=""></main> | For details, see "Main Menu" on page 745. |
| <node></node> | A component from which TQL queries are built. |
| <relationship></relationship> | The entity that defines the relationship between two nodes. |
| <context menu="" options=""></context> | For details, see "Context Menu Options" on page 393. |
| <toolbar></toolbar> | For details, see "Toolbar Options" on page 749. |
| <tooltip></tooltip> | Hold the cursor over a node or relationship to view its tooltip. |
| | The tooltips contain the following information: |
| | ➤ Element name. The name of the node. |
| | ➤ CI Type. The CIT of the node as defined in the CI Type Manager. For details, see "CI Type Manager" on page 261. |
| | ➤ Definitions of the selected nodes and relationships. The attribute conditions, as described in "Node/Relationship Properties Dialog Box" on page 436. |
| | ➤ 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 | Displays a hierarchical tree structure of the CI Types found in the CMDB. For more details, see "CI Type Manager User Interface" on page 272. |
|--------------------------|--|
| | Note : The number of instances of each CIT in the CMDB is displayed to the right of each CIT. |
| | 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> . |
| Important Information | The CI Type Selector is part of the following managers: View Manager, Enrichment Manager, Query Manager, Correlation Manager, Topology Report Manager, and Trigger TQL Editor. |
| Included in Tasks | ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Define a TQL Query" on page 382 ➤ "Create a Pattern View" on page 198 ➤ "Define a Report Rule – Scenario" on page 300 |

| GUI Element (A-Z) | Description |
|-------------------|---|
| (| Click Add CI Type to Map to move the selected CI type to the Editing pane. |
| 9 | Click Refresh to refresh the CI type tree. |
| Q | Click Search to search for the CI type entered. |
| 验 | Click Expand All to expand all subtrees within the CI type tree. |

| GUI Element (A-Z) | Description |
|-----------------------------|---|
| ₩ | Click Collapse All to collapse the subtrees within the CI type tree. |
| <search window=""></search> | 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 | The Information pane appears in the lower part of the window in the following managers and user interfaces: View Manager, Correlation Manager, Query Manager, Topology Report Manager, Enrichment Manager, Discovery Input TQL Editor, and Discovery Trigger TQL Editor. A small green indicator ** appears next to the tabs in which a change occurred. |
|--------------------------|---|
| Included in Tasks | ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Define a TQL Query" on page 382 ➤ "Create a Pattern View" on page 198 ➤ "Define a Report Rule – Scenario" on page 300 |

| GUI Element (A-Z) | Description |
|-------------------|--|
| 4 Þ | If the window is not wide enough to display all the tabs, use the left and right arrows to move to the required tab. |
| ▼ | Click Show List to display a list of the available tabs for the current manager. You can select a tab from the list. |
| Affected Nodes | Displays which node is affected by the changes that occur in the selected trigger node. If required, you can click Edit to open and modify the Affected Nodes dialog box. For details, see "Affected Nodes Dialog Box" on page 242. |
| | 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 438. |
| 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 440. |
| Details | Displays the following information: 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 | 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 372. | |
| | Note: This tab appears only in Enrichment Manager. | |
| Folding Rule | Displays the folding rule defined for the selected relationship. For details about folding rules, see "Adding Folding Rules to Relationships" on page 68. | |
| | Note: This tab appears only when a relationship is selected in View Manager. | |
| Grouping | Displays the different CI groupings for the selected node, as defined in the Grouping dialog box. | |
| | Note: This tab appears only in View Manager. | |
| Node Definition | 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 330. | |
| | Note: This tab appears only in Topology Report Manager. | |
| Qualifiers | Displays the qualifier conditions defined for the node or the relationship. For details, see "Qualifier Tab" on page 443. | |
| Rule | Displays the report folding rule defined for the selected relationship. For details about folding rules, see "Editing Pane" on page 324. | |
| | Note: This tab appears only when a relationship is selected in Topology Report Manager. | |
| Selected Identities | Displays the element instances that are used to define what should be included in the TQL results. For details, see "Identity Tab" on page 445. | |

Q Details Dialog Box

| Description | Displays the new Correlation rule you created in the Correlation Definition dialog box. To access: Click Next in the Affected Nodes dialog box. | |
|-------------------|--|--|
| Included in Tasks | "Define a Correlation Rule – Workflow" on page 235 | |

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

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

| Creates or modifies a Correlation rule. | |
|---|--|
| To access: | |
| To create a Correlation rule, right-click anywhere in the Correlation Rules pane and click New or click the New button. To modify a Correlation rule, right-click a Correlation rule in the Correlation Rules pane and select Properties. To create a new Correlation rule based on an existing query, right-click a Correlation rule in the Correlation Rules pane and select Save As. | |
| 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 440). Minor changes, such as adding a node to the TQL, do not cause the deletion of the rule. The Correlation TQL that serves as the basis of the Correlation rule, is subject to certain validation restrictions. For details, see "Troubleshooting and Limitations" on page 462. If the TQL is not valid, it cannot be used for the creation of a Correlation rule. | |
| "Define a Correlation Rule – Workflow" on page 235 | |
| The New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard contains: Rule General Attributes Page > Rule Base TQL Page > Rule Groups Page | |
| | |

💘 Rule General Attributes Page

| Enables you to enter a unique name and description for the Correlation rule. | |
|---|--|
| "Define a Correlation Rule – Workflow" on page 235 | |
| ➤ The Correlation TQL that serves as the basis of the Correlation rule, is subject to certain validation restrictions. For details, see "Troubleshooting and Limitations" on page 462. If the TQL is not valid, it cannot be used for the creation of a Correlation rule. ➤ For important information on the effects of making changes to the TQL after creating it, see "New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard" on page 255. ➤ By default, this wizard is set to display a Welcome page. You can choose not to display the Welcome page by changing the user preferences. For details, see "User Preferences Dialog Box" on page 461. | |
| "Topology Query Language" on page 377 | |
| The New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard contains: Rule General Attributes Page > Rule Base TQL Page > Rule Groups Page | |
| | |

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



| Description | Enables you to define the properties of the TQL on which the Correlation rule is based. | |
|--------------------------|---|--|
| Included in Tasks | "Define a Correlation Rule – Workflow" on page 235 | |
| Important Information | ➤ The Correlation TQL that serves as the basis of the Correlation rule, is subject to certain validation restrictions. For details, see "Troubleshooting and Limitations" on page 462. If the TQL is not valid, it cannot be used for the creation of a Correlation rule. ➤ For important information on the effects of making changes to the TQL after creating it, see "New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard" on page 255. | |
| Useful Links | "Topology Query Language" on page 377 | |
| Wizard Map | The New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard contains: Rule General Attributes Page > Rule Base TQL Page > Rule Groups Page | |

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

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

Rule Groups Page

| Description | Enables you to define where you can run Correlation rules. | |
|--------------------------|--|--|
| Included in Tasks | "Define a Correlation Rule – Workflow" on page 235 | |
| Important Information | ➤ The Correlation TQL that serves as the basis of the Correlation rule, is subject to certain validation restrictions. For details, see "Troubleshooting and Limitations" on page 462. If the TQL is not valid, it cannot be used for the creation of a Correlation rule. ➤ For important information on the effects of making changes to the TQL after creating it, see "New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard" on page 255. ➤ By default, this wizard is set to display a Completion page after clicking Next in this page. You can choose not to display the Completion page by changing the user preferences. For details, see "User Preferences Dialog Box" on page 461. | |
| Useful Links | "Topology Query Language" on page 377 | |
| Wizard Map | The New Correlation Rule/Correlation Rule Properties/Save As Correlation Rule Wizard contains: Rule General Attributes Page > Rule Base TQL Page > Rule Groups Page | |

| GUI Element (A-Z) | Description | |
|-------------------|--|--|
| Others | Currently not supported. | |
| PI | Enables you to run correlation rules, which are used by the on-demand monitors in Problem Isolation. For details, see "On-demand Monitors" in <i>Using Problem Isolation</i> . | |
| UCMDB | Enables you to run a Correlation rule in the Topology View Application tab. For details, see "Topology View Overview" on page 540. | |

Chapter 6 • Correlation Manager

CI Type Manager

This chapter provides information on CI Type Manager.

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

This chapter includes:

Concepts

- ➤ CI Types Overview on page 262
- ➤ CI Type Attributes on page 263
- ➤ CI Type Relationships on page 264
- ➤ System Type Manager on page 264

Tasks

- ➤ Create a CI Type on page 265
- ➤ Create a Relationship Type on page 266
- ➤ Create a Calculated Relationship Type on page 268
- ➤ Create List and Enumeration Definitions on page 269
- ➤ Enumeration Definition Scenario on page 269

Reference

- ➤ View Descriptions for CI Types and Relationships on page 272
- ➤ CI Type Manager User Interface on page 272

CI Types Overview

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

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

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

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

You can also define new CITs to match your business needs. For details on defining new CITs, see "Create Configuration Item Type/Relationship/Calculated Relationship Wizard" on page 281.

& CI Type Attributes

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

When you define a new CI type, you first select a Base Configuration Item Type from a list of existing CITs. Your new CIT inherits the attributes of the existing CIT. You can then set the attributes for the new CIT. You edit the attributes of an existing CIT by selecting a CIT from the tree in the CI Types pane and selecting the Attributes tab of the topology map. For details on CIT attributes, see "Attributes Page" on page 283.

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

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

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

& CI Type Relationships

A relationship defines the link between two CIs. Relationships represent the dependencies and connections between the entities in your IT environment. When you select relationships or calculated relationships in the drop-down box in the CI Types pane, the topology map displays all the valid instances of CITs linked by the selected relationship. For details about calculated relationships, see "Impact Modeling" on page 467.

The same attributes defined for CITs are also defined for relationships. You can also assign key attributes for relationships but it is not required. For details on defining new relationship types, see "Create Configuration Item Type/Relationship/Calculated Relationship Wizard" on page 281.

\lambda System Type Manager

System Type Manager enables you to create a predefined list whose values define an attribute type. For more details on System Type Manager, see "System Type Manager Dialog Box" on page 297.

You can create the following attribute types:

- ➤ List. Enables you to create a predefined list of values, for example, Location.
- ➤ Enumeration. Enables you to create a predefined list of values, as well as assign each value a color. Enumerations are designed to be used as severity value lists by states. For details, see "State Manager" on page 533.

Severity lists are used for:

- ➤ Retrieving Correlation results in Topology View Application. For details, see "Topology View Application" on page 539.
- ➤ Creating a Correlation rule. For details, see "Correlation Manager" on page 233.

You can use both List and Enumeration values for:

➤ Editing the attributes of a CIT. For details, see "Create a CI Type" on page 265.

➤ Defining an attribute condition for a TQL node or relationship. For details, see "Node/Relationship Properties Dialog Box" on page 436.

Create a Cl Type

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

This task includes the following steps:

- ➤ "Prerequisites" on page 265
- ➤ "Define the CI Type" on page 265
- ➤ "Set the CI Type Attributes" on page 265
- ➤ "Assign Qualifiers to the CI Type" on page 266
- ➤ "Assign an Icon to the CI Type" on page 266
- ➤ "Customize the CI Type Menu" on page 266
- ➤ "Define the CI Type Default Label" on page 266

1 Prerequisites



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

2 Define the CI Type

Enter the name, description and base configuration item type for the new CI type. For details, see "Details Page" on page 282.

3 Set the CI Type Attributes

Edit the attributes of the new CI type and define key attributes for it. For details, see "Attributes Page" on page 283.

Note: List and Enumeration definitions are created in the System Type Manager. If required, you can create additional List and Enumeration definitions. For details, see "Create List and Enumeration Definitions" on page 269.

4 Assign Qualifiers to the CI Type

Assign qualifiers to the definition of the new CI type. For details, see "Qualifiers Page" on page 285.

5 Assign an Icon to the CI Type

Select an icon to assign to the new CI type. For details, see "Icon Page" on page 288.

6 Customize the CI Type Menu

Select the menu items and commands to appear in the shortcut menu for the new CI type. For details, see "Attached Menu Page" on page 290.

7 Define the CI Type Default Label

Define the attributes to appear in the CI type label. For details, see "Default Label Page" on page 293.

🦒 Create a Relationship Type

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

This task includes the following steps:

- ➤ "Prerequisites" on page 267
- ➤ "Define the Relationship" on page 267
- ➤ "Set the CI Type Attributes" on page 267

- ➤ "Assign Qualifiers to the Relationship" on page 267
- ➤ "Customize the Relationship Menu" on page 267
- ➤ "Define the Relationship Default Label" on page 268

1 Prerequisites



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

2 Define the Relationship

Enter the name, description and base CI type for the new relationship. For details, see "Details Page" on page 282.

3 Set the CI Type Attributes

Edit the attributes of the new relationship and define key attributes for it. For details, see "Attributes Page" on page 283.

Note: List and Enumeration definitions are created in the System Type Manager. If required, you can create additional List and Enumeration definitions. For details, see "Create List and Enumeration Definitions" on page 269.

4 Assign Qualifiers to the Relationship

Assign qualifiers to the definition of the new relationship. For details, see "Qualifiers Page" on page 285.

5 Customize the Relationship Menu

Select the menu items and commands to appear in the shortcut menu for the new relationship. For details, see "Attached Menu Page" on page 290.

6 Define the Relationship Default Label

Define the attributes to appear in the relationship label. For details, see "Default Label Page" on page 293.

🦒 Create a Calculated Relationship Type

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

This task includes the following steps:

- ➤ "Prerequisites" on page 268
- ➤ "Define the Calculated Relationship" on page 268
- ➤ "Assign Qualifiers to the Relationship" on page 268
- ➤ "Add Required Triplets" on page 268

1 Prerequisites



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

2 Define the Calculated Relationship

Enter the name, description and base CI type for the new calculated relationship. For details, see "Details Page" on page 282.

3 Assign Qualifiers to the Relationship

Assign qualifiers to the definition of the new relationship. For details, see "Qualifiers Page" on page 285.

4 Add Required Triplets

Add the required triplets. For details, see see "Triplets Page" on page 287.

Create List and Enumeration Definitions

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

This task includes the following steps:

- ➤ "Create a List Definition" on page 269
- ➤ "Create an Enumeration Definition" on page 269

1 Create a List Definition

You can create a **List** definition of predefined values. For example, a List definition called **Location** might contain:

- ➤ New York
- ➤ Boston
- ➤ Baltimore

For details, see "Create/Update List/Enumeration Definition Dialog Box" on page 295.

2 Create an Enumeration Definition

You can create an **Enumeration** definition, which enables you to assign a color for each value on the list. For details, see "Create/Update List/Enumeration Definition Dialog Box" on page 295. For an example of an Enumeration definition, see "Enumeration Definition – Scenario" on page 269.

🏲 Enumeration Definition – Scenario

The following steps describe how to create an Enumeration definition.

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

To create an Enumeration definition:

1 Select Admin > Universal CMDB > Modeling > CI Type Manager.



- **2** In the left pane, click the **System Type Manager** button to open the System Type Manager dialog box.
- **3** Click the **Add** button to open the Create List/Enumeration Definition dialog box.

Note: Alternatively, you can select **Admin > Universal CMDB > Settings > State Manager** and then click the **New Enumeration** button to open the Create List/Enumeration Definition dialog box.

- **4** Select Enumeration.
- **5** In the **Name** box, enter the required name.
- **6** (Optional) In the **Display Name** box, enter the required display name.

This example describes how to create the following severity list:

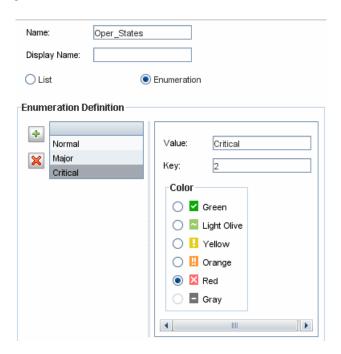
| Key | Value | Severity Represented |
|-----|--------|----------------------|
| 0 | Green | Normal |
| 1 | Orange | Major |
| 2 | Red | Critical |



- **7** Click the **Add** button to create a new row.
- **8** In the **Value** box, enter **Normal**.
- **9** In the **Key** box, enter 0.
- **10** In the **Color** section, select **Green**.
- +
- **11** Click the **Add** button to create another row.
 - **12** In the Value box, enter Major.
 - **13** In the **Key** box, enter 1.
 - **14** In the **Color** section, select **Orange**.

- +
- **15** Click the **Add** button to create another row.
- **16** In the **Value** box, enter Critical.
- **17** In the **Key** box, enter 2.
- **18** In the Color section, select Red.

The following image shows the Enumeration Definition section after the changes:



19 Click **OK** to save your changes.

🔍 View Descriptions for CI Types and Relationships

You can view a complete list of available CI types in tree format in the left pane of CI Type Manager. You can search incrementally for a specific CI type as described in "CI Type Manager" on page 276. To see a description for a particular CI type, select it from the tree and hold the pointer over the icon which corresponds to it in the Topology Map. A tooltip containing a description of the CI type is displayed.

For relationships, select **Relationships** in the left pane and search incrementally by the first letter of the relationship. Select the relationship you want and hold the pointer over its icon in the Topology Map to display a tooltip containing a description of the relationship.

You can also view a list of relationships in "Relationship Definitions" in *Reference Information*.

🍳 CI Type Manager User Interface

This section describes:

- ➤ Add/Edit Attribute Dialog Box on page 273
- ➤ Add/Remove Relationship Dialog Box on page 276
- ➤ CI Type Manager on page 276
- ➤ Create Configuration Item Type/Relationship/Calculated Relationship Wizard on page 281
- ➤ Create/Update List/Enumeration Definition Dialog Box on page 295
- ➤ System Type Manager Dialog Box on page 297

Name Add/Edit Attribute Dialog Box

| Description | Enables you to define a new attribute to add to a CIT or to edit an existing attribute of a CIT. |
|--------------------------|---|
| | To access: In the CIT Manager, select the Attributes tab, then click the Add button, or select an attribute and click the Edit button or double-click the attribute. |
| Important Information | In Edit mode, fields that cannot be changed are disabled. |

Chapter 7 • Cl Type Manager

| GUI Element (A-Z) | Description |
|-------------------|--|
| Advanced | You can set the following optional parameters: |
| | ➤ Index. Select to accelerate the attribute retrieval performance. This option is recommended for attributes that are used frequently in search conditions. For example, IP address is usually an index attribute of a host. |
| | ➤ Lower Case. When this option is selected, the attribute value remains in lower case. |
| | ➤ Required. Select to define this attribute as a required one, if its value is required for the creation of the CIT. |
| | ➤ Visible. Select to display this attribute in the Properties tab in IT Universe Manager. |
| | ➤ Editable. Select to enable future editing of the attribute. Only attributes that are marked as Editable (or ones that have values) are displayed in the Properties tab in IT Universe Manager. |
| | ➤ Password. When this option is selected, the attribute value appears as asterisks (a hidden value). |
| | ➤ Change Monitored. Select to define attributes whose values are being marked as Change Monitored in CI Type Manager. For every change in an attribute defined as Change Monitored, you are notified by a Change event in the Topology View. |
| | ➤ Comparable. Select to enable this attribute to be used for comparing compound CIs. |
| | ➤ Asset Data. Select to display the attribute value in the Asset Report. |
| Attribute Name | Enter a unique name for the new attribute. The name can contain all characters except the following: " \ / [] : $ < > + = $; , ? * |
| | Note: The attribute name is not case sensitive. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Attribute Type | Select one of the following options: |
| | ➤ Primitive. Choose from one of the following field types: boolean, bytes, date, double, float, integer, integer_list, long, string, string_list, xml. |
| | ➤ Enumeration/List. Contains a list of Enumerations and Lists defined in the System Type Manager. For details, see "System Type Manager" on page 264. |
| | This option enables you to define an attribute with a predefined value. For example, a location attribute might be defined by a location list containing the following values: Singapore, Paris, New York. |
| Default Value | Enter or select a default value for the attribute. The options for the Default Value field vary depending on the attribute type you selected. |
| | Note: If you select the integer_list or string_list Primitive attribute type, you can enter multiple values. |
| Description | Enter a description for the new attribute. |
| | Note: This field is optional. |
| Display Name | Enter a name for the new attribute to identify it in HP Business Availability Center. |
| | Note: This field is optional. |
| Value Size | Enter a value for the maximum physical size of the new attribute. (Enabled for bytes and string only). |

Add/Remove Relationship Dialog Box

| Description | Enables you to add or remove default or new relationships between CITs, which define their physical or logical connections. |
|--------------------------|---|
| | To access: In the CIT Manager, right-click a CIT or two CITs and select Add/Remove Relationship from the context menu. |
| Important Information | When adding a relationship between two CITs, select the two CITs to be linked by holding down CTRL and clicking the CIT names. Then right-click one of them to display the context menu and select Add/Remove Relationship. |

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

| GUI Element (A-Z) | Description |
|--------------------------------|---|
| <node1 node2="" to=""></node1> | Select the relationships to add in the direction of the first node to the second. |
| <node2 node1="" to=""></node2> | Select the relationships to add in the direction of the second node to the first. |
| Relationship Name | A list of the possible relationships. |

Q CI Type Manager

| Description | Enables you to view the information in the CI Type model, which contains the definitions of all configuration item types (CITs) defined in the system and the relationships that define the connections between them. Each CIT has its own attributes, as well as the attributes inherited from its parent CIT. |
|-------------|---|
| | To access: Select Admin > Universal CMDB > Modeling > CI Type Manager. |

| GUI Element (A-Z) | Description |
|--|---|
| * | Click the New button to open the Create Configuration Item Type Wizard which enables you to define a new CI type. For details, see "Create Configuration Item Type/Relationship/Calculated Relationship Wizard" on page 281. |
| × | Click Delete to delete the selected CI type or relationship. |
| | Click to refresh the data content of the hierarchical tree structure that may have been modified by other users. |
| | Click the Save button to save changes made to a CI type. |
| I _{XML} | Enables you to import CITs from an external file. |
| Em. | Enables you to export a CIT as an XML file. Use this option to move CITs from one server to another. |
| <main menu=""></main> | For details, see "Main Menu" on page 745. |
| <ci Type/Relationship Box></ci | Select CI Types to display the CI types in the CIT model. Select Relationships to display the relationships in the CIT model. |
| <toolbar></toolbar> | For details, see "Toolbar Options" on page 749. |

Chapter 7 • Cl Type Manager

| GUI Element (A-Z) | Description |
|-------------------|---|
| CI Types Pane | A hierarchical tree structure of the CI Type model containing the inheritance relationships among CITs, and displaying the number of instances of each CIT in the UCMDB. All CITs included in the CI Type model are classified as either a CIT or a relationship. You can drill down and view the relationships and neighbors of the selected CIT in the topology map. You can search in the list of CITs or relationships using the Incremental Search by entering the first letter of the CIT or relationship repeatedly until you reach the required selection. You can also search for a CIT or relationship by entering its full name. |
| | Note: Each CI type is represented by a unique icon. (If an icon has not been defined for the CIT, it takes the icon of its parent.) |

| GUI Element (A-Z) | Description |
|-------------------|--|
| Main Window | The following tabs are available: |
| | ➤ Dependencies. Displays the CI Type model in a topology map, including the CITs and the relationships between them. The name of the selected CI type or relationship appears in the border at the top of the pane. When you point to a CIT, a tooltip displays the display name of the CIT and its description. |
| | ➤ Details. Enables you to edit the basic information about the CI type selected in the left pane. For details, see "Details Page" on page 282. |
| | ➤ Attributes. Enables you to edit the attributes of the selected CIT. For details, see "Attributes Page" on page 283. |
| | ➤ Qualifiers. Enables you to assign qualifiers to the selected CIT. For details, see "Qualifiers Page" on page 285. |
| | ➤ Triplets . Enables you to create a calculated relationship. For details, see "Triplets Page" on page 287. This page appears only for calculated relationships. |
| | ➤ Icon. Enables you to assign an icon to the selected CIT. For details, see "Icon Page" on page 288. This tab does not appear for relationships. |
| | ➤ Attached Menu. Enables you to customize the shortcut menu of a CI by adding menu items and commands (for example, ping, run a program, open a URL). The customized menu is displayed when you right-click a CI instance in IT Universe Manager. For details, see "Attached Menu Page" on page 290. |
| | ➤ Default Label. Enables you to define attributes that appear in the CIT label. You can include more than one attribute by using the function buttons. For details, see "Default Label Page" on page 293. |

Context Menu

CI Type Manager includes the following context menu options available by right clicking a CI type in the CI Types pane or the Dependencies map:

| GUI Element (A-Z) | Description |
|----------------------------|---|
| Add/Remove Relationship | Opens the Add/Remove Relationship dialog box, which enables you to add or remove relationships from CITs. For details, see "Add/Remove Relationship Dialog Box" on page 276. |
| Delete | Deletes the selected CI type. This option is only available for CI types that have no children and no instances. |
| Export | Enables you to export a CIT as an XML file. Use this option to move CITs from one server to another. |
| New | Opens the Create Configuration Item Type Wizard which enables you to define a new CI type. For details, see "Create Configuration Item Type/Relationship/Calculated Relationship Wizard" on page 281. |
| Show CIT Instances | Opens the Show All Instances window, which displays all instances of the selected CIT. For details, see "Element Instances Dialog Box" on page 429. |

Create Configuration Item Type/Relationship/Calculated Relationship Wizard

| Description | Enables you to define a new configuration item type or relationship. |
|-------------|---|
| | To access: |
| | Click a CI type or relationship in the topology map or CI Types pane of the CIT Manager and select New from the context menu. Click the New button in the CI types pane. |
| Wizard Map | The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains: |
| | Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page |

The Create Configuration Item Type wizard includes the following pages:

- ➤ "Details Page" on page 282
- ➤ "Attributes Page" on page 283
- ➤ "Qualifiers Page" on page 285
- ➤ "Triplets Page" on page 287
- ➤ "Icon Page" on page 288
- ➤ "Attached Menu Page" on page 290
- ➤ "Default Label Page" on page 293

Q Details Page

| Description | Enables you to enter basic information about the new CI type you are defining. |
|--------------------------|--|
| Important Information | For general information about the Create Configuration Item Type Wizard, see "Create Configuration Item Type/Relationship/Calculated Relationship Wizard" on page 281. |
| Wizard Map | The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains: Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Base CI Type | Select a base CIT for the CIT you are creating. The new CIT inherits the base CIT's attributes. |
| | Note: This field only appears in the Create CI Type Wizard. It is not relevant when editing an existing CIT in the Details tab of CI Type Manager. |
| Description | A description for the new CIT. |
| | Note: This field is optional. |
| Display Name | The name of the CIT as it appears in the HP Business Availability Center interface. |
| Name | The unique name of the new CIT. The name can contain all characters except the following: $ \ / [] : <> + = ;$, ? * |
| | Note: The name field is case sensitive, but you cannot use the same name with different cases for two different CITs. |

Attributes Page

| Description | Enables you to edit the attributes of the CIT. |
|-------------|---|
| Wizard Map | The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains: |
| | Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page |

| GUI Element (A-Z) | Description |
|-------------------|---|
| 8 | To define an attribute as a key attribute, click in the left column beside the attribute name. A key icon appears in the cell. A key attribute is an attribute that must be defined for CIs of that CI type. |
| | To remove the key attribute definition, click in the left column again. The key icon disappears. |
| | For more information on key attributes, see "CI Type Attributes" on page 263. |
| 100 | Denotes a static attribute. A static attribute takes the same value for all the CIs of that type. If it is changed, all the CIs of that type are affected and automatically display the new value. A static attribute cannot be defined as a key attribute. |
| | Note: You cannot define an attribute as static from within the CIT Manager. It is done by deploying the relevant package. Static attributes are for internal use only. |
| + | Click the Add button to define a new attribute. For details, see "Add/Edit Attribute Dialog Box" on page 273. |
| 0 | Select a row and click the Edit button to open the Edit Attribute dialog box. For details, see "Add/Edit Attribute Dialog Box" on page 273. |
| | Note: If you modify an attribute belonging to a CIT's parent, the text turns light blue. If you modify an attribute belonging to the CIT itself, the text turns dark blue. |

| GUI Element (A-Z) | Description |
|---------------------------|---|
| × | Click the Delete button to delete a selected attribute. This option is only active for newly defined attributes. |
| 9 | Click the Reset button to reset the attribute settings after editing a pre-existing attribute. |
| | Click Select Columns to select the columns to appear using the Select Columns dialog box. |
| <attributes></attributes> | Displays all attributes associated with the new CIT. Attributes appearing in black are ones that the new CIT inherits from the base CIT. Attributes appearing in light blue are ones that have been modified for the new CIT. |
| Asset Data | Select to display the attribute value in the Asset Report. For details see "Asset Report User Interface" on page 593. |
| | Note: When this qualifier is selected for a given attribute, the attribute appears as a visible column in the Element Instances dialog box. For details, see "Element Instances Dialog Box" on page 429. |
| Change Monitored | Select to define attributes whose values are being marked as Change Monitored in CI Type Manager. |
| | Note: When this qualifier is selected for a given attribute, the attribute appears as a visible column in the Element Instances dialog box. For details, see "Element Instances Dialog Box" on page 429. |
| Comparable | Select to enable this attribute to be used for comparing compound CIs. For details, see "Compare CIs User Interface" on page 585. |
| | Note: When this qualifier is selected for a given attribute, the attribute appears as a visible column in the Element Instances dialog box. For details, see "Element Instances Dialog Box" on page 429. |
| Default Value | The default value for the attribute. This value appears when the new CIT is defined and there is no runtime value for the attribute. |
| Description | A description of the attribute. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Display Name | The attribute name that appears in the HP Business Availability Center interface. |
| Editable | Select to enable future editing of the attribute. |
| | Only attributes that are marked as Editable (or ones that have values) are displayed in the Properties tab in IT Universe Manager. |
| Index | Select to accelerate the attribute retrieval performance. |
| | This option is recommended for attributes that are used frequently in search conditions. For example, IP address is usually an index attribute of a host. |
| Lower Case | Select to keep the attribute value in lower case. |
| Name | The actual name of the attribute (compare to Display Name). |
| Required | Select to define this attribute as a required one, if its value is required for the creation of the CIT. |
| Туре | The type of the attribute. |
| Visible | Select to display this attribute in the Properties tab in IT Universe Manager. |

Qualifiers Page

| Description | Enables you to assign qualifiers to a CIT definition. |
|--------------------------|---|
| Important Information | Qualifiers enable you to define added attribute definitions to the CIT. In the Qualifiers list, select the required qualifiers using the Add buttons to move your selections to the Configuration Item Type Qualifiers list. You can make multiple selections by holding down the CTRL key. |
| Wizard Map | The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains: Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page |

Chapter 7 • Cl Type Manager

| GUI Element (A-Z) | Description |
|---|---|
| | Click this button to move all qualifiers to the Configuration Item Type Qualifiers list. |
| \Rightarrow | Select the qualifier and click this button to add the qualifier to the Configuration Item Type Qualifiers list. Select multiple qualifiers by holding down the CTRL key. |
| (= | To remove a qualifier from the CIT definition, select the qualifier from the Configuration Item Type Qualifiers list and click this button. |
| \(| Click this button to remove all qualifiers from the Configuration Item Type Qualifiers list |
| Insert | To define a new, custom qualifier, enter the qualifier name in the window and click Insert . The qualifier appears in the Configuration Item Type Qualifiers list. |
| <configuration item="" qualifiers="" type=""></configuration> | The list of qualifiers that define attributes of the new CIT. For example, you can use a qualifier to define a CIT as abstract, which means that you cannot create instances from it. |
| <qualifiers></qualifiers> | For a list of the available qualifier options, see "Qualifier Tab" on page 443. |

1 Triplets Page

| Description | Enables you to create a calculated relationship. |
|--------------------------|--|
| | Each row on the Triplets page represents one of the allowed steps in the path leading from the source CI to the target CI in the topology map. |
| | Note: This step of the wizard is relevant only for calculated relationships. |
| Important Information | For details about calculated relationships, see "Impact Modeling" on page 467. For general information about the Create Configuration Item Type Wizard, see "Create Configuration Item Type/Relationship/Calculated Relationship Wizard" on page 281. |
| Useful Links | "Impact Modeling" on page 467 |
| Wizard Map | The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains: Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page |

| GUI Element (A-Z) | Description |
|-------------------|---|
| • | Click to define the allowed steps in a path in the topology graph leading from the source CI to the target C in the calculated relationship. Opens the Add Triplet dialog box. For details, see "Add Triplet Dialog Box" on page 425. |
| 0 | Select a row and click the Edit button to edit the triplet. Opens the Edit Triplet dialog box. For details, see "Add Triplet Dialog Box" on page 425. |
| × | Click the Delete button to delete a selected triplet. |
| Relationship | The required relationship connecting the two nodes. |

Chapter 7 • Cl Type Manager

| GUI Element (A-Z) | Description |
|---------------------------|---|
| Relationship Direction | The required relationship direction. ➤ □ Indicates the direction of the physical relationship. ➤ □ Indicates the direction opposite to the physical relationship. |
| Source | The required source node. |
| Target | The required target node. |

🙎 Icon Page

| Description | Enables you to select an icon to assign to the new CI Type. Note: This step of the wizard is not relevant for relationships. |
|--------------------------|--|
| Important Information | Each CIT is displayed with a default icon. However, you can attach different icons to the same CIT when certain conditions apply. For example, you can associate different icons with the same CIT when one of its attribute values changes. |
| Wizard Map | The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains: Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page |

| GUI Element (A-Z) | Description |
|--|---|
| Φ | Click to add a row. Note: Only active if Change the Configuration Item Type icon according to its attribute value is selected. |
| × | Click to remove a row. Note: Only active if Change the Configuration Item Type icon according to its attribute value is selected. |
| Change the Configuration Item Type icon according to its attribute value | Enables you to assign an icon for each attribute value. For example, you could define two values for the City attribute: if City=London, one icon is displayed. If City=Beijing, another icon is displayed. Note: If you change the icon of a CIT that appears in an existing view, the CIT's icon is not updated in the view. |
| Attribute Name | Select an attribute to determine the icon assigned to the CIT. |
| Configuration Item Type Main Icon | Select the group to which the CIT belongs. |
| Icon | Select an icon to associate with the value you entered in the Value column. |
| Value | Enter a value corresponding to the attribute you selected. You can add a new line for each value you enter. |

Attached Menu Page

| Description | Enables you to customize the shortcut menu of a CI by adding menu items and commands (for example, ping, run a program, open a URL). The customized menu is displayed when you right-click a CI instance in IT Universe Manager. |
|--------------------------|---|
| Important Information | If a CIT does not have a method defined specifically for it, the CIT inherits all the menus from its parent CIT or the nearest ancestor that does have a method defined for it. If you create or modify a menu, the change occurs only in the specific CIT that is being edited. |
| Wizard Map | The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains: Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page |

| GUI Element (A-Z) | Description |
|-------------------|---|
| + | Select a menu item from the tree and click the button. A new entry appears under the selected item. |
| × | Click to remove a menu item. |
| | Click to move a selected menu item up in the menu. |
| U | Click to move a selected menu item down in the menu. |
| <tree></tree> | Hierarchical tree containing the default menu items. |
| | Caution: It is not recommended to edit the definitions of the default menu items. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| Command | To connect to a specific location on the World Wide Web, select URL, and enter the exact Internet address, for example, http://www.hp.com/go/software. (Available only if you select the URL command type option.) |
| | Note: If you use a variable in the Command field, use the format command name %1 and define the CIT attributes as described in Parameters. The parameter values replace %1 according to their order in the list. For example, %1 is replaced by the first parameter in the list, %2 is replaced by the second parameter in the list, and so on. |
| Description | Enter a description for the method. (This is for internal use only and does not appear in the menu.) |
| Existing Method | Select to choose a command from a list of defined methods inherited from the IT Universe CIT and all its ancestors. |
| Icon | Select the icon to appear next to the menu option in the context menu. |
| | Note: This field is optional. |
| Menu Item Name | Enter a name for the new menu item as it should appear in the menu. |
| Method | Enables you to add a command to the menu. |
| | Note: To create a method and not override the existing method, it is recommended to create a new menu item and place the new method there. |
| Method Name | Enter a name for the command. |
| New Method | Select to add an action (for example, ping) to the menu item. |
| Parameters | To add attributes to the command or URL, click the Add Parameter button and select the attribute from the list. |
| | To delete an existing entry, select it and click the Remove Parameter button. |
| | Note: Parameters are not relevant when Inner Process is selected. |

Chapter 7 • Cl Type Manager

| GUI Element (A-Z) | Description |
|----------------------------|--|
| Require user confirmation? | Select the check box for users to confirm access to a menu item before the item is displayed. |
| Separator | To place a separator between two menu items: Click OK to place a separator underneath the selected menu option. |
| Shortcut | Press any key combination to create a shortcut for the menu item, for example, CTRL+H. Note: This field is optional. |
| Sub-Menu | Select to create a sub-menu under the selected menu option. CI History |
| Туре | Choose a command type: URL. Opens a web page to the specified URL. Enter the URL of a Web page for the command to open in the URL box. Inner Process. Triggers an internal HP Business Availability Center action. Select an action from the dropdown list of actions. Execute. Triggers an executable action. Enter an executable command in the Executable box. |

Default Label Page

| Description | Enables you to define attributes that appear in the CIT label. You can include more than one attribute by using the function buttons. The final step of the Create Configuration Item Type Wizard. |
|--------------------------|---|
| Important Information | The label appears as the title under a CI of the new CI Type. The label definition can be customized to include different attribute values. For example, if the function label of the host CIT is composed of hostname and network, the displayed label is: server1 10.0.65.0. Labels can also be created using regular expressions. |
| Wizard Map | The Create Configuration Item Type/Relationship/Calculated Relationship Wizard contains: Details Page > Attributes Page > Qualifiers Page > Triplets Page > Icon Page > Attached Menu Page > Default Label Page |

| GUI Element (A-Z) | Description |
|-------------------|---|
| | Selects the attributes to appear in the Format box. Use the following function buttons to display multiple attributes in the label. |
| | Adds parentheses to the formatted text (use in conjunction with the other functions). |
| And | Places an AND operator between two attributes in the formatted text. For example, network_netaddr&network_domain displays the network address and the domain of a node. |
| Attribute Name | Displays the available options of attributes to be included in the CIT label. |
| Clear | Click to clear the Format window. |

Chapter 7 • Cl Type Manager

| GUI Element (A-Z) | Description |
|-------------------|---|
| Format | Displays the attributes that you select to appear in the CIT label. |
| | For example, to label a host by its host name and operating system, choose the host_hostname and host_os attributes. The CIT label is host1 UNIX . |
| | You can define conditions using AND and OR combinations. |
| | Note: To delete an attribute from the Format box, highlight it and press the Delete key. |
| Or | Places an OR operator between two attributes in the formatted text. |
| RegExp | Adds a regular expression (using regular expression syntax) to the label definition. The structure of the entry is (v1, v2, v3), where v1 represents the selected attribute, v2 represents the regular expression itself (which divides the value into groups), and v3 represents the number of the selected group. |
| | For example, if the selected attribute is a name, consisting of a first name, a space, and a surname, the regular expression would be (name, (\S*)(\S*), 3), which indicates that the surname can be used for the name attribute in the default label. |
| | For examples of how to use regular expression syntax, see "Regular Expression Examples" in <i>Reference Information</i> . |
| Undo | Click to undo the last change in the Format window. |

Create/Update List/Enumeration Definition Dialog Box

| Description | Enables you to define a new List or Enumeration definition. The List or Enumeration definition you have created appears in the System Type Manager dialog box, where you can edit it if required (for details, see "System Type Manager Dialog Box" on page 297). |
|-------------------|---|
| | To access: Click the Add button in the System Type Manager dialog box. |
| Included in Tasks | "Create List and Enumeration Definitions" on page 269 |

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

| GUI Element (A-Z) | Description |
|-------------------|--|
| Display Name | Enter the name you want to appear in the list of System Type Definitions. If you leave this field empty, the entry in the Name field is used. |
| Enumeration | Enables you to create a predefined list of values, as well as assign each value a color. For details, see "Enumeration Definition Area" on page 296. |
| List | Enables you to create a predefined list of values. For details, see "List Definition Area" on page 295. |
| Name | Enter a unique name for the definition. |

List Definition Area

| Description | Create a predefined list of values. For example, a Location attribute might be defined by a location list containing the following values: |
|-------------|--|
| | ➤ New York |
| | ➤ Boston |
| | ➤ Baltimore |
| | To access: Select List in the Create List/Enumeration Definition dialog box. |

Chapter 7 • Cl Type Manager

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| • | Add a List definition. Double-click inside the row and either select a date from the calendar that appears (if you chose the type Date) or type the required value. |
| × | Delete a List definition. |
| Туре | Choose one of following field types: |
| | ➤ Date |
| | ➤ Double |
| | ➤ Integer |
| | ➤ Long |
| | ➤ String |

Enumeration Definition Area

| Description | Enables you to create a list from a predefined list of values (similar to List), with capabilities such as assigning a color for every value. Enumerations are designed to be used as severity value lists by states. You can use Enumerations for lists that require key values. To access: Select Enumeration in the Create List/Enumeration Definition dialog box. |
|--------------|---|
| Useful Links | "Enumeration Definition – Scenario" on page 269 |

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

| GUI Element (A-Z) | Description |
|-------------------|--|
| + | Add an Enumeration definition. Double-click inside the row and either select a date from the calendar that appears (if you chose the type Date) or type the required value. |
| × | Remove an Enumeration definition. |
| Color | Select a color that indicates the severity level. |
| Key | Type a number to create an enumeration that describes a severity list for a category. Assign key values according to the following rules: ➤ The list of key values must always begin with zero (0). (Zero represents the Normal state.) Otherwise, it does not appear in the State Manager (for details, see "State Manager" on page 533). ➤ The list must always be numbered consecutively. For an example of an Enumeration definition, see "Enumeration Definition – Scenario" on page 269. |
| Value | Type a value, either a string or a number, for example, Red or my value. The value appears in the tooltip for the CI in IT Universe. |

🙎 System Type Manager Dialog Box

| Description | Displays the attribute types you defined in the Create List/Enumeration Definition dialog box. To access: Select CI Types > System Type Manager. |
|-------------------|---|
| Included in Tasks | "Create List and Enumeration Definitions" on page 269 |
| Useful Links | "Enumeration Definition – Scenario" on page 269 |

Chapter 7 • Cl Type Manager

| GUI Element (A-Z) | Description |
|---|--|
| Φ | Create a predefined list whose values define an attribute type. You can create a definition for the following attribute types: |
| | ➤ List definition. |
| | ➤ Enumeration definition. |
| | For a description of these attribute types, see "Create/Update List/Enumeration Definition Dialog Box" on page 295. |
| × | Delete an existing definition. Select the system type definition you want to delete and click the Delete button. |
| 0 | Enables you to edit an existing definition. For details, see "Create/Update List/Enumeration Definition Dialog Box" on page 295. |
| <system type<br="">Definitions></system> | The list of Enumeration and List definitions created in the System Type Manager. |

Topology Report Manager

This chapter provides information on Topology Report Manager.

This chapter includes:

Concepts

- ➤ Topology Report Manager Overview on page 300

 Tasks
- ➤ Define a Report Rule Scenario on page 300
- ➤ Compare a CI Configuration to a Gold Master Template on page 310 Reference
- ➤ Topology Report Manager User Interface on page 310

 Troubleshooting and Limitations on page 335

\lambda Topology Report Manager Overview

Topology Report Manager enables you to define the following reports:

- ➤ Topology reports. Contains information about selected Report nodes in the managed world. Each report is based on a specific Report TQL query, which is created especially for it. (If required, you can define multiple reports for each query.) For more information about TQL queries, see "Topology Query Language" on page 377. Topology Report Manager enables you to define exactly which information appears in each report, including the order in which nodes are listed and their placement relative to other nodes, and how the information within each report is sorted. For details, see "Topology Report Manager Window" on page 321.
- ➤ 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 315.

🏲 Define a Report Rule – Scenario

This scenario describes how to create a Report TQL definition whose query results retrieve hosts that run on a Windows operating system. Then, by changing a report's parameterized values, you can generate a report from that same TQL query displaying hosts that run on a Linux operating system.

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

This task includes the following steps:

- ➤ "Create a Report TQL Query" on page 301
- ➤ "Set TQL Node Definitions" on page 302
- ➤ "Define the Column Content of the Selected Node" on page 303
- ➤ "Sort the Column Information" on page 304
- ➤ "Set the Node Order" on page 305
- ➤ "Refine the Report Layout" on page 306
- ➤ "View a Topology Report Displaying Hosts that Run on a Windows Operating System" on page 308
- ➤ "View a Topology Report Displaying Hosts that Run on a Linux Operating System" on page 309

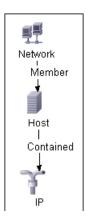
1 Create a Report TQL Query

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

Select Admin > Universal CMDB > Modeling > Topology Report Manager to open Topology Report Manager. For details about how to create a Report TQL query, see "New Report/Report Properties/Save As Report Wizard" on page 317. For details about how to add nodes and relationships to a query, see "Add Nodes and Relationships to a TQL Query".

Example of a Report TQL Query

In this Report TQL query, a Network and a Host node are linked by a Member relationship and the Host node is linked to an IP node by a Contained relationship. The TQL results must comply with the direction of the arrows.



Note: A TQL query is subject to certain validation restrictions. For details, see "Troubleshooting and Limitations" on page 462.

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 436.

Example of a TQL Node Definition

In Topology Report Manager, the attribute condition of the Host node are defined in the Attribute tab in the Node Properties dialog box to retrieve only hosts that run on a Windows operating system.

To do this, in the Attribute tab, select the following:

- ➤ Attribute name Host Operating System
- ➤ **Operator** Like ignore case
- ➤ Parameterized Value
- ➤ Value %windows%

When the **Parameterized Value** equals **%windows%**, all hosts that run on a Windows operating system are displayed in the query results.

3 Define the Column Content of the Selected Node

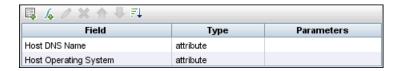
Define which nodes to include in the report, and which attributes and functions to display for each node. In the editing pane, right-click the required node, and select **Report Node Definition** to open the Report Node Definition dialog box. Click the **Add Attributes** button to select the required attributes. For details, see "Report Node Definition Dialog Box" on page 330.

Example of Nodes to Be Included in a Report

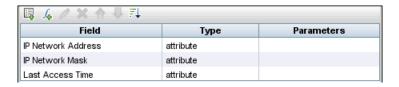
➤ The attributes **Network Address** and **Network Class** are selected for the Network node.



➤ The attributes **Host DNS Name** and **Host Operating System** are selected for the Host node.



➤ The attributes IP Network Address, IP Network Mask, and Last Access Time are selected for the IP node.



4 Sort the Column Information

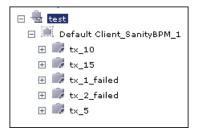
Determine the order of the information displayed for each node, and the method by which the data is sorted in each column. In the editing pane, right-click the appropriate node and select **Report Node Definition** to open the Report Node Definition dialog box. Then click **Sort** to open the Attribute Column dialog box to define the order in which the node's attributes appear in the Topology report. For details, see "Attribute Columns Dialog Box" on page 313.

Example of the Order in Which the Node Information is Displayed in a Report

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



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



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



5 Set the Node Order

Determine the order of the nodes in the report. Right-click any node from the query and select **Node Order** to open the Set Node Order dialog box. The Set Node Order dialog box displays a row for each node that is included in the report. Use the up and down arrows to move the nodes to the required location in the report. For details, see "Set Node Order Dialog Box" on page 332.

Example of How the Order of the Nodes is Displayed in a Report

Use the up and down arrows to move the **Network** node to the beginning of the list and the **IP** node to the bottom. The **Network** node is the parent node, so it should appear at the beginning of the report. The data of the **Host** node is displayed next, followed by the **IP** node.



6 Refine the Report Layout

You can display nodes dependent on other nodes either aligned underneath or indented underneath the parent node a generated report. Displaying nodes indented beneath one another enables you to better distinguish between parent nodes and their children.

The editing pane enables you to define how nodes are displayed in a generated report in relation to one another. For details about the editing pane, see "Topology Report Manager Window" on page 321.

Example of How Nodes are Displayed in Relation to One Another

➤ In this report, the **IP** CI is defined as the child of the **Host** CI, and the **Host** CI is defined as the child of the **Network** CI. As a result, the **IP** CI is indented underneath the **Host** CI and the **Host** CI is indented under the **Network** CI in the generated report.

```
□ 192.168.59.0 ( Network )
 Network Address: 192.168.59.0 Network Class: C
    □ labm2am141 ( Host ) (Path: 192.168.59.0 ( Network ) )
      Host DNS Name: devlab.ad
                                             Host Operating System: Windows 2003
         □ 192.168.140.1 ( IP ) (Path: 192.168.59.0 ( Network ) --> labm2am141 ( Host ) )
          IP Network Address: 192.168.140.0
                                                      Last Access Time: Sat Feb 9, 2008 06:29 AM
          IP Network Mask:
                               255.255.255.0
         □ 192.168.59.1 ( IP ) (Path: 192.168.59.0 ( Network ) --> labm2am141 ( Host ) )
          IP Network Address: 192.168.59.0
                                                      Last Access Time: Sat Feb 9, 2008 06:29 AM
          IP Network Mask:
                               255.255.255.0
         ☐ 16.59.57.130 ( IP ) (Path: 192.168.59.0 ( Network ) --> labm2am141 ( Host ) )
```

➤ In this report, the **IP**, **Host**, and **Network** CIs are defined as siblings, so all the CIs are displayed aligned with one another.

```
□ 192.168.59.0 ( Network )

Network Address: 192.168.59.0 Network Class: C

□ labm2am141 ( Host )

Host DNS Name: devlab.ad Host Operating System: Windows 2003

□ 192.168.140.1 ( IP )

IP Network Address: 192.168.140.0 Last Access Time: Sat Feb 9, 2008 06:29 AM

IP Network Mask: 255.255.255.0
```

7 View a Topology Report Displaying Hosts that Run on a Windows Operating System

In the Reports pane, right-click the Report TQL query definition and select **Generate**.

```
∃ 192.168.59.0 ( Network )
 Network Address: 192.168.59.0 Network Class: C
    □ labm2am141 ( Host ) (Path: 192.168.59.0 ( Network ) )
     Host DNS Name: devlab.ad
                                            Host Operating System: Windows 2003
         □ 192.168.140.1 ( IP ) (Path: 192.168.59.0 ( Network ) --> labm2am141 ( Host ) )
          IP Network Address: 192.168.140.0
                                                     Last Access Time: Sat Feb 9, 2008 06:29 AM
          IP Network Mask: 255.255.255.0
         □ 192.168.59.1 ( IP ) (Path: 192.168.59.0 ( Network ) --> labm2am141 ( Host ) )
          IP Network Address: 192.168.59.0
                                                    Last Access Time: Sat Feb 9, 2008 06:29 AM
          IP Network Mask: 255.255.255.0
         □ 16.59.57.130 ( IP ) (Path: 192.168.59.0 ( Network ) --> labm2am141 ( Host ) )
          IP Network Address: 16.59.57.0
                                                       Last Access Time: Sun Feb 10, 2008 04:22 AM
          IP Network Mask: 255.255.255.0
∃ 192.168.214.0 ( Network )
 Network Address: 192.168.214.0 Network Class: C
    □ labm2am22 ( Host ) (Path: 192.168.214.0 ( Network ) )
```

This report displays an instance of a host CI that runs on a Windows 2003 operating system.

8 View a Topology Report Displaying Hosts that Run on a Linux Operating System

In the Reports pane, right-click the Report TQL query and select **Set Report Parameters** to open the **Set Report Parameters** wizard. Click **%windows%**, and in the Editing window that opens, enter **%linux%**. Save the new definition. Then right-click the **Hosts** report definition and select **Generate**.

| □ 16.59.57.0 (Network) | | |
|-----------------------------|-------------------------------|---|
| Network Address: 16.59.57.0 | Network Class: C | |
| ⊡ beatboxqa2 (Host) (Path | : 16.59.57.0 (Network)) | |
| Host DNS Name: | Host Operating System | n: Linux |
| □ 16.59.57.207 (IP) (| Path: 16.59.57.0 (Network) | > beatboxqa2 (Host)) |
| IP Network Address: | 16.59.57.0 L | .ast Access Time: Sun Feb 10, 2008 04:22 AM |
| IP Network Mask: | 255.255.255.0 | |
| □ LABM2PCOE26 (Host) (Pa | ath: 16.59.57.0 (Network)) | |
| Host DNS Name: | Host Operating System | n: Linux |
| □ 16.59.57.122 (IP) (| Path: 16.59.57.0 (Network) | > LABM2PCOE26 (Host)) |
| IP Network Address: | 16.59.57.0 L | ast Access Time: Sun Feb 10, 2008 04:22 AM |
| IP Network Mask: | 255.255.255.0 | |
| □ labm2am154 (Host) (Pat | h: 16.59.57.0 (Network)) | |
| Host DNS Name: | Host Operating System | n: Linux |
| □ 16.59.57.212 (IP) (| Path: 16.59.57.0 (Network) | > labm2am154 (Host)) |
| IP Network Address: | 16.59.57.0 L | ast Access Time: Sun Feb 10, 2008 04:22 AM |

This report displays an instance of a host CI that runs on a Linux operating system.

Compare a CI Configuration to a Gold Master Template

This task describes how to create a Gold Master report definition and then generate a Gold Master report.

This task includes the following steps:

- ➤ "Create a Gold Master Report Definition" on page 310
- ➤ "Generate a Gold Master Report" on page 310

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 315.

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 315.

Topology Report Manager User Interface

This section describes:

- ➤ Add Attributes Dialog Box on page 311
- ➤ Add/Edit Function Dialog Box on page 312
- ➤ Attribute Columns Dialog Box on page 313
- ➤ Edit Attribute Dialog Box on page 314
- ➤ Filter CITs Dialog Box on page 314
- ➤ Gold Master Report Pane on page 315
- ➤ New Report/Report Properties/Save As Report Wizard on page 317

- ➤ Topology Report Manager Window on page 321
- ➤ Report Node Definition Dialog Box on page 330
- ➤ Set Node Order Dialog Box on page 332
- ➤ Set Report Parameters Wizard on page 333
- ➤ Set View-specific Report Dialog Box on page 334

Name 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 300 |
| Important Information | Attributes that have already been selected in the Report Node Definition dialog box do not appear on the list. |

| GUI Element (A-Z) | Description |
|--|---|
| <click a="" column<br="">header></click> | For details, see "Customizing Columns" in <i>Reference Information</i> . |
| <right-click a="" column="" header=""></right-click> | 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 300 |

| 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: |
| | ➤ average. The average value of all the attributes of the connected nodes. |
| | ➤ count. Calculate the number of node instances connected to the selected node. |
| | ➤ max. The maximum value of all the attributes of the connected nodes. |
| | ➤ min. The minimum value of all the attributes of the connected nodes. |
| | ➤ sum. The sum of all the attributes of the connected nodes. |
| Related | The node on which you want to perform the function. |
| Title | The name of the function attribute displayed in the report. |

Attribute Columns Dialog Box

| Description | Determine the order of the information displayed for each Report node, and the method by which the data is sorted in each column. To access: Click the Sort button in the Report Node Definition dialog box. |
|-------------------|---|
| Included in Tasks | "Define a Report Rule – Scenario" on page 300 |

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

Edit Attribute Dialog Box

| Description | Modify the name of the column title. |
|-------------------|--|
| | To access: Select the required attribute in the Report Node Definition dialog box and click the Edit/Attribute Function button. |
| Included in Tasks | "Define a Report Rule – Scenario" on page 300 |

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. |

1 Filter CITs Dialog Box

| Description | Enables you to exclude the CI types you do not want to appear in the Gold Master report. |
|-------------|---|
| | To access : Click the Filter CI Types whitton in the Gold Master Report pane. |

| GUI Element (A-Z) | Description |
|------------------------------------|---|
| <list ci="" of="" types=""></list> | The CI types you select are excluded from the report. |

Quantity Gold Master Report Pane

| Description | 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. |
|--------------------------|--|
| | To access: |
| | 1 Select Admin > Universal CMDB > Modeling > Topology Report Manager. |
| | 2 Right-click anywhere in the Reports pane and click New or click the New to open the New Report Wizard. |
| | 3 Define the report and select Gold Master . |
| Important Information | ➤ You can also define a schedule that generates and saves Gold Master reports on a periodic basis. For details, see "Scheduler" on page 519. |
| | ➤ The CIs appear in this report under the following circumstances: |
| | ➤ 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. |
| | For details, see "Add/Edit Attribute Dialog Box" on page 273. |

Chapter 8 • Topology Report Manager

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

| GUI Element (A-Z) | Description |
|-----------------------|---|
| Y | Determines which CI types are not included in the Gold Master report. Opens the Filter CITs dialog box. |
| * | Generates a Gold Master report. For details, see "Gold Master Report" on page 567. |
| \$ | 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 Cls 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. |
|-------------|--|
|-------------|--|

Left Pane

| Description | The left pane contains the following tabs: |
|-------------|--|
| | ➤ Browse. Select the required CI from different levels of the view hierarchy. For details, see "Browse Tab" on page 589. |
| | ➤ Search. Search for a specific CI in existing views or in the entire CMDB. For details, see "Search Tab" on page 590. |

New Report/Report Properties/Save As Report Wizard

| Description | Create or modify a Topology or Gold Master report definition. |
|-------------------|--|
| | To access: |
| | ➤ To create a Topology or Gold Master report definition, right-click anywhere in the Reports pane and click New or click the New ★ button. |
| | ➤ To modify a Topology or Gold Master report definition, right-click a report definition in the Reports pane and select Properties . |
| | ➤ To create a new report based on an existing query, right-click a report definition in the Reports pane and select Save As. |
| Included in Tasks | "Define a Report Rule – Scenario" on page 300 |
| Wizard Map | The New Report/Report Properties/Save As Report Wizard contains: |
| | Report General Attributes Page > Report Titles Page > Report Base TQL Page |

Report General Attributes Page

| Description | Enables you to enter a unique name and description for a Topology or Gold Master report. |
|--------------------------|--|
| Included in Tasks | "Define a Report Rule – Scenario" on page 300 |
| Important Information | By default, this wizard is set to display a Welcome page. You can choose not to display the Welcome page by changing the user preferences. For details, see "User Preferences Dialog Box" on page 461. |
| Useful Links | "Topology Query Language" on page 377 |
| Wizard Map | The New Report/Report Properties/Save As Report Wizard contains: Report General Attributes Page > Report Titles Page > Report Base TQL Page |

Chapter 8 • Topology Report Manager

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

| GUI Element (A-Z) | Description |
|--------------------|--|
| Report Description | (Optional) Enter a description of the report. |
| Report Name | Enter a unique name for the Topology or Gold Master report. The report name cannot contain any of the following characters: \/ : " <> % ? |
| | Note: If the Report name is either empty, contains a name used by another report, or uses invalid characters, the Next and Finish buttons are disabled. |
| Report Type | Select one of the following options: Gold Master. Create a Gold Master report. For details on how to define a Gold Master report, see "Gold Master Report Pane" on page 315. Topology. Create a Topology report. For details, see "Topology Report" on page 607. |

Report Titles Page

| Description | Enables you to define the report titles. |
|--------------------------|--|
| Included in Tasks | "Define a Report Rule – Scenario" on page 300 |
| Important Information | This page is relevant to Topology reports only. |
| Useful Links | "Topology Query Language" on page 377 |
| Wizard Map | The New Report/Report Properties/Save As Report Wizard contains: |
| | Report General Attributes Page > Report Titles Page > Report Base TQL Page |

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| Report Subtitle | Enter the subtitle of the Topology report. This title appears underneath the title at the head of the report. |
| Report Title | Enter the title of the Topology report. This title appears at the head of the report. |

Report Base TQL Page

| Description | Enables you to define the properties of the TQL on which the Topology report is based. | |
|--------------------------|---|--|
| Included in Tasks | "Define a Report Rule – Scenario" on page 300 | |
| Important Information | ➤ This page is relevant to Topology reports only. ➤ By default, this wizard is set to display a Completion page after clicking Next in this page. You can choose not to display the Completion page by changing the user preferences. For details, see "User Preferences Dialog Box" on page 461 | |
| Useful Links | "Topology Query Language" on page 377 | |
| Wizard Map | The New Report/Report Properties/Save As Report Wizard contains: Report General Attributes Page > Report Titles Page > Report Base TQL Page | |

Chapter 8 • Topology Report Manager

| GUI Element (A-Z) | Description |
|------------------------------------|--|
| Base the report on a new TQL | Select this check box if you want to base the Topology report on a new TQL query. The report that is generated displays the results of the attributes defined for the new TQL. |
| Base the report on an existing TQL | Select this check box if you want to base the Topology report on an existing TQL query. Select the required Report TQL query from the drop-down list. |
| Base TQL Description | (Optional) Enter a description of the TQL query. |
| Base TQL Name | Enter a unique name for the Report TQL query. |
| | If you selected the Base the report on an existing TQL option, select the Report TQL query on which you want to base the Topology report. |
| Base TQL Priority | Select a priority level for the new TQL query (Low, Medium, High, Express). This setting determines how often the query is rerun automatically by the system to include updated information from the CMDB. |

Topology Report Manager Window

| Description | Topology Report Manager enables you to: |
|--------------------------|--|
| | Define Topology reports about specific Report nodes. Each report is based on a specific Report TQL query, which is created especially for it. You can define exactly what information appears in each report, including the order in which Report nodes are listed and their placement relative to other Report nodes, and how the information within each report is sorted. Define a report that compares the configuration of a Gold Master CI to other CIs of the same CI type or a child of the CI type. For details, see "Gold Master Report Pane" on page 315. |
| | To access: Select Admin > Universal CMDB > Modeling > Topology Report Manager. |
| Important Information | You can also define a schedule that creates Topology reports based on a specific Report query, on a periodic basis. For details, see "Scheduler" on page 519. |
| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 ➤ "Compare a CI Configuration to a Gold Master Template" on page 310 |

Reports Pane

| Description | Displays a hierarchical tree structure of predefined folders containing report definitions. Each report is associated with a TQL query. |
|-------------|---|
| | You can create your own TQL query, or work with the default queries provided with your HP Business Availability Center installation. |
| | The predefined folders are provided for the default queries. You can modify these folders, or add additional folders according to your organization's requirements. |

Chapter 8 • Topology Report Manager

| GUI Element (A-Z) | Description |
|-------------------|---|
| | Create a new folder. |
| * | Create a TQL Report or Gold Master report definition. Opens the New Report wizard. |
| | (Enabled only when a report is created or when changes are made to an existing one.) Save the Gold Master or Topology report to the CMDB. |
| × | Delete the selected folder or report. |
| 3 | Refresh the data content of the hierarchical tree structure that may have been modified by other users. |
| & | Open the New Report Properties dialog box. Enables you to change the description and activation state of the report. |
| Q | Generates a preview of the results of the selected Report TQL. |
| | Represents a folder. |
| | Represents a Gold Master report definition. |
| q ₀ | Represents a Topology report definition. |

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

| GUI Element (A-Z) | Description | |
|-------------------|--|--|
| Delete | Delete the selected folder or report definition from the CMDB. | |
| Export | Displays a standard Save As dialog box, enabling you to save the report as an XML script. This option can be used to move a report from one workstation to another, provided the related TQL Report query is also relocated. | |
| | Note : Only relevant for Topology reports and not Gold Master reports. | |
| Generate | Generate the selected report. | |
| Import | Import XML files that contain saved Report queries to Topology Report Manager. | |
| New | Create a TQL Report or Gold Master report definition. Opens the New Report Wizard. | |
| New Folder | Create a new folder. | |
| Properties | Open the Report Properties wizard. Enables you to change the description and activation state of the report. | |
| Rename Folder | Rename the folder. | |
| Save | (Enabled only when a new TQL Report or Gold Master report definition is created or when changes are made to an existing one.) Save the TQL Report or Gold Master report definition to the CMDB. | |
| Save As | Displays the Save As dialog box, enabling you to define a new name and description for a TQL Report or Gold Master report definition. This option can be used for creating a new report based on an existing one. | |

| GUI Element (A-Z) | Description |
|--------------------------|---|
| Set Report Parameters | Enables you to generate a report using values different than the ones you defined in the Attribute tab in the Node/Relationship dialog box. Opens the Set Report Parameters wizard. |
| | Note: This option only appears if you defined a parameterized value in the Attribute tab in the Node/Relationship Properties dialog box. |
| Set view-specific report | (Optional) Enables you to generate a report of the selected Report TQL query based on a certain view rather than the entire CMDB. Select the view on which you want to base the report. |

Editing Pane

| Description | Create and define Report nodes and relationships. 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 384 |

| GUI Element (A-Z) | Description |
|-------------------------------|---|
| <main menu=""></main> | For details, see "Main Menu" on page 745. |
| <node></node> | A component from which TQL queries are built. |
| <relationship></relationship> | The entity that defines the relationship between two nodes. |

| GUI Element (A-Z) | Description |
|----------------------------------|---|
| <right click=""> options</right> | For details, see "Context Menu Options" on page 393. |
| <toolbar></toolbar> | For details, see "Toolbar Options" on page 749. |
| <tooltips></tooltips> | Hold the cursor over a node or relationship to view its tooltip. |
| | The tooltips contain the following information: |
| | ➤ 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 | Enables you to define how nodes are displayed in a generated report in relation to one another. |
| | You can use one of the following options: |
| | 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. |
| | None . Does not define any rules for this relationship. In the Topology report, the Report nodes appear in different tables. |
| | 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. |
| | SonGrid . Groups all the leaf instances in a table under their parent's node. This option applies to leaf nodes only. |

CI Type Selector

| Description | Displays a hierarchical tree structure of the CI Types found in the CMDB. For more details, see "CI Type Manager User Interface" on page 272. |
|--------------------------|--|
| | Note : The number of instances of each CIT in the CMDB is displayed to the right of each CIT. |
| | 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> . |
| Important Information | The CI Type Selector is part of the following managers: View Manager, Enrichment Manager, Query Manager, Correlation Manager, Topology Report Manager, and Trigger TQL Editor. |
| Included in Tasks | "Define a Correlation Rule – Workflow" on page 235 "Define an Enrichment Rule – Scenario" on page 354 "Define a TQL Query" on page 382 "Create a Pattern View" on page 198 "Define a Report Rule – Scenario" on page 300 |

| GUI Element (A-Z) | Description |
|-------------------|---|
| (= | Click Add CI Type to Map to move the selected CI type to the Editing pane. |
| 8 | Click Refresh to refresh the CI type tree. |
| Q | Click Search to search for the CI type entered. |
| 8 | Click Expand All to expand all subtrees within the CI type tree. |

| GUI Element (A-Z) | Description |
|-----------------------------|---|
| ₩ | Click Collapse All to collapse the subtrees within the CI type tree. |
| <search window=""></search> | 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 | The Information pane appears in the lower part of the window in the following managers and user interfaces: View Manager, Correlation Manager, Query Manager, Topology Report Manager, Enrichment Manager, Discovery Input TQL Editor, and Discovery Trigger TQL Editor. A small green indicator ** appears next to the tabs in which a change occurred. |
|--------------------------|---|
| Included in Tasks | ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Define a TQL Query" on page 382 ➤ "Create a Pattern View" on page 198 ➤ "Define a Report Rule – Scenario" on page 300 |

| GUI Element (A-Z) | Description |
|-------------------|--|
| 4 b | If the window is not wide enough to display all the tabs, use the left and right arrows to move to the required tab. |
| V | Click Show List to display a list of the available tabs for the current manager. You can select a tab from the list. |
| Affected Nodes | Displays which node is affected by the changes that occur in the selected trigger node. If required, you can click Edit to open and modify the Affected Nodes dialog box. For details, see "Affected Nodes Dialog Box" on page 242. 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 438. |
| 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 440. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Details | Displays the following information: |
| | ➤ CI Type. The CIT of the selected node/relationship. |
| | ➤ Visible. A green check indicates that the selected node/relationship is visible in the topology map. A red mark indicates that it is not visible. |
| | ➤ Include subtypes. A green check indicates that both the selected CI and its children are displayed in the topology map. A red mark indicates that only the selected CI appears. |
| Edit | Click Edit to open the relevant dialog box for the selected tab. |
| Enrichment Rules | 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 372. |
| | Note: This tab appears only in Enrichment Manager. |
| Folding Rule | Displays the folding rule defined for the selected relationship. For details about folding rules, see "Adding Folding Rules to Relationships" on page 68. |
| | Note: This tab appears only when a relationship is selected in View Manager. |
| Grouping | Displays the different CI groupings for the selected node, as defined in the Grouping dialog box. |
| | Note: This tab appears only in View Manager. |
| Node Definition | 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 330. |
| | Note: This tab appears only in Topology Report Manager. |
| Qualifiers | Displays the qualifier conditions defined for the node or the relationship. For details, see "Qualifier Tab" on page 443. |

| GUI Element (A-Z) | Description |
|---------------------|---|
| Rule | Displays the report folding rule defined for the selected relationship. For details about folding rules, see "Editing Pane" on page 324. |
| | Note: This tab appears only when a relationship is selected in Topology Report Manager. |
| Selected Identities | Displays the element instances that are used to define what should be included in the TQL results. For details, see "Identity Tab" on page 445. |

Report Node Definition Dialog Box

| Description | 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. You select the required attributes from the Add Attributes dialog box. To access: Right-click a node and select Report Node Definition. |
|--------------------------|---|
| Included in Tasks | "Define a Report Rule – Scenario" on page 300 |
| Important Information | 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. 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. |

| 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. |
| 0 | Modify the attributes, functions and parameters, defined for each Report node. |
| | Enables you to: Modify the name of the column title for that attribute. Select an attribute that displays attribute in the Function column. Opens the Add/Edit Attribute dialog box. Modify the functions and parameters you defined for the selected report node. Select an attribute that displays the parameters included for each node and the function (such as sum or max) performed on them in the Function and Parameter columns. Opens the Add/Edit Function dialog box. |
| × | Delete the selected report node definition. A column for the node definition you deleted does not appear in the report. |
| ₩ | Use the up and down arrows to determine the order of each node included in the report. |
| FL. | Define the sort order of the information reported for each Report node. Opens the Attribute Columns dialog box. |
| <click a="" column<br="">header></click> | For details, see "Customizing Columns" in Reference Information. |
| <right-click a="" column<br="">header></right-click> | For details, see "Customizing Columns" in Reference Information. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Field | Displays the nodes that are included in the report, that is, the report's columns. |
| | The title of the column as displayed in the Field box is the way the column title appears in the report template. By default, column titles take the same name as the selected attribute. You can change the title of the column in the Edit Attribute dialog box. |
| Parameters | Displays the parameters you defined for the Report node. For details, see the Add/Edit Function dialog box. |
| Title | A title for the selected Report node definition. |
| Туре | Displays the functions you defined for the Report node. For details, see the Add/Edit Function dialog box. |

🙎 Set Node Order Dialog Box

| Description | Determine the order in which the Report nodes appear in the report. |
|-------------------|---|
| | To access : Right-click any node displayed in the editing pane and select Node Order to open the Set Node Order dialog box. |
| | The Set Node Order dialog box displays a row for each node that is included in the report. |
| Included in Tasks | "Define a Report Rule – Scenario" on page 300 |

| GUI Element (A-Z) | Description |
|-------------------|--|
| ₩ | Use the up and down arrows to determine the order of each node included in the report. |
| Nodes | The list of nodes contained in the selected Report query. |

Set Report Parameters Wizard

| Description | Displays all the parameterized values defined for the nodes in the TQL as configured in the Attribute tab in the Node/Relationship dialog box. Enables you to modify the value and then generate a report based on the changed value. 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. |
|--------------------------|--|
| Important Information | ➤ Changing the value in the Set Report Parameters wizard changes what is displayed in the generated report and not the TQL query results. ➤ This dialog box is available only if you defined parameterized values in the Attribute tab in the Node/Relationship dialog box. |
| Included in Tasks | "Define a Report Rule – Scenario" on page 300 |
| Useful Links | "Topology Report" on page 607 |
| Wizard Map | The Set Report Parameters Wizard contains: Set Parameters on <node> > Set Parameterized Values Summary Page</node> |

№ Set Parameters on <node>

| Description | Enables you to modify the parameterized value and then generate a report based on the changed value. |
|-------------|--|
| Wizard Map | The Set Report Parameters Wizard contains: |
| | Set Parameters on <node> ></node> Set Parameterized Values Summary Page |

Chapter 8 • Topology Report Manager

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

| GUI Element (A-Z) | Description |
|-------------------|--|
| Attribute name | The attribute used in the attribute condition. |
| Operator | The operator used in the attribute condition. |
| Value | The value of the attribute. |

🍳 Set Parameterized Values Summary Page

| Description | Displays all the parameterized values defined for all the TQL's nodes as configured in the Attribute tab in the Node/Relationship dialog box. |
|-------------|---|
| Wizard Map | The Set Report Parameters Wizard contains: |
| | Set Parameters on <node> > Set Parameterized Values Summary Page</node> |

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

| GUI Element (A-Z) | Description |
|---|--|
| <parameterized values=""></parameterized> | Displays all the parameterized values defined for the TQL's nodes. |

🔍 Set View-specific Report Dialog Box

| Description | Enables you to generate a report of the selected Report TQL query based on a specific view rather than the entire CMDB. |
|-------------|---|
| | To access: In the Reports pane, right-click a Report definition and select View-Specific Report . |

| Included in Tasks | "Define a Report Rule – Scenario" on page 300 |
|-------------------|---|
| Useful Links | "Topology Report" on page 607 |

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| | Click to open the Select View dialog box. Select the view on which you want to base the report. |
| View | Opens the View tree. Select the view on which you want to base the report. |

Troubleshooting and Limitations

You cannot create a new report if the report's name contains more than 16 Japanese characters. For details, see "New Report/Report Properties/Save As Report Wizard" on page 317.

Chapter 8 • Topology Report Manager

Query Manager

This chapter provides information on Query Manager.

This chapter includes:

Concepts

➤ Query Manager Overview on page 337

Tasks

➤ Create a TQL Query on page 339

Reference

➤ Query Manager User Interface on page 339

Query Manager Overview

Query Manager enables you to create TQL queries that can be used in other managers.

It is recommended to use the relevant managers (Correlation Manager, Enrichment Manager, View Manager, Topology Report Manager, Trigger TQL Editor) to create your TQL queries, rather than Query Manager. All TQL queries that are created in the other managers automatically appear in Query Manager.

You can use the Save As option in Query Manager to change the type of a TQL, so you do not have to recreate it. For details, see "TQLs Pane" on page 343. 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.

Chapter 9 • Query Manager

Once you create and save a TQL query of the types View, Correlation, Enrichment, and Report, you cannot edit it. To edit a TQL of these types, you can go to the relevant manager, for example, the View Manager, and create a new view based on the TQL query that you created in Query Manager. Then you can edit the TQL query which was created in Query Manager, in the View Manager. Any changes you make to the query in the View Manager appear in the TQL query in Query Manager. You can only edit queries of the types Integration or Discovery in Query Manager.

You can display the retrieved data of the view's TQLs in a topology map where you can monitor the data. For details, see "Topology View Application" on page 539. 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 377.

Teate a TQL Query

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

Select Admin > Universal CMDB > Modeling > Query Manager to open Query Manager. For details about how to create a TQL query, see "Query Definition/Save Query As/Query Properties Dialog Box" on page 339.

For details about how to add nodes and relationships to a query, see "Add Nodes and Relationships to a TQL Query" on page 384.

Query Manager User Interface

This section describes:

- ➤ Query Definition/Save Query As/Query Properties Dialog Box on page 339
- ➤ Query Manager Window on page 342

Query Definition/Save Query As/Query Properties Dialog Box

| Description | Create or modify a TQL query. | |
|--------------------------|---|--|
| | To access: | |
| | ➤ 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 462. | |
| | If the TQL is not valid, you cannot save it. | |
| Included in Tasks | "Create a TQL Query" on page 339 | |

Chapter 9 • Query Manager

| GUI Element (A-Z) | Description |
|-------------------|---|
| Query 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. |
| Query Priority | Select a priority level for the new TQL query (Low, Medium, High, or Express). This setting determines how often the query should be rerun automatically by the system to include updated information from the CMDB. Note: If you are creating a TQL of the type Enrichment, you can choose a priority of either Low or Medium only. |
| | , , , , |
| Query Name | Enter a unique name for the TQL query. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| Query Type | You can create a TQL query of the following types: |
| | ➤ View. Creates queries for pattern views whose results are displayed in IT Universe. For details, see "View Manager" on page 179. |
| | Note: Perspectives cannot be deleted from the Query Manager. |
| | ➤ Correlation. Creates queries containing Correlation nodes, defined using the Correlation Manager. For details, see "Correlation Manager" on page 233. |
| | ➤ Enrichment. Creates queries containing Enrichment nodes and relationships. For details, see "Enrichment Manager" on page 351. |
| | ➤ Report. Creates queries whose results are compiled into reports using Topology Report Manager. For details, see "Topology Report Manager" on page 299. |
| | ➤ Discovery. Creates queries for use by the Discovery and Dependency Mapping (DDM) system. For details, see, "Trigger TQL Editor Window" in <i>Discovery and Dependency Mapping Guide</i> . |
| | ➤ Integration. Creates queries for use with the CMDB API. For details, see "The HP Universal CMDB Web Service API" in <i>Solutions and Integrations</i> . |
| | 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. |

Query Manager Window

| Description | Enables you to query the CMDB by defining TQL queries or to change the type of an existing TQL. To access: Click Admin > Universal CMDB > Modeling > Query Manager. |
|--------------------------|---|
| Important Information | ➤ It is recommended to use the relevant Managers (Correlation Manager, Enrichment Manager, View Manager, Topology Report Manager, Trigger TQL Editor) to create your TQL queries, rather than Query Manager. All TQLs that are created in the other managers automatically appear in Query Manager. You can use the Save As option in Query Manager to change the type of TQL, so you do not have to recreate it. For details, see "TQLs Pane" on page 343. |
| | ➤ Once you create and save a TQL query of the types View, Correlation, Enrichment, and Report, you cannot edit it. To edit a TQL of these types, you can go to the relevant manager, for example, the View Manager, and create a new view based on the TQL query that you created in Query Manager. You can then can edit the TQL query (which was created in Query Manager) in the View Manager. Any changes you make to the query in the View Manager appear in the TQL query in Query Manager. |
| | You can only edit queries of the Integration or Discovery types in Query Manager. ➤ For TQL queries to be valid, they must comply with the restrictions described in "Troubleshooting and Limitations" on page 462. |
| Useful Links | "Topology Query Language (TQL) Overview" on page 378 |

TQLs Pane

| Description | Displays a hierarchical tree structure of predefined folders and TQL queries. |
|-------------|--|
| | You can create your own query, or work with the default queries provided with your HP Business Availability Center installation. |
| | 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. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| | Creates a new folder. |
| * | Enables you to create a TQL query of the types View, Correlation, Enrichment, Report, Discovery, or Integration. You can only edit queries of the types Integration or Discovery in Query Manager. Opens the Query Definition 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 Query Properties dialog box. For a description, see "Properties" below. |
| Q | Generates a preview of the results of the selected TQL query. |
| | Represents a folder. |
| | Represents a TQL query of the type Integration. |

Chapter 9 • Query Manager

| GUI Element (A-Z) | Description |
|-------------------|--|
| 'n | Represents a TQL query of the type (pattern) View. |
| | Represents a TQL query of the type Template. |
| 0 | Represents a TQL query of the type Perspective. |
| Š. | Represents a TQL query of the type Correlation. |
| ia. | Represents a TQL query of the type Enrichment. |
| 46 | Represents a TQL query of the type Report. |
| M | Represents a TQL query of the type Discovery. |

The following elements are available by right-clicking a folder or a TQL query:

| GUI Element (A-Z) | Description |
|-------------------|---|
| Delete | Delete the selected folder or TQL query. |
| Export | Displays a standard Save As dialog box, enabling you to save the TQL query in XML script format. This option can be used to move TQL queries from one workstation to another. |
| Import | Imports XML files that contain saved TQL queries to Query Manager. |
| New | Create a TQL query. For details, see "Query Definition/Save Query As/Query Properties Dialog Box" on page 339. |
| 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 Query Manager without saving, a confirmation dialog box is displayed, requesting that you save your query. |
| Save As | Opens the Save Query As dialog box, enabling you to create a query by copying an existing one. You can change the type of the query. For a description of the available query types, see "Query Type" on page 341. |

Editing Pane

| Description | Displays the currently selected TQL. 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 384. | |

| GUI Element (A-Z) | Description |
|-------------------------------|---|
| <main menu=""></main> | For details, see "Main Menu" on page 745. |
| <node></node> | A component from which TQL queries are built. |
| <relationship></relationship> | The entity that defines the relationship between two nodes. |

| GUI Element (A-Z) | Description |
|----------------------------------|--|
| <right click=""> options</right> | For details, see "Context Menu Options" on page 393. |
| <toolbar></toolbar> | For details, see "Toolbar Options" on page 749. |
| <tooltips></tooltips> | Hold the cursor over a node or relationship to view its tooltip. |
| | The tooltips contain the following information: |
| | Element name. The name of the node. CI Type. The CIT of the node as defined in the CI Type Manager. For details, see "CI Type Manager" on page 261. |
| | ➤ Definitions of the selected nodes and relationships. The attribute conditions, as described in "Node/Relationship Properties Dialog Box" on page 436. |

CI Type Selector

| Description | Displays a hierarchical tree structure of the CI Types found in the CMDB. For more details, see "CI Type Manager User Interface" on page 272. |
|--------------------------|--|
| | Note : The number of instances of each CIT in the CMDB is displayed to the right of each CIT. |
| | 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> . |
| Important Information | The CI Type Selector is part of the following managers: View Manager, Enrichment Manager, Query Manager, Correlation Manager, Topology Report Manager, and Trigger TQL Editor. |

| Included in Tasks | ➤ "Define a Correlation Rule – Workflow" on page 235 |
|-------------------|--|
| | ➤ "Define an Enrichment Rule – Scenario" on page 354 |
| | ➤ "Define a TQL Query" on page 382 |
| | ➤ "Create a Pattern View" on page 198 |
| | ➤ "Define a Report Rule – Scenario" on page 300 |

| GUI Element (A-Z) | Description |
|-----------------------------|---|
| ¢ | Click Add CI Type to Map to move the selected CI type to the Editing pane. |
| 9 | Click Refresh to refresh the CI type tree. |
| Q | Click Search to search for the CI type entered. |
| 밥 | Click Expand All to expand all subtrees within the CI type tree. |
| ₩ | Click Collapse All to collapse the subtrees within the CI type tree. |
| <search window=""></search> | 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 | The Information pane appears in the lower part of the window in the following managers and user interfaces: View Manager, Correlation Manager, Query Manager, Topology Report Manager, Enrichment Manager, Discovery Input TQL Editor, and Discovery Trigger TQL Editor. A small green indicator ** appears next to the tabs in which a change occurred. |
| Included in Tasks | ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Define a TQL Query" on page 382 ➤ "Create a Pattern View" on page 198 ➤ "Define a Report Rule – Scenario" on page 300 |

| GUI Element (A-Z) | Description |
|-------------------|--|
| 1 | If the window is not wide enough to display all the tabs, use the left and right arrows to move to the required tab. |
| ▼ | Click Show List to display a list of the available tabs for the current manager. You can select a tab from the list. |
| Affected Nodes | Displays which node is affected by the changes that occur in the selected trigger node. If required, you can click Edit to open and modify the Affected Nodes dialog box. For details, see "Affected Nodes Dialog Box" on page 242. |
| | 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 438. |
| 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 440. |
| Details | Displays the following information: 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 | 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 372. |
| | Note: This tab appears only in Enrichment Manager. |
| Folding Rule | Displays the folding rule defined for the selected relationship. For details about folding rules, see "Adding Folding Rules to Relationships" on page 68. |
| | Note: This tab appears only when a relationship is selected in View Manager. |
| Grouping | Displays the different CI groupings for the selected node, as defined in the Grouping dialog box. |
| | Note: This tab appears only in View Manager. |
| Node Definition | 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 330. Note: This tab appears only in Topology Report Manager. |
| Qualifians | |
| Qualifiers | Displays the qualifier conditions defined for the node or the relationship. For details, see "Qualifier Tab" on page 443. |
| Rule | Displays the report folding rule defined for the selected relationship. For details about folding rules, see "Editing Pane" on page 324. |
| | Note: This tab appears only when a relationship is selected in Topology Report Manager. |
| Selected Identities | Displays the element instances that are used to define what should be included in the TQL results. For details, see "Identity Tab" on page 445. |

10

Enrichment Manager

This chapter provides information on Enrichment Manager.

This chapter includes:

Concepts

➤ Enrichment Manager Overview on page 351

Tasks

➤ Define an Enrichment Rule – Scenario on page 354

Reference

➤ Enrichment Manager User Interface on page 357

& Enrichment Manager Overview

Enrichment rules can be used for several purposes:

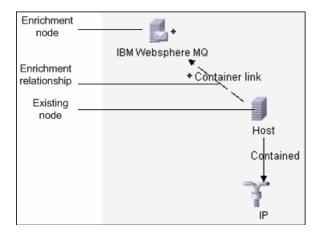
- ➤ Adding new CIs and relationships to the CMDB.
- ➤ Deleting specific CI instances from the CMDB.
- ➤ Updating the attribute values of specific CI instances in the CMDB.

Enrichment nodes and relationships differ from other nodes and relationships in that they are conceptual deductions that represent real relationships and CIs that cannot be discovered automatically by the discovery process.

Chapter 10 • Enrichment Manager

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 377.

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

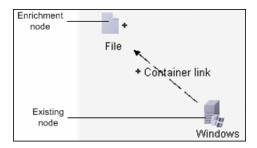


By placing an Enrichment node within a TQL query context, the query receives data from its attributes, and uses it to insert new information into the CMDB.

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 354.
- ➤ 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 354
- ➤ "Define the Host Node that Is Identified by its Lowest MAC Address" on page 356
- ➤ "Define the Host Node that is Identified by its IP Address" on page 356
- ➤ "Define the Enrichment Rule" on page 357

1 Create an Enrichment TQL Query

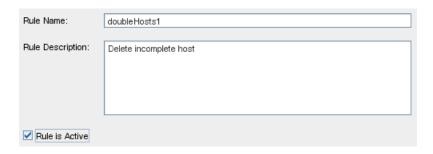
To create an Enrichment TQL query, you need to define an Enrichment rule and then add the regular TQL nodes and relationships that define the query.

Note: You can add Enrichment nodes and relationships only after at least one regular node has been added to the query. In this task then, you must first add regular nodes and relationships.

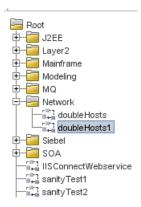
Select Admin > Universal CMDB > Modeling > Enrichment Manager. For details about how to create an Enrichment TQL query, see "New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard" on page 368. For details about how to add nodes and relationships to a query, see "Add Nodes and Relationships to a TQL Query" on page 384.

Example of an Enrichment TQL Query

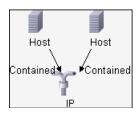
A new Enrichment TQL query called doubleHosts1 (located under the **Network** folder) is created in the Enrichment Manager.



The **doubleHosts1** Enrichment rule is displayed in the Enrichment Rules pane.



In this Enrichment TQL query, an **IP** node is linked to two **Host** nodes by a **Contained** relationship. The TQL results must comply with the direction of the arrows.



Note: A TQL query is subject to certain validation restrictions. For details, see "Troubleshooting and Limitations" on page 462.

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 438.

Example of an Attribute Condition Definition that Identifies the Host by its Lowest Mac Address

In the Attribute tab, this attribute condition definition identifies the required Host by its lowest MAC address.

- ➤ Attribute name Host is Complete
- ➤ Operator Equal
- ➤ Value True

3 Define the Host Node that is Identified by its IP Address

At the top of the Enrichment Manager window, select **TQL** mode. In the editing pane, right-click the required **Host** node, and select **Node Properties** to open the Node Properties dialog box. Then define two attribute conditions in the Attribute tab. For details on how to define an attribute condition, see "Attribute Tab" on page 438.

Example of an Attribute Condition that Enables a Host to Be Identified by its IP Address

This attribute condition is the first attribute condition you need to define in the Attribute tab to enable the Host node to be identified by its IP address.

- ➤ Attribute name Host is Complete
- ➤ Operator Equal

➤ Value — False

This is the second attribute condition you need to define in the Attribute tab to enable the Host node to be identified by its IP address.

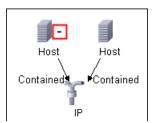
- ➤ Attribute name Host is Complete
- ➤ Operator Is null
- ➤ Value Value cannot be changed

4 Define the Enrichment Rule

Define the Enrichment rule that deletes all instances of the **Host** node that are identified by their IP address. From the Enrichment Manager window toolbar, select **Enrichment** mode. In the Enrichment Rules pane, select the **doubleHosts1** Enrichment rule. Then right-click the **Host** node that is identified by its IP address and select **Delete Relationship/Node Item**.

Example of a Host Node Containing a Removed Indicator

The **Host** node now has a removed indicator to denote that all host instances that have identical attribute and cardinality settings are removed from the CMDB. The Enrichment query now looks like this.



Enrichment Manager User Interface

This section describes:

- ➤ Enrichment Manager Window on page 358
- ➤ New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard on page 368

- ➤ Node/Relationship Definition Dialog Box on page 372
- ➤ Node Definition Advanced Attribute Dialog Box on page 374

🔍 Enrichment Manager Window

| Description | Define Enrichment rules. These rules, which are based on a specific TQL query, 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. To access: Select Admin > Universal CMDB > Modeling > Enrichment Manager. |
|--------------------------|---|
| Important Information | 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. |
| Included in Tasks | "Define an Enrichment Rule – Scenario" on page 354 |

Enrichment Rules Pane

| Description | Displays a hierarchical tree structure of predefined folders and Enrichment rules. Each Enrichment rule is associated with a TQL query. |
|-------------|---|
| | You can create your own query, or work with the out-of- the-box (factory) queries provided with your HP Business Availability Center installation. |
| | 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. |

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| | Creates a new folder. |
| * | Creates an Enrichment rule. Opens the New Enrichment Rule/Properties 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 New Enrichment Rule/Properties dialog box. Enables you to change the description and the activation state of the Enrichment rule. |
| Q | Generates a preview of the results of the selected Enrichment rule. |
| | Represents a folder. |
| F=1 | 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. |

Chapter 10 • Enrichment Manager

| GUI Element (A-Z) | Description |
|-------------------|--|
| Import | Imports XML files that contain saved Enrichment queries to the Enrichment Manager. |
| New | Creates an Enrichment rule. Opens the New Enrichment Rule dialog box. |
| New Folder | Creates a new folder. |
| Properties | Opens the New Enrichment Rule/Properties dialog box. Enables you to change the description and the activation state of the rule. |
| Rename Folder | Renames the folder |
| Save | (Enabled only when a new Enrichment query is created or when changes are made to an existing one.) Saves the Enrichment rule to the CMDB. |
| Save As | Displays the Save As dialog box, enabling you to define a new name and description for a query. This option can be used for creating a new Enrichment rule based on an existing one. |

Editing Pane

| Description | Create and define Enrichment nodes and relationships. |
|--------------------------|---|
| | 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 | ➤ 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 749 and "Remove Enrichment Results" on page 754. |
| Included in Tasks | "Define an Enrichment Rule – Scenario" on page 354 |
| Useful Links | For details on how to create a TQL query, see "Add Nodes and Relationships to a TQL Query" on page 384. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| • | Indicates an added Enrichment node or relationship. |
| - | Indicates a node or relationship that has been deleted from the CMDB. |
| 3 | Indicates an updated node or relationship. |

| GUI Element (A-Z) | Description |
|-------------------------------------|---|
| Enrichment TQL and Enrichment mode | The Enrichment Manager has two modes in which you can work: Enrichment mode and TQL mode. Working in: |
| | ➤ 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=""></main> | For details, see "Main Menu" on page 745. |
| <node></node> | A component from which TQL queries are built. |
| <relationship></relationship> | The entity that defines the relationship between two nodes. |
| <context menu=""> options</context> | For details, see "Context Menu Options" on page 393. |
| <toolbar></toolbar> | For details, see "Toolbar Options" on page 749 |
| <tooltips></tooltips> | Hold the cursor over a node or relationship to view its tooltip. |
| | The tooltips contain the following information: |
| | ➤ Element name. The name of the node. |
| | ➤ CI Type. The CIT of the node as defined in the CI Type Manager. For details, see "CI Type Manager" on page 261. |
| | ➤ Definitions of the selected nodes and relationships. The attribute conditions, as described in "Node/Relationship Properties Dialog Box" on page 436. |

CI Type Selector

| Description | Displays a hierarchical tree structure of the CI Types found in the CMDB. For more details, see "CI Type Manager User Interface" on page 272. |
|--------------------------|--|
| | Note : The number of instances of each CIT in the CMDB is displayed to the right of each CIT. |
| | 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> . |
| Important Information | The CI Type Selector is part of the following managers: View Manager, Enrichment Manager, Query Manager, Correlation Manager, Topology Report Manager, and Trigger TQL Editor. |
| Included in Tasks | ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Define a TQL Query" on page 382 ➤ "Create a Pattern View" on page 198 ➤ "Define a Report Rule – Scenario" on page 300 |

| GUI Element (A-Z) | Description |
|-------------------|---|
| (| Click Add CI Type to Map to move the selected CI type to the Editing pane. |
| 9 | Click Refresh to refresh the CI type tree. |
| Q | Click Search to search for the CI type entered. |
| 验 | Click Expand All to expand all subtrees within the CI type tree. |

Chapter 10 • Enrichment Manager

| GUI Element (A-Z) | Description |
|-----------------------------|---|
| ₩. | Click Collapse All to collapse the subtrees within the CI type tree. |
| <search window=""></search> | 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 | The Information pane appears in the lower part of the window in the following managers and user interfaces: View Manager, Correlation Manager, Query Manager, Topology Report Manager, Enrichment Manager, Discovery Input TQL Editor, and Discovery Trigger TQL Editor. A small green indicator ** appears next to the tabs in which a change occurred. |
|--------------------------|---|
| Included in Tasks | "Define a Correlation Rule – Workflow" on page 235 "Define an Enrichment Rule – Scenario" on page 354 "Define a TQL Query" on page 382 "Create a Pattern View" on page 198 "Define a Report Rule – Scenario" on page 300 |

Chapter 10 • Enrichment Manager

| GUI Element (A-Z) | Description |
|-------------------|--|
| () | If the window is not wide enough to display all the tabs, use the left and right arrows to move to the required tab. |
| V | Click Show List to display a list of the available tabs for the current manager. You can select a tab from the list. |
| Affected Nodes | Displays which node is affected by the changes that occur in the selected trigger node. If required, you can click Edit to open and modify the Affected Nodes dialog box. For details, see "Affected Nodes Dialog Box" on page 242. |
| | 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 438. |
| 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 440. |
| Details | Displays the following information: 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 | 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 372. |
| | Note: This tab appears only in Enrichment Manager. |
| Folding Rule | Displays the folding rule defined for the selected relationship. For details about folding rules, see "Adding Folding Rules to Relationships" on page 68. |
| | Note: This tab appears only when a relationship is selected in View Manager. |
| Grouping | Displays the different CI groupings for the selected node, as defined in the Grouping dialog box. |
| | Note: This tab appears only in View Manager. |
| Node Definition | 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 330. |
| | Note: This tab appears only in Topology Report Manager. |
| Qualifiers | Displays the qualifier conditions defined for the node or the relationship. For details, see "Qualifier Tab" on page 443. |
| Rule | Displays the report folding rule defined for the selected relationship. For details about folding rules, see "Editing Pane" on page 324. |
| | Note: This tab appears only when a relationship is selected in Topology Report Manager. |
| Selected Identities | Displays the element instances that are used to define what should be included in the TQL results. For details, see "Identity Tab" on page 445. |

New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard

| Description | Creates or modifies an Enrichment rule. |
|--------------------------|--|
| | To access: |
| | To create a new Enrichment rule, right-click anywhere in the Enrichment Rules pane and click New or click the New button. To modify an existing Enrichment rule, right-click an Enrichment rule in the Enrichment Rules pane and select Properties. To create a new Enrichment rule based on an existing query, right-click an Enrichment rule in the Enrichment Rules pane and select Save As. |
| Included in Tasks | "Define an Enrichment Rule – Scenario" on page 354 |
| Important Information | ➤ 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: ➤ 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 436. ➤ An Enrichment TQL that serves as the basis for Enrichment rules, is subject to certain validation restrictions. For details, see "Troubleshooting and Limitations" on page 462. If the TQL is not valid, you cannot save it. |
| Useful links | "Topology Query Language" on page 377 |
| Wizard Map | The New Enrichment Rule /Enrichment Rule Properties/Save As Correlation Rule wizard contains: Rule General Attributes Page > Rule Base TQL Page |



Rule General Attributes Page

| Description | Enables you to enter a unique name and description for the Enrichment rule. |
|--------------------------|--|
| Included in Tasks | "Define an Enrichment Rule – Scenario" on page 354 |
| Important Information | An Enrichment TQL that serves as the basis for Enrichment rules, is subject to certain validation restrictions. For details, see "Troubleshooting and Limitations" on page 462. If the TQL is not valid, you cannot save it. For important information on the effects of making changes to the TQL after creating it, see "New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard" on page 368. By default, this wizard is set to display a Welcome page. You can choose not to display this page by changing the user preferences. For details, see "User Preferences Dialog Box" on page 461. |
| Useful Links | "Topology Query Language" on page 377 |
| Wizard Map | The New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard contains: Rule General Attributes Page > Rule Base TQL Page |

Chapter 10 • Enrichment Manager

| GUI Element (A-Z) | Description |
|------------------------------|--|
| Enrichment Rule is Active | (Optional) Select this option to activate the rule in the system as soon as it is saved. |
| | Default: Not selected |
| | Notes: |
| | If an active Enrichment rule is deactivated (by clearing the Enrichment Rule is Active check box), all changes that occurred in the CMDB relating to the rule are deleted from the system. When you deactivate an Enrichment rule, a red X appears next to the Enrichment rule in the Enrichment Rules pane. To reactivate the rule, right-click the rule in the Enrichment Rules pane and select Properties. In the General Attributes page, select Enrichment Rule is Active. |
| Description | (Optional) Enter a description of the rule. |
| Rule Name | Enter a unique name for the Enrichment rule. |
| | The rule name cannot contain any of the following characters: \/: " < > % ? |
| | Note : If the Enrichment rule name is either empty, contains a name used by another Enrichment rule, or uses invalid charcters, the Next and Finish buttons are disabled. |

Rule Base TQL Page

| Description | Enables you to define the properties of the TQL on which the Enrichment rule is based. |
|--------------------------|--|
| Included in Tasks | "Define an Enrichment Rule – Scenario" on page 354 |
| Important Information | An Enrichment TQL that serves as the basis for Enrichment rules, is subject to certain validation restrictions. For details, see "Troubleshooting and Limitations" on page 462. If the TQL is not valid, you cannot save it. For important information on the effects of making changes to the TQL after creating it, see "New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard" on page 368. By default, this wizard is set to display a Completion page after clicking Next in this page. You can choose not to display the Completion page by changing the user preferences. For details, see "User Preferences Dialog Box" on page 461. |
| Useful Links | "Topology Query Language" on page 377 |
| Wizard Map | The New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard contains: Rule General Attributes Page > Rule Base TQL Page |

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

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

Node/Relationship Definition Dialog Box

| Description | Displays the attributes of the selected node/relationship. The key attributes and the required attributes of the selected node appear in bold. 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. |
|--------------------------|--|
| | 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. |
| Important Information | 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. |
| | 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 . |
| Included in Tasks | "Define an Enrichment Rule – Scenario" on page 354 |

Attributes Area

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| Name | The attribute name. |
| Туре | The field type of the selected attribute. |
| Value | The value as defined in one of the following: |
| | 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

| GUI Element (A-Z) | Description |
|-------------------|---|
| | (Appears only if you selected an attribute of the field type string.) Opens the Node Definition - Advanced Attribute dialog box. |
| | Define node and relationship attributes of the type string using simple or complex expressions. You can also create complex expressions using regular expression format. |
| 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 | Define an attribute using attributes from other nodes in the TQL query. |
| | ➤ In the box to the left, select the required node. |
| | ➤ In the box to the right, select the node's required attribute. |
| | The attribute definition appears in the Value column in the Attributes area. |
| RegExp Group | (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. |
| Regular Expression | (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. |
| Value (in the Set Attributes area) | Define a constant value. Enter the required value in the Value box or select a value from the Value list. |
| | Note : The value definition appears in the Value column in the Attributes area. |

Node Definition – Advanced Attribute Dialog Box

| Description | Define node and relationship attributes of the type String using simple or complex expressions. You can also create complex expressions using regular expression format. |
|-------------------|---|
| | To access: |
| | 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 | "Define an Enrichment Rule – Scenario" on page 354 |

| 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<br="">appears between the Value and Regular Expression columns></the> | (This list is only available if you select By Attribute in the Type column.) Click the entry inside the box and select the required attribute. |
| Concatenate | Use all the attribute values listed in this dialog box. |
| RegExp Group | (This list is only available if you select By Attribute in the Type column.) Click inside the RegExp Group column, click the button, and enter the group number in the Value for RegExp Group dialog box that opens. This is the part of the regular expression pattern to focus on when creating the attribute. A set of parentheses () constitutes a group. |
| Regular Expression | (This list is only available if you select By Attribute in the Type column.) Click inside the Regular Expression column, click the button, and enter the regular expression pattern in the Value for Regular Expression dialog box that opens. |

Chapter 10 • Enrichment Manager

| GUI Element (A-Z) | Description |
|--------------------------------|---|
| Туре | Click the entry inside the Type column and select one of the following options: |
| | ➤ Simple. Define a constant value using a simple expression. |
| | ➤ By Attribute. Define an attribute using attributes from other nodes in the TQL. |
| | Default is: Simple |
| Use first attribute with value | Use the first attribute value listed in this dialog box that is not empty. |
| Value | If you select Simple in the Type column, click inside the Value column, click the button, and enter the required value in the Value for Simple dialog box. If you select By Attribute in the Type column, click inside the Value column and select the required value from the list. |

11

Topology Query Language

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

This chapter includes:

Concepts

- ➤ Topology Query Language (TQL) Overview on page 378
- ➤ Topology Query Language on page 378
- ➤ The Roles of TQL on page 379
- ➤ Where TQL Queries Are Created on page 379
- ➤ Viewing TQL Query Results on page 380
- ➤ Compound Relationship on page 380
- ➤ Join Relationship on page 381
- ➤ Subgraph Definition on page 382

Tasks

- ➤ Define a TQL Query on page 382
- ➤ Add Nodes and Relationships to a TQL Query on page 384
- ➤ Add Enrichment Nodes and Relationships to an Enrichment TQL Query on page 385
- ➤ Define a Compound Relationship Scenario on page 386
- ➤ Define a Join Relationship Scenario on page 389
- ➤ Create a Subgraph Definition Scenario on page 391

Reference

➤ Context Menu Options on page 393

- ➤ Attribute Operator Definitions on page 400
- ➤ TQL Logs on page 402
- ➤ TQL Parameters on page 406
- ➤ Topology Query Language User Interface on page 414

 Troubleshooting and Limitations on page 462

Topology Query Language (TQL) Overview

Topology Query Language (TQL) is a language and tool for discovering, organizing, and managing IT infrastructure data. It enables you to create TQL queries that retrieve business service data from the configuration management database (CMDB) and displays the data in a visual representation that facilitates data monitoring and managing. For details on CMDB, see "Configuration Management Database (CMDB)" on page 21.

Topology Query Language

TQL extends the standard SQL language by adding two important capabilities:

- ➤ TQL enables you to draw conceptual relationships between configuration items (CIs), which represent their actual interdependencies. Using predefined operators, the different types of interconnections (relationships) that exist between CIs can be established, and consequently the infrastructure design and performance are more accurately represented. This representation serves as a basis and a model for the discovery, arrangement, query, and management of complex infrastructures.
- ➤ TQL includes a graphical aspect, consisting of visual symbols and syntax, that represents the resources and their interconnections. This visualization of an IT infrastructure simplifies the understanding, monitoring, and managing of the IT business operations.

The Roles of TQL

TQL plays several roles:

- ➤ Builds a business service model that defines and delineates the interconnection between IT assets that function together as business services. The business service model guides the discovery and identification of these business services, from the ever-increasing number and complexity of infrastructure resources. After the resources that comprise the business services are discovered, the business service model structures the way they are organized and managed in the CMDB.
- ➤ Constantly searches the CMDB for changes that occur in the state of managed resources. When such changes are detected, the relevant subsystems are informed and updated.
- ➤ Creates queries that retrieve business service data from the CMDB, and displays the data in a visual representation that facilitates data monitoring and managing.

Where TQL Queries Are Created

The following managers use TQL:

- ➤ Correlation Manager. Create a Correlation TQL query to simulate how infrastructure changes can impact your system. A Correlation rule is based on either a Correlation TQL query created from within the Correlation Manager, or on an existing query. By creating Correlation rules based on TQL queries, you can determine the true origin of a problem and its business impact. For details, see "Correlation Manager" on page 233.
- ➤ 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 351.
- ➤ Query Manager. Create TQL queries that can be used in other managers. For details, see "Query Manager" on page 337.

- ➤ Topology Report Manager. Create a report definition based on either a Report TQL query from within the Topology Report Manager, or on an existing query. You can define exactly which information appears in each report, including the order in which nodes are listed and their placement relative to other nodes, and how the information within each Report is sorted. For details, see "Topology Report Manager" on page 299.
- ➤ View Manager. Create a pattern view, template, or perspective based on a TQL query, or create a template based view using an existing template. For details, see "View Manager" on page 179.

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 539.

🚜 Compound Relationship

A compound relationship represents a path in the topological graph. You use a compound relationship to define the allowed steps in the path between the source and the target CIs.

Each row represents one of the allowed steps in the path leading from the source CI to the target CI in the topology map.



For an example of a compound definition, see "Define a Compound Relationship - Scenario" on page 386. For details on defining compound relationships, see "Add Compound Relationship Dialog Box" on page 415.

& Join Relationship

A join relationship is a logical connection, which appears only in the topology view containing the TQL query results, and represents the relationship between two CIs. It does not exist in the CMDB. A join relationship is created by defining an attribute for each node, whose values are used for comparison.

The TQL results retrieve all CIs whose attribute values meet the conditions defined in the join definition.

For example, you can create a join definition that links all **Host** CIs connected to **IP** CIs whose **Created by** attribute values are equal (see the example below).

| Host | Operator | IP |
|------------|----------|------------|
| Created By | Equal | Created By |

Each join definition represents one condition defined for the join relationship.

Note: You can define multiple conditions.

For an example of a join definition, see "Define a Join Relationship - Scenario" on page 389. For details on defining join relationships, see "Add Join Relationship Dialog Box" on page 422.

Subgraph Definition

A subgraph definition enables you to create a graph that represents additional TQL query data related to a specific CI. The DDM job searches for the results from both the TQL query and the subgraph definitions. The query recursively retrieves all the related CIs by a defined depth. For details on defining subgraph definitions, see "Subgraph Definition Dialog Box" on page 451.

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 449.

The DDM job retrieves data that meets the criteria that is defined in the subgraph.

For an example of a subgraph definition, see "Create a Subgraph Definition - Scenario" on page 391.

Define a TQL Query

This task describes how to create a TQL query in Correlation Manager, Query Manager, View Manager, Topology Report Manager, and Enrichment Manager.

This task includes the following steps:

- ➤ "Create a TQL Query" on page 382
- ➤ "Add Nodes and Relationships to the Query" on page 383

1 Create a TQL Query

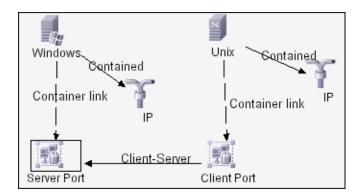
Create a new query by giving the query a unique name in the relevant manager. For details about the managers in which you can create a TQL query, see "Where TQL Queries Are Created" on page 379. In this task, you create a TQL query in the Query Manager. For details, see "Query Definition/Save Query As/Query Properties Dialog Box" on page 339.

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 384. For details on the CI Type Manager, see "CI Type Manager" on page 261.

Example of a TQL Query Definition

The direction of the relationship indicates which node is dependent on the other. The following example displays two hosts, a Server Port, and a Client Port, which are linked to one another via a client/server connection. The TQL results must comply with the direction of the arrows.



Note: A TQL query is subject to certain validation restrictions. For details, see "Troubleshooting and Limitations" on page 462.

🏲 Add Nodes and Relationships to a TQL Query

This section explains how to add nodes and relationships to a TQL query. It is relevant for View Manager, Query Manager, Correlation Manager, Enrichment Manager, and Topology Report Manager.

Note: For TQL queries to be valid, they must comply with certain restrictions. For details, see "Troubleshooting and Limitations" on page 462.

To add nodes and relationships to a TQL query:



- **1** From the tree in the left pane, select the required query or click the **New** button to create one.
- **2** From the tree displayed in the CI Type Selector, click and drag one or more required TQL nodes on to the editing pane. These are the TQL nodes that are included in the query.
- **3** To add a relationship between two nodes:
 - ➤ Select the required TQL nodes by holding down CTRL and clicking the TQL nodes, right-click and select **Add Relationship**.

 or



 Click the Create Relationship icon and draw a line between the required nodes.

The Select Relationship Type dialog box opens. Select the required relationship type. For details, see "Select Relationship Type Dialog Box" on page 448.

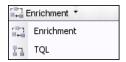
4 Click **OK**. The selected nodes are linked by the relationship you have selected.

P 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 351.

To add Enrichment nodes and relationships to a TQL query:

- **1** From the tree in the Enrichment Rules pane, select the Enrichment rule to which you want to add Enrichment nodes and relationships or create a new one. For details, see "New Enrichment Rule/Enrichment Rule Properties/Save As Enrichment Rule Wizard" on page 368.
- **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 420.

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

🦒 Define a Compound Relationship - Scenario

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

Note: To reach the required result, you must implement each one of the following steps.

To define a compound relationship between a Network CI and an IP CI:

- **1** Create a TQL query and drag the following nodes from the CI Type Selector onto the editing pane:
 - ➤ Network
 - ➤ IP

2 Right-click the **Network** and **IP** nodes and select **Add Compound Relationship** to open the Add Compound Relationship dialog box.



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



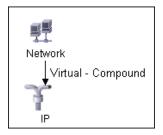
- **5** Click the **Add** button to open the Add Triplet dialog box and do the following:
 - ➤ From the **Source** list, select **Host**.
 - ➤ From the **Target** list, select **IP**.
 - ➤ From the **Relationship** list, select **Contained**.
 - ➤ Select the required **Relationship** direction.
- **6** Click **OK** to save your changes.

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

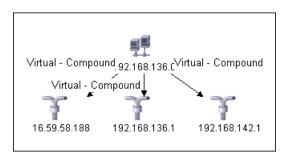
| Source | Relationship | Target |
|---------|--------------|--------|
| Network | Member | Host |
| Host | Contained | IP |

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

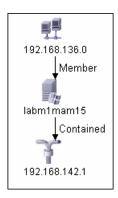
The TQL query in the editing pane now looks like this:



8 Go to the required view in IT Universe to view the results. If you did not select the **Show full path between source and target CIs** option, then the results display the names of the relationships that link the CIs as **Virtual-Compound** rather than the actual names of the relationships. See the illustration below:

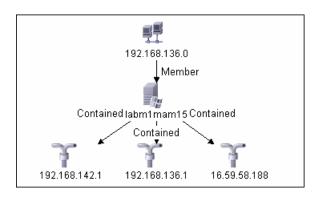


You can double-click the **Virtual - Compound** relationship in IT Universe to open the Link Map, which displays the CIs and relationships that comprise the allowed steps used to link the **Network** and **IP** CIs.



In the example above, the **192.168.136.0** (Network) CI is linked to the **192.168.142.1** (IP) CI through the **labm1mam15** (Host) CI.

If you did select the **Show full path between source and target CIs** option, then the results in IT Universe display the actual names of the relationships that link the CIs and the full path between the source and target CIs. See the illustration below:



🦒 Define a Join Relationship - Scenario

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

Note: To reach the required result, you must implement each one of the following steps.

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

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

Chapter 11 • Topology Query Language



- **3** Click the **Add** button to open the Join Relationship Condition dialog box and do the following:
 - ➤ In the Host Attribute box, select Created by.
 - ➤ In the **Operator** box, select **Equal**.
 - ➤ In the IP Attribute box, select Created by.
- **4** Click **OK** to save your changes.

The Join Definition area now looks like this.

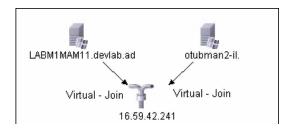
| Host | Operator | IP |
|------------|----------|------------|
| Created By | Equal | Created By |

5 Click **OK** to save your changes.

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



Go to the required view in IT Universe to view the results. Double-click the **Virtual - Join** relationship in IT Universe to open the Link Map (as seen below), which displays all the **Host** CIs that are connected to an **IP** CI whose **Created by** attribute values are equal.



🦒 Create a Subgraph Definition - Scenario

This section describes how to create a subgraph definition. In this example, the TQL query results retrieve all CIs that are connected to a host whose host's display label is <host display label> by either a **Container link** or a **Contained** relationship.

Note: To reach the required result, you must implement each one of the following steps.

To create this sample subgraph definition:

- **1** Create a TQL query and drag a **Host** node from the CI Type Selector onto the editing pane.
- **2** Right-click the **Host** node and select **Subgraph Definition** to open the Subgraph Definition dialog box.
- **3** Select the default subgraph definition that appears and delete it.



- **4** Click the **Add** button to open the Add Triplet dialog box and do the following:
 - ➤ From the **Source** list, select **IT Universe**.
 - ➤ From the **Target** list, select **IT Universe**.
 - ➤ From the **Relationship** list, select **Contained**.
- **5** Click **OK** to save your changes.



- **6** Click the **Add** button to open the Add Triplet dialog box and do the following:
 - ➤ From the **Source** list, select **IT Universe**.
 - ➤ From the **Target** list, select **IT Universe**.
 - ➤ From the **Relationship** list, select **Container link**.
- **7** Click **OK** to save your changes.



- **8** Click the **Add** button to open the Add Triplet dialog box and do the following:
 - ➤ From the **Source** list, select **IT Universe**.
 - ➤ From the **Target** list, select **IT Universe**.
 - ➤ From the **Relationship** list, select **Contains**.
- **9** Click **OK** to save your changes.

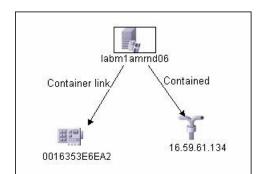
The Add Triplet dialog box now looks like this.



- **10** Click **OK** in the Subgraph Definition dialog box.
- **11** Right-click the **Host** node and select **Node Properties** to open the Node Properties dialog box.
- **12** Click the **Attribute** tab.
- **13** From the **Attribute Name** list, select **Display Label**.
- **14** From the **Operator** list, select **Equal**.
- **15** Select Fixed Value.
- **16** In the **Value** box, enter <host display label>.
- **17** Click **OK** to save your changes.

The Attribute tab now looks like this.





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

The results show that the **labm1amrnd06** (Host) CI is linked to the **16.59.61.134** (IP) CI by the **Contained** relationship and to the **0016353E6EA2** (Interface) CI by the **Container link** relationship.

Q 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 415. |
| Add Calculated Relationship | Enables you to create a calculated relationship. For details on how to create a calculated relationship, see "Triplets Page" on page 287. For details about Impact Modeling, see Chapter 12, "Impact Modeling." |

Chapter 11 • Topology Query Language

| GUI Element (A–Z) | Description |
|-----------------------|--|
| 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 422. |
| 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 420. |
| | 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 351. Added relationships are denoted by an added indicator. |

| GUI Element (A–Z) | Description |
|---------------------|--|
| Add Rule | 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: |
| | ➤ 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. |
| | Note: Only relevant for View Manager. |
| Add to Applications | 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 187. |
| | Note: Only relevant for View Manager. |
| Clear | 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 351. |
| | Appears only if you have updated or deleted a node/relationship using an Enrichment rule. |
| | Note: Only relevant for Enrichment Manager. |

Chapter 11 • Topology Query Language

| GUI Element (A–Z) | Description |
|--------------------------|--|
| Clear Contact Node | Changes the selected node from a contact node to a regular node. |
| | Note: Only relevant for perspectives in View Manager. |
| Clear Node Definition | Deletes the report definition for the selected Report node. For details, see "Topology Report Manager" on page 299. Note: Only relevant for Topology Report Manager. |
| Copy/Paste | Copy/paste an existing TQL node/relationship in the same query or into another TQL query. |
| | The copied TQL node/relationship includes all TQL definitions. |
| | 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. |
| | You can select multiple TQL nodes/relationships as well. |
| | Note : The Paste option is available only after using the Copy option to copy an existing TQL node/relationship. |
| Define Affected | 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 242. Note: Only relevant for Correlation Manager. |
| Delete | Deletes the selected node/relationship/CI. |
| | Note: This option is not available for calculated relationships. |

| GUI Element (A–Z) | Description |
|---------------------------------|--|
| Delete Relationship/Node | Available by right-clicking a node or relationship when working in Enrichment mode. |
| | 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 351. |
| | Deleted nodes and relationships are denoted by a removed indicator. |
| | Note: Only relevant for Enrichment Manager. |
| Edit Relationship Type | Displays the Edit Relationship Type dialog box. For details, see "Add/Edit Relationship Dialog Box" on page 420. |
| | Note: This option appears only when the selected relationship has descendants. |
| Node Order | 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 332. |
| | Note: Only relevant for Topology Report Manager. |
| Node/Relationship Definition | Displays the Grouping dialog box which enables you to group CIs in the topology map. For details, see "Node/Relationship Grouping Dialog Box" on page 216. Note: Only relevant for View Manager. |
| Node/Relationship Properties | 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 436. Note: This option is not available for calculated relationships. |

| GUI Element (A–Z) | Description |
|-----------------------------|--|
| Refine Node Type | 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 447. Note: This option only appears if a child of the CI type |
| | exists. |
| Remove from Applications | Click to remove a business service item from a business service view. For details, see "Link Nodes to Application CI" on page 187. |
| | Note: Only relevant for View Manager. |
| Remove Subgraph | Only appears if you have defined a subgraph. For details, see "Subgraph Definition Dialog Box" on page 451. |
| Report Node Definition | 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 330. |
| | Note: Only relevant for Topology Report Manager. |
| Reset Affected | Removes the Define Affected definition applied to that node. For details on the Define Affected definition, see "Affected Nodes Dialog Box" on page 242. |
| | Note: Only relevant for Correlation Manager. |
| Reset Inner Relationship | Redraws a self-referential relationship in the Topology map as a square for ease of viewing. |
| | Note: Only relevant for self-referential relationships which are not square. |
| Set As Contact Node | Designates the selected node as a contact node for the perspective. |
| | Note: Only relevant for perspectives in View Manager. |

| GUI Element (A–Z) | Description |
|--------------------------------|---|
| Set View Element Parameters | Appears only when a parameterized condition is defined for the selected CI. |
| | 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 220. |
| | Note: Only relevant for View Manager and Topology Report. |
| Show Element's instances | 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 429. |
| Straighten | Straightens the relationship between two nodes. This option is only available for relationships that have angles. |
| Subgraph Definition | Displays the Subgraph Definition dialog box, where you can create a graph that represents additional TQL query data related to a specific node. For details, see "Subgraph Definition Dialog Box" on page 451. |
| TQL Node Wizard | Displays the TQL Node Wizard dialog box which enables you to build a TQL query. For details, see "TQL Node Wizard" on page 453. |
| Update Relationship/Node | 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 372. This is applicable for both regular and Enrichment nodes. Updated nodes are denoted by an updated indicator. Note: Only relevant for Enrichment Manager. |

Nattribute Operator Definitions

This section contains a list of operators used to define attribute conditions in various dialog boxes, such as the Subgraph Condition dialog box, the Add Relationship dialog box, Correlation Definition dialog box, or the Node/Relationship Properties dialog box.

| Operator | Description |
|-----------------------|--|
| Changed during | (Displayed only when you select the Create Time attribute.) Displays only the instances that changed during the period specified in the Value comparison box. |
| Equal | Checks whether the attribute value is equal to the value specified in the Value Comparison box. |
| Equal ignore case | Checks whether the attribute value is equal to the value specified in the value box regardless of the case. |
| Greater than or equal | Checks whether the attribute value is greater than or equal to the value specified in the Value comparison box. |
| Greater | Checks whether the attribute value is greater than the value specified in the Value comparison box. |
| In | Displays only the instances where this attribute value equals one of the selected values. For example, for CIs that have a Change state that equals Plan and New, select the operator In from the Operator list and select both Plan and New from the Value box. |
| In list | Equals one of the elements that appears in the list. For example: 320,4445,3483. |
| Is null | Checks whether the attribute value is null. |
| Less | Checks whether the attribute value is less than the value specified in the Value comparison box. |

| Operator | Description |
|--------------------|--|
| Less than or equal | Checks whether the attribute value is less than or equal to the value specified in the Value comparison box. |
| Like | Uses a wildcard (%). Use Like when you are not sure of the complete name for which you are searching. |
| Like ignore case | Uses a wildcard (%). Use Like ignore case when you are not sure of the complete name for which you are searching. The case of the string is ignored. |
| Not equal | Checks whether the attribute value is not equal to the value specified in the Value Comparison box. |
| Unchanged during | (Displayed when you select a date type attribute.) Displays only the instances that did not change during the period specified in the Value comparison box. |

Note:

- ➤ For **Not equal** or **Not like** operators, query results do not include data from the CI instances that are not assigned a value. For example, a system contains three hosts: Host1 is assigned the value A, Host2 is assigned the value B, and Host3 is not assigned a value. If you create a query to retrieve all hosts that are **Not equal** to A, the results of your query include Host2 only, because Host3 is not assigned a value.
- ➤ HP Business Availability Center supports both Microsoft SQL Server and Oracle Server servers. Microsoft SQL Server is not case sensitive by default (unlike Oracle Server which is case sensitive). Consequently, if you are using Microsoft SQL Server, the Equal operator retrieves the same query results as the Equal ignore case operator. For example, if you select the attribute City, the operator Equal, and type NEW YORK in the Value comparison box, case differences are ignored and query results include NEW YORK, New York and new york.

10 TQL Logs

This section contains definitions for TQL parameter log files.

This section includes the following topics:

- ➤ "Pattern Log" on page 402
- ➤ "Pattern Statistics Log" on page 403
- ➤ "Audit Short/Detailed Log (TQL Perspective)" on page 404
- ➤ "Incremental Statistics Log" on page 404
- ➤ "Incremental Splitter Log" on page 405
- ➤ "Incremental Detailed Log" on page 406

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: |
| | ➤ status changes |
| | ➤ model changes |
| | ➤ query changes |
| | ➤ completed calculations |

| Log File | Description |
|-----------------|--|
| Basic | Check if a TQL query has the same status for a long time: |
| Troubleshooting | ➤ new – the query is in lazy loading |
| | ➤ inactive |
| | ➤ calculation – the calculation may have failed but the scheduler was not informed |
| | You can also view the number of notifications that a TQL received. |

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: ➤ 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 | Verify that a specific TQL was updated. Evaluate a TQL's calculation time. Evaluate a TQL's result size. |

Audit Short/Detailed Log (TQL Perspective)

The log name is **cmdb.audit.short.log**.

| Log File | Description |
|--------------------------|---|
| Purpose | CMDB state changes, CI Type changes, and TQL results. You can use this log to follow the results of TQL queries. |
| Information Level | Not available. |
| Error Level | Not available. |
| Debug Level | 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 | Use this log to verify which notifications are published by the TQL subsystem. Check the section at the end of each result. This section includes added, removed, and updated CIs and relationships. Track the CIT changes and see if the query results also change. You can thus correlate the CIT changes to the results of the query calculations. |

Incremental Statistics Log

The log name is **cmdb.incremental.statistics.log**.

| Log File | Description |
|----------------------|--|
| Purpose | Traces the calculation procedure, full or incremental, of every query. |
| Information Level | Not available. |

| Log File | Description |
|--------------------------|--|
| Error Level | Not available. |
| Debug Level | 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 | Monitors the calculation process. If a specific query calculation takes a long time, check if it is a full or incremental calculation: 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: ➤ 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 | Туре | Value Description | Change Value? (Y/N) |
|-----------------------|--|---------|-------------------|------------------------|
| tql.threads.pool.size | 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 | Туре | Value Description | Change Value? (Y/N) |
|---|---|---------|--|------------------------|
| tql.scheduler.timer.t ime | 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.statisti cs.logupdate.interva l.time.millisec | The interval between updates of cmdb.pattern.statistic s.log. | long | Value is in milliseconds. | N |
| tql.resultrepository.t imer.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.patter ntakeover.timeout | | | 10000 | |
| tql.resultutils.adhoc .validate | Defines whether to perform pattern validation of ad hoc TQLs. | Boolean | true. Perform pattern validation. false. Do not perform pattern validation. | N |
| tql.resultutils.chunk .maxresultsize | 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 |

Chapter 11 • Topology Query Language

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|---|--|---------|----------------------|------------------------|
| tql.resultutils.chunk .maxnotificationsiz e | 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.seco nds | 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.conditionstatisti cs.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.fai l.retries | Number of times to recalculate a TQL before the status is set to Fail. | integer | | N |
| tql.statemachine.fai l.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 | Туре | Value Description | Change Value? (Y/N) |
|---|--|---------|-------------------|------------------------|
| tql.scheduler.statisti cs.maxcalculation | The maximum number of a TQL's recent calculations stored in the Scheduler statistics. | integer | | N |
| tql.group.all.active. | Maximum number of active TQLs | integer | | N |
| tql.group.collectors. active.count | permitted per customer in the appropriate group: all, collectors, view, topology, report, server data, path manager, and internal | | | |
| tql.group.view.activ e.count | | | | |
| tql.group.topology.a ctive.count | | | | |
| tql.group.report.acti ve.count | enrichment. The name of the | | | |
| tql.group.serverdata .active.count | group is found in the name of the parameter after | | | |
| tql.group.pathmana ger.active.count | tql.group. | | | |

Chapter 11 • Topology Query Language

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|--|--|---------|--|------------------------|
| tql.group.all.result.s ize | The maximum number of CIs held | integer | Values are assigned | N |
| tql.group.collectors. result.size | in a TQL result before the TQL is deactivated. | | according to TQL group: all, collectors, view, | |
| tql.group.view.resul t.size | | | topology, report, server data, path | |
| tql.group.topology.r esult.size | | | manager, and internal enrichment. | |
| tql.group.report.res ult.size | | | | |
| tql.group.serverdata .result.size | | | | |
| tql.group.pathmana ger.result.size | | | | |
| EXPRESS_PRIORITY. Min.CalculationTim eInterval | Minimum length of time to wait until a full calculation is | long | ➤ Value is in milliseconds.➤ Value is defined | N |
| HIGH_PRIORITY.Mi n.CalculationTimeI nterval | performed for some TQL query. The results are | | for each TQL priority. | |
| MED_PRIORITY.Mi n.CalculationTimeI nterval | updated after calculation. | | | |
| LOW_PRIORITY.Mi n.CalculationTimeI nterval | | | | |

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|---|--|------|--|------------------------|
| EXPRESS_PRIORITY. Max.CalculationTi meInterval | Maximum length of time to wait until a full calculation is | long | Value is in milliseconds.Value is defined | N |
| HIGH_PRIORITY.Ma x.CalculationTimeI nterval | performed for a TQL query. The results are updated after | | for each TQL priority. | |
| MED_PRIORITY.Ma x.CalculationTimeI nterval | calculation. | | | |
| LOW_PRIORITY.Ma x.CalculationTimeI nterval | | | | |
| EXPRESS_PRIORITY. Min.EventArrivalTi meInterval | 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 | long | ➤ Value is in milliseconds.➤ Value is defined | N |
| HIGH_PRIORITY.Mi n.EventArrivalTimeI nterval | | | for each TQL priority. | |
| MED_PRIORITY.Mi n.EventArrivalTimeI nterval | | | | |
| LOW_PRIORITY.Mi n.EventArrivalTimeI nterval | this value. | | | |

Chapter 11 • Topology Query Language

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|--|--|------|---|------------------------|
| EXPRESS_PRIORITY. Max.EventArrivalTi meInterval | The maximum length of time to wait after the last | long | ➤ Value is in milliseconds.➤ Value is defined | N |
| HIGH_PRIORITY.Ma x.EventArrivalTimeI nterval | event arrives before starting a full calculation. A full calculation is started | | for each TQL priority. | |
| MED_PRIORITY.Ma x.EventArrivalTimeI nterval | if this value is reached. | | | |
| LOW_PRIORITY.Ma x.EventArrivalTimeI nterval | | | | |
| EXPRESS_PRIORITY. Max.EventArrivalTi meIntervalForImme diate | The maximum length of time to wait after the last event arrives before | long | ➤ Value is in milliseconds.➤ Value is defined for each TQL | N |
| HIGH_PRIORITY.Ma x.EventArrivalTimeI ntervalForImmediat e | starting an immediate calculation. An immediate calculation is started | | priority. | |
| MED_PRIORITY.Ma x.EventArrivalTimeI ntervalForImmediat e | no later than this value. | | | |
| LOW_PRIORITY.Ma x.EventArrivalTimeI ntervalForImmediat e | | | | |

| Parameter Name | Parameter Description | Туре | Value Description | Change Value? (Y/N) |
|--|---|---------|---|------------------------|
| EXPRESS_PRIORITY. Min.PendingEvents Amount | Minimum number of events to accumulate to start | integer | Value is defined for each TQL priority. | N |
| HIGH_PRIORITY.Mi n.PendingEventsAm ount | a full calculation. A full calculation is not started if the number of pending | | | |
| MED_PRIORITY.Mi n.PendingEventsAm ount | events for some TQL is less than this value. | | | |
| LOW_PRIORITY.Mi n.PendingEventsAm ount | | | | |
| EXPRESS_PRIORITY. Max.PendingEvents Amount | Maximum number of events to accumulate to start | integer | Value is defined for each TQL priority. | N |
| HIGH_PRIORITY.Ma x.PendingEventsAm ount | 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. | | | |
| MED_PRIORITY.Ma x.PendingEventsAm ount | | | | |
| LOW_PRIORITY.Ma x.PendingEventsAm ount | | | | |

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

Topology Query Language User Interface

This section describes:

- ➤ Add Compound Relationship Dialog Box on page 415
- ➤ Add Calculated Relationship Dialog Box on page 419
- ➤ Add/Edit Relationship Dialog Box on page 420
- ➤ Add Join Relationship Dialog Box on page 422
- ➤ Add Triplet Dialog Box on page 425
- ➤ Element Instances Dialog Box on page 429
- ➤ Filter CI Instances Dialog Box on page 432
- ➤ Join Relationship Condition Dialog Box on page 433
- ➤ Layout Settings Dialog Box on page 435
- ➤ Node/Relationship Properties Dialog Box on page 436
- ➤ Refine Node Type Dialog Box on page 447

- ➤ Select Relationship Type Dialog Box on page 448
- ➤ Subgraph Condition Definition Dialog Box on page 449
- ➤ Subgraph Definition Dialog Box on page 451
- ➤ TQL Node Wizard on page 453
- ➤ User Preferences Dialog Box on page 461

🍳 Add Compound Relationship Dialog Box

| Description | Enables you to define the connection between two nodes using a compound relationship. |
|--------------------------|--|
| | To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: |
| | Right-click the required node in the editing pane in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, View Manager and select Add Compound Relationship. |
| | Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Add Relationship option. |
| | To access in Manage Discovery Resources in Discovery and Dependency Mapping (DDM): 1 Select a pattern in the Discovery Resources pane. |
| | 2 In the Pattern Signature tab, click the ② 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 . |
| Important Information | You can create as many compound definitions as necessary. |

| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Create a TQL Query" on page 339 ➤ "Create a Pattern View" on page 198 ➤ "Implement a Pattern" in Discovery and Dependency Mapping Guide. |
|-------------------|--|
| Useful Links | "Compound Relationship" on page 380 "Define a Compound Relationship - Scenario" on page 386 |

| GUI Element (A-Z) | Description |
|--|--|
| * | Add a compound definition. Opens the Add Triplet dialog box. |
| × | Delete the selected compound definition. |
| 0 | Edit the selected compound definition. Opens the Add Triplet dialog box. |
| Show full path between source and target CIs | If you select this option, then the query results display the actual names of the relationships that link the CIs and the full path between the source and target CIs. |
| Max steps | The longest path allowed between the two CIs in the CMDB to be included in the discovery process. Default is: 5 |
| Min steps | The shortest path allowed between the two CIs in the CMDB to be included in the discovery process. |
| | Default is: 1 |
| Relationship | The relationship connecting the two nodes. |
| Relationship Direction | The direction of the relationship that indicates which node is dependent on the other. |

| GUI Element (A-Z) | Description |
|------------------------------|--|
| Relationship Restrictions | Select an option to define how to handle relationships between identical nodes or self relationships in the query results. A self relationship is a relationship that leads from a node to itself. |
| | Note: This list appears only when you select one node or two identical nodes. |
| | ➤ 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 | Select this option if you want the system to stop looking for TQL results once it reaches the first target in the path. |
| | In the following sample compound link definition, Depth is defined as 10 and Stop at first compound level is selected. |
| | Source Target 2 Target 2 Target 3 |
| | 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). |

Chapter 11 • Topology Query Language

| GUI Element (A-Z) | Description |
|-------------------|--|
| Target | The required target node. |
| Visible | Select Visible to include query results relating to a join or compound relationship. By default, Visible is selected. When Visible is cleared, a box appears to the left of the of the relationship's name in the editing pane, denoting that any query results pertaining to the relationship are not displayed in the topology map. |

Add Calculated Relationship Dialog Box

| Description | Enables you to define the connection between two nodes using a calculated relationship from the CI Type model. |
|-------------------|--|
| | To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: ➤ Right-click the required node in the editing pane in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, View Manager and select Add Calculated Relationship. |
| | Note : If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Add Relationship option. |
| | To access in Manage Discovery Resources in Discovery: 1 Select a pattern in the Discovery Resources pane. 2 In the Pattern Signature tab, click the Edit Input TQL button to the right of the Input TQL box to open the Input TQL Editor. 3 Right-click the required node and select Add Calculated Relationship. |
| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Create a TQL Query" on page 339 ➤ "Create a Pattern View" on page 198 ➤ "Implement a Pattern" in Discovery and Dependency Mapping Guide. |
| Useful Links | ➤ Chapter 12, "Impact Modeling" ➤ "CI Type Relationships" on page 264 |

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

| GUI Element (A-Z) | Description |
|---|--|
| <list calculated="" of="" relationships<="" th=""><th>Select the calculated relationship that defines the connection between two nodes.</th></list> | Select the calculated relationship that defines the connection between two nodes. |
| Relationship Direction | The direction of the relationship that indicates which node is dependent on the other. |

Add/Edit Relationship Dialog Box

| Description | Enables you to define the connection between two nodes in a query. |
|-------------|--|
| | To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: ➤ Right-click the required node in the editing pane in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, View Manager and select Add Relationship. |
| | or ➤ Click the Create Relationship icon and draw a line between the required nodes. |
| | Note : If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Add Relationship option. |
| | To access in Manage Discovery Resources in Discovery: 1 Select a pattern in the Discovery Resources pane. 2 In the Pattern Signature tab, click the |
| | 3 Right-click the required node and select Add Relationship . |

| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Create a TQL Query" on page 339 ➤ "Create a Pattern View" on page 198 ➤ "Implement a Pattern" in Discovery and Dependency Mapping Guide. |
|--------------------------|--|
| Important Information | This option does not appear when two selected nodes (or a single selected node) do not have a valid relationship between them. |

| GUI Element (A-Z) | Description |
|---|---|
| <list of="" relationships<br="">from which to choose></list> | 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 | Select an option to define how to handle relationships between identical nodes or self relationships in the query results. A self relationship is a relationship that leads from a node to itself. |
| | Note: This list appears only when you select one node or two identical nodes. |
| | Allow All Relationships. All relationships appear in the query results. Allow Self Relationships only. Only self-relationships (a relationship that leads to itself) appear in the query results. Allow Non Self Relationships only. Self-relationships do not appear in the query results. |

Add Join Relationship Dialog Box

| Description | Enables you to define join relationships. |
|-------------------|--|
| | To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: |
| | Right-click the required nodes in the editing pane in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, View Manager and select Add Join Relationship. |
| | Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Add Relationship option. |
| | To access in Manage Discovery Resources in Discovery: 1 Select a pattern in the Discovery Resources pane. |
| | 2 In the Pattern Signature tab, click the ② 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 | "Define a Report Rule – Scenario" on page 300 "Define a Correlation Rule – Workflow" on page 235 "Define an Enrichment Rule – Scenario" on page 354 "Create a TQL Query" on page 339 "Create a Pattern View" on page 198 "Implement a Pattern" in Discovery and Dependency Mapping Guide. |
| Useful Links | "Join Relationship" on page 381 "Define a Join Relationship - Scenario" on page 389 |
| | Define a join Relationship - Seemano on page 309 |

| GUI Element (A-Z) | Description |
|--------------------------------|--|
| 4 | Define a join definition. Opens the Join Relationship Condition dialog box. |
| × | Delete the selected join definition. |
| 0 | Edit the join definition. Opens the Join Relationship Condition dialog box. |
| <selected node1=""></selected> | A selected node. The first attribute applies to <end_1>.</end_1> |
| <selected node2=""></selected> | A selected node. The second attribute applies to <end_2>.</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 400. |
| Relationship Direction | The direction of the relationship that indicates which node is dependent on the other. |

Chapter 11 • Topology Query Language

| GUI Element (A-Z) | Description |
|------------------------------|---|
| Relationship Restrictions | Select an option to define how to handle relationships between identical nodes or self relationships in the query results. A self relationship is a relationship that leads from a node to itself. |
| | Note: This list appears only when you select one node or two identical nodes. |
| | ➤ Allow All Relationships. All relationships appear in the query results. |
| | ➤ Allow Self Relationships only. Only self-relationships (a relationship that leads to itself) appear in the query results. |
| | ➤ Allow Non Self Relationships only. Self-relationships do not appear in the query results. |
| Visible | 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 papears 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. |
| | Host EVirtual - Join |

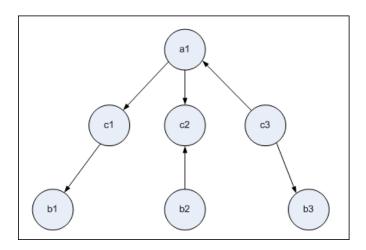
Name Add Triplet Dialog Box

| Description | Enables you to define the allowed steps in a path in the topology graph leading from the source CI to the target CI when creating a subgraph definition, a compound relationship, or a calculated relationship Select the nodes and relationships to be included in the |
|-------------------|--|
| | topology graph. |
| | To access: |
| | ➤ In the Add Compound Relationship dialog box, click the Add → button. For details, see "Add Compound Relationship Dialog Box" on page 415. |
| | ➤ In the Subgraph Definition dialog box, click ♣ Add. For details, see "Subgraph Definition Dialog Box" on page 451. |
| | ➤ In CI Type Manager, select Calculated Relationships from the drop-down list in the CI Types pane. In the main window, select the Triplets page and then click Add. |
| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 |
| | ➤ "Define a Correlation Rule – Workflow" on page 235 |
| | "Define an Enrichment Rule – Scenario" on page 354 "Create a TQL Query" on page 339 |
| | ➤ "Create a Pattern View" on page 198 |
| | ➤ "Implement a Pattern" in <i>Discovery and Dependency Mapping Guide</i> . |
| Useful Links | ➤ "Compound Relationship" on page 380 |
| | ➤ "Define a Compound Relationship - Scenario" on page 386 |
| | ➤ "Subgraph Definition" on page 382 |

| GUI Element (A-Z) | Description |
|---------------------------|---|
| 0 | Define attribute conditions for the source and target nodes you selected. Opens the Subgraph Condition Definition dialog box. |
| | The Condition button is enabled only after you select a node from the Source or Target lists. |
| | Note : You cannot define attribute conditions for the source and target nodes in the CI Type Manager. |
| Relationship | Select an available relationship connecting the two nodes. The list of available relationships appears only after defining both nodes. |
| Relationship Direction | 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 427. |
| | Note : The Relationship list remains empty until you have selected a source and target. |
| Source | Select the required source node. |
| Target | Select the required target node. |

Setting Different Relationship Directions for Compound Definitions

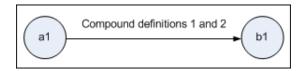
You can achieve different TQL results by setting different relationship directions. For example, in your business world, as illustrated below, you want to create a compound relationship that connects between a node of the CIT **a** and a node of the CIT **b**. Depth is defined at **5** (for details, see "Depth" on page 452).



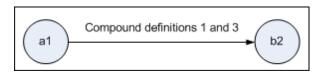
In the Add Triplet dialog box, you can create compound definitions to link nodes **a** and **b** using different relationship directions.

| Compound Definition | Source | Target | Relationship | Relationship Direction |
|------------------------|---------------|---------------|-------------------------------|---------------------------|
| #1 | node a | node c | <relationship></relationship> | source> target |
| #2 | node c | node b | <relationship></relationship> | source> target |
| #3 | node c | node b | <relationship></relationship> | source < target |

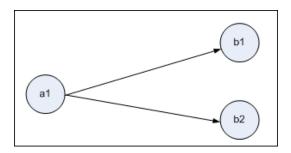
➤ Compound definitions 1 and 2 result in the following query:



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



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



Element Instances Dialog Box

| Description | Displays all of the CI instances found for the selected TQL node in a table. |
|--------------------------|--|
| | To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: In the editing pane, right-click the required node and select Show Element's Instances. |
| | 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. |
| | To access in Manage Discovery Resources in Discovery: Select a pattern in the Discovery Resources pane. 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. Right-click the required node and select Show Element's Instances. |
| Important Information | The columns in the report display the attributes of the selected CI type. The attributes displayed vary according to the CI type selected. |
| | By default, only columns corresponding to attributes that have been defined with the Asset Data, Change Monitored, and Comparable attribute qualifiers in the CIT Manager are displayed as columns in the dialog box. For details, see "Attributes Page" on page 283. |
| | If required, you can click the Display Hidden Columns button to display the attributes that are defined as Visible but not Static. For details on Static attributes, see "Attributes Page" on page 283. |
| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Create a TQL Query" on page 339 ➤ "Create a Pattern View" on page 198 |

| GUI Element (A–Z) | Description |
|------------------------------|---|
| Show Clinstances of: Network | Specify the CIT you want displayed in the table. The table also includes the children of the selected CIT. |
| | Click Show CI Properties to open the Configuration Item Properties dialog box for the selected CI. |
| 0 | Click to refresh the list of CI instances. |
| 7 | Filters the CI instances you want to display for the selected node. Opens the Filter CI Instances dialog box. |
| X | Clears the filter definitions you created in the Filter CI Instances dialog box. |
| | Enables you to select the columns to be displayed. For details, see, "Select Columns Dialog Box" in <i>Reference Information</i> . |
| E | Enables you to set the order of the visible columns. For details, see, "Sort Column Content Dialog Box" in <i>Reference Information</i> . |

| GUI Element (A–Z) | Description |
|----------------------------------|---|
| Export → | Choose the export format for the table data. The available options are: |
| | ➤ Excel. The table data is formatted as an .xls (Excel) file that can be displayed in a spreadsheet. |
| | ➤ PDF. The table data is exported in PDF format. |
| | ➤ RTF. The table data is exported in Rich Text Format. |
| | ➤ CSV. The table data is formatted as a comma-separated values (CSV) text file that can be displayed in a spreadsheet. |
| | Note: For the CSV formatted table data to display correctly, the comma (,) must be defined as the list separator. In Windows, to verify or modify the list separator value, open Regional Options from the Control Panel, and on the Numbers tab ensure that the comma is defined as the List Separator value. In Solaris, you can specify the list separator in the application that opens the CSV file. |
| | ➤ XML. The table data is formatted as an XML file that can be opened in a text or XML editor. Tip: To extract HTML code from the report: |
| | ➤ Save the file as HTML |
| | ➤ Open the file in an HTML editor |
| | ➤ Copy the relevant table into the target file |
| | Note: This option is displayed in Text mode only. |
| 30 | Select the number of rows to be displayed. |
| □ 3 of 16528 □ □ | Click to navigate through the results page by page or to jump to the first or last page. |
| <element instances=""></element> | The CI instances found for the selected TQL node. |
| | You can double-click an instance to open the Configuration Item Properties dialog box for that CI. |
| <toolbar></toolbar> | For details, see "Toolbar Options" on page 749 |

| GUI Element (A–Z) | Description |
|---|---|
| <element instances<br="">context (right-click) menu></element> | For details, see "IT Universe Manager Context Menu" on page 95. |
| Display Label | The name of the CI instance as it appears in the topology map. |

Filter CI Instances Dialog Box

| Description | 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. |
|-------------------|---|
| | A description of the filter condition you defined appears above the table columns in the Element Instances dialog box. For example, the following illustration shows that a filter condition was created to display only CI instances whose CI type is Windows . |
| | Filter: Cl Type[Equal nt]; Display Label Cl Type VMXPUKR01 Windows |
| | To access: |
| | ➤ Click the Filter button in the Element Instances dialog box. |
| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 |
| | ➤ "Define a Correlation Rule – Workflow" on page 235 |
| | ➤ "Define an Enrichment Rule – Scenario" on page 354 |
| | ➤ "Create a TQL Query" on page 339 |
| | ➤ "Create a Pattern View" on page 198 |
| | "Implement a Pattern" in Discovery and Dependency Mapping Guide. |

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

| GUI Element (A-Z) | Description |
|-------------------|--|
| Attribute | Displays all the attributes of the CI type to which the CI belongs. |
| Condition | Select the required operator. For details, see "Attribute Operator Definitions" on page 400. |
| Value | Select or enter the required value. |

Join Relationship Condition Dialog Box

| Description | Enables you to define the connection between two nodes using a join relationship. The join definition appears in the Join Definition area. To access: Click the Add button in the Add Join Relationship dialog box. |
|-------------------|--|
| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Create a TQL Query" on page 339 ➤ "Create a Pattern View" on page 198 ➤ "Implement a Pattern" in Discovery and Dependency Mapping Guide. |

| GUI Element (A-Z) | Description |
|--------------------------------|--|
| <selected node1=""></selected> | A selected node. The first attribute applies to <end_1>.</end_1> |

Chapter 11 • Topology Query Language

| GUI Element (A-Z) | Description |
|--------------------------------|---|
| <selected node2=""></selected> | A selected node. The second attribute applies to <end_2>.</end_2> |
| Operator | Select one of the following operators: |
| | ➤ 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. |
| | 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. |

Layout Settings Dialog Box

| Description | Enables you to determine which attributes are used in the calculation of the TQL query when using the UCMDB API. For details, see "The HP Universal CMDB Web Service API" on page 325 in <i>Solutions and Integrations</i> . To access: Click Advanced layout settings in the Node/Relationship Properties dialog box. |
|--------------------------|--|
| Important Information | ➤ 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 | "Define a Report Rule – Scenario" on page 300 "Define a Correlation Rule – Workflow" on page 235 "Define an Enrichment Rule – Scenario" on page 354 "Create a TQL Query" on page 339 "Create a Pattern View" on page 198 "Implement a Pattern" in Discovery and Dependency Mapping Guide. |

| 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

| Description | Enables you to define the attribute conditions for the selected TQL node/relationship. |
|-------------------|--|
| | To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: In the editing pane, right-click the required node and select Node/Relationship Properties. |
| | Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Node Properties option. |
| | To access in Discovery: 1 To access from the Discovery Resources pane, select a pattern. In the Pattern Signature tab, click the |
| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Create a TQL Query" on page 339 ➤ "Create a Pattern View" on page 198 ➤ "Implement a Pattern" in Discovery and Dependency Mapping Guide. |

| GUI Element (A-Z) | Description |
|--------------------------|--|
| Advanced layout settings | 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. |
| | Opens the Layout Settings dialog box. |
| Element name | (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. |
| Include subtypes | Select to display both the selected CI and its children in the topology map. |
| Visible | Select Visible to display the selected TQL node in the editing pane. When this option is cleared, an invisible box appears to the right of the selected TQL node in the editing pane. Windows 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. |

Attribute Tab

| Description | Enables you to create an expression defining conditions that restrict the number of nodes that appear in the query. Add an attribute condition to a node or relationship. Filter the query results. To access: 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 | ➤ "Define a Report Rule – Scenario" on page 300 ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Create a TQL Query" on page 339 ➤ "Create a Pattern View" on page 198 ➤ "Implement a Pattern" in Discovery and Dependency Mapping Guide. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| + | Add the attribute condition you have defined. |
| × | Delete an attribute definition. |
| ightharpoons | Move a selected row up. |
| U | Move a selected row down. |
| Q | View the condition definition. |
| And/Or | Click inside the And/Or field and select either And or Or to link multiple conditions. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| Attribute name | Choose an attribute from the list. |
| Brackets | Click inside the Brackets box to display a list of brackets you can use to build more complex, logical statements. |
| Criteria | Contains the attribute condition definition as defined in the Element Instances dialog box. |
| Fixed value | Select one of the following options: |
| | Fixed value . You cannot change the value of the parameter. |
| | Parameterized value . Enables you to change the value of the parameter. |
| | ➤ 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 435. 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. |
| | ➤ When a parameterized value is selected in Topology Report Manager, a Set parameters values option is displayed at the top right of a generated Topology report, enabling you to edit the predefined parameters of node conditions in a Topology report. For details, see "Topology Report" on page 607. |
| Not | Select NOT if you want the condition statement to do the opposite of what is defined. |
| | Note : If you select NOT , query results do not include data from the CI instances that were not assigned a value. For example, your system contains three hosts: Host1 is assigned the value A, Host2 is assigned the value B and Host3 is not assigned a value. You create a query to retrieve all hosts that are equal to A and select NOT ; the results of your query only include Host2 because Host3 is not assigned a value. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Operator | Select the required operator. For details, see "Attribute Operator Definitions" on page 400. |
| Update | Update an attribute condition that has been modified. |
| Value | Enter or select the value of the attribute. The Value options vary according to the attribute type you select. |

Cardinality Tab

| Description | 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. |
|--------------------------|--|
| | 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. |
| | 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 442. |
| | To access: Click the Cardinality tab in the Node/Relationship Properties dialog box. |
| Important Information | This tab appears only when a node is selected. |
| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Create a TQL Query" on page 339 ➤ "Create a Pattern View" on page 198 ➤ "Implement a Pattern" in Discovery and Dependency Mapping Guide. |

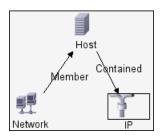
| GUI Element (A-Z) | Description |
|-------------------|--|
| 4 | Add the cardinality definition you have defined. |
| × | Delete a cardinality definition from the Cardinality area. |
| 1 | Move a selected row up. |
| ψ | Move a selected row down. |
| Q | View the cardinality condition definition. |
| And/Or | Click inside the And/Or field and select either And or Or to link multiple conditions. |
| Brackets | Click inside the Brackets box to display a list of brackets you can use to build more complex, logical statements. |
| Criteria | Contains the attribute condition definition as defined in the Element Instances Dialog Box. |
| Max | Enter the value that defines the upper limits for including the node at the other end of the relationship in the query results. |
| | Note : You can use an asterisk (*) in the Max box to represent an infinite value. |
| Min | Enter the value that defines the lower limits for including the node at the other end of the relationship in the query results. |
| | For example, if <end_1> is IP and <end_2> is Windows, entering 1 in the Min box and asterisk (*) in the Max box instructs the system to retrieve only those IPs that are connected to at least one Windows operating system. (The asterisk indicates an infinite value.) Entering 3 in the Min box and asterisk (*) in the Max box instructs the system to retrieve only those Windows operating systems that are connected to at least three IPs.</end_2></end_1> |

Chapter 11 • Topology Query Language

| GUI Element (A-Z) | Description |
|-------------------|--|
| Node | Select the required relationship to which the selected node is attached. The list contains all the relationships that are linked to the selected node. |
| Not | Select NOT if you want the condition statement to do the opposite of what is defined. |
| | Note : If you select NOT , query results do not include data from the CI instances that were not assigned a value. For example, your system contains three hosts: Host1 is assigned the value A, Host2 is assigned the value B and Host3 is not assigned a value. You create a query to retrieve all hosts that are equal to A and select NOT ; the results of your query only include Host2 because Host3 is not assigned a value. |
| Update | Update a cardinality definition that has been modified. |

Example of a Relationship Condition

The example of relationship conditions is based on the following TQL query:



In the Relationship Cardinality dialog box, the following relationship conditions are defined for the TQL:

➤ Member – Min: 1, Max: *

➤ Contained – Min: 2, Max: 4

Using the OR operator, the definitions appear in the **Cardinality** section, as follows:



➤ [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:



➤ [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 | 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. To access: Click the Qualifier tab in the Node/Relationship Properties dialog box. |
|--------------------------|--|
| Included in Tasks | "Define a Report Rule – Scenario" on page 300 "Define a Correlation Rule – Workflow" on page 235 "Define an Enrichment Rule – Scenario" on page 354 "Create a TQL Query" on page 339 "Create a Pattern View" on page 198 "Implement a Pattern" in Discovery and Dependency Mapping Guide. |
| Important Information | Important : By default, multiple selection links the conditions with the OR operator. |

Chapter 11 • Topology Query Language

| GUI Element (A-Z) | Description |
|-------------------|--|
| ABSTRACT_CLASS | You cannot create instances of this CIT. |
| BLE_LINK_CLASS. | A relationship that has been assigned this qualifier is loaded by an online BLE engine TQL and becomes part of the Dashboard status calculations. |
| CONTAINER | This qualifier is assigned to relationships that signify a containment relationship, such as Member, Container link, Contains, or Contained. |
| HIDDEN_CLASS | Instances of this CIT do not appear anywhere in the application. |
| ITU_HIDDEN_CLASS | Instances of this CIT do not appear in the topology map application. |
| MAJOR_APP | CI types that are assigned this qualifier appear in the Major Application Type Breakdown overview report. For details, see "Major Application Type Breakdown Report" on page 625. |
| MODELING_ENABLED | Enables a CIT to act as model in Modeling Studio. For details, see "Business CI Models" on page 132. |
| NETWORK_DEVICES | A qualifier common to all the CI types that represent a network device. It can be used for TQL queries related to network devices and serves as a replacement for CI types in a query. |
| Negate Qualifiers | If this check box is selected, then multiple selection links the conditions with the AND operator. |
| PM_SUSPECT | Used by Problem Isolation to determine which CIs are to be considered as suspects when isolating a problem. For details, see "Problem Isolation Reactive Analysis" in <i>Using Problem Isolation</i> . |
| ProtocolDialog | For internal use only. |
| ProtocolFields | For internal use only. |

| GUI Element (A-Z) | Description |
|--------------------|--|
| READ_ONLY_CLASS | This CIT cannot be edited. |
| TRACK_LINK_CHANGES | Changes that occur in the specified relationship appear in Change reports. For details, see "Change Report" on page 601. |

Identity Tab

| Description | Enables you to filter the TQL results according to the element ID of the instances found for the selected TQL node. |
|-------------------|--|
| | Move the required element from the Optional identities pane on the left to the Selected identities pane on the right to define what you want included in the TQL results using the left and right arrows. |
| | To access : Click the Identity tab in the Node Properties dialog box. |
| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Create a TQL Query" on page 339 ➤ "Create a Pattern View" on page 198 ➤ "Implement a Pattern" in Discovery and Dependency Mapping Guide. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| 7 | Filter the CI instances you want to display for the selected node. Opens the Filter CI Instances dialog box. |
| T _k | Clear the filter definitions you created in the Filter CI Instances dialog box. |
| | Hide or display specific columns. For details, see "Select Columns Dialog Box". |

| GUI Element (A-Z) | Description |
|--------------------------|--|
| 9 | Update the table. |
| □ 3 of 16528 □ □ | Click to navigate through the results page by page or to jump to the first or last page. |
| Optional identities pane | Displays all the instances found for the selected TQL node. For details, see "Optional Identites Pane" on page 446. |
| Selected identites pane | Displays the elements that are used to define what should be included in the TQL results. For details, see "Selected Identities Pane" on page 446. |
| Set Rows per Page | Determine the number of CI instances that appear on a page. |

Optional Identites Pane

| Description | Displays all the instances found for the selected TQL node in a table. |
|-------------|--|
| | To access: Click the Identity tab in the Node Properties dialog box. |

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

| GUI Element (A-Z) | Description |
|-------------------|--|
| CI Type | The CI type. |
| Display label | The label that is displayed for the node's instance. |

Selected Identities Pane

| Description | Displays the elements that are used to define what should be included in the TQL results. |
|-------------|---|
| | To access: Click the Identity tab in the Node Properties dialog box. |

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

| GUI Element (A-Z) | Description |
|-------------------|--|
| CI Type | The CI type. |
| Display label | The label that is displayed for the node's instance. |

Refine Node Type Dialog Box

| Description | Enables you to change the CI type of the TQL node after you have created a TQL query. |
|--------------------------|--|
| | To access: Right-click the required node and select Refine Node Type . |
| | Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Refine Node Type option. |
| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Create a TQL Query" on page 339 ➤ "Create a Pattern View" on page 198 ➤ "Implement a Pattern" in Discovery and Dependency Mapping Guide. |
| Important Information | You can change the CI type to a type from one of the CI type's children, if one exists. If one does not exist, this option does not appear. |

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

| GUI Element (A-Z) | Description |
|---------------------------------------|------------------------------|
| List of CI types from which to choose | Select the required CI type. |

🙎 Select Relationship Type Dialog Box

| Description | Enables you to select the type of TQL relationship to be created. To access: In the editing pane of IT Universe, Query Manager, View Manager, Correlation Manager, Enrichment Manager, and in the Topology Report Manager, click the Create Relationship to button in the toolbar and draw a line between two nodes. The Select Relationship Type dialog box opens automatically. |
|--------------------------|--|
| Important Information | Select one of the following relationship types: > Regular Relationship. For details, see "Add/Edit Relationship Dialog Box" on page 420. > Join Relationship. For details, see "Add Join Relationship Dialog Box" on page 422. > Compound Relationship. For details, see "Add Compound Relationship Dialog Box" on page 415. > Calculated Relationship. For details, see "Add Calculated Relationship Dialog Box" on page 419. |
| Included in Tasks | "Define a Report Rule – Scenario" on page 300 "Define a Correlation Rule – Workflow" on page 235 "Define an Enrichment Rule – Scenario" on page 354 "Create a TQL Query" on page 339 "Create a Pattern View" on page 198 "Implement a Pattern" in Discovery and Dependency Mapping Guide. |

Subgraph Condition Definition Dialog Box

| Description | Creates an expression defining conditions that restrict the number of nodes that appear in the query. Enables you to: ➤ Define attribute conditions for nodes and relationships. ➤ Filter the query results. For details, see "Attribute Tab" on page 438. To access: Click Condition in the Add Triplet dialog box. |
|-------------------|--|
| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Create a TQL Query" on page 339 ➤ "Create a Pattern View" on page 198 ➤ "Implement a Pattern" in Discovery and Dependency Mapping Guide. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| + | Add the subgraph condition definition. |
| × | Delete the subgraph condition definition. |
| ↑ | Move a selected row up. |
| U | Move a selected row down. |
| Q | 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. |

Chapter 11 • Topology Query Language

| 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 | Select NOT if you want the condition statement to do the opposite of what is defined. |
| | Note : If you select NOT , query results do not include data from the CI instances that were not assigned a value. For example, 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. |
| Operator | Select the required operator. For details, see "Attribute Operator Definitions" on page 400. |
| 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. |

Subgraph Definition Dialog Box

| D | F1.1 |
|--------------------------|--|
| Description | Enables you to create a graph that represents additional TQL query data related to a specific CI. |
| | To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: In the editing pane, right-click the required node and select Subgraph Definition. |
| | Note: If you are using Enrichment Manager, select TQL mode at the top of the editing pane to display the Subgraph Definition option. |
| | To access in Manage Discovery Resources in Discovery: Select a pattern in the Discovery Resources pane. 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. Right-click the required node and select Subgraph Definition. |
| Important Information | The following icon is displayed next to the node for which you define a subgraph: |
| Included in Tasks | "Define a Report Rule – Scenario" on page 300 "Define a Correlation Rule – Workflow" on page 235 "Define an Enrichment Rule – Scenario" on page 354 "Create a TQL Query" on page 339 "Create a Pattern View" on page 198 "Implement a Pattern" in Discovery and Dependency Mapping Guide. |
| Useful Links | "Subgraph Definition" on page 382 "Create a Subgraph Definition - Scenario" on page 391 |

Chapter 11 • Topology Query Language

| GUI Element (A-Z) | Description |
|--------------------------|--|
| ÷ | Add a subgraph definition. Opens the Add Triplet dialog box. |
| × | Delete a subgraph definition. |
| 0 | Edit a subgraph definition. Opens the Add Triplet 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 |
| Element condition exists | A green asterisk appears next to either the source, relationship, or target in the subgraph definition if an attribute condition has been defined for one of them in the Subgraph Condition Definition dialog box (for details, see "Subgraph Condition Definition Dialog Box" on page 449). |
| Source | The required source node selected in the Add Triplet dialog box. |
| Target | The required target node selected in the Add Triplet dialog box. |
| Relationship | The relationship selected in the Add Triplet dialog box connecting the source to the target node. |

💐 TQL Node Wizard

| Description | Enables you to build a TQL query. |
|--------------------------|--|
| | To access in Topology Report Manager, Enrichment Manager, Correlation Manager, Query Manager, and View Manager: In the editing pane, right-click the required node and select TQL Node Wizard. |
| | Note : If you are using Enrichment Manager, select TQL mode at the top of the editing pane. |
| | To access in Job Configuration in Discovery: 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. |
| | To access in Manage Discovery Resources in Discovery: 1 Select a pattern in the Discovery Resources pane. |
| | 2 In the Pattern Signature tab, click the Description 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 . |
| Important Information | 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. |
| Included in Tasks | ➤ "Define a Report Rule – Scenario" on page 300 ➤ "Define a Correlation Rule – Workflow" on page 235 ➤ "Define an Enrichment Rule – Scenario" on page 354 ➤ "Create a TQL Query" on page 339 ➤ "Create a Pattern View" on page 198 ➤ "Implement a Pattern" in Discovery and Dependency Mapping Guide. |

Chapter 11 • Topology Query Language

| Useful Links | "Topology Query Language" on page 378 |
|--------------|--|
| 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 453. |
| Wizard Map | The TQL Node Wizard contains: |
| | New TQL Node Page > New TQL Relationship Page > TQL Node Properties Page > Element Instances Page |

| GUI Element (A-Z) | Description |
|-------------------------------|--|
| <node> is required</node> | Define the relationship cardinality. For details, see "Cardinality Tab" on page 440. |
| | 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.</node> Selecting the check box gives the relationship a cardinality value of 1*. Clear the <node> is required check box to give the</node> |
| | relationship a cardinality value of 0*. |
| Element name | (Optional) Contains the name of the selected node. 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. |
| Show only CITs with instances | Select this check box to display only the CITs of which there are instances in the CMDB. |
| | Note : The Show only CITs with instances check box is selected by default. |
| TQL Node hierarchy tree | Select the required node. The node you select appears in the Element name box. |
| | This list only includes the nodes of the CIT type that have valid relationships to the selected (source) node. |
| | 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. |
| | Note : The first node in the hierarchy tree is selected by default. |

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 |

| 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<br="">hierarchy tree></tql> | 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. ➤ Add an attribute condition to a node or relationship. ➤ Filter the query results. |
|-------------|---|
| Wizard Map | The TQL Node Wizard contains: New TQL Node Page > New TQL Relationship Page > TQL Node Properties Page > Element Instances Page |

| GUI Element (A-Z) | Description |
|-------------------|---|
| + | Add the attribute definition. |
| × | Delete an attribute condition. |
| ightharpoons | Move a selected row up. |
| U | Move a selected row down. |
| Q | 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 | Select one of the following options: |
| | Fixed value . You cannot change the value of the parameter. |
| | Parameterized value . Enables you to change the value of the parameter. |
| | ➤ 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 220. 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. When a parameterized value is selected in Topology Report Manager, a Set parameters values option is displayed in a generated Topology report, enabling you to edit the predefined parameters of node conditions in a Topology report. For details, see "Topology Report" on page 607. |
| Include subtypes | Display both the selected CI and its children in the topology map. |
| Not | Select NOT if you want the condition statement to do the opposite of what is defined. |
| | Note : If you select NOT , query results do not include data from the CI instances that were not assigned a value. For example, your system contains three hosts: Host1 is assigned the value A, Host2 is assigned the value B and Host3 is not assigned a value. You create a query to retrieve all hosts that are equal to A and select NOT ; the results of your query only include Host2 because Host3 is not assigned a value. |
| Operator | Select the required operator. For details, see "Attribute Operator Definitions" on page 400. |

| Update Update an attribute condition that has been modified. Value Enter or select the value of the attribute. The Value options vary according to the attribute type you select. Visible Select Visible to display the selected TQL node in the editing pane. When Visible is cleared, an invisible box papears to the right of the selected TQL node in the editing pane. 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, | GUI Element (A-Z) | Description |
|---|-------------------|--|
| options vary according to the attribute type you select. Visible Select Visible to display the selected TQL node in the editing pane. When Visible is cleared, an invisible box papears to the right of the selected TQL node in the editing pane. Windows 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 | Update | Update an attribute condition that has been modified. |
| editing pane. When Visible is cleared, an invisible box appears to the right of the selected TQL node in the editing pane. Windows Windows Network 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 | Value | |
| 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. | Visible | Select Visible to display the selected TQL node in the editing pane. When Visible is cleared, an invisible box papears to the right of the selected TQL node in the editing pane. Windows Windows 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 |

Element Instances Page

| Description | Displays all the instances found for the selected TQL node in a table. |
|--------------------------|---|
| Important Information | The columns displayed in the report vary according to the CI type selected. |
| | By default, only columns corresponding to attributes that have been defined with the Asset Data, Change Monitored, and Comparable attribute qualifiers in the CIT Manager are displayed as columns in the dialog box. For details, see "Attributes Page" on page 283. |
| | If required, you can click the Display Hidden Columns button to display the attributes that are defined as Visible but not Static. For details on Static attributes, see "Attributes Page" on page 283. |
| | Note: For information on the elements included in the Element Instances page, see "Element Instances Dialog Box" on page 429. |
| Wizard Map | The TQL Node Wizard contains: |
| | New TQL Node Page > New TQL Relationship Page > TQL Node Properties Page > Element Instances Page |

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. |

| GUI Element (A-Z) | Description |
|-----------------------|---|
| <left pane=""></left> | Select the preferences page to edit. The following options are available: |
| | ➤ Wizard Preferences |
| | ➤ Optional Messages Preferences |
| | ➤ Discovery Preferences |
| Preferences list | The list of warning messages and their user-selected preferences. |
| Reset Page | Click to reset the selected preference to its default value. |
| Reset All | Click to reset all the preferences to their default values. |

Troubleshooting and Limitations

For TQL queries to be valid, they must comply with certain restrictions.

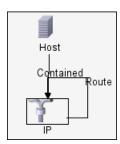
This section includes the following topics:

- ➤ "Understanding Validation Restrictions" on page 462
- ➤ "Correlation TQL Validation" on page 464
- ➤ "Enrichment TQL Validation" on page 465

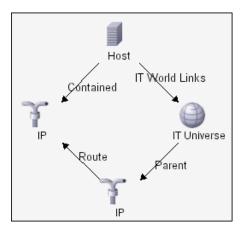
Understanding Validation Restrictions

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

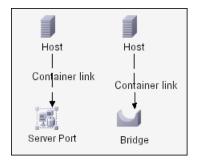
➤ Self Relationships. A TQL must not contain self relationships, that is, a relationship must not lead from a node to itself, as the following example illustrates:



➤ 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:

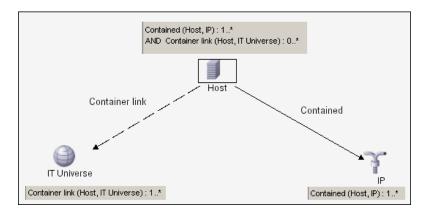


Note: This restriction also applies to Report TQLs.

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 440. 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.

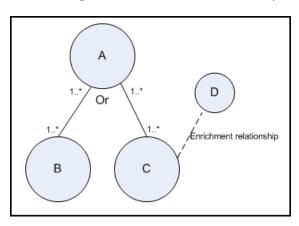
➤ The connection between trigger and affected nodes. The trigger node and affected nodes you define must be connected by a path of relationships from the triggered node to the affected nodes.

Enrichment TQL Validation

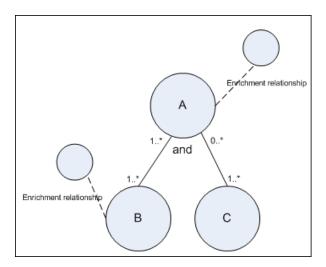
Enrichment TQL queries must comply with the following restriction:

➤ **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 385.



Example 2. In this example, both **A** and **B** are required elements that always appear in the TQL results. Only **C** is not a required element because it has a cardinality of 0. Therefore, you cannot add an Enrichment node to it.



12

Impact Modeling

This chapter describes the impact modeling concept.

This chapter includes:

Concepts

- ➤ Impact Modeling Overview on page 467
- ➤ Impact Layer on page 468
- ➤ Impact Rules on page 468
- ➤ Propagation Reversal on page 470
- ➤ Calculated Relationship Types on page 472
- ➤ Creating Views Based on the Impact Model on page 474

Impact Modeling Overview

The impact model enables you to determine the direction of the propagation of the IT infrastructure CIs in your business world. The direction of the impact is not always the same direction as the physical relationships taken from the CI Type model.

The impact model uses the impact layer to change the propagation direction. The impact layer is used in the applications where propagation occurs. You change the direction of the impact using the impact layer, regardless of the direction of the physical relationships.

Chapter 12 • Impact Modeling

All KPI propagation is affected by the impact model. For details on KPI propagation in Dashboard, see "Propagations" in *Using Dashboard*. For details on KPI propagation in Service Level Management, see "Propagations" in *Using Service Level Management*.

For information on troubleshooting and limitations relating to Impact Modeling in upgraded environments, see "HP ServiceCenter/HP Service Manager Integration" in the *HP Business Availability Center Deployment Guide* PDF.

\lambda Impact Layer

The impact layer changes the direction of the impact. The impact layer separates the impact direction from the CI Type model, creating an independent layer on top of the CI Type model. This means that components affected by the impact model are no longer relying on the physical relationships as defined in the CI Type model. As a result, the impact direction is no longer necessarily identical to the direction of the physical relationships in the CI Type model.

Impact Rules

The impact layer consists of impact rules. The impact rules are defined in the CI Type Manager. For details, see "Triplets Page" on page 287.

An impact rule is defined by one or more triplets. For details, see "Triplets Page" on page 287. Each triplet is defined by the following components:

- ➤ One source CI type
- ➤ One target CI type
- ➤ A physical relationship that links the two CI types
- ➤ The required impact direction. The direction of the impact can be identical to or opposite from the direction of the relationship in the class model.

HP Business Availability Center implements the impact layer by creating calculated relationships that are defined by impact rules. Once one of the triplets fulfills the impact rule condition, HP Business Availability Center automatically creates the calculated relationship based on the triplet definition.

Since calculated relationships are defined by physical relationships from within the class model, their lifetime is determined by the lifetime of the physical relationships defined in the impact rule. When the physical relationship in the class model is removed, the corresponding calculated relationship is removed from all view results as well.

Note: If you create a new CI type or relationship in the CI Type Manager, you need to define the required triplets. For example, to enable the impact model to properly affect KPI propagation. If the triplets are not defined, the required KPIs are not included in the Dashboard views and SLA agreements.

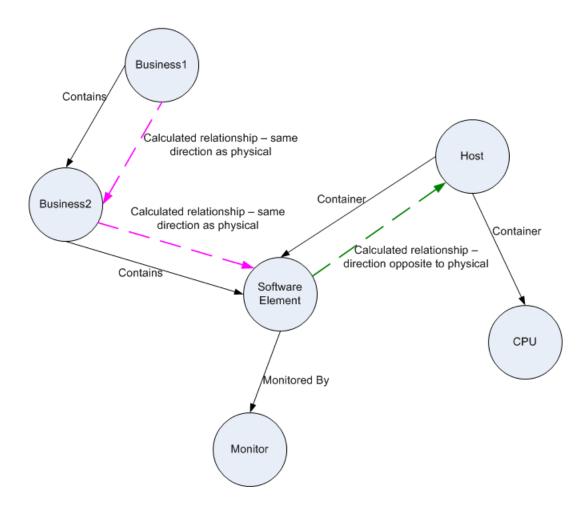
You can use calculated relationships to create TQL queries just like any other relationship in the CI Type model. This enables you to base Enrichment rules, Correlation rules, Report rules, and views on calculated relationships. Calculated relationships affect the results of all TQLs that use that calculated relationship since calculated relationships are part of the class model.

Example of an Impact Rule Definition



\lambda Propagation Reversal

The following example illustrates a scenario in which propagation is reversed.



Based on the impact rules defined in the CI Type Manager, the impact is propagating from the Business2 CI to Business1, the same direction as the physical relationship that is connecting the Software Element CI to Business2.

According to the direction of the physical relationship between the **Software Element** CI and the **Host**, the **Software Element** CI should impact the **Host**.

But based on the following impact rule, a calculated relationship is automatically created and HP Business Availability Center reverses the impact of the propagation.



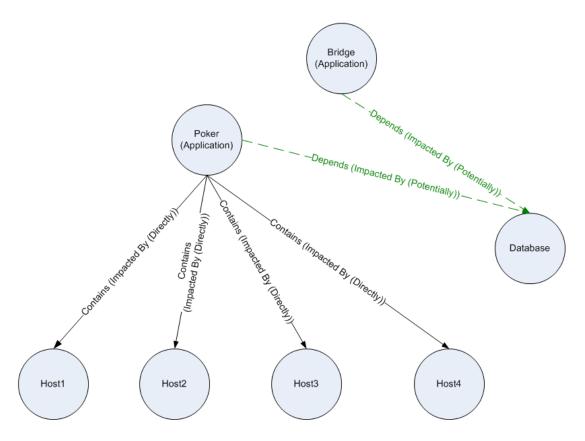
The impact is now propagated from the **Host** to the **Software Element**.

Calculated Relationship Types

There are two types of out-of-the-box calculated relationships. Each one represents a different type of relation.

- **Impacted by (Directly).** Represents the fact that one CI that is linked to another CI using an Impacted By (Directly) relationship is part of that CI. You use an Impacted By (Directly) relationship for those CIs that you want to see in your model. The ownership of the two CIs may be the same, but this is not always the case.
- **Impacted By (Potentially).** Represents the fact that one CI consumes the products of another. CIs that are linked by an Impacted By (Potentially) relationship are not part of that model, but are listed as related CIs. For details, see "Model Editor" on page 155.

The example below illustrates the difference between the Impacted By (Directly) and Impacted By (Potentially) relationships.



- ➤ If **Host4** experiences downtime, it impacts only the **Poker** application.
- ➤ If the **Database** CI experiences downtime, it impacts both the **Poker** and **Bridge** applications.
- ➤ If there is a planned downtime for **Poker**:
 - ➤ The four hosts are also in downtime because they are contained within the **Poker** application.
 - ➤ The **Database** CI continues to be active.

Creating Views Based on the Impact Model

As a best practice, you should use Modeling Studio to create a view of calculated relationships based on a model. Modeling Studio enables you to create perspective based views that use calculated relationships instead of physical relationships. For details, see "Modeling Studio" on page 131.

For details on how to create and edit models, see "Model Editor" on page 155.

Note: For an in-depth description of the Impact Modeling Solution, see "Best Practices for Modeling" on page 475.

13

Best Practices for Modeling

This chapter includes the best practices for modeling using HP Business Availability Center.

This chapter includes:

Reference

- ➤ Using Modeling Studio on page 476
- ➤ Models and Perspectives on page 476
- ➤ Building Models on page 477
- ➤ Model Dependencies on Other CIs in the CMDB on page 481
- ➤ Modeling an Application with Software Elements on page 483
- ➤ Creating Views Using the Modeling Studio on page 483
- ➤ Working with Upgraded Views on page 485

🍳 Using Modeling Studio

Modeling Studio is a new component introduced in HP Business Availability Center. It replaces the Instance View Editor for building views for display in Dashboard. This document details the required flow to create Dashboard views using the Modeling Studio tool.

The motivation behind developing the Modeling Studio was to create a separation between the need to change the CMDB content by creating CIs and relationships and the need to consume (view) the CMDB content. In earlier versions, altering the CMDB content was part of the view creation workflow. Hence, users were unintentionally changing the CMDB and influencing other users' views. In the Modeling Studio, you build models and transform your content into views to be consumed by HP Business Availability Center.

Models and Perspectives

A model is a CI collection that represents a managed business entity such as an application, business service, or line of business. A model is usually created by solution or application architects who are familiar with the content and hierarchy of the model. The model content can include system CIs (typically hosts), software elements (such as web servers, databases, and J2EE servers), end user monitoring components (Business Process Monitor or Real User Monitor applications), business processes, groups, and other existing models.

To generate a view from a model, a perspective needs to be applied. A perspective is a TQL-based tool that enriches the model content by adding additional CIs, thus creating a view. The default perspectives that are applied to create Dashboard views add all descendent CIs that are related by impact links down to the level of monitor CIs. There are other perspectives provided out of the box that can be used to address additional use cases.

The resulting view shows the model content as it is monitored by HP Business Availability Center.

Q Building Models

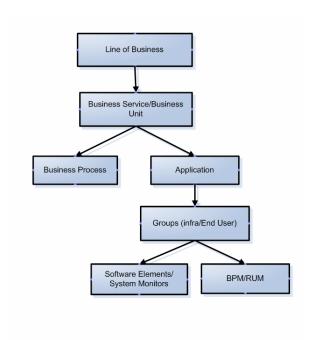
The information required to define a model includes the CI content, the hierarchy, and the dependencies upon additional CIs.

HP Business Availability Center is configured with a predefined list of CI types that represent your business entities. When creating a new model using the Modeling Studio, the following list of valid models appears:



Chapter 13 • Best Practices for Modeling

The model CI types can be arranged in hierarchies to reflect the organization's specific needs. Here is an example of a typical recommended model hierarchy:



A model can be nested in any logical hierarchy, but it is best to create a hierarchy that starts from high level business entities down to more specific model types.

It is strongly recommended to build models in a way that allows them to be reused as components of other models.

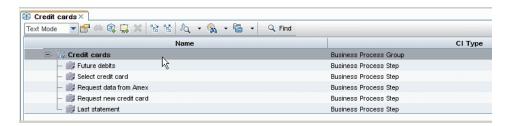
Building a model creates a **contains** link between the model and its CIs according to the defined hierarchy.

The creation of a CI which is a model CI results in the creation of an empty model by default. Therefore, if you want to create a model for a CI that does not yet exist, you create a new model and thus, a new CI. If you want to model an existing CI for the first time you select **Open Model** and select that CI.

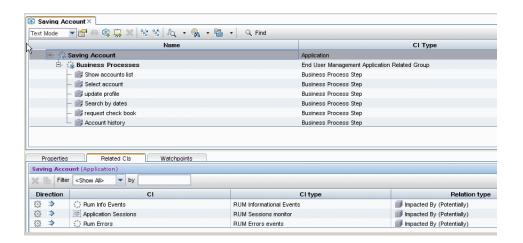
Preconfigured Models

HP Business Availability Center creates out-of-the-box models for applications monitored by Business Process Monitor and Real User Monitor.

The Business Process Monitor model is of type business process group and it contains business process step CIs.



The Real User Monitor model is of type application and contains the End User Management Application related group and business process step CIs. The Real User Monitor model is also impacted by the Real User Monitor Sessions monitor CIs, Real User Monitor Errors events CIs, and Real User Monitor Informational events CIs, which are visible in the Related CIs pane.



Building Model Content

Create a model of the desired type and assign it a name. The new model appears as the top CI in the content pane of the Model Editor. Drag and drop CIs from the CI selector into the content pane to build the model content.

A model can contain system CIs, software elements, SiteScope groups, and other models (both existing models and new ones created during the modeling process).

The only CIs that cannot be part of a model containment tree are monitors. Monitor CIs are added to a model after you generate a view from the model using one of the monitor perspectives. You can include monitors in view by dragging them into the Related CIs pane when a model CI is selected in the upper pane of the Model Editor. If you try to drop a monitor CI into the upper pane, a message appears prompting you to add the monitor CI to the Related CIs pane.

The CI selector pane offers two ways to search for a CI (both model CIs and non-model CIs):

➤ Browse Views

Use this option when you are familiar with a view that contains the CI you are looking for. The following out-of-the-box views can help you find commonly used CIs:

- ➤ End User Monitors view contains business process groups and their content.
- ➤ Real Users Applications view contains Real User Monitor applications and their content.
- ➤ System Monitors view contains SiteScope groups hierarchy.
- ➤ System Software Monitoring view contains software elements and the servers on which they are deployed.

In the CI selector, select **Browse Views** and begin entering the view name or use the view tree to look for a CI in a specific folder.

➤ Search Cls

If you know the CI type you are looking for, select the **Search CIs** mode and use the quick search dialog to locate the desired CI. Use the Advanced Search option for CIs that do not appear in the quick search mode.

The search result appears in the left pane. After the list of CIs is refreshed, you can drag and drop CIs into the model content pane. It is possible to drag and drop multiple CIs in a single selection.

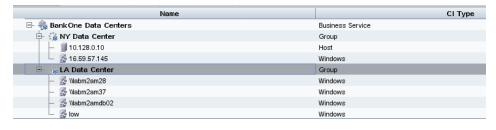
Models can be placed in a hierarchical mode. During the process of building the content you can insert new models and create groups.

Hierarchies between CI types which are not models is not supported.

Grouping

In some cases, there is a need to divide the model into logical groups according to ownerships, locations or any other custom representation.

In the following example the application contains two groups that represent data centers:



For details on creating groups in a model, see "Grouping" on page 158.

Model Dependencies on Other CIs in the CMDB

Each model CI in the model can be dependent on other CIs that exist in the CMDB but are not part of the model itself. Examples of such CIs include shared resources such as database servers and storage devices.

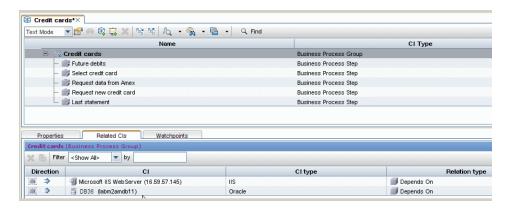
Chapter 13 • Best Practices for Modeling

The model structure may vary between organizations according to policies and responsibilities in the IT department. There are organizations where shared resources are considered to be part of the application and are monitored as part of it, while in other organizations they are considered external to the application. In the first case, shared resources are part of the model and appear in the content pane, whereas in the second case they appear as related CIs (in the lower pane of the Model Editor).

To create a dependency between a CI in the model and another CI in the CMDB, search for a CI in the left pane and drag it into the Related CIs tab. This operation creates a **depends on** link in the CMDB.

In order to create a dependency relationship between two CIs, there must be a valid link in the CMDB between the two CI types. By default, all business CIs can be dependent on other business CIs.

The following example shows an application that depends on a web server and Oracle software elements:



HP Business Availability Center offers a revised out-of-the-box impact model. The impact model describes the impact relationships between CI types. For example, a software element is impacted by the host on which it is deployed. In the Modeling Studio, when you include a software element as part of a model, the host on which it is deployed appears in the Related CIs tab, since the software element is dependent on the server.

🔍 Modeling an Application with Software Elements

Software elements are CIs that describe the implementation components of an application. Example include web servers such as IIS or Apache, application servers such as Webshpere or Weblogic, and databases.

In previous versions, those CIs were discovered only by using Discovery and Dependency Mapping. Starting from SiteScope version 10.00, software elements are discovered by SiteScope as well.

To build the implementation model of a three tier application using its software elements, create an application model.

You can use the Software Elements search in the Advanced Search dialog or browse the System Software Monitoring view to locate software elements. The names of the software elements are formed by combining the software element CI type with the server name, for example, Microsoft IIS web server (Server1).

Drag the relevant software elements into the modeling pane. The server on which the software element was deployed as well as the monitor of the software element both appear automatically in the Related CIs pane. This change derives from the new SiteScope monitoring model. In previous versions, all monitors (of both hardware and software) were connected to the Server CI. The SiteScope model was enhanced and now hardware monitors are connected to the server CI, while software monitors are connected to the software elements.

Creating Views Using the Modeling Studio

There are two methods of creating views using the Modeling Studio. The first option is to create a view based on a model (or on several models); the second one is to create a view out of CI collection that is not a model.

A view based on a model is updated automatically when the model content is updated. For example, a view was generated using a business process group model that initially contained five business process steps. The business process group was then updated to include additional business process steps. Those changes are automatically reflected in the view.

This option is the recommended one, since it creates a dynamic view.

In a view based both on models and individual CIs, the view content is updated according to changes in the models.

Generating a View from a Model

After building a model and saving the model definition, select the top model and select **Generate view for selected model**. In the dialog box that opens, select the desired perspective according to the desired view content.

The recommended perspective is All Monitors. It creates a view with all the CIs in the model and for each CI, it adds all the child CIs including the monitor CIs. Additional perspectives that may be used for other purposes are described in "Predefined Perspectives" on page 184.

If the selected model includes dependent CIs (which appear in the Related CIs tab), they are also enriched by the perspective and become part of the view.

The Content Only perspective does not make any changes in the view, even for model CIs.

Hiding Irrelevant CIs from a View

The view result appears in the View Results pane. At this point, you may choose to hide CIs that appear in the view.

Hiding CIs from a view does not change the status calculation of CIs in the view (the status calculation is performed according to the CMDB hierarchy). For example, hiding two business process steps from a business process group with five steps does not affect the business process group status. If a hidden CI has a critical status and the remaining CIs are OK, the business process group shows a critical status.

For details on hiding CIs and restoring them to a view, see "Including and Excluding Child CIs" on page 135.

Working with Upgraded Views

After the upgrade from version 7.x, all instance views remain available for further editing in the Modeling Studio.

The view content pane shows only the first level in the view. The complete view content can only be seen in the preview.

During the upgrade process all CIs of types that can be models are converted into models.

The upgrade includes model CIs and non-model CIs. To edit a model CI, double click the CI and the model is opened for editing in a new tab.

To edit the view, use one of the following options:

- ➤ To add a CI under the view root, drag and drop it onto the view content pane.
- ➤ To remove a CI from the first level of the hierarchy, select the CI and delete it from the view content.
- ➤ To remove CIs which are not under the view root, use the Hide CI option.
- ➤ To add or remove CIs within a model CI, double click the CI. The selected model is opened in a new tab and can be edited as required. After editing the model and saving it, the changes appear in the view.

Chapter 13 • Best Practices for Modeling

Part II

Model Management Settings

14

Package Manager

This chapter provides information on Package Manager.

This chapter includes:

Concepts

- ➤ Package Administration Overview on page 490
- ➤ Package Zip File Contents and Format on page 491
- ➤ Packages for Federated CMDB Adapters on page 492

Tasks

- ➤ Create a Custom Package on page 493
- ➤ Deploy a Package on page 494
- ➤ Export a Package on page 494

Reference

- ➤ Package Resources on page 495
- ➤ Using the JMX Console to Perform Package Manager Tasks on page 497
- ➤ Package Manager User Interface on page 501

Troubleshooting and Limitations on page 516

\lambda Package Administration Overview

A package is a subset of resources grouped together by a defined criteria. For a list of the predefined resource types, see "Resource Types" on page 507.

Package Manager fulfills several functions:

- ➤ Enables the discovery of specific IT infrastructure assets. For example, HP Business Availability Center deploys the SQL_Server package to discover Microsoft SQL servers.
- ➤ Enables you to define the CI Type model through the CI types that are included in the packages. For example, some of the CI types included in the package Host_Resources_Basic are Disk, CPU,Process, and Print Queue.
- ➤ Enables you to move groups of resources from one system to another. For example, from a test to a production environment.

There are two types of packages:

➤ **Factory package**. Contains resources that are deployed with the installation and are used to initialize HP Business Availability Center.

By default, factory packages are located in: <**HP Business Availability Center** root directory>\mam_lib\factory_packages on the Data Processing server machine.

Note: Some of the factory packages that are deployed with the installation are not visible in the list of packages that appear in Package Manager. To display the hidden packages, right-click anywhere in the Package Manager Window and select **Show Hidden Packages**.

➤ Custom package. A package that is user created. You may want to create a custom package if the factory packages do not contain the resources needed for the tool you are developing, or if you want to export resources from system to system. For details, see "Create New Package/Edit Package Wizard" on page 503.

Important: If you create custom packages for the resources or tools you develop, do not place them in the <HP Business Availability Center root directory>\mam_lib\factory_packages folder on the Data Processing server machine. This folder is only for factory packages.

Export and deployment of packages from system to system is performed through the Package Manager interface.

You can:

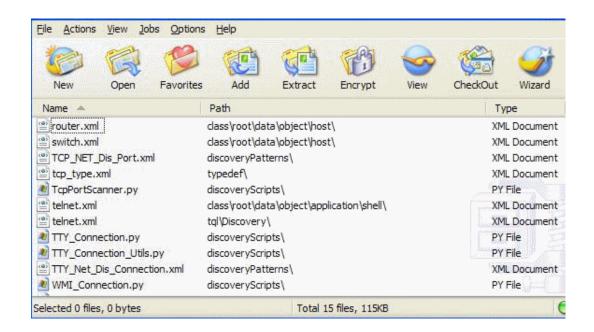
- ➤ Export some or all of a package's resources to your local directory. For details, see "Export a Package" on page 494.
- ➤ Deploy some or all of a package's resources to the CMDB from your local directory. For details, see "Deploy a Package" on page 494.

\lambda Package Zip File Contents and Format

A package's resources are stored in the CMDB. To export a package from system to system, you use the Package Manager interface (for details, see "Package Manager Window" on page 511). Package Manager creates a zip file containing the resources to enable the export of the resources.

When you export resources from the Package Manager to your local directory, the resource definitions are stored in various formats, for example, XML format.

In the sample **Network.zip** below, the **router.xml** file contains a Router CIT definition and the **Switch.xml** file contains a Switch CIT definition.



Packages for Federated CMDB Adapters

You deploy Federated CMDB adapters by creating a package and placing them in the appropriate folder. For details, see "Deploy the Adapter" on page 809.

🔭 Create a Custom Package

When you create a new package, you give the package a unique name and description, and then select the resources you want included in the package. For details, see "Create New Package/Edit Package Wizard" on page 503.

Example of Resources Selected to Be Included in a Package

The summary page in the Create New Package wizard displays the resources selected to be included in the package, as shown in the illustration below:

The package contains resources from the following resource groups:

- ➤ Relationships
- ➤ Valid Links
- ➤ Configuration Item Types

Selection Summary

View the resources to be included in the package.

Relationships:

applicationLink

Valid Links:

Service Desk Link: Siebel Application -> IT Incident

Configuration Item Types:

Business Service View

Deploy a Package

You can deploy some or all of a package's resources to the CMDB from your local directory. For details, see "Package Manager Window" on page 511.

Example of Deploying Only Specific Resources in a Package

You want to deploy only some of the resources contained in the package called **ticket2.zip**. Click the button. In the Deploy Specific Resources dialog box, browse to the package's location and select the resources from the package you want to deploy. See the following illustration:

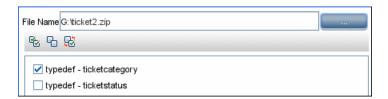


🚏 Export a Package

You can export some or all of a package's resources to your local directory. For details, see "Package Manager Window" on page 511.

Example of Exporting Only Specific Resources in a Package

You want to export only some of the resources contained in a package called **ticket2.zip** to your local directory. Click the → button. In the Export Package dialog box, select the **Export Resources** option and select the resources you want to export. See the following illustration:



Package Resources

This section contains a list of the resources a package can contain. For a list of the available resource types and their descriptions, see "Resource Types" on page 507.

- ➤ acl. The definition of a role such as Administrator or Guest. For details, see "User Management" in *Platform Administration*.
- ➤ adapter. Contains a description and the capabilities of the deployed federated adapter.
- ➤ adapterCode. Contains compiled classes (normally a jar), based-on *.jar files, and configuration files needed for federated adapters. Place these files in the adapterCode\<adapter ID> folder in the zip package. For details, see "Deploy the Adapter" in *Discovery and Dependency Mapping Guide*.
- ➤ calculatedLinks subsystem. Contains the calculated relationships and their triplets as defined in the CI Type Manager.
- ➤ categories. Contains the State definitions used by Correlation Manager. For details on States, see "State Manager" on page 533. For details on Correlation Manager, see "Correlation Manager" on page 233.
- ➤ class. CI type descriptions, such as host, file, switch, and so on. For details, see "CI Type Manager" on page 261.
- ➤ **correlation**. Correlation rule definitions. For details, see "Correlation Manager" on page 233.
- ➤ datamodel. Used to import CI instances into the system. If the CI does not exist in the CMDB, an instance of the CI is created. If a CI type already exists in the CMDB, the values of the CI from the package resource overwrites the values of the CI in the CMDB.
- ➤ datamodelcreateonly. Used to import CI instances into the system. If the CI does not exist in the CMDB, an instance of the CI is created. If a CI type already exists in the CMDB, the values of the CI from the package resource does not overwrite the values of the CI in the CMDB.
- ➤ datamodelgenerateids. Used to import CI instances into the system for CITs that require the ID to be calculated dynamically upon deployment (such as CITs with no key attributes).

- ➤ discoveryConfigFiles. Configuration files include properties and parameters that are needed to discover components on the system. For details, see "Manage Discovery Resources" in *Discovery and Dependency Mapping Guide*.
- ➤ discoveryJobs. A Discovery and Dependency Mapping (DDM) job includes configuration data, scheduling information, and TQL assignments needed to activate discovery of components. For details, see "Run Discovery" in Discovery and Dependency Mapping Guide.
- ➤ discoveryModules. A DDM module includes all the jobs needed to discover a specific component in the system. For details, see "Run Discovery" in Discovery and Dependency Mapping Guide.
- ➤ discoveryPatterns. DDM patterns define what scripts need to be run and in which order, declare the input and output CI Types and parameters to be configurable on the DDM jobs related to them. For details, see "Manage Discovery Resources" in *Discovery and Dependency Mapping Guide*.
- ➤ **discoveryResources**. External resources include all external resources that are needed in DDM, for example, a Visual Basic file, a credentials file, and so on. For details, see "Manage Discovery Resources" in *Discovery and Dependency Mapping Guide*.
- ➤ **discoveryScripts**. DDM scripts enable navigating to, and accessing, components that must be discovered. For details, see "Manage Discovery Resources" in *Discovery and Dependency Mapping Guide*.
- ➤ **discoveryWizard**. Used to define the Discovery Wizard dialog box contents. For details, see "Run Discovery" in *Discovery and Dependency Mapping Guide*.
- ➤ enrichment. Enrichment rule definitions. For details, see "Enrichment Manager" on page 351.
- ➤ modelnotification. Contains filter definitions for CMDB model notifications. The data model notification system gives notification of changes that occurred in the CMDB. For example, items in the CMDB that have been removed, updated, or added.
- ➤ report. Report rule definitions, as described in "Topology Report Manager" on page 299.
- ➤ **schedulerJobs**. Tasks that have been defined to run in the Scheduler. For details, see "Scheduler" on page 519.
- ➤ tql. TQL query definitions. For details, see "Query Manager" on page 337.

- ➤ 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 264.
- ➤ users. The definition of a user and the user's role. For details, see "User Management" in *Platform Administration*.
- ➤ validlinks. All predefined, valid connections (relationships) between CITs.
- ➤ view. View Manager definitions. For details, see "View Manager" on page 179.

Using the JMX Console to Perform Package ManagerTasks

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 498
- ➤ "View Package Deployment History" on page 498
- ➤ "Undeploy a Package" on page 499
- ➤ "Display Currently Deployed Packages" on page 500
- ➤ "Export Packages" on page 500

1 Deploy a Package

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

- **a** Launch your Web browser and enter the following address: http://<server_name>:8080/jmx-console, where <server_name> is the name of the machine on which HP Business Availability Center is installed.
- **b** Under MAM, click service=MAM Packaging Services to open the JMX MBEAN View page.
- c Locate java.lang.String deployPackages.
- **d** In the **ParamValue** box for the parameter **customerId**, enter the <customer id>.
- **e** In the **ParamValue** box for the parameter **dir**, enter the name of the folder that contains the package's zip file. Ensure that you include the full path to the folder.

Note: To deploy the package from the **factory_packages** directory, leave this box empty.

f In the **ParamValue** box for the parameter **packagesNames**, enter the name of the packages.

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.
- **g** Select **True** to override DDM job configurations changed in the DDM user interface. For details, see the *Discovery and Dependency Mapping Guide*.
- **h** Click **Invoke** to deploy the package.

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 Business Availability Center is installed.
- **b** Under MAM, click service=MAM Packaging Services to open the JMX MBEAN View page.
- c Locate java.lang.String displayResourcesDeploymentHistory.
- **d** In the **ParamValue** box for the parameter **customerId**, enter the <customer id>.
- **e** In the **ParamValue** box for the parameter **reportNum**, enter the number of the report you want to view.
- **f** Click **Invoke** to view the deployment status report of the packages.

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 Business Availability Center is installed.
- **b** Under MAM, click service=MAM Packaging Services to open the JMX MBEAN View page.
- c Locate java.lang.String undeployPackages.
- **d** In the **ParamValue** box for the parameter **customerId**, enter the <customer id>.
- **e** In the **ParamValue** box for the parameter **packagesNames**, enter the name of the package you want to remove.

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 Business Availability Center is installed.
- **b** Under MAM, click service=MAM Packaging Services to open the JMX MBEAN View page.
- c Locate java.lang.String displayDeployedPackages.
- **d** In the **ParamValue** box for the parameter **customerId**, enter the <customer id>.
- **e** In the **ParamValue** box for the parameter **packagesNames**, specify the names of the packages you want to display.

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 Business Availability Center is installed using the JMX console.

- **a** Launch the Web browser and navigate to: http://<server_name>:8080/jmx-console, where <server_name> is the name of the machine on which HP Business Availability Center is installed.
- **b** Under MAM, click service=MAM Packaging Services to open the JMX MBEAN View page.
- **c** Locate java.lang.String exportPackages.

- **d** In the **ParamValue** box for the parameter **customerId**, enter the <customer id>.
- **e** In the **ParamValue** box for the parameter **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 Business Availability Centerserver 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 502
- ➤ Create New Package/Edit Package Wizard on page 503
- ➤ Export Package Dialog Box on page 509
- ➤ Filter Dialog Box on page 510
- ➤ Find Dialog Box on page 511
- ➤ Package Manager Window on page 511
- ➤ Undeploy Package Resource Wizard on page 514

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=""></list> | 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 | "Create a Custom Package" on page 493 |
| Wizard Map | The Create New Package Wizard contains: Package Properties Page > Resource Selection Page > Selection Summary Page |

2 Package Properties Page

| Description | Define the properties of the package. |
|-------------|--|
| Wizard Map | The Create New Package/Edit Package Wizard contains: |
| | Package Properties Page > Resource Selection Page > Selection Summary Page |

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

| GUI Element (A-Z) | Description |
|---------------------|---|
| Package Category | A free text box for any notes you want to associate with the package. |
| Package Description | A description of the package. |
| Package Name | The name of the package. |

Resource Selection Page

| Description | Enables you to add the required resources to the package. Select the required resources from the various resource types. Note: You can make multiple selections from each resource type. |
|-------------|---|
| Wizard Map | The Create New Package/Edit Package Wizard contains: Package Properties Page > Resource Selection Page > Selection Summary Page |

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| ~ | Appears in the left pane. Indicates that a resource has been added to the package. |
| - | Appears in the left pane. Indicates that no resource has been added to the package. |

| GUI Element (A-Z) | Description |
|---|---|
| <resource in="" left="" pane="" the="" types=""></resource> | Contains the resource types from which you can choose the required resources to add to the package. |
| | For details of a list of the available resource types and their descriptions, see "Resource Types" on page 507. |
| | Note : A green dot appears on the resource type icon when one or more of its resources are selected to be included in the package. |

| GUI Element (A-Z) | Description |
|---|---|
| <resources in="" pane="" right="" the=""></resources> | Select the resources you want to add to the package. You can select multiple resources. |
| | Notes: |
| | ➤ A green check appears to the right of a Configuration Item Types, Relationships, or Calculated Relationships when one or more of its children in the resource tree are included in the package. ➤ A folder's check box has a when only some of its resources are included in the package. (This does not apply to Configuration Item Types, Relationships, or Calculated Relationships.) |
| | ➤ A folder's check box is selected when all its resources are included in the package. (This does not apply to Configuration Item Types, Relationships, or Calculated Relationships.) |
| | Important information: |
| | If you want to add a calculated relationship to the package, you can choose to select either the required calculated relationship together with one or more of its triplets, or the required triplets without selecting the calculated relationship itself. |
| | ➤ If you choose to select only specified triplets and not the calculated relationship, the triplets are added only if you already have an existing calculated relationship in the system. |
| | ➤ If you select a calculated relationship together with one or more of its triplets, then the property definitions of the calculated relationship you are adding, are included in the package. If you already have a calculated relationship in the system, then the property definitions of the existing calculated relationship are updated with the properties of the calculated relationship you are adding to the package. |

Resource Types

This section contains a list of the available resource types and their descriptions. For a list of the resources a package can contain, see "Package Resources" on page 495.

- ➤ Calculated Links subsystem. Contains the calculated relationships and their triplets as defined in the CI Type Manager.
- ➤ Configuration Item Types. The CITs defined in the CI Type Manager. For details, see "CI Types Overview" on page 262.
- ➤ Correlations. The Correlation rules defined in the Correlation Manager. For details, see "Correlation Manager" on page 233.
- ➤ **Discovery Configuration Files**. Configuration files include properties and parameters that are needed to discover components on the system. For details, see "Resource Files" in the *Discovery and Dependency Mapping Guide*.
- ➤ **Discovery External Resource**. Includes resources not used by the DDM Probe directly, but rather indirectly by the DDM scripts. It can contain binary executable files or DLLs, XML configuration files, or any other essential resource needed for the discovery to function properly. For details, see "Manage Discovery Resources" in the *Discovery and Dependency Mapping Guide*.
- ➤ **Discovery Jobs**. A DDM job includes configuration data, scheduling information, and TQL assignments needed to activate discovery of components. For details, see "Run Discovery" in the *Discovery and Dependency Mapping Guide*.
- ➤ **Discovery Jython Script**. DDM Jython Scripts are Jython scripts used by the discovery process to discover and map the various network entities.
- ➤ **Discovery Modules**. A DDM module includes all the jobs needed to discover a specific component on the system. For details, see "Discovery Modules Pane" in the *Discovery and Dependency Mapping Guide*.
- ➤ **Discovery Wizard Resource**. Used to define the Discovery Wizard dialog box contents. For details, see "Basic Mode Window" in the *Discovery and Dependency Mapping Guide*.

- ➤ **Discovery Patterns**. DDM patterns define what scripts need to be run and in which order, declare the input and output CI Types and the parameters to be configurable on the DDM jobs related to them. For details, see "Manage Discovery Resources" in the *Discovery and Dependency Mapping Guide*.
- ➤ Enrichments. The Enrichment rules defined in the Enrichment Manager. For details, see "Enrichment Manager" on page 351.
- ➤ **Job Scheduler**. Tasks that have been defined to run in the Scheduler. For details, see "Scheduler" on page 519.
- ➤ **Relationships**. The relationships defined in the CI Type Manager. For details, see "CI Type Relationships" on page 264.
- ➤ **Reports**. Report rules definitions, as described in "Topology Report Manager" on page 299.
- ➤ **State Categories**. The states defined in the State Manager. For details, see "State Manager" on page 533.
- ➤ TQLs. The TQL queries defined in the Query Manager. For details, see "Query Manager" on page 337.
- ➤ Type Definitions. Predefined Enumeration definitions that relate to attributes of enumeration type, such as severity levels, admin states, and so on. For details, see "System Type Manager" on page 264.
- ➤ **Users**. The definition of a user and the user's role. For details, see "User Management" in *Platform Administration*.
- ➤ **Valid Links**. All possible predefined valid connections (relationships) between the CITs that are defined in the CIT folder.
- ➤ Views. The views defined in the View Manager. For details, see "View Manager" on page 179.

🙎 Selection Summary Page

| Description | Enables you to view the resources to be included in the package. |
|-------------|--|
| Wizard Map | The Create New Package/Edit Package Wizard contains: |
| | Package Properties Page > Resource Selection Page > Selection Summary Page |

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

| GUI Element (A-Z) | Description |
|------------------------------------|--|
| <selected resources=""></selected> | 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. |

| 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 | Enables you to display only specific packages in the Package Manage window. |
|-------------|---|
| | 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 . |
| | Filter: Package Name[Equal Network]; |
| | To access : Click the Filter T button in the Package Manager window. |

| GUI Element (A-Z) | Description |
|---|---|
| <click a="" column<br="">header></click> | For details, see "Customizing Columns" in <i>Reference Information</i> . |
| <right-click a="" column<br="">header></right-click> | For details, see "Customizing Columns" in <i>Reference Information</i> . |
| Condition | Click inside the box and select the required operator. For details, see "Attribute Operator Definitions" on page 400. |
| Display Name | Filter the task list according to one of the following: |
| | ➤ Package name |
| | ➤ Package Category |
| | ➤ Package Description |
| | For details, see "Package Manager Window" on page 511. |
| Value | Click inside the box to open the Edit box. Enter the required value. |

🖎 Find Dialog Box

| Description | Find a package that contains a specified resource. For details, see "Resource Types" on page 507. |
|-------------|---|
| | To access: Click the Find Q 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 subsysytem containing the resource you want the package to contain. For details, see "Resource Types" on page 507. |

Package Manager Window

| Description | Package Manager enables you to: |
|-------------|--|
| | Create a package out of existing resources or edit an existing one to suit your IT management needs. |
| | To access: Select Admin > Universal CMDB > Settings > Package Manager. |

Chapter 14 • Package Manager

| GUI Element (A-Z) | Description |
|-------------------|--|
| + | Enables you to create a package out of existing resources. Opens the Create New Package Wizard. |
| 0 | 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. |
| Q | 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. |
| ₽ | Deploys all of a package's resources to the CMDB from your local directory. Opens the Deploy Packages to Server dialog box. Browse to the required package. The name of the package is added to the list of the packages in the Package Manager. |
| | 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. |
| 透 | 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. |
| | 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. |
| +3 | Exports some or all of the package's resources to your local directory. Opens the Export Package dialog box. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Q | Finds a package that contains a specified resource. Opens the Find dialog box. |
| 0 | Update the contents of the table. |
| 7 | Opens the Filter dialog box. You use the Filter dialog box to show only the packages you want displayed in the Package Manager window. |
| ₹ | Clear the filter definitions you created in the Filter dialog box. This is enabled only if filter definitions were created. |
| | 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. |
| | For details on the Select Columns dialog box, see "Select Columns Dialog Box" in <i>Reference Information</i> . |
| * | Generate a report displaying a list of the packages that are deployed in the system. Notes: |
| | For information about limitations on the size of reports produced in .pdf format, see "Troubleshooting and Limitations" in <i>Reports</i>. For details on how to work with reports, see "Working in Reports - Overview" in <i>Reports</i>. |
| # | Represents a factory package. |
| # | Represents a hidden package. |
| g | Represents a custom package. |
| Category | The free text you want to associate with the package, as displayed in the Package Properties page of the Create New Package Wizard. |
| Description | The description of the package, as displayed in the Package Properties page of the Create New Package Wizard. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| Package Name | The name of the package. |
| Readme | Click to read a description of the package, as well as other relevant information. |

Undeploy Package Resource Wizard

| Description | Deletes the resources from the system and removes them from the selected package. To access: Click the Undeploy resources button in the Package Manager window. |
|--------------------------|---|
| Important Information | When you undeploy a package, the resources are removed from the system, and from the other packages that contain that resource. You can restore the resources only when a package containing those resources is deployed. |
| Wizard Map | The Undeploy Package Resource Wizard contains: Remove Resources Page > 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<br="">contained in the selected package></list> | 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 |

| GUI Element (A-Z) | Description |
|---|---|
| <list deleted="" of="" resources=""></list> | 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 516
- ➤ "Datamodel Resources Cannot Be Undeployed" on page 516
- ➤ "Additional Information on Package Deployment Failure" on page 516
- ➤ "Package Creation and Deployment in a Non-English Locale" on page 517

Gold Master Reports Cannot be Deployed by Package Manager

If you export a package's resources from Package Manager that includes a Gold Master report definition, and then export those resources again to another system, the Gold Master report definition is not deployed.

Datamodel Resources Cannot Be Undeployed

For a list of the package resources, see "Package Resources" on page 495.

Additional Information on Package Deployment Failure

If package deployment fails, you can check the following Package Manager log files for additional information on why the deployment failure occurred.

- ➤ The mam.packaging.log file is located in:<HP Business Availability Center root directory>\log\mam.
- ➤ The cmdb.classmodel.log file is located in:<HP Business Availability Center root directory>\log\cmdb.
- ➤ The mam.log file is located in:<HP Business Availability Center root directory>\log\mam.
- ➤ The cmdb.log file is located in:<HP Business Availability Center root directory>\log\cmdb.

Note: If a **log\mam** or a **log\cmdb folder** does not exist, look for the log files under **log\EJBContainer**.

Package Creation and Deployment in a Non-English Locale

This section describes the limitations when working in a non-English locale.

- ➤ You cannot deploy a package if the server locale is different than the client locale and the package name contains non-English characters.
- ➤ You cannot create a package that contains resources (for example, views and TQLs) having non-English characters in their names, if the server locale is different from the client locale.

Chapter 14 • Package Manager

15

Scheduler

This chapter provides information on Scheduler.

This chapter includes:

Concepts

➤ Scheduler Overview on page 519

Tasks

➤ Define Tasks that Are Activated on a Periodic Basis on page 520

Reference

- ➤ Cron Expressions on page 521
- ➤ Scheduler User Interface on page 522

Scheduler Overview

You can define tasks to run periodically. For example, you can define a schedule for taking snapshots of a specific view on a daily basis.

D - 6:--

P Define Tasks that Are Activated on a Periodic Basis

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

This section includes the following tasks:

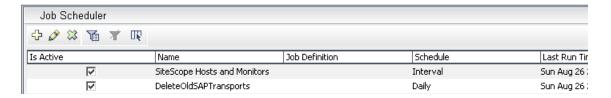
- ➤ "Create a Job Definition" on page 520
- ➤ "Choose an Action" on page 520
- ➤ "Schedule a Task" on page 520

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 525.

Example of a Job Definition

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



2 Choose an Action

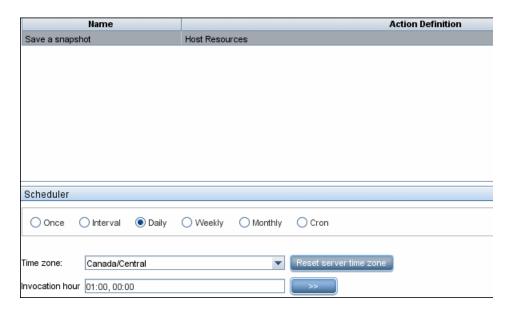
Select the actions that you want the Scheduler to run. For details, see "Action Definition Dialog Box" on page 523.

3 Schedule a Task

Set the schedule for activating a task in the Scheduler pane. For details, see "Job Definitions Dialog Box" on page 525.

Example of a Scheduled Task

The illustration below shows that the Scheduler is set to take a snapshot of the View called **Host Resources** every day at 1:00 AM.



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 | ,-*?/LC# |
| 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 523
- ➤ Filter Dialog Box on page 524
- ➤ Job Definitions Dialog Box on page 525
- ➤ Job Scheduler Window on page 529

- ➤ Select Days Dialog Box on page 531
- ➤ Select Hours Dialog Box on page 531

Q 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 520 |

| GUI Element (A-Z) | Description |
|---|--|
| <click a="" column<br="">header></click> | For details, see "Customizing Columns" in <i>Reference Information</i> . |
| <right-click a="" column<br="">header></right-click> | For details, see "Customizing Columns" in <i>Reference Information</i> . |
| Actions | For a list of actions that can be run by the Scheduler, see "Scheduler Actions" on page 524. |

Scheduler Actions

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

- ➤ Run Targeted Discovery on View. Runs a discovery on the CIs in a selected view. This enables you to configure a general discovery for the entire infrastructure on a less frequent basis, such as once a week, while updating the CIs in important views more frequently, for example, on a daily basis.
- ➤ Run an Enrichment rule. Activates the selected Enrichment rule according to its set schedule. Click Next to display a list of the available Enrichment rules and select the required ones. For details, see "Enrichment Manager" on page 351.
- ➤ Run a Replication job. You can set a schedule for running a replication job. A replication job contains all the information needed to federate data from an external data source. You can use this option only if a suitable data source has been defined. Click Next to display a list of replication jobs and select the required ones. For details, see "Replication Jobs Tab" on page 778.
- ➤ 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 337.
- ➤ 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 179.
- ➤ 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 573.

% 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 520 |

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

| GUI Element (A-Z) | Description |
|---|---|
| <click a="" column<br="">header></click> | For details, see "Customizing Columns" in <i>Reference Information</i> . |
| <right-click a="" column<br="">header></right-click> | For details, see "Customizing Columns" in <i>Reference Information</i> . |
| Condition | Click inside the box and select the required operator. For details, see "Attribute Operator Definitions" on page 400. |
| Display Name | Filters the task list according to one of the following: 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. ➤ Click the Add button in the Schedule tab in the Replication Jobs window. |
| Included in Tasks | "Choose an Action" on page 520 "Schedule a Task" on page 520 |

Chapter 15 • Scheduler

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 520 |

| GUI Element (A-Z) | Description |
|-------------------|--|
| + | Adds an action to the task. Opens the Action Definition dialog box. |
| 0 | Edits an existing action. |
| × | Deletes an action. |
| n | Moves a selected row up. |
| \ | Moves a selected row down. |
| Action Definition | Displays the action details you selected in the Action Definition dialog box for the action added. |
| Name | Displays the name of the action that was added to the task. |

Scheduler Pane

| Description | Enables you to set the schedule for activating a task. |
|-------------------|--|
| Included in Tasks | "Schedule a Task" on page 520 |
| Useful Links | "Cron Expressions" on page 521 |

| GUI Element (A-Z) | Description |
|---|--|
| ß | Opens a calendar. Select the required date and time. |
| Reset server time zone | Automatically set the time zone to the correct one for the server. |
| 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 521. |
| 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 521. |
| Daily | Runs a task on a daily basis. |
| Days of month | (Appears when you choose Monthly) Click the button to the right of the Days of month box to choose the day of the month on which you want to run the action. Opens the Select Days dialog box. |
| Days of the week (Sunday - Saturday) | (Appears when you choose Weekly). Select the day or days on which you want the action to run. |

| GUI Element (A-Z) | Description |
|--|---|
| End by | (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. |
| Monthly | Runs a task on a monthly basis. |
| Months of the year (January - December) | (Appears when you choose Monthly). Select the month or months in which you want the action to run. |
| Once | Activates the task only once. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| Repeat every | (Appears only when you select Interval) Type a value for the interval between successive runs and then choose the required unit of time measurement (seconds, minutes, hours, or days). |
| Start at | (Does not appear when you select Once) Choose the date and time when you want the action to begin running by selecting the Start at check box and then clicking the Open Calendar button to the right. |
| | Note : This step is optional. If you do not want to specify a beginning time, leave the Start at check box unselected. |
| Time Zone | Set the required time zone. |
| Weekly | Runs a task on a weekly basis. |

Job Scheduler Window

| Description | Enables you to define tasks that are activated on a periodic basis. For example, you can define a task that generates a Topology report on a daily basis at 3:00 PM. To access: Click Admin > Universal CMDB > Settings > Scheduler. |
|-------------------|---|
| Included in Tasks | "Define Tasks that Are Activated on a Periodic Basis" on page 520 |

| GUI Element (A-Z) | Description |
|-------------------|---|
| + | Creates and schedules a task. Opens the Job definitions dialog box. |
| 0 | Edits a task. Opens the Job definitions dialog box. |

Chapter 15 • Scheduler

| GUI Element (A-Z) | Description |
|---|--|
| × | Deletes a task. |
| 7 | 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. |
| T _k | 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<br="">header></click> | For details, see "Customizing Columns" in <i>Reference Information</i> . |
| <right-click a="" column<br="">header></right-click> | For details, see "Customizing Columns" 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 527. |

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 520 |

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

| GUI Element (A-Z) | Description |
|---|--|
| <list 1-31="" days="" from="" of=""></list> | 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 [252] 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 520 |

Chapter 15 • Scheduler

| GUI Element (A-Z) | Description |
|---|--|
| List of times by the hour and half hour | Choose all the required time by selecting the required check box. You can select multiple times. |
| | The selected hours appear in the Invocation hour box. For details, see "Invocation Hour" on page 528. |

16

State Manager

This chapter provides information on State Manager.

This chapter includes:

Concepts

➤ State Manager Overview on page 533

Tasks

➤ Define an Attribute State on page 534

Reference

➤ State Manager User Interface on page 534

\lambda State Manager Overview

A state is based on an Enumeration definition. An Enumeration definition is is a severity list, which is designed to be used in defining states.

State Manager contains two default states — Change and Operation. Each one is based on its own severity list. States are necessary for retrieving Correlation results in Topology View Application. For details, see "Topology View Application" on page 539.

To retrieve Correlation results, you must create a Correlation rule in Correlation Manager. A Correlation rule is based on a state that exists in State Manager. For details, see "Correlation Manager" on page 233.

Chapter 16 • State Manager

You can use a default state, or if required, create one based on a severity list (Enumeration definition) that is more relevant to your needs. For details on creating Enumeration definitions, see "Create/Update List/Enumeration Definition Dialog Box" on page 295.

Note: It is not recommended to define states without first consulting HP Software Support.

🦒 Define an Attribute State

Enter a unique name and description for the state. Then select an Enumeration definition that can be used to define an attribute type. The Type Definition list displays the Enumeration definitions that are defined in System Type Manager. For details, see "System Type Manager Dialog Box" on page 297.

You can also click the **New Enumeration** button to create a new Enumeration definition. For details, see "State Manager Dialog Box" on page 535.

Alternatively, you can create an Enumeration definition in System Type Manager. The Enumeration definition you create in System Type Manager appears in State Manager.

🍳 State Manager User Interface

This section describes:

➤ State Manager Dialog Box on page 535

State Manager Dialog Box

| Description | Enables you to create a state based on a severity list (Enumeration definition). |
|--------------------------|---|
| | To access: Admin > Universal CMDB > Settings > State Manager. |
| Important Information | The Change and Operation states are default states that cannot be edited. It is recommended to consult with HP Software Support before defining a state. |
| Included in Tasks | "Define an Attribute State" on page 534 |
| Useful Links | "Enumeration Definition – Scenario" on page 269 |

| GUI Element (A-Z) | Description |
|-------------------|--|
| + | Add an attribute state. |
| × | Delete an attribute state. |
| New Enumeration | Creates an Enumeration definition. Opens the Create Enumeration Definition dialog box. |
| | For details, see "Create/Update List/Enumeration Definition Dialog Box" on page 295. |
| | The Enumeration definition you have created appears in the System Type Manager dialog box, where you can edit it if required (for details, see "System Type Manager" on page 264). |
| Description | (Optional) Click in the row and enter a description of the state. |

Chapter 16 • State Manager

| GUI Element (A-Z) | Description |
|-------------------|---|
| 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

17

Topology View Application

This chapter provides information on the Topology View application.

This chapter includes:

Concepts

➤ Topology View Overview on page 540

Tasks

- ➤ Retrieve Correlation Results Scenario on page 540
- ➤ Take a Snapshot of a View on page 549
- ➤ Print and Save a Topology Map to File on page 550

Reference

➤ Topology View Application User Interface on page 550

Topology View Overview

Topology View displays the CIs of the currently selected view in graphical format. Topology View includes the same functionality as IT Universe Manager, however their context menu options differ. For information on the Topology Map, see "Working with Topology Map" on page 721.

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 233. You can run the Correlation rule you defined in the Correlation Manager. For details, see "Retrieve Correlation Results Scenario" on page 540.
- ➤ Take a snapshot of a view. HP Business Availability Center enables you to display the status of a view in one snapshot by comparison with its status taken at a different time. For details on how to take snapshots, see "Take a Snapshot of a View" on page 549.

🏲 Retrieve Correlation Results – Scenario

Correlation Manager enables you to create a Correlation rule that allows you to simulate the impact certain infrastructure changes have on your system. The results of the Correlation rule are displayed in the Topology View application. The Correlation results in this task describes how a change in CPU usage affects the Host node to which it is connected.

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

This task includes the following steps:

- ➤ "Create an Enumeration Definition" on page 541
- ➤ "Define a State" on page 542
- ➤ "Define a Correlation TQL Query" on page 543
- ➤ "Define a Correlation Rule" on page 544
- ➤ "Create a TQL of the Type View in Query Manager" on page 546
- ➤ "Create a View in View Manager" on page 546
- ➤ "Get Correlation Results" on page 546

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 533).

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

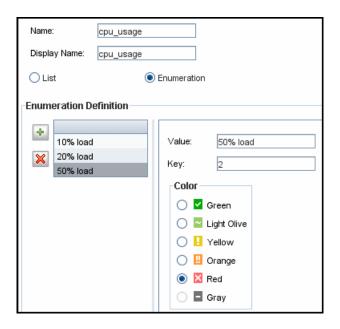
A state is based on an Enumeration definition. Enumerations are designed to be used as severity value lists by states. You can either base a state on an existing Enumeration definition in the State Manager or, if required, create one by clicking the **New Enumeration** button. For details on creating Enumeration definitions, see "Create/Update List/Enumeration Definition Dialog Box" on page 295.

Note: Alternatively, you can create an Enumeration definition in the System Type Manager. For details, see "System Type Manager" on page 264. The Enumeration definition you create appears in the State Manager.

Example of an Enumeration Definition

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

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



2 Define a State

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

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

To define a new state, select **Admin > Universal CMDB > Settings > State Manager** to open the State Manager. For details on defining a new state, see "State Manager Dialog Box" on page 535.

Example of a New State Definition

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

| Name | Description | Type Definition | |
|-----------|-----------------|------------------------------|--|
| change | Change State | Change States | |
| operation | Operation State | Operation States | |
| cpu_usage | CPU usage | cpu_usage | |
| | | Change States | |
| | | Operation States | |
| | | Test States | |
| | | Status Accounting | |
| | | concrete_synch_config_status | |
| | | synch_config_unit_status | |
| | | synch_unit_state | |
| | | cpu_usage | |

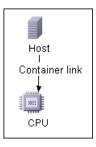
3 Define a Correlation TQL Query

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 > Universal CMDB > Modeling > Correlation Manager**. For details about how to add nodes and relationships to a query, see "Add Nodes and Relationships to a TQL Query" on page 384.

Example of a Correlation TQL Query

In this Correlation TQL query, a CPU and a Host node are linked by a Container Link relationship.



4 Define a Correlation Rule

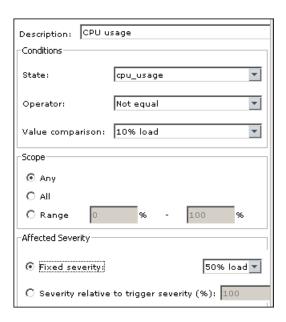
When you define a Correlation rule, you must specify the required causal relationship between the nodes. Define one node as the trigger, or the node that represents the changes you want to make to the system, and another node as the one that is affected.

Right-click the node you want to define as the trigger node and select **Define Affected** to open the Affected Nodes dialog box. In the Affected Nodes dialog box, select the node you want the trigger node to affect. Then click the **Add** button to open the Correlation Definition dialog box to set conditions for defining affected nodes. For details about how to define a Correlation rule, see "Correlation Definition Dialog Box" on page 243.

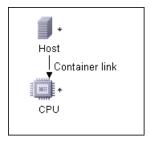
Example of a Correlation Rule

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

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



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



5 Create a TQL of the Type View in Query Manager

The Correlation TQL query created in the Correlation Manager appears in Query Manager as the type Correlation.

In Query Manager (select Admin > Universal CMDB > Modeling > Query Manager), right-click the query in the TQLs pane and save it as the type View. For details, see "Query Manager Window" on page 342.

6 Create a View in View Manager

Create a view in View Manager (select **Admin > Universal CMDB > Modeling > View Manager**) based on the TQL query of the type View you created in Query Manager in the previous task. For details, see "New View/View Properties/Save As View Wizard" on page 210.

7 Get Correlation Results

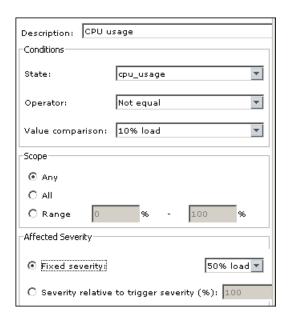
Select **Application** > **Universal CMDB** > **Topology View** and select the required view in View Explorer. To get Correlation results, you need to run the Correlation rule on a CI instance in the topology map that is a trigger. Right-click a trigger CI and select **Run Correlation** to open the Run Correlation dialog box. For details on how to run a Correlation rule, see "Run Correlation Dialog Box" on page 552.

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 243.

Example for Getting Correlation Results

A TQL Correlation query is created containing a CPU and Host node connected by a Container Link relationship. The CPU node is defined as the trigger node and the Host node is defined as the affected node.

The following Correlation rule is defined for the query.



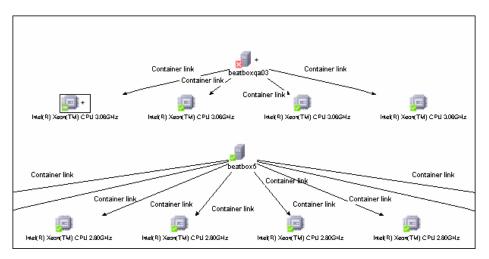
In Topology View, select the required view, right-click a CPU CI, and select **Run Correlation** to open the Run Correlation dialog box. In the **State** box, select **cpu_usage**, as this was the state on which the Correlation rule was based. The trigger severity selected is other than the one assigned to the trigger node in the **Value Comparison** box.



To see results, click one of the following:

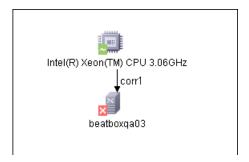
➤ Show in Views. This assigns a status to all the CIs in the view. Only the Host CI connected to the CPU CI (whose severity was changed), becomes affected and turns red because CPU usage of the Host node no longer equals 10%. According to the Correlation rule, the Host node is automatically assigned the 50% load status, which in this case, is the color red according to the severity list. If the other CIs were not affected, so they remain green (10% load according to the Enumeration definition).

The trigger CPU CI turns light olive because 20% load was assigned the color light olive in the Enumeration definition.



➤ Show Map. A map appears in a separate window containing only the trigger CPU CI and the Host CI it affected. The relationship connecting the two CIs contains the name of the Correlation rule defined in the Correlation Manager.

Note: Optionally, you can create a URL that enables you to embed the map. For details, see "Direct Link Parameters — Show Impact Map Page" in *Platform Administration*.



➤ **Generate Map**. Generates an Impact Analysis report that displays a list of CIs that are impacted in the system as a result of the simulated changes. For details, see "Run Correlation Dialog Box" on page 552.

Take a Snapshot of a View

You can take a snapshot of a view in Topology View application, save it, and then compare snapshots of the same view taken at different times using Compare Snapshots in **Application** > **Universal CMDB** > **Compliance** > **Compare Snapshots**. For details on how to take a snapshot of a view, see "Save Snapshot Dialog Box" on page 555. For details on how to view actual differences in the compared views, see "Compare Snapshots Window" on page 576.

🦒 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 747. For details on how to preview the content of the topology map before printing see "Print Preview Dialog Box" on page 747. For details on how to print the content of a topology map, see "Print Dialog Box" on page 746. For details on how to save a topology map to file, see "Run Correlation Dialog Box" on page 552.

Topology View Application User Interface

This section describes:

- ➤ Correlation Rules Window on page 551
- ➤ Run Correlation Dialog Box on page 552
- ➤ Save Snapshot Dialog Box on page 555
- ➤ Topology View Window on page 556

Q Correlation Rules Window

| Description | 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. To access: In the Run Correlation Dialog box, click Show Map. |
|--------------------------|--|
| Important Information | 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 233. 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 540 |

The Correlation Rules window includes the following elements (listed alphabetically):

| GUI Element (A-Z) | Description |
|---|---|
| <relationship></relationship> | The relationships represent the Correlation rule you defined in the Correlation Manager. For details, see "Correlation Definition Dialog Box" on page 243. |
| <the and<br="" statuses="">the colors that represent each one></the> | 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 295. |

Run Correlation Dialog Box

| Description | Enables you to run the Correlation rule you defined in Correlation Manager for that view. |
|--------------------------|--|
| | You can: |
| | ➤ 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 554. |
| | ➤ Simulate how the statuses of the affected CIs are impacted. For details, see "Show in Views" on page 553. |
| | ➤ 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 553. |
| | To access: Select Application > Universal CMDB > Topology View. Right-click a trigger node in the Topology Map and select Run Correlation. |
| Important Information | This dialog only appears if a Correlation rule is defined for that view. For details, see "Correlation Manager" on page 233. |
| Included in Tasks | "Retrieve Correlation Results – Scenario" on page 540 |

The Run Correlation dialog box includes the following elements (listed alphabetically):

| GUI Element (A-Z) | Description |
|-------------------|---|
| Generate Report | Generates an Impact Analysis report, which displays information that is divided as follows: |
| | 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 187. Trigger CIs. The CIs that represent the changes you want to make to the system. |
| | Notes: |
| | For information about limitations on the size of reports produced in .pdf format, see "Troubleshooting and Limitations" in <i>Reports</i>. (If the default values do not suit your needs, and must be modified, contact Customer Support.) For details on how to work with reports, see "Working in Reports - Overview" in <i>Reports</i>. |
| Show in Views | 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. The Topology Map also displays the Correlation |
| | indicators: |
| | ➤ 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. |
| | 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 295. |

Chapter 17 • Topology View Application

| GUI Element (A-Z) | Description |
|--------------------|---|
| Show Map | 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 551. |
| | 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. |
| | Note: Show Map enables you to view the results of multiple triggers. |
| State | Select the required State. For details about States, see "State Manager" on page 533. |
| Trigger's Severity | Select the required severity. |
| | Note : The severity list was defined for the state in the System Type Manager. For details, see "System Type Manager" on page 264. |
| | For example, you can create a Correlation rule in the Correlation Manager (see the "Correlation Definition Dialog Box" on page 243), 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. |

Save Snapshot Dialog Box

| Description | Enables you to take a snapshot of a view and save it. To access: Go to Application > Universal CMDB > Topology View and click the Save Snapshot button in View Explorer. |
|--------------------------|--|
| Important Information | You can compare snapshots of the same view taken at different times using Compare Snapshots in Application > Universal CMDB > Compliance > Compare Snapshots. For details, see "Compare Snapshots Window" on page 576. |
| Included in Tasks | "Take a Snapshot of a View" on page 549 |

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 | 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. To access: Select Application > Universal CMDB > Topology View. |
|--------------------------|--|
| Important Information | The Topology View window contains the following panes: |
| | ➤ 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 705. |
| | ➤ Topology Map. Displays the CIs of a selected view in Map mode or text mode. For details, see "IT Universe Manager Window" on page 90. |
| | ➤ Information Pane. Displays properties and history for the selected CI. For details, see "Information Pane" on page 97. |
| | Note: The Topology View window shares the same functionality as the IT Universe Manager topology map. The Topology View application includes some additional context menu options and toolbar options. For details on the IT Universe Manager topology map, see "Topology Map" on page 91. |
| Included in Tasks | "Retrieve Correlation Results – Scenario" on page 540 "Take a Snapshot of a View" on page 549 |
| Useful Links | "Save Snapshot Dialog Box" on page 555 "Set View Parameters/Set View Element Parameters Dialog Box" on page 220 |

Context Menu

The Topology View window includes the following elements (listed alphabetically) available by right-clicking a CI in the View Explorer pane or the Topology Map:

| GUI Element (A-Z) | Description |
|--|--|
| <it context="" manager="" menu="" options="" universe=""></it> | The context menu options from IT Universe Manager are also available in the Topology View application. For details, see "IT Universe Manager Window" on page 90. |
| 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 233. |
| | Note : You can only see Correlation results if you defined a Correlation rule for that view in Correlation Manager. |
| Show Impact | 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. |
| | This option appears only after the following has occurred: |
| | ➤ You defined a Correlation rule for the selected view in the Correlation Manager (for details, see "Correlation Manager" on page 233). |
| | ➤ You clicked Show in Views in the Run Correlation dialog box. |
| | ➤ Correlation results appear in the Topology Map. |
| | 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. |
| | By using the Show Impact option, you can display all CIs that are affected by the IP CI. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| Show Root Cause | 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. |
| | 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. |
| | This option appears only after the following has occurred: |
| | ➤ You defined a Correlation rule for the selected view in the Correlation Manager (for details see, "Correlation Manager" on page 233). |
| | ➤ You clicked Show in Views in the Run Correlation dialog box. |
| | ➤ Correlation results appear in the Topology Map. |
| | A window, as illustrated below, is displayed containing the root cause CI and all the other CITs in the Correlation rule chain. |
| | agents Cor1 |
| | 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. |
| | 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. |

18

CI Lifecycle

This chapter provides information on the main concepts, tasks, and reference information of the CI Lifecycle application.

This chapter includes:

Concepts

➤ CI Lifecycle Overview on page 560

Tasks

➤ Generate CI Lifecycle Data and Filter the Results on page 560

Reference

➤ CI Lifecycle User Interface on page 561

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 64.

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 563.

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 561
- ➤ "Filter the CI Lifecycle Results" on page 561

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 563.

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 566.

🙎 CI Lifecycle User Interface

This section describes:

- ➤ CI Lifecycle Report on page 562
- ➤ CI Lifecycle Window on page 563
- ➤ Filter Dialog Box on page 566

Q 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 Reports. |

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 |
|-------------------|---|
| То | 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. |

Q CI Lifecycle Window

| Description | Enables you to filter CIs and relationships which are candidates for deletion. To access: Select Application > Universal CMDB > CI Lifecycle. |
|-------------------|--|
| Included in Tasks | "Generate CI Lifecycle Data and Filter the Results" on page 560 |

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

| GUI Element (A-Z) | Description |
|---------------------------|---|
| <u>5</u> | Click Postpone Deletion to delay the deletion of a CI. It disappears from the list of candidates for deletion. |
| Á | 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. |
| Physical Particles (1997) | Click Select/Clear All to select or clear all rows of data on the current page. |
| S | Click Refresh to update the data displayed. |

| GUI Element (A-Z) | Description |
|---|---|
| Y | Click Filter to open the Filter dialog box, which enables you to customize the filter. For details, see "Filter Dialog Box" on page 566. |
| ¥ | 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> . |
| □ 3 of 16528 □ □ | Click to navigate through the results page by page or to jump to the first or last page. |
| <right-click a="" column<br="">header></right-click> | 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. |
| Relationships tab | Select to see lifecycle results for relationships. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| 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). |
| Set Rows per Page | Select the number of rows per page from the drop-down list. |
| То | 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 "Configuration Item Properties Dialog Box" on page 78. |

🖎 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 560 |

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. |

19

Gold Master Report

This chapter provides information on Gold Master reports.

This chapter includes:

Concepts

➤ Gold Master Report Overview on page 567

Reference

➤ Gold Master Report User Interface on page 567

Gold Master Report Overview

A Gold Master report compares the configuration of a Gold Master CI to other CIs of the same CI type, or a descendant of the CI type. The report contains the results of the Gold Master report definition defined in Topology Report Manager. For details, see "Gold Master Report Pane" on page 315.

🍳 Gold Master Report User Interface

This section describes:

➤ Gold Master Report Page on page 568

💘 Gold Master Report Page

| Description | Specifies which of the selected CIs are configured differently from the Gold Master CI. |
|--------------------------|--|
| | To access: Select Applications > Universal CMDB > Compliance > Gold Master. |
| Important Information | Verify that popups are not blocked in your browser. For details on how to work with reports, see "Working in Reports" in Reports. |

Left Pane

| Description | Select the required Gold Master report definition you |
|-------------|---|
| | want to generate. |

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| Definitions tab | Displays a hierarchical tree structure of the Gold Master reports defined in Topology Report Manager. For details, see "Gold Master Report Pane" on page 315. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| Results tab | The Gold Master report you select in the Definitions pane is automatically selected in the Results pane. 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 519. Report Date User gold1 V V V gold1 Sun Jul admin gold1 Sun Jul admin gold1 Sun Jul admin gold1 Sun Jul admin gold1 Mon Jul admin |
| | From the: ➤ Report list, select the required Gold Master report. ➤ Date list, select the required time. ➤ User list, select the required user. 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 Reports. |

Right Pane

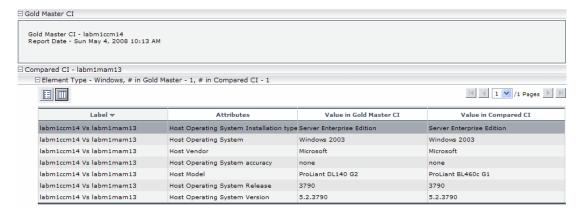
| Description | Compares the attribute values of the CIs in the Gold Master CI subgraph to the attribute values of the CIs in the subgraph of the Compared CI in the CMDB. |
|--------------------------|---|
| | Note : Only attributes that have been assigned the Comparable qualifier in the CIT Manager (for details, see "CI Type Manager" on page 261), can be compared. |
| | 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. |
| | Note : The Gold Master report only displays a CI attribute comparison if the values are different. |
| | 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. |
| | 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. |
| | For a sample of a Gold Master report, see "Sample Gold Master Report" on page 571. |
| Important Information | For details on how to work with reports, see "Working in Reports" in <i>Reports</i> . |

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| # in Compared CI | The number of CIs for that element type (CIT) the Compared CI subgraph contains. |
| # in Gold Master | The number of CIs for that element type (CIT) the Gold Master CI subgraph contains. |
| Attributes | The CI attribute. |

| GUI Element (A-Z) | Description |
|----------------------------|---|
| Compared CI | The display name of the Compared CI. |
| Element Type | The CIT of the CI. |
| Label | The display label of the Gold Master CI. |
| Report Date | The time and date the report was generated. |
| Value in Compared CI | The value of the attribute in the Compared CI. |
| Value in Gold Master CI | The value of the attribute in the Gold Master CI. |

Sample Gold Master Report



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.

Chapter 19 • Gold Master Report

20

Compare Snapshots

This chapter provides information on Compare Snapshots.

This chapter includes:

Concepts

➤ Snapshot Comparison Overview on page 573

Tasks

➤ Snapshot Comparison on page 574

Reference

➤ Compare Snapshots User Interface on page 575

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 576.

🔭 Snapshot Comparison

This task describes how to take a snapshot of a view, and then compare two snapshots of a specific view taken at different times.

This section includes the following tasks:

- ➤ "Take a Snapshot of a View" on page 574
- ➤ "Save Snapshots on a Periodic Basis" on page 574
- ➤ "Compare Snapshots" on page 574

1 Take a Snapshot of a View

Select **Applications** > **Universal CMDB** > **Topology View**. In View Explorer, right-click the required view and select **Save Snapshot** to take a snapshot of a view and save it. For details, see "Save Snapshot Dialog Box" on page 555.

2 Save Snapshots on a Periodic Basis

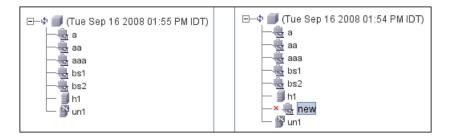
Optionally, you can schedule snapshots to be taken of a certain view at specific times by defining a task. For details, see "Job Scheduler Window" on page 529.

3 Compare Snapshots

Compare the snapshots of a view taken at different times. Select **Applications** > **Universal CMDB** > **Compliance** > **Compare Snapshots** to open the Compare Snapshots dialog box. For details on how to compare snapshots taken at different times, see "Compare Snapshots Window" on page 576.

Example of Snapshots of a View Taken at Different Times

In the following example, the **Deleted Item** icon next to the CI **new** in the right pane, indicates that the CI has been deleted in the newer view.



Compare Snapshots User Interface

This section describes:

- ➤ Compare Snapshots Window on page 576
- ➤ Find CI by Label Dialog Box on page 581
- ➤ Snapshots of <View> Dialog Box on page 582

Compare Snapshots Window

| Description | 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. You can compare a current snapshot to a previous snapshot or two snapshots both taken in the past. To access: Select Applications > Universal CMDB > Compliance > Compare Snapshots. or Click View Snapshot in a Change report if a snapshot was taken of that view. For details, see "View Snapshot" on page 603. 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 601), appear in the report. |
|--------------------------|--|
| Important Information | 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 519. Snapshots of views that are marked as Track Changes (for details, see "Track Changes" on page 214), are created on a daily basis. |
| Included in Tasks | "Snapshot Comparison" on page 574 |

| 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. |
| Q | Search for a CI within the selected view whose label contains the searched text. Opens the Find CI by label dialog box. |
| Δ⇒ | Find the next occurrence of an item marked as changed. |
| φΔ. | 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. |
| | 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. |
| Č | 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 . |
| | Note : This button is only enabled if you selected a CI of the CIT Configuration File from the tree. |
| | Display the selected CI's attributes. For details, see "Configuration Item Properties Dialog Box" on page 78. |
| | Note : The Properties functionality is sometimes displayed in a window and not in a tab. |

Chapter 20 • Compare Snapshots

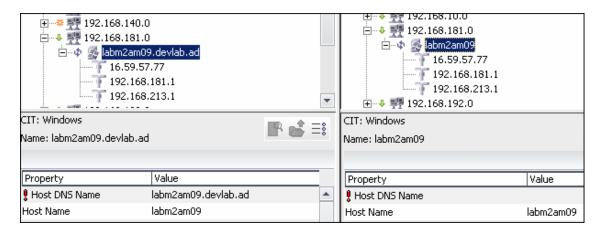
| GUI Element (A-Z) | Description |
|-------------------|---|
| • | The Contains an Updated Item icon indicates that either a new child CI was created for a CI or an existing child CI was updated or deleted. |
| | For example, the 16.59.56.0 CI in the figure below has a Contains an Updated Item icon due to the child CIs that were added to it. |
| | 10.168.20.0 10.168.21.0 10.168.22.0 10.168.23.0 10.168.248.12 10.168.248.16 10.168.248.40 |
| * | 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. |

| GUI Element (A-Z) | Description |
|---------------------------------|--|
| * | 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. |
| Φ | The Updated Item icon indicates that the attribute value of a CI has changed. For more information, see the Example of an Attribute Value of a CI that Has Changed on page 580. |
| <at of="" panes="" top=""></at> | The Compare Snapshots window is divided into two panes. Each side displays an hierarchical tree structure of all the CIs in the Topology Map for that snapshot version. The left side always represents the newer of the two versions. When you select a CI on one side, the corresponding CI on the other side is automatically selected (provided the Synchronize Selection check box is selected). |
| СІТ | The name of the CIT to which the CI belongs as defined in the CI Type Manager, as described in "CI Type Manager" on page 261. |
| Name | The name of the CI as defined in the CI's label. |
| Properties pane | Displays the attributes of the selected CI. |
| | The Properties pane contains the following fields: |
| | 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.</view> |
| Select View Name | Displays the name of the view whose snapshots you want to compare. |
| | Note : Only views for which snapshots have been taken are available. |
| Synchronize Selection | Enables you to select a CI on one side and have its corresponding CI automatically selected on the other side. |
| | The default for the Synchronize Selection check box is selected. Clearing this check box allows you to select two different CIs from each of the two trees. This allows you to compare two different CIs and see their different properties. |

Example of an Attribute Value of a CI that Has Changed

The **Updated Item** icon indicates that the attribute value of a CI has changed. For example, the figure below shows that the CI **labn2am09.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).



🔁 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 Snapshots window. To access: Click the Find button in the Compare |
|-------------------|---|
| | Snapshots window. |
| Included in Tasks | "Snapshot Comparison" on page 574 |

| 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 555. |
| Included in Tasks | "Snapshot Comparison" on page 574 |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Description | The description you wrote for the snapshot in "Save Snapshot Dialog Box" on page 555. |
| Note | The note you wrote for the view in "Save Snapshot Dialog Box" on page 555. |
| 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. |

21

Compare Cls

This chapter provides information on Compare CIs.

This chapter includes:

Concepts

➤ CI Comparison Overview on page 583

Tasks

➤ CI Comparison on page 584

Reference

➤ Compare CIs User Interface on page 585

CI Comparison Overview

Compare CIs enables you to compare the hierarchies of two compound CIs. A compound CI is a CI that is linked to another CI by a **Container link** relationship.

You can display the compared CIs and their child CIs that appear in a selected view or in the CMDB.

Change indicators in the Compare CIs window denote:

- ➤ A CI in one pane does not match any corresponding CI in the other pane.
- ➤ A CI has a match but one of its children does not have a match.

Chapter 21 • Compare Cls

You can only see differences in the attributes of the CI whose values have been defined as **Comparable** in the CI Type Manager. For information, see "Add/Edit Attribute Dialog Box" on page 273. 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 586.

훩 CI Comparison

This task explains how to compare the hierarchies of two compound CIs, view a CI's configuration file, and show the difference between two configuration files.

This section includes the following tasks:

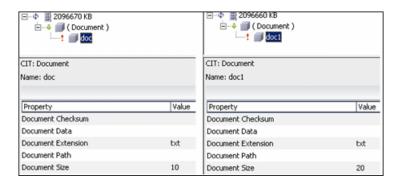
- ➤ "Select the Required CIs" on page 584
- ➤ "View a CI's Configuration File" on page 585
- ➤ "Show the Difference Between Two Configuration Files" on page 585

1 Select the Required Cls

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 589.

Example of Nonmatching Cls

The following example displays the **No Matching CI** icon next to the CIs **doc** and **doc1** because the CI on one side does not match the corresponding CI on the other side. The reason they do not match is the difference in document size. The value for **Document Size** for the **doc** CI on the left side is **10** while the **Document Size** for the **doc** CI on the right side is **20**.



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 586.

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 586.

Compare Cls User Interface

This section describes:

- ➤ Compare CIs Window on page 586
- ➤ Find CI by Label Dialog Box on page 588

➤ Select CI Dialog Box on page 589

Q Compare Cls Window

| Description | Compare the hierarchies of two compound CIs. A compound CI is a CI that is linked to another CI by a Container link relationship. |
|--------------------------|--|
| | The Compare CIs window is divided into two panes. Each side displays a hierarchical tree structure of the CIs you selected. When you select a CI on one side, the corresponding CI on the other side is automatically selected, provided the Synchronize Selection check box is selected. |
| | To access: Select Applications > Universal CMDB > Compliance > Compare Cls. |
| 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 584 |

| 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. |
| Q | Search for a CI within the selected view whose label contains the searched text. Opens the Find CI by label dialog box. |
| Δ⇒ | Find the next occurrence of an item marked as changed. For information on the change indicators, see "No Matching CI" on page 587 and "Has a Non-Matching Child" on page 587. |

| GUI Element (A-Z) | Description |
|--|--|
| ¢Δ | Find the previous occurrence of an item marked as changed. For information on the change indicators, see "No Matching CI" on page 587 and "Has a Non-Matching Child" on page 587. |
| No. | Show the difference between the content of the two configuration files. Configuration files use the .xml, .txt or .ini extensions. |
| | Select a CI of the CIT Configuration File in both panes and click the Show Differences button. A window opens displaying the differences in the configuration files, which are marked in blue. |
| ≧ | View the content of a Configuration File CI. Select a CI of the Configuration File CI and click the Open button. |
| | Note : This button is only enabled if you selected a CI of the CIT Configuration File from the tree. |
| | Display the selected CI's properties. For details, see "Configuration Item Properties Dialog Box" on page 78. |
| No Matching CI | Indicates that a CI in one pane does not match any corresponding CI in the other pane. |
| Has a Non- Matching Child | Indicates that the child of the CI does not have a matching child in the other pane. |
| <at of="" panes="" top=""></at> | Displays the CIs you selected in the Select CI dialog box. |
| <left and="" panes="" right=""></left> | Displays a tree of the compared CIs and their child CIs that appear in the selected view or in the CMDB, depending on whether you selected the View or the CMDB options. |
| CIT | The CIT (as defined in the CI Type Manager) of the selected CI at the top of the pane. For details, on CI Type Manager, see "CI Type Manager" on page 261. |
| CMDB | Display the selected CIs and their child CIs that appear in the entire CMDB. |
| Name | The name of the selected CI as defined in the CI's label. |

| GUI Element (A-Z) | Description |
|--------------------------|--|
| Property | Displays the attribute name for the selected CI, which was marked as Comparable in the CI Type Manager. For details, see "Create Configuration Item Type/Relationship/Calculated Relationship Wizard" on page 281. |
| 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 584 |

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

| GUI Element (A-Z) | Description |
|-------------------|--|
| Backward | Do a backward search. |
| Case Sensitive | Distinguish between uppercase and lowercase characters. When you select Case Sensitive , the search results only include those instances in which the capitalization matches the text you typed in the Text to find box. |
| Forward | Do a forward search. |
| Text to find | Enter the text of the CI you want to find. You can specify a whole word or part of it. |

Select CI Dialog Box

| Description | Select the required CI for comparison from the hierarchical tree or search for a CI for comparison. |
|-------------|---|
| | To access: Click Select CI in the Compare CIs window. |

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 589 below. |
| Search tab | Search for a CI for comparison. For details, see "Search Tab" on page 590. |

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. |

Chapter 21 • Compare Cls

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). |
| 60 | 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. |
| \odot | Enables you to move to the next or previous result of the search for the string entered in the Find box. |
| <hierarchical ci="" tree=""></hierarchical> | 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. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Q | 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 CITs to search in button to open the hierarchical tree structure of the CI Type model. Select the required CIT. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| СІ Туре | 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. |

Chapter 21 • Compare Cls

22

Asset Report

This chapter provides information on Asset reports.

This chapter includes:

Concepts

➤ Asset Report Overview on page 593

Reference

➤ Asset Report User Interface on page 593

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 594

Asset Report Page

| Description | 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. |
|--------------------------|--|
| | The report contains only the attributes whose Asset Data check box was selected in the Attributes tab in the CI Type Manager. For more details, see "Add/Edit Attribute Dialog Box" on page 273. |
| | You can generate a list from a specific view or from the CMDB. |
| | 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. |
| | To access: Select Applications > Universal CMDB > Reports > Asset Report. |
| Important Information | ➤ Make sure that popups are not blocked in your browser. |
| | ➤ For details on how to work with reports, see "Working in Reports - Overview" in <i>Reports</i> . |
| | ➤ For information about limitations on the size of reports produced in .pdf format, see "Publishing a Report" in <i>Reports</i> . |

| GUI Element (A-Z) | Description |
|-------------------|--|
| CMDB | Include information from the selected view as well as information about the child CIs and their attribute values in the CMDB. |
| | 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. |
| Selected view | Select the required view. |
| Views | Includes only information about the CIs and their attributes contained in this view. |

Chapter 22 • Asset Report

23

Host Dependency Report

This chapter provides information on Host Dependency reports.

This chapter includes:

Concepts

➤ Host Dependency Report Overview on page 597

Reference

➤ Host Dependency Report User Interface on page 598

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

Nost Dependency Report User Interface

This section describes:

➤ Host Dependency Report Page on page 598

Nost Dependency Report Page

| Description | 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. To access: Select Applications > Universal CMDB > Reports > Host Dependency. |
|--------------------------|---|
| Important Information | 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 Reports. |

The Host Dependency report page includes the following elements (listed alphabetically):

| GUI Element (A-Z) | Description |
|-------------------|---|
| CMDB | Display all the servers in the CMDB that are dependent on the servers in the selected view. |
| Selected view | Select the required view. |
| Views | Display all the dependencies between the servers in the selected view |

The following elements are included in the generated Host Dependency report (unlabeled GUI elements are shown in angle brackets):

| GUI Element (A-Z) | Description |
|-------------------|---|
| Clients | The list of clients that are linked to the servers. |
| Counter | The number of clients to which the server is connected. |
| Host | The servers in the selected view. |
| Relationship | The display label of the relationship in the Topology Map. |

Chapter 23 • Host Dependency Report

24

Change Report

This chapter provides information on Change reports.

This chapter includes:

Concepts

➤ Change Report Overview on page 601

Reference

➤ Change Report User Interface on page 602

Change Report Overview

Change reports enable you to view and analyze the actual changes made to a specific CI and its children, or to a specific view. This can help with possible troubleshooting issues related to this CI. For example, seeing the changes that occurred to a CI might enable you to conclude that these changes are the cause of the problem. By the same token, the source of the troubleshooting issue could be related to expected changes which failed to occur.

Scheduling Change reports to run periodically also enables you to monitor the changes that are made to the system and verify that all the changes are in line with your organization's planning. For details, see "Create a Schedule" in *Reports*.

Change Report User Interface

This section describes:

- ➤ Change Report Page on page 602
- ➤ CI History Report Page on page 606

🙎 Change Report Page

| Description | Displays information about the changes made to the CIs whose properties are marked as either Change Monitored or Comparable. For details, see "Add/Edit Attribute Dialog Box" on page 273. The report displays: Changes that occurred in a selected CI and all its children that are linked, by default, by an impact_link. For details on how to confugure the report to retrieve CIs that are defined with a qualifier, see the online Help. Changes that occurred in all CIs in the selected view. In addition, this page displays any CIs that were added or deleted during the defined time frame according to snapshots taken of that view. CIs with a Container link relationship that were added to or removed from a CI. CIs whose relationship was defined with a TRACK_LINK_CHANGES qualifier, that were added to or removed from a CI. For information about qualifiers, see "Qualifiers Page" on page 285. |
|--------------|--|
| | To access: Select Applications > Universal CMDB > Reports > Change Report. |
| | Note: You can also access Change report using the Change Rule right-click option for any CI with changed properties in relevant views in Dashboard. For details, see the "Change Rule" option in Dashboard Administration. |
| Useful Links | For details on how to work with reports, see "Working in Reports" in <i>Reports</i> . |

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

| GUI Element (A-Z) | Description |
|---------------------|--|
| Select CI/View | Select the required CI or view. Opens the Select CI/View dialog box. For details, see "Working with View Explorer" on page 697. |
| 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 573. |
| | 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: ➤ 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 604
- ➤ "Relationship Changes Area" on page 605

CI Changes Area

| 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.</child_ci></parent_ci> |
| | Note : Click to view the change history of a specific CI. For details, see "CI History Report Page" on page 606. |
| 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). |
| Туре | The type of change that occurred. |
| <view other="" pages=""></view> | 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

| GUI Element (A-Z) | Description |
|-------------------|--|
| Change Date | The date and time at which the update was performed. |
| Changer | The name of the user that manually modified the CI's property, or the name of the DDM probe that automatically discovered a change made to the CI's property. |
| Container Label | The label of the path from the root to the container CI. |
| | A backslash (\) in a CI name indicates a parent-child relationship with the format: <pre><pre><pre><pre></pre></pre></pre></pre> |
| | Note : Double-click an item to view the change history of the container CI. For details, see "CI History Report Page" on page 606. |
| Event type | You can have one of the following values: |
| | Add related CI. A contained CI was added to the container CI using a Container link relationship. Remove related CI. A contained CI that was linked to a container CI using a Container link was removed. |
| Related label | The label of the path from the root to the contained CI. |
| | Note : Double-click an item to view the change history of the related CI. For details, see "CI History Report Page" on page 606. |

🙎 CI History Report Page

| Description | 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. |
|--------------------------|--|
| | To access: |
| | ➤ 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. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| Change Date | The date and time when the update was performed. |
| Changer | The name of the user that manually modified the CI's property, or the name of the DDM probe that automatically discovered a change made to the CI's attribute. |
| CI Attribute | The name of the CI attribute that was updated. |
| New Value | The new value of the CI attribute. |

25

Topology Report

This chapter provides information on Topology reports.

This chapter includes:

Concepts

➤ Topology Report Overview on page 607

Tasks

- ➤ Generate and Send a Topology Report at Defined Intervals on page 608

 Reference
- ➤ Topology Reports User Interface on page 609

\lambda Topology Report Overview

A Topology report is based on a specific Report TQL query, defined in Topology Report Manager. It gives you information about the selected Report nodes in the TQL on which it is based.

Topology Report Manager enables you to customize the way the report is displayed. The information that appears in the report, including the order in which Report nodes are listed and their placement relative to other Report nodes, and how the information within each Report node is sorted, is defined in Topology Report Manager. For details, see "Topology Report Manager" on page 299.

You can generate a report and save it. The results of the generated report are saved in the History Results tab in the Topology Report page. For details, see "Topology Report Page" on page 610.

You can optionally schedule the Topology report to run on a periodic basis, For details, see "Generate and Send a Topology Report at Defined Intervals" on page 608.

Generate and Send a Topology Report at Defined Intervals

This section explains how to schedule a Topology report to be generated and sent to specific recipients, through email, at regularly defined intervals. The results of the scheduled reports are displayed in the History Results tab in the Topology Report page.

This task includes the following steps:

- ➤ "Configure a Favorite Filter" on page 608
- ➤ "Edit the Favorite Filter in Report Manager" on page 608
- ➤ "Send a Report at Specific Intervals" on page 609

1 Configure a Favorite Filter

Configure a Favorite Filter for the required Topology report. The filter is uploaded to the Report Manager. For details, see "Save Filter to Favorites Dialog Box" on page 70.

2 Edit the Favorite Filter in Report Manager

Edit the Favorite Filter in Report Manager to enable you to create a schedule to send the Favorite Filter to specified individuals at specific intervals.

In Report Manager, select the required Favorite Filter and then click the Edit button to open the Favorite Filters wizard. In the Filter Setting page, select the **Save to History DB** option. For details, see "Favorite Filters Wizard" on page 107.

3 Send a Report at Specific Intervals

In Report Manager, create a schedule to send the Favorite Filter to specified individuals at specific intervals. The results of the scheduled reports are saved in the History Results tab in the Topology Report page.

For details on how to create a schedule, see "Create New Schedule Dialog Box" on page 121.

For details about the History Results tab, see "Topology Report Page" on page 610.

Topology Reports User Interface

This section describes:

- ➤ Set Parameter Values Dialog Box on page 609
- ➤ Topology Report Page on page 610

🙎 Set Parameter Values Dialog Box

| Description | Enables you to edit the predefined parameterized values of node conditions defined for the selected Report definition in Topology Report Manager. The dialog box displays all the conditions for the selected report definition. For each element, every condition appears on a separate line. To access: Click the Set parameter values link in the Topology Report page. |
|--------------------------|--|
| Important Information | The Set parameter values link appears only if you defined a node condition using parameterized values in the Attribute tab in the Node Condition dialog box in Topology Report Manager. For details, see "Attribute Tab" on page 438. |

Chapter 25 • Topology Report

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></attribute> | The attribute used for the attribute condition definition. |
| <operator></operator> | The operator used for the attribute condition definition. |
| Value | The required value. |

🙎 Topology Report Page

| Description | A Topology report is based on a specific Report TQL query defined in Topology Report Manager. Each report is customized to display specific information, as defined in the relevant Report TQL. For details, see "Topology Report Manager" on page 299. To access: Select Applications > Universal CMDB > Reports > Topology Report. |
|--------------------------|---|
| Important Information | For details on how to work with reports, see "Working in Reports" in <i>Reports</i>. For information about limitations on the size of reports produced in .pdf format, see "Publishing a Report" in <i>Reports</i>. |
| Included in Tasks | "Generate and Send a Topology Report at Defined Intervals" on page 608 |

The Topology Report page includes the following panes:

- ➤ "Left pane" on page 611
- ➤ "Right pane" on page 612

Left pane

| Description | Select the required Topology report definition you want |
|-------------|---|
| | to generate. |

| GUI Element (A-Z) | Description |
|---------------------|--|
| Definitions tab | Displays the hierarchical tree structure of the Topology reports defined in Topology Report Manager. For details, see "Topology Report Manager" on page 299. |
| History Results tab | Displays the history of the Topology reports that were generated and saved using the Save to History DB option. This enables you to produce a Topology report that was generated at a specific time or a by a specific user. |
| | The Topology report you select in the Definitions tab is automatically selected in the History Results tab. |
| | Definitions History Results 1 V /1 Pages |
| | Report Date User [Modeling Report 0 admin Report1 Report1 Report1 Report2 Report3 Report3 Report3 Report4 Report5 Rep |
| | From the: |
| | ➤ Report list, select the required Topology report. |
| | ➤ Date list, select the required time. |
| | ➤ User list, select the required user. |
| | Note: For details on how to customize columns and divide a table of data or a list of reports into pages, see "Working in Reports" in <i>Reports</i> . |

Right pane

| Description | Contains the information that was defined in Topology Report Manager to be included in the report. This includes which Report nodes should appear in the report, the parameter defined for each Report node, and the function you want to use to calculate the results on the report's columns. For details, see "Topology Report Manager" on page 299. |
|--------------------------|---|
| Important Information | For details on how to work with reports, see "Working in Reports" in <i>Reports</i> . |

| GUI Element (A-Z) | Description |
|--------------------------|---|
| Set parameter values | (Optional) A link that opens the Set parameters values dialog box. Enables you to edit the predefined values of node conditions. |
| | Note: This link appears only if you defined a node condition using parameterized values in the Attribute tab in the Node Condition dialog box in Topology Report Manager. For details, see "Attribute Tab" on page 438. |
| Save to History DB | Enables you to generate and save a Topology report. The report results are stored in the History Results tab. |
| Set view-specific report | (Optional) Enables you to generate a report of the selected Report TQL query based on a certain view rather than the entire CMDB. Select the view on which you want to base the report. |
| | Note : Click Clear to run the report based on the entire CMDB. |

26

Overview Reports

This chapter provides information on Overview reports, located in Applications > Universal CMDB > Overview Reports.

This chapter includes:

Concepts

➤ Overview Report Overview on page 613

Reference

➤ Overview Reports User Interface on page 614

& 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 Business Availability Center and stored in the CMDB. When generating reports, you can specify various report settings, such as time range or location, as well as drill down to see further information.

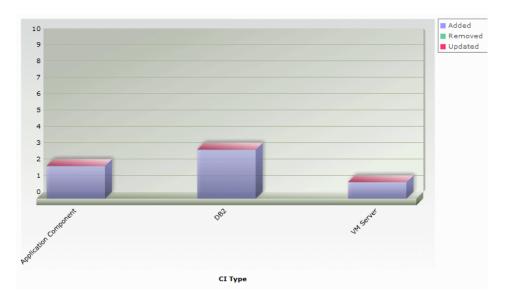
Note: You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see "Viewing Reports with Adobe Flash Player" in *Reports*.

🔍 Overview Reports User Interface

This section describes:

- ➤ Changed Applications Report on page 615
- ➤ Changed Views Report on page 617
- ➤ CMDB Utilization Report on page 618
- ➤ Database Breakdown Report on page 620
- ➤ Delete Candidates Overview Report on page 622
- ➤ Host OS Breakdown Report on page 624
- ➤ Major Application Type Breakdown Report on page 625
- ➤ Network Device Breakdown Report on page 627
- ➤ Number of Changes Report on page 628

Q Changed Applications Report



Description

This report displays a bar graph showing the number of detected changes in applications within a defined period.

Each bar represents a different application type. The colors in each bar represent the different types of changes that occurred in the application. Each color in the legend at the right of the bar graph represents a different type of change. The CI type of each application is displayed under the bar.

You can display the number of each type of change that occurred by moving the cursor over the related color. The tooltip that appears displays the relevant number of changes that occurred.

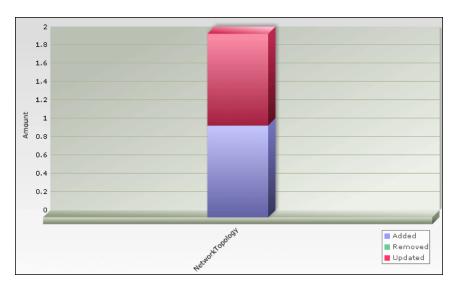
Click the relevant color in the bar to drill down to see a Show CI Instances report displaying the application instances that represent the changes.

To access: Select Applications > Universal CMDB > Overview Reports > Changed Applications.

Chapter 26 • Overview Reports

| Important Information | ➤ You can add this report as a portlet in My BSM. For details, see "Add Portlets to <page_name>/Add Portlets Dialog Box" in My BSM.</page_name> ➤ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see "Viewing Reports with Adobe Flash Player" in Reports. ➤ For information about limitations on formatting reports, see "Formatting a Report" in Reports. |
|--------------------------|---|
| Useful Links | For details on how to work with reports, see "Working in Reports" in <i>Reports</i> . |

🍳 Changed Views Report



Description

This report displays a bar graph showing the number of changes that occurred in a specific view within a defined period.

Note: Only views with changes that reflect the differences between two snapshots, one taken before the **From** date and another snapshot taken before the **To** date in Change Report appear in the report.

Each bar represents a different view. The bar graph displays up to ten views with the largest number of changes. The view name is displayed under the bar. The legend at the right side of the bar graph shows which color represents the type of change that occurred. You can display the number of each type of change by moving the cursor over the relevant color. The tooltip that appears displays the name of the view and the number of changes that occurred.

Click a bar to open the Save Snapshot window and display the differences between the views. For details, see "Compare Snapshots" on page 573.

To access: Select Applications > Universal CMDB > Overview Reports > Changed Views.

| Important Information | ➤ You can add this report as a portlet in My BSM. For details, see "Add Portlets to <page_name>/Add Portlets Dialog Box" in My BSM.</page_name> ➤ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see "Viewing Reports with Adobe Flash Player" in Reports. ➤ For information about limitations on formatting reports, see "Formatting a Report" in Reports. |
|--------------------------|---|
| Useful Links | For details on how to work with reports, see "Working in Reports" in <i>Reports</i>. For details on Change reports, see "Change Report" on page 601. |

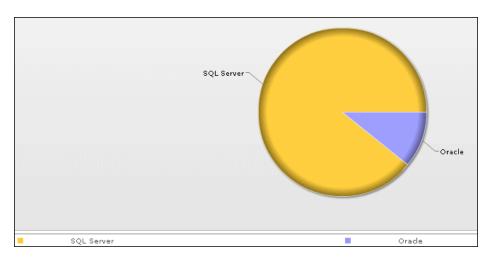
CMDB Utilization Report

| Туре | Amount |
|------------------------|---------|
| CIs and Relationships | 203,050 |
| Correlation Rules | 2 |
| Enrichment Rules | 18 |
| Reports | 2 |
| Running Discovery Jobs | 34 |
| Snapshots | 0 |
| Views | 44 |

| Description | 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. To access: Select Applications > Universal CMDB > Overview Reports > CMDB Utilization. |
| Important Information | ➤ You can add this report as a portlet in My BSM. For details, see "Add Portlets to <page_name>/Add Portlets Dialog Box" in My BSM.</page_name> |

| Useful Links | For details on how to work with reports, see "Working in |
|--------------|--|
| | Reports" in <i>Reports</i> . |

🍳 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.

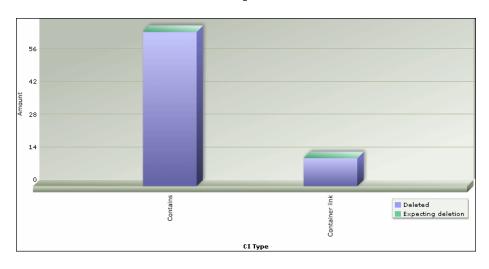
To verify the database versions, use the legend below the pie chart. You can display the number of each database version by moving the cursor over the related color. The tooltip that appears displays the relevant number.

Click a pie slice to drill down to see a Show CI Instances report for each database version.

To access: Select Applications > Universal CMDB > Overview Reports > Database Breakdown.

| Important Information | ➤ You can add this report as a portlet in My BSM. For details, see "Add Portlets to <page_name>/Add Portlets Dialog Box" in My BSM.</page_name> |
|--------------------------|--|
| | ➤ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see "Viewing Reports with Adobe Flash Player" in <i>Reports</i> . |
| | ➤ For information about limitations on formatting reports, see "Formatting a Report" in <i>Reports</i> . |
| Useful Links | For details on how to work with reports, see "Working in Reports" in <i>Reports</i> . |

🔍 Delete Candidates Overview Report



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.

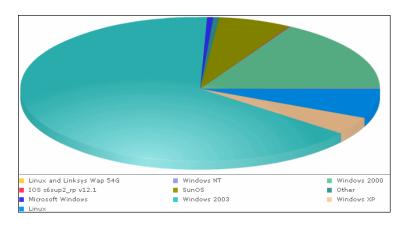
You can display the number of CIs and relationships that were deleted and the ones that are about to be deleted by moving the cursor over the related color in the bar. The tooltip that appears displays the relevant number.

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 > Universal CMDB > Overview Reports > Delete Candidates Overview.

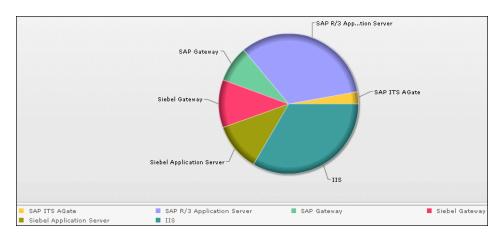
| Important Information | ➤ You can add this report as a portlet in My BSM. For details, see "Add Portlets to <page_name>/Add Portlets Dialog Box" in My BSM.</page_name> ➤ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see "Viewing Reports with Adobe Flash Player" in Reports. ➤ For information about limitations on formatting reports, see "Formatting a Report" in Reports. |
|--------------------------|---|
| Useful Links | For details on how to work with reports, see "Working in Reports" in <i>Reports</i> . |

Nost OS Breakdown Report



| Description | 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. |
|--------------------------|---|
| | 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. |
| | Click a pie slice to drill down to see a Show CI Instances report for each operating system. |
| | To access: Select Applications > Universal CMDB > Overview Reports > Host OS Breakdown. |
| Important Information | ➤ You can add this report as a portlet in My BSM. For details, see "Add Portlets to <page_name>/Add Portlets Dialog Box" in My BSM.</page_name> |
| | ➤ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see "Viewing Reports with Adobe Flash Player" in <i>Reports</i>. ➤ For information about limitations on formatting |
| | reports, see "Formatting a Report" in Reports. |
| Useful Links | For details on how to work with reports, see "Working in Reports" in <i>Reports</i> . |

Najor 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" on page 285.

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.

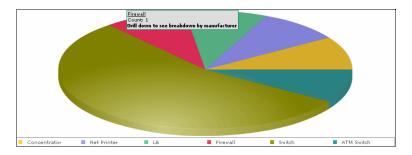
- ➤ Use the legend below the pie chart to verify an application.
- ➤ Click a segment to view a specific application sorted by version.
- ➤ Use the legend below the pie chart to verify the different versions.
- ➤ Click a pie segment to drill down to see a Show CI Instances report for each application version.

To access: Select Applications > Universal CMDB > Overview Reports > Application Breakdown.

Chapter 26 • Overview Reports

| Important Information | ➤ You can add this report as a portlet in My BSM. For details, see "Add Portlets to <page_name>/Add Portlets Dialog Box" in My BSM.</page_name> ➤ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see "Viewing Reports with Adobe Flash Player" in Reports. ➤ For information about limitations on formatting reports, see "Formatting a Report" in Reports. |
|--------------------------|---|
| Useful Links | For details on how to work with reports, see "Working in Reports" in <i>Reports</i> . |

Network Device Breakdown Report



Description

Displays a breakdown of network devices. Only the network devices that meet the following conditions appear in the report:

- ➤ The CIT of the network device has been assigned the qualifier NETWORK_DEVICES. For details, see "Qualifiers Page" on page 285.
- ➤ 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 438.

You can view all network devices deployed in the system or at a certain location. Choose the country, state, and city for which you want to view network device breakdown data, or select **All** to show the entire network device breakdown.

Each color in the pie chart represents a different network device. The legend underneath shows which network device each color represents. You can display the name and number of each network device by moving the cursor over the related color. The tooltip that appears displays the relevant information.

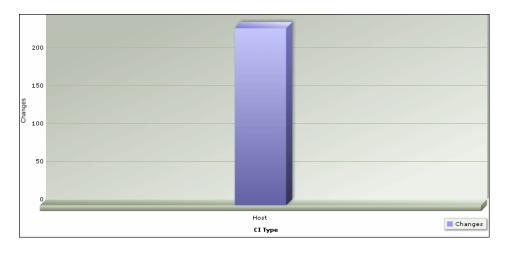
Click a segment to view a specific network device sorted by manufacturer.

Click a segment to generate a Show CI Instances report, displaying the details of the CI instances of that network device for that manufacturer.

To access: Select Applications > Universal CMDB > Overview Reports > Network Device Breakdown.

| Important Information | ➤ You can add this report as a portlet in My BSM. For details, see "Add Portlets to <page_name>/Add Portlets Dialog Box" in My BSM.</page_name> ➤ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see "Viewing Reports with Adobe Flash Player" in Reports. ➤ For information about limitations on formatting reports, see "Formatting a Report" in Reports. |
|--------------------------|---|
| Useful Links | For details on how to work with reports, see "Working in Reports" in <i>Reports</i> . |

Number of Changes Report

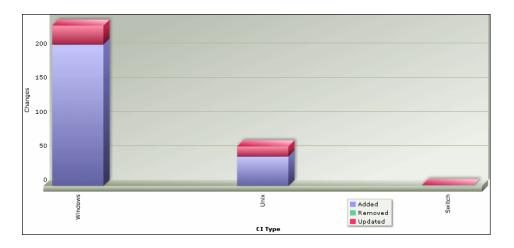


| Description | This report displays a bar graph showing the number of detected changes in a CIT within a defined period. |
|-------------|---|
| | Click the bar to view the breakdown of the types of changes that occurred for the CIT and its child CITs. |
| | To access: Select Applications > Universal CMDB > Overview Reports > Number of Changes. |

| Important Information | ➤ You can add this report as a portlet in My BSM. For details, see "Add Portlets to <page_name>/Add Portlets Dialog Box" in My BSM.</page_name> |
|--------------------------|--|
| | ➤ You must have Adobe Flash Player version 8.0 or later installed on your machine to view Overview reports. For details, see "Viewing Reports with Adobe Flash Player" in <i>Reports</i> . |
| | ➤ For information about limitations on formatting reports, see "Formatting a Report" in <i>Reports</i> . |
| Useful Links | For details on how to work with reports, see "Working in Reports" in <i>Reports</i> . |

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.

Chapter 26 • Overview Reports

Part IV

Source Manager

27

Working with Source Manager

This chapter provides information on Source Manager.

This chapter includes:

Concepts

- ➤ Source Manager Overview on page 634
- ➤ Source Adapter Activities on page 635
- ➤ Source Adapter Templates on page 635
- ➤ Dynamic Node Factory Resource on page 636
- ➤ Predefined Monitoring Views on page 637
- ➤ Customize the Source Adapters on page 637
- ➤ When to Use Generic EMS on page 638
- ➤ When to Use the XML File Source Adapter on page 639
- ➤ Business Process Monitoring Source Adapter Details on page 639
- ➤ Real User Monitor Source Adapter Details on page 641
- ➤ SiteScope Source Adapter Details on page 644
- ➤ Generic EMS Source Adapter Details on page 646
- ➤ XML File Source Adapter Details on page 648

Tasks

- ➤ Configure a Source Adapter Workflow on page 650
- ➤ Work with the SiteScope Source Adapter Workflow on page 653
- ➤ Modify an Adapter Template on page 658

Chapter 27 • Working with Source Manager

- ➤ Modify Relationships on page 668
- ➤ Define Selectors on page 670
- ➤ Customize Dynamic Node Factory Definitions on page 672
- ➤ Change the Decay Timeout Value on page 673

Reference

➤ Source Manager User Interface on page 674

Source Manager Overview

Source Manager enables you to define and manage the source adapters used by HP Business Availability Center.

Source Manager predefined definitions provide all the tools required to harness data from the data sources used by HP Business Availability Center. You use the received information to build views for the HP Business Availability Center applications.

The source adapters format the data arriving from the external data sources (collected by HP Business Availability Center data collectors, or supplied by other external resources) using predefined templates.

Each source adapter template defines the information needed for creating configuration item (CI) in the configuration management database (CMDB), and defines the relationships to be created between the CIs in order to build the CI hierarchies. The CI definitions include the KPIs, business rules, selectors, and so on, that are needed to present the real-time monitoring data received from the data sources in a meaningful way in Dashboard and Service Level Management.

The templates define the mapping between the external source objects and the HP Business Availability Center CIs, so that the incoming data samples are mapped to the appropriate CIs. Source Manager contains default source adapters that are preconfigured to work immediately with the data collected by the HP Business Availability Center data collectors (Business Process Monitoring, Real User Monitor, Diagnostics, and SiteScope) and generic source adapters (Generic EMS Source Adapter Details or XML File Source Adapter Details).

Default source adapters that are automatically preconfigured and activated when HP Business Availability Center starts, using a default template for each source adapter.

Source Adapter Activities

A source adapter performs the following steps:

- ➤ Imports system hierarchy information from System Availability Management, and, if applicable, from an external system. An external system can be, for example, the data source's database, a file system, or an API.
- ➤ Maps components from the hierarchy to predefined CIs in HP Business Availability Center.
- ➤ Creates CIs and relationships for the imported information and stores them in the CMDB.

Source Adapter Templates

The source adapter templates define all necessary information needed to present aggregated data from the various data sources.

Each source adapter uses a template that maps the entities in the data source to the CIs stored in the CMDB and defines the resources to be used in CMDB for a CI, such as KPIs, and business rules.

Advanced Users

You can customize the source adapter templates, or you can modify the KPIs, rules, and selector definitions in the Dashboard Administration Repositories page, in order to meet your organization's needs. To customize a source adapter template, click Admin > Universal CMDB > Source Manager. To access the Dashboard Repositories, click Admin > Dashboard > Repositories. To access the Service Level Management Repositories, click Admin > Service Level Management > Repositories.

HP Professional Services offers best practice consulting; it is recommended that you use this service before making any changes to the templates or repositories. For information on how to obtain this service, contact HP Software Support.

Dynamic Node Factory Resource

Some adapter templates include a Dynamic Node Factory resource. When a Dynamic Node Factory CI is included in a view, HP Business Availability Center dynamically builds a hierarchy for the source in run time, under the Dynamic Node Factory CI. For more information on the Dynamic Node Factory resource, see "Working with Dynamic Node Factory Overview" on page 113.

Predefined Monitoring Views

For each source adapter, predefined monitoring views display the created CI hierarchies for the monitored sources. When data is received over the bus for a defined source, you can open the relevant view in Dashboard and view status information for the CIs. You can use the configuration item (CI) hierarchies created in the predefined monitoring views as the building blocks for defining your own customized views.

Customize the Source Adapters

Source Manager provides you with the ability to modify and add to the majority of the adapter definitions, enabling you to customize the data sampling, the way the hierarchies are constructed, the parameters used for calculations, and the way the data is presented in the applications. This allows you to present the aggregated source data in a way that is relevant for your organization's needs.

Integration with Third-Party Source

It is recommended to work with the EMS Integrations application for each new integration of the following third-party sources: BMC PATROL, CA Unicenter, Hewlett-Packard (HP) OpenView, HP OpenView Service Navigator, and Tivoli TEC. You can still edit those third-party source adapters if they were created before version 7.0.

To access the EMS Integrations application, select **Admin > Integrations**.

When to Use Generic EMS

It is recommended to use the Generic EMS source adapter when you want to perform an EMS integration that sends samples with the Event type. The Generic EMS source adapter is useful for demos, or to view which EMS source adapters have been enabled.

When the Generic EMS source adapter and other EMS source adapters are enabled, two or more views are created: the Generic EMS view and the views corresponding to the other EMS source adapters.

The Generic EMS view displays information about each EMS source adapter in a hierarchy where each CI above the monitor CI level is represented by an EMS Group type CI. In addition, separate views are created for each one of the other EMS source adapters using that source adapter's specific hierarchy.

The top level of the Generic EMS source adapter view displays the EMS source adapters present in the system. The hierarchy appearing below that level is specific to each EMS source adapter but each one of them has the EMS Group type except for the monitor CI level. Some additional EMS Group type CIs might be created to fill in the different levels of the Generic EMS hierarchy.

In the Generic EMS view, the rules and KPIs applied to each CI level (except the measurement CI level) are the rules and KPIs attached to the EMS Group type CI. In the other EMS source adapter views, the rules and KPIs applied to each CI level (except for the measurement CI level) are the rules and KPIs defined for the relevant CI type.

The samples that are caught by the Generic EMS DNode and by a specific EMS source adapter DNode do not create the same monitor CIs (the CIs are duplicated in the CMDB) though their values are updated from the same sample.

To check the status of a specific CI in Dashboard, it is recommended to go to the view appropriate for the EMS source adapter as the Generic EMS source adapter view might display a different status appropriate for its view but that might not represent the appropriate status. In the same way, to use one of the EMS source adapter CIs in a specific view, make sure to use the CIs from the view appropriate for the EMS source adapter and not the CIs from the Generic EMS source adapter.

When to Use the XML File Source Adapter

Use the XML File source adapter when you want to create a hierarchy that is different from the hierarchies offered by the other source adapters.

The user with the appropriate permissions who creates an XML File source adapter must know how the data is stored in the CMDB (using the CI Type manager).

For an example, see "Example - Create an XML File" on page 660.

Business Process Monitoring Source Adapter Details

The Business Process Monitoring source adapter sets the decay timeout and the duration of the rules according to the Business Process Monitor and rules scheduling, set in "Business Process Monitor Administration" in *Using End User Management*.

You can customize some of the source adapter parameters, as explained in "New/Edit Source Adapter Dialog Box" on page 674.

This section includes the following topics:

- ➤ "Hierarchies" on page 640
- ➤ "Template Elements" on page 640
- ➤ "Relationships" on page 641
- ➤ "Selectors" on page 641

Hierarchies

Depending on the options and parameters you selected when defining a source adapter or editing it, the following hierarchies are created in the CMDB:

Note: Business Process Step and Location CIs use the same instance of the Business Process Monitor transaction with location.

For details about the End User Monitors View and End User Locations View, see "End User Monitors View and End User Locations View" in *Using Dashboard*.

Template Elements

The template defines the mapping between the external source objects and the HP Business Availability Center CIs, so that the incoming data samples are mapped to the appropriate CIs.

For details about the elements used in the template, see "CI Definition Parameters" on page 686.

For details about the KPIs, see "List of Dashboard KPIs" on page 498.

For details about the business rules, see "List of Dashboard Business Rules" on page 566.

For details about the context menus, see "List of Context Menus" on page 685.

Note: When you use the Baseline auto modes to calculate thresholds, the **baselineTransaction** and the **baselineTransactionLocation** entities are used instead of the **transaction** and **transactionLocation** entities, which are used when you set up thresholds manually. For details about the Baseline feature, see "Baselines" in *Using End User Management*.

For details on how to modify the template, see "Modify an Adapter Template" on page 658.

Relationships

The template displays the relationships used by the source adapter.

For details on how to modify the relationships or add new relationships, see "Modify Relationships" on page 668.

Selectors

To modify or add selectors, see "Define Selectors" on page 670.

Real User Monitor Source Adapter Details

The Real User Monitor source adapter retrieves real-user data information from Real User Monitor engines, and hierarchy information from System Availability Management. The hierarchy includes applications, containers, pages, transactions, end-user, server, global statistic data, user sessions, and other information.

You can customize some of the source adapter parameters, as explained in "New/Edit Source Adapter Dialog Box" on page 674.

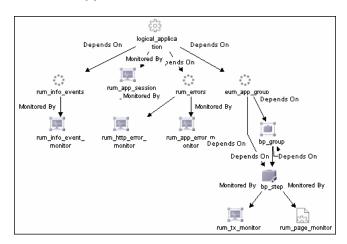
This section includes the following topics:

- ➤ "Hierarchies" on page 642
- ➤ "Template Elements" on page 643
- ➤ "Relationships" on page 644
- ➤ "Selectors" on page 644

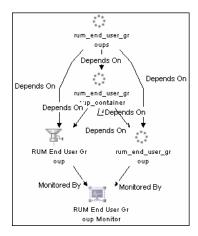
Hierarchies

The Real User Monitor adapter builds hierarchies that are displayed in the following views:

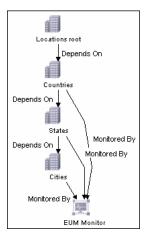
- ➤ All RUM Monitors view. This view includes all of the view hierarchies listed below.
- > Real User Applications view



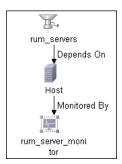
➤ Real User End Users view



➤ Real User Locations view



➤ Real User Servers View



For more details about the Real User Monitor views, see "About Real User Monitor Views" in *Using End User Management*.

Template Elements

The template defines the mapping between the external source objects and the HP Business Availability Center CIs, so that the incoming data samples are mapped to the appropriate CIs.

For details about the elements used in the template, see "CI Definition Parameters" on page 686.

For details about the KPIs, see "List of Dashboard KPIs" on page 498.

For details about the business rules, see "List of Dashboard Business Rules" on page 566.

For details about the context menus, see "List of Context Menus" on page 685.

For details on how to modify the template, see "Modify an Adapter Template" on page 658.

Relationships

The template displays the relationships used by the source adapter.

For details on how to modify the relationships or add new relationships, see "Modify Relationships" on page 668.

Selectors

To modify or add selectors, see "Define Selectors" on page 670.



SiteScope Source Adapter Details

Note: The SiteScope source adapter is deprecated from HP Business Availability Center version 7.50. It should be used only for backward compatibility purposes. The KPI assignment mechanism of the SiteScope assignment group is used to create the appropriate topology. For details, see "SiteScope KPI Assignment Group Overview" in *Using Dashboard*.

The SiteScope source retrieves system information from a SiteScope system, and builds a hierarchy that includes the machines, SiteScope groups, monitors, and measurements.

You can customize some of the source adapter parameters, as explained in "New/Edit Source Adapter Dialog Box" on page 674.

This section includes the following topics:

- ➤ "Hierarchies" on page 645
- ➤ "Template Elements" on page 645
- ➤ "Relationships" on page 646
- ➤ "Selectors" on page 646

Hierarchies

Depending on the parameters you selected when defining a source or editing it, the following hierarchy is displayed.



The curved arrow indicates that the hierarchy element is recursive; the CI type is the child of the level above in the hierarchy, but it can also be a child of the CI type itself. For example, a SiteScope Group CI type is the child of a SiteScope Profile CI type, but can also be the child of a SiteScope group CI type.

Template Elements

The template defines the mapping between the external source objects and the HP Business Availability Center CIs, so that the incoming data samples are mapped to the appropriate CIs.

For details about the elements used in the template, see "CI Definition Parameters" on page 686.

For details about the KPIs, see "List of Dashboard KPIs" on page 498.

For details about the business rules, see "List of Dashboard Business Rules" on page 566.

Chapter 27 • Working with Source Manager

For details about the context menus, see "List of Context Menus" on page 685.

For details on how to modify the template, see "Modify an Adapter Template" on page 658.

Relationships

The template displays the relationships used by the source adapter.

For details on how to modify the relationships or add new relationships, see "Modify Relationships" on page 668.

Selectors

To modify or add selectors, see "Define Selectors" on page 670.

Generic EMS Source Adapter Details

The Generic EMS source adapter retrieves a generic hierarchy for enterprise management systems (EMS), through SiteScope. You use this source adapter when your site includes more than one third-party source, thus enabling you to integrate the hierarchies of all sources.

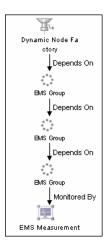
You can also use this adapter when performing an EMS integration that sends samples with the Event type.

This section includes the following topics:

- ➤ "Hierarchies" on page 647
- ➤ "Template Elements" on page 647
- ➤ "Selectors" on page 648

Hierarchies

When you select this source adapter and enable it, the relevant CIs hierarchy is created in the CMDB. You can then view the hierarchy in the Generic EMS view in View Manager tab in CMDB Administration.



Template Elements

The template defines the mapping between the external source objects and the HP Business Availability Center CIs, so that the incoming data samples are mapped to the appropriate CIs.

For details about the elements used in the template, see "CI Definition Parameters" on page 686.

For details about the KPIs, see "List of Dashboard KPIs" on page 498.

For details about the business rules, see "List of Dashboard Business Rules" on page 566.

For details about the context menus, see "List of Context Menus" on page 685.

For details on how to modify the template, see "Modify an Adapter Template" on page 658.

Selectors

To modify or add selectors, see "Define Selectors" on page 670.

XML File Source Adapter Details

The XML File source adapter retrieves topology information from an XML file produced by an external system. The XML file contains the definition of the CIs. This source includes a predefined generic adapter. You use this source adapter if you need to create a hierarchy that is different from the hierarchies of the other source adapters.

A detailed example of XML File creation is provided in "Example - Create an XML File" on page 660.

This section includes the following topics:

- ➤ "Template" on page 648
- ➤ "Template Elements" on page 649
- ➤ "Selectors" on page 649

Template

The XML File source retrieves information from an XML file produced by an external system that you define.

An XML File example is provided in <hP Business Availability Center Gateway server root directory>/ CMDB/adapters/templates/tivoli.config.xml

For details on how to modify the template, see "Modify an Adapter Template" on page 658.

Template Elements

The template defines the mapping between the external source objects and the HP Business Availability Center CIs, so that the incoming data samples are mapped to the appropriate CIs.

For details about the elements used in the template, see "CI Definition Parameters" on page 686.

For details about the KPIs, see "List of Dashboard KPIs" on page 498.

For details about the business rules, see "List of Dashboard Business Rules" on page 566.

For details about the context menus, see "List of Context Menus" on page 685.

For details on how to modify the template, see "Modify an Adapter Template" on page 658.

Selectors

To modify or add selectors, see "Define Selectors" on page 670.

P Configure a Source Adapter – Workflow

Add source adapters when you want to:

- ➤ Receive hierarchy information from a third-party source adapter (not Business Process Monitoring, Real User Monitor, or SiteScope).
- ➤ Use different hierarchies from a single data source. In such a case, you can define more than one source adapter based on a single third-party or on a default source adapter. Each new source adapter represents a different instance of the adapter used as a base, receiving hierarchy information from a single source.

Use Source Manager to add new source adapters or edit existing source adapters.

This task includes the following steps:

- ➤ "Set Up the Permissions" on page 650
- ➤ "Make a Default Source Adapter Available For Defining a Custom Source Adapter" on page 651
- ➤ "Add Third-Party Source Adapters or Default Source Adapters" on page 651
- ➤ "Modify an Adapter Template" on page 651
- ➤ "Customize Dynamic Node Factory Definitions" on page 652
- ➤ "Limitations When Working With the XML File Source Adapter" on page 652

1 Set Up the Permissions

You must have at least the **Superuser** or **Administrator** role to have access to the CMDB Administration. If you have the **Superuser** role, you have full viewing and editing rights for all of the CMDB Administration, including the sources. If you have the **Administrator** role, you can only view/edit views for which you have permission and you cannot edit, add, or view sources. To access the Permissions page, select **Admin > Platform > Users and Permissions**. For details, see "Understanding Permissions Resources" in *Platform Administration*.

Note to HP Software-as-a-Service customers: You must have at least the Superuser, Operator, Customer Super User, or Customer Administrator role to have access to the CMDB Administration. If you have the Customer Administrator role, you can only view/edit views for which you have permission, and you cannot edit the sources.

2 Make a Default Source Adapter Available For Defining a Custom Source Adapter

If required, the default source adapters are available for defining new custom source adapters when you have configured Source Manager to include them. In this case, the default source appears in the list of available custom source adapters when you create a new source adapter.

To make a default source adapter available for defining new source adapters, select Admin > Platform > Setup and Maintenance > Infrastructure Settings, choose Foundations, select Sources Configuration, and locate the relevant source type entry (for example, Add Business Process Monitor Sources) in the Sources Configuration - Sources table. Modify the value to true. The change takes effect when the server is restarted.

3 Add Third-Party Source Adapters or Default Source Adapters

You can add source adapters based on supported third-party source adapters or on default source adapters. For details on the user interface, see "New/Edit Source Adapter Dialog Box" on page 674.

4 Modify an Adapter Template

You must then customize the newly-created source adapter, by defining the parameters required by the adapter to receive data from the appropriate source. For details on how to perform this task, see "Modify an Adapter Template" on page 658.

5 Customize Dynamic Node Factory Definitions

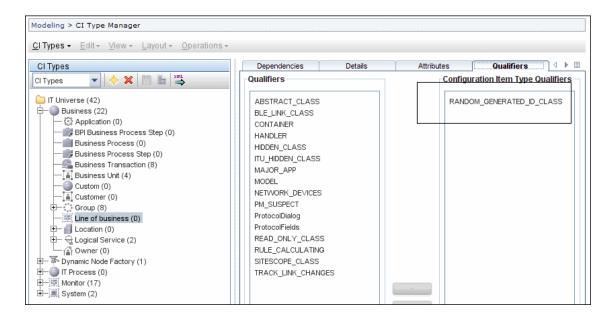
For advanced users only. Where required, you can open the default adapter template for the source, to edit the template instance according to your organization's specific needs. This may be necessary if you define a new source adapter based on one of the generic template types (Generic EMS or XML File). For details on how to perform this task, see "Customize Dynamic Node Factory Definitions" on page 672.

6 Limitations When Working With the XML File Source Adapter

Some of the CMDB configuration item types cannot be configured in the XML file used by the XML adapter because their ID is randomly generated, and the XML adapter cannot synchronize it. An example of such a CIT is Line of Business.

To find the internal name of a CIT, select **Admin > Universal CMDB > Modeling > CI Type Manager**, select the appropriate CIT in the CI Types pane, and click the **Details** tab, and view the name of the CIT in the **Name** box.

Click the **Configuration Item Type Qualifier** tab to see whether the CI ID is randomly generated as follows:



P Work with the SiteScope Source Adapter – Workflow

Note: The SiteScope source adapter is deprecated from HP Business Availability Center version 7.50. It should be used only for backward compatibility purposes when working with SiteScope versions prior to 9.50. The KPI assignment mechanism of the SiteScope assignment group is used to create the appropriate topology. For details, see "Work with the SiteScope Assignment Group" in *Using Dashboard*.

This task describes how to work with the SiteScope source adapter.

This task includes the following steps:

- ➤ "Set the SiteScope Monitor to Report to HP Business Availability Center" on page 653
- ➤ "Synchronize the SiteScope Profile" on page 654
- ➤ "Prevent CIs in Dashboard from Changing Status to Decay" on page 654
- ➤ "Backward Compatibility Workarounds" on page 655
- ➤ "SiteScope Host Discovery" on page 656
- ➤ "Enable the Creation of Relationships Between Hosts and SiteScope Monitors" on page 657
- ➤ "Select or Clear the Enable host topology reporting Option" on page 658

1 Set the SiteScope Monitor to Report to HP Business Availability Center

When you set SiteScope to report to HP Business Availability Center for the first time, and you have defined monitors for SiteScope, the status of each SiteScope monitor is automatically changed to **Disable reporting to BAC**. Use this option when you do not want the SiteScope monitor and measurements for the subject monitor to be transferred to HP Business Availability Center. Select another logging option for the monitors whose information you need. For details about this option, see "Common Monitor Settings" in *Using System Availability Management*.

2 Synchronize the SiteScope Profile

After you have defined a SiteScope profile and connected to the profile of a SiteScope monitor, in System Availability Management, the SiteScope configuration remains in the CMDB until the SiteScope profile is deleted and the next synchronization has been performed (manually or automatically, by default, every 60 minutes). To synchronize the SiteScope profile, select Admin > System Availability Management, select the appropriate SiteScope preferences folder, and use one of the following options located in HP Business Availability Center Preferences:

- ➤ Re-Synchronize. SiteScope re-sends all its configuration data to Business Availability Center. This data includes all of the group and monitor definitions.
- ➤ Hard Re-Synchronize. SiteScope re-sends all its configuration data to Business Availability Center. It also deletes the existing monitor and group data in Business Availability Center for this SiteScope. For details on the user interface, see "Integration Preferences User Interface" in *Using System Availability Management*.

3 Prevent CIs in Dashboard from Changing Status to Decay

When SiteScope does **not** work in Data reduction mode, and you use Dashboard to view SiteScope data, the default decay (timeout) period for a CI in Dashboard is 15 minutes. If a SiteScope monitor has a schedule longer than 15 minutes, the status of the corresponding CIs in Dashboard changes to decay status, until the SiteScope monitor runs again and updates HP Business Availability Center.

When SiteScope works in Data reduction mode, and you use Dashboard to view SiteScope data, the status of the CIs in Dashboard changes to decay status after an hour and 15 minutes, until the SiteScope monitor runs again and updates HP Business Availability Center.

To avoid this, you can do one of the following:

- ➤ Set run schedules for the monitors in SiteScope or in System Availability Management for less than 15 minutes in the Frequency parameter. For details, see **Frequency** in System Availability Management or in SiteScope. For details about this option, see "Common Monitor Settings" in *Using System Availability Management*.
- ➤ For each SiteScope item in Dashboard, change the decay timeout period parameter to a value greater than the schedule for the SiteScope monitor by modifying the **No Data Timeout** parameter for the appropriate rule. For details on how to perform this task, see "Modify Rule Parameters or Global Rule Parameters" in *Using Dashboard*.
- ➤ In the rule parameters for the SiteScope source adapter template in Dashboard, change the decay timeout parameter to a value greater than the schedules used for the SiteScope monitors. For details on how to perform this task, see "Change the Decay Timeout Value" on page 673.

You can also set the decay timeout parameter to -1 (minus 1), meaning no decay timeout. This is the required value if the SiteScope monitor is event-based (meaning that data is sent to the HP Business Availability Center bus only when the monitor reports a change in status), but is not recommended for monitors sending data according to a schedule.

4 Backward Compatibility Workarounds

When you select the **Include Measurements** and **Include Machines** options in the SiteScope source adapter definition in the previous version, these options stay selected when you upgrade to this version. The **Include Measurements** option includes the measurement level for SiteScope monitors in the hierarchy. The **Include Machines** option includes the machine level (the monitor target) in the hierarchy.

If, after the upgrade, you clear any of these options, you cannot select them again. To obtain the information that was displayed when those options were selected, the following alternatives are available:

➤ To get information corresponding to the **Include Measurements** option, select a view in the Console tab or in the Filters tab in Dashboard, right-click the appropriate CI, select **Go to report**, and select the Cross-Performance report.

For details on the user interface, see "Cross-Performance Report" in *Using System Availability Management*.

➤ The information corresponding to the **Include Machines** option is automatically available as explained below.

5 SiteScope Host Discovery

The **Enable host topology reporting** option is enabled by default for all SiteScope monitors (select **Admin > System Availability Management**, select the appropriate SiteScope preferences folder – the option is located in the HP Business Availability Center Preferences). This means that the host CIs for the monitored hosts in SiteScope are sent to the HP Business Availability Center CMDB. All the data necessary for creating a CI based on that host, including the DNS name, is then forwarded to HP Business Availability Center from the SiteScope, whenever a monitor is created or edited, or when SiteScope is restarted.

The SiteScope source adapter creates a CI for each monitor.

In addition, when performing discovery, the discovered hosts CIs are created in the CMDB. Automatic host reconciliation is performed when the discovered host CI and a SiteScope host CI represent the same host.

CMDB enrichment rules create a **Monitored by** relationship between the host CIs and the monitor CIs. These rules run every 30 minutes when the **Host DNS Name** attribute of the discovered Host CI and the **Target Host** attribute of the SiteScope Monitor CI have the same value. This process works when there is only one Host CI for every instance of an actual host. If more than one Host CI is discovered for an actual host, the Host Reconciliation process reconciles the Host CIs. For details on this topic, see "Reconciliation of Hosts" in *Solutions and Integrations*.

Note: Creating the **Monitored by** relationship between the two CIs in the CMDB may take up to 90 minutes after a SiteScope monitor has been created or modified.

You can view the host information in the Monitored Hosts view.

To access the enrichment rules, select Admin > Universal CMDB > Modeling > Enrichment Manager, and expand SiteScope. The enrichment rules are: SiteScope Hosts and Monitors and Disconnect Hosts from SiteScope Monitor. The SiteScope Hosts and Monitors scheduler job located in Admin > Universal CMDB > Settings > Scheduler, schedules when the enrichment rules are run.

6 Enable the Creation of Relationships Between Hosts and SiteScope Monitors

If you are using the **Include Measurements** option, and you want to enable the creation of relationships between hosts and SiteScope monitors (SiteScope measurement groups), perform the following procedure:

- > Select Admin > Universal CMDB > Settings > Scheduler, edit SiteScope Hosts and Monitors scheduler job, edit the Run Enrichment rule, and add the SiteScope Hosts and Measurement Groups enrichment rule.
- ➤ Select Admin > Universal CMDB > Modeling > Enrichment Manager, expand SiteScope, and activate the Disconnect Hosts from SiteScope MGroup enrichment rule.

If you are using HP Business Availability Center for SAP Applications or HP Business Availability Center for Siebel Applications you cannot use the above capability.

7 Select or Clear the Enable host topology reporting Option

If you use the **Enable host topology reporting** option, you must use discovery processes that discovers the host DNS names.

To clear the **Enable host topology reporting** option, select **Admin > System Availability Management**, select the appropriate SiteScope preferences folder, select BAC Preferences, and clear the option. In this case, no host topology data is forwarded to HP Business Availability Center and the corresponding host CIs are not created in the CMDB.

🦒 Modify an Adapter Template

Most of the templates used by the source adapters follow a basic format, with variations for each adapter. The Dynamic Node Factory templates are somewhat different. For details on how to perform this task, see "Customize Dynamic Node Factory Definitions" on page 672.

Each source adapter uses a template that maps the entities in the data source to the configuration items (CIs) stored in the CMDB and defines the resources to be used in CMDB for a CI, such as KPIs, and business rules. The template is used to create the source adapter's XML file.

You can modify an adapter template by changing the XML code used to specify:

- ➤ The mapping of source entities to CIs.
- ➤ The rules to be applied to the appropriate CIs/KPIs data before it is displayed in the views. The business rules resources are defined in the Dashboard repositories.
- ➤ The context menus to be used for the CI in the Dashboard application.
- ➤ The KPIs assigned to each CI. The KPIs are defined in the repositories. For details on this topic, see "Repositories Overview" in *Using Dashboard*.

Note: When editing an adapter template in Source Manager, if you add a KPI definition to any CI template, the KPI is attached to all CIs generated by that template, but does not propagate up to the parents of the generated CIs. A KPI that is manually attached to a CI in the **KPIs** page located in **Admin** > **Dashboard** > **KPIs**, does propagate up to the parent CI.

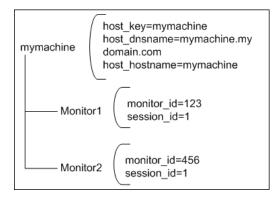
- ➤ The selectors required by each business rule to identify and catch the appropriate samples that relate to the relevant CIs and KPIs.
 - Group CIs (groups or machines for example) have the simplest level of definitions. The monitor CIs use a higher level of definitions and require selectors to check data samples from the source and to present the data from the bus as KPI status in Dashboard.
- ➤ The predefined Dynamic Node Factory CIs included in the adapter templates, that you add to your view to generate a hierarchy that fits your organization's needs. For details on this topic, see "Customize Dynamic Node Factory Definitions" on page 672.
- ➤ The new Dynamic Node Factory CIs. For details on this topic, see "IT Universe Manager Dynamic Node Factory" on page 113.
- ➤ The relationships between CIs. For details on how to perform this task, see "Modify Relationships" on page 668.

Note: It is recommended to perform a backup of the source before you modify it as follows: access the <HP Business Availability Center Gateway server root directory>\CMDB\adapters\adapters directory, find the file that corresponds to the adapter you want to back up, copy that file to another directory (not under <HP Business Availability Center Gateway server root directory>). When you want to restore the original source, copy the original file back to the <HP Business Availability Center Gateway server root directory>\CMDB\adapters\adapters directory and restart HP Business Availability Center.

To modify an adapter template, access the Edit Source dialog box for the appropriate source adapter and click **Edit Template**. For details on the user interface, see "New/Edit Source Adapter Dialog Box" on page 674.

Example - Create an XML File

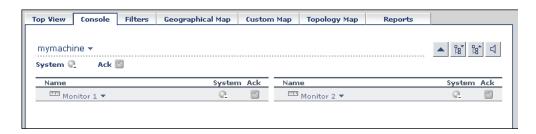
You want to create a hierarchy and a view that includes hosts and monitors as follows:



The hierarchy is as follows:



The view is as follows:



To create such a hierarchy, do the following:

1 Write the XML File template:

Use the following XML File template:

```
<adapterTemplate>
 <description>Customized XML Adapter</description>
 <type>XML File</type>
 <logicType>User Experience</logicType>
<classPath>com.mercury.topaz.tdm.adapters.XMLFileAdapter.XMLFileAdapterImpl</cl
assPath>
 <autoMapEntities>true</autoMapEntities>
<autoMappingEntities>
<entity id="monitor">
 <basicEntity>Mercury:sitescope monitor</basicEntity>
 <contextmenu>ssMonitorMenu</contextmenu>
<dimensions>
<dimension id="1">
<logics>
 <logic id="4" />
 </logics>
<selectors type="AND">
 <selector key="sampleType" operator="EQ" value="ss monitor t" dataType="String"</pre>
readOnly="true" />
 <selector key="u iConnectionId" operator="EQ" value="" dataType="Long"</pre>
reference="true" referencedProperty="monitor id" />
 <selector key="u iSessionId" operator="EQ" value="" dataType="Long"</pre>
reference="true" referencedProperty="session id" />
 </selectors>
 </dimension>
</dimensions>
</entity>
<entity id="machine">
 <basicEntity>host</basicEntity>
 <contextmenu>groupMenu</contextmenu>
<dimensions>
<dimension id="1">
<logics>
 <logic id="1" />
 </logics>
 </dimension>
 </dimensions>
 </entity>
```

```
</autoMappingEntities>
<autoMappingLinks>
link type="Mercury:monitored_by" src_obj_type="host" dest_obj_type=
"Mercury:sitescope_monitor" weight="1" />
</autoMappingLinks>
<displayNameMapping />
</adapterTemplate>
```

The template maps the following elements:

| entity id | basicEntity | contextmenu | dimension (KPI) | logic (business rule) |
|-----------|-----------------------------------|--|-----------------|--------------------------|
| monitor | Mercury: sitescope_ monitor | ssMonitorMenu – SiteScope Monitor Menu | 1 – System | 4 – SiteScope Monitor |
| machine | host | groupMenu – Group Menu | 1 – System | 1 – Worst Child |

The monitor entity has the following selectors:

```
<selectors type="AND">
  <selector key="sampleType" operator="EQ" value="ss_monitor_t" dataType="String"
readOnly="true" />
  <selector key="u_iConnectionId" operator="EQ" value="" dataType="Long"
reference="true" referencedProperty="monitor_id" />
  <selector key="u_iSessionId" operator="EQ" value="" dataType="Long"
reference="true" referencedProperty="session_id" />
  </selectors>
```

The following relationships are defined:

```
<autoMappingLinks>
link type="Mercury:monitored_by" src_obj_type="host"
dest_obj_type="Mercury:sitescope_monitor" weight="1" />
</autoMappingLinks>
```

2 Write the Configuration File:

Use the following **xmlFile.xml** file where one host is monitored by two monitors:

```
<?xml version="1.0" encoding="UTF-8" ?>
<extSysGraph>
<generalData>
properties />
</generalData>
<entities>
<entity type="monitor">
<name>Monitor 1</name>
<idProperties>
cong" key="monitor_id" value="123" />
</idProperties>
<children />
<parents>
<idProperties>
cproperty dataType="String" key="host_key" value="mymachine" />
</idProperties>
</parents>
</entity>
<entity type="monitor">
<name>Monitor 2</name>
<idProperties>
</idProperties>
```

```
<children />
<parents>
<idProperties>
cproperty dataType="String" key="host_key" value="mymachine" />
</idProperties>
</parents>
</entity>
<entity type="machine">
<name>mymachine</name>
<idProperties>
</idProperties>
properties>
main.com" />
cycle="String" key="host_hostname" value="mymachine" />
</properties>
<children>
<idProperties>
cong" key="monitor_id" value="123" />
</idProperties>
<idProperties>
</idProperties>
</children>
<parents />
</entity>
</entities>
</extSysGraph>
```

The guidelines to create a configuration file are as follows:

➤ You must write this file in such a way that each CI type has at least one unique property in its **idProperties** definition (so that it is unique in the CMDB). For details, see "CI Type Manager" in *Model Management*.

For example, for Monitor1 the **idProperties** are monitor_id=123 and session id=1:

```
<entity type="monitor">
<name>Monitor 1</name>
<idProperties>
cproperty dataType="Long" key="monitor_id" value="123" />
cproperty dataType="Long" key="session_id" value="1" />
</idProperties>
```

For example, for Monitor2 the **idProperties** are monitor_id=456 but the session_id is the same as for Monitor1: session_id=1:

```
<entity type="monitor">
<name>Monitor 1</name>
<idProperties>
<property dataType="Long" key="monitor_id" value="456" />
<property dataType="Long" key="session_id" value="1" />
</idProperties>
```

➤ Regular properties (between the properties and tags) can have similar values. For example, for the mymachine host, the properties are: host key, host dsname, and the name of the host, as follows:

➤ You must specify the parent for each item, if any. It is recommended to also write the reverse relation, that is, to specify the children of each item.

For example, you specify that the parent of entity Monitor1 is: mymachine (host key=mymachine):

You must also specify that the entity machine has the following children: Monitor1 (monitor_id=123) and Monitor2 (monitor_id=456):

```
<entity type="machine">
...
<children>
<idProperties>
<property dataType="Long" key="monitor_id" value="123" />
<property dataType="Long" key="session_id" value="1" />
</idProperties>
<idProperties>
<property dataType="Long" key="monitor_id" value="456" />
<property dataType="Long" key="session_id" value="456" />
<property dataType="Long" key="session_id" value="1" />
</idProperties>
</children>
```

You must do the same for entity Monitor2.

3 Create an XML File Source Adapter That Monitors Hosts and Monitors

To create an XML File source adapter that monitors hosts and monitors, you must modify the default source adapter template, save the configuration file in the appropriate location, and you must create a view.

To create an XML File source adapter that monitors hosts and monitors, proceed as follows:

- **a** Access the New Source dialog box. For details on the user interface, see "New/Edit Source Adapter Dialog Box" on page 674.
- **b** In the New Source dialog box, select the XML File source adapter in the **Type** box, and click **Edit Template**. The dialog box expands to display the adapter template in the **Template** box.

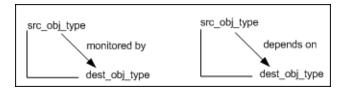
Note: In the **Template** box, use the dialog box scrollbar and the **Template** box scrollbar to display the areas of the template you want to modify. You can also highlight the text, copy it to a text editor, make the appropriate changes, and copy the text back into the **Template** box.

- c Copy the first part of the XML File template provided in the example above from <autoMappingEntities> to </autoMappingEntities> (tags included) and insert it in the XML File template between <autoMappingEntities bac-version="BAC 8.0"> and </autoMappingEntities> and erase the rest of the file.
- **d** Copy the second part of the XML File template provided in the example above from <autoMappingLinks> to </autoMappingLinks> (tags included) and insert it in the XML File template after </autoMappingEntities> (included).
- **e** Save the **xmlFile.xml** file (shown above) in a specific location; for example:
 - <HP Business Availability Center Gateway server root directory>\
 CMDB\adapters\templates\xmlFile.xml and enter the path in the Path
 box in the source adapter definition.
- **f** Create a pattern specific for the structure that is used in the **xmlFile.xml** file. For details, see "Working with Views in IT Universe Manager" in *Model Management*.

🦒 Modify Relationships

Attaching one CI to another CI creates a hierarchical relationship between them, so that one CI may be dependent on or influenced by the other.

In all adapter templates, except for the XML File adapter template, only the **depends on** or **monitored by** types of relationships are used; for example:



The automapping code is usually located at the end of the template file.

In the XML File template you can use all of the available types of relationships, as defined in CI Type Manager. For details, see "CI Type Manager" in *Model Management*.

Note: If you add or remove a relationship, you might have to modify the corresponding view in View Manager, to reflect the change. For details, see "View Manager Window" in *Model Management*.

This task includes the following steps:

- ➤ "Modify the Relationship" on page 669
- ➤ "Find the Internal Name of a CIT" on page 670

1 Modify the Relationship

In the XML template, modify the relationships between the relevant CIs.

Each relationship may include the following information:

| Template Element | Description |
|------------------|---|
| dest_obj_type | Identifies the configuration item type (CIT) that is the higher level in a relationship; for example, a monitor. When you want to add a new relationship, you must use the CIT internal name in the code. For details on how to find out the internal name of a CIT, see below. |
| src_obj_type | Identifies the CIT at the lower level of the relationship; for example a group. When you want to add a new relationship, you must use the CIT internal name in the code. For details on how to find out the internal name of a CIT, see below. |
| type | The type of relationship. For details, see "CI Type Manager" in <i>Model Management</i> . Type can be depends_on or monitored by . |
| weight | The weight assigned to the relationship. For details, see "Percentage Rule" in <i>Using Dashboard</i> . |

Example

The following example shows the relationships used in the SiteScope adapter template definition:

```
<autoMappingLinks bac-version="BAC 8.0">
  <link dest_obj_type="host" src_obj_type="sitescope_group"
    type="Mercury:depends_on" weight="1"/>
  </autoMappingLinks>
```

2 Find the Internal Name of a CIT

When you define a new relationship between CITs you must specify the internal name of the CITs.

To find the internal name of a CIT, select **Admin > Universal CMDB > Modeling > CI Type Manager**, select the appropriate CIT in the CI Types pane, and click the **Details** tab, and view the name of the CIT in the **Name** box.

Define Selectors

For monitor CIs, the adapter template includes the selectors required by the business rule to identify and catch the samples in the HP Business Availability Center bus that relate to the CI and KPI.

This task includes the following steps:

- ➤ "Build Complex Logical Expressions in the Selector Definitions" on page 670
- ➤ "Define Your Own Selectors" on page 671

1 Build Complex Logical Expressions in the Selector Definitions

You can build complex logical expressions in the selector definitions using AND and OR logical operators. The principles for defining selector blocks using the logical operators are the same as described for defining selectors for individual KPIs. For details on how to perform this task, see "Define Selectors" in *Dashboard*.

The selector definitions in the adapter template contain additional information that is not viewed in the Selector areas when configuring individual KPIs.

The following example shows the selectors used in the adapter template definition for the Performance KPI of a Business Process Monitor measurement:

```
<selectors type="AND">
<selector dataType="String" key="sampleType"
    operator="EQ" readOnly="true" reference="false"
    referencedProperty="sampleType" value="trans_t"/>
<selector dataType="Long" key="u_iTransactionId"
    operator="EQ" readOnly="false" reference="true"
    referencedProperty="tx_id"/>
<selector dataType="Long" key="u_iSessionId"
    operator="EQ" readOnly="false" reference="true"
    referencedProperty="session_id"/>
</selectors>
```

For details about the parameters, see "Selector Parameters" on page 689.

2 Define Your Own Selectors

To define your own selectors in an adapter template, you should first use the default definitions to create the hierarchy; you can then use the properties from the samples caught in the bus as a reference for the new selectors. Note that all selector fields and values are case sensitive and must be defined exactly as they are used in the samples, or the selector fails. The recommended method is to open the samples log and take the fields and values from there. The samples log is located in

<HP Business Availability Data Processing Gateway server root directory>
\log\mercury_online_engine\TrinitySamples.log.

Note that the samples are written to this log at the **debug** log level, while the default log level is **error**, meaning that only log entries of level error and above are displayed. Therefore, to view the sample entries you must change the log level, as described in the following procedure.

To change the samples log level, open the file:

<HP Business Availability Data Processing Gateway server root directory>\
conf\core\Tools\log4j\mercury_online_engine\bleOnline.properties and
look for the following line:

log4j.category.Trinity.BLE_SAMPLES=\${loglevel}, trinity.samples.appender and change the line to:

log4j.category.Trinity.BLE_SAMPLES = DEBUG, trinity.samples.appender Save and close the file. The change takes effect after about one minute.

Customize Dynamic Node Factory Definitions

Advanced users can customize the Dynamic Node Factory (DNode) definitions included in some adapter templates, to generate a hierarchy that fits your organization's needs. You can also add and customize Dynamic Node Factory CIs directly in your views. For details on this topic, see "IT Universe Manager – Dynamic Node Factory" on page 113.

A Dynamic Node Factory source does not have a fixed topology; its topology is built from the samples themselves. The template defines the way the samples are matched to each CI created by the Dynamic Node Factory.

You can modify the mapping to the samples that create the hierarchy, the rules, and logic used to import the data, and present it in Dashboard. For details on how to perform this task, see "DNode Definition Key Property" on page 118.

Change the Decay Timeout Value

When using HP Business Availability Center Dashboard to view SiteScope data, the default decay (timeout) period for a CI in Dashboard is 15 minutes. If you have a SiteScope monitor with a schedule longer than 15 minutes, the corresponding CIs in Dashboard has time to change to decay status until the SiteScope monitor runs again and updates HP Business Availability Center.

In the rule parameters for the SiteScope source adapter template in Dashboard, change the **No data timeout** parameter to a value greater than the schedules used for the SiteScope monitors. To modify the decay timeout value in the template, add the following in the relevant <logic> section after the logic ID (the value is in seconds, 900 is the default):

```
<parameters>
<param key="No data timeout" value="777"
    dataType="Long" reference="false"/>
</parameters>
```

For example:

Source Manager User Interface

This section describes:

- ➤ New/Edit Source Adapter Dialog Box on page 674
- ➤ Source Manager Page on page 690

New/Edit Source Adapter Dialog Box

| Description | Enables you to define a new adapter or edit an existing adapter. You must customize the newly-created source adapter, by defining the parameters required by the adapter to receive data from the appropriate source. |
|--------------------------|---|
| | Edit a source adapter to customize the view adapter to change the path to a template file, to modify the corresponding view's hierarchy in the application where the view appears, and so on. |
| | To Access: Click New Source in the Source Manager window or click the Edit button for an existing adapter. |
| Important Information | The dialog box displays different fields depending on the selected source adapter. |
| Included in Tasks | "Configure a Source Adapter – Workflow" on page 650 |
| Useful Links | "Source Manager Overview" on page 634 |

Business Process Monitoring Source Adapter

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| Edit Template | Click the Edit Template button to open the Template box. |
| | The template enables you to edit the template instance according to your organization's specific needs, for example, when defining a new source adapter based on one of the generic template types (Generic EMS or XML File). The template: |
| | ➤ Maps the entities in the data source to the configuration items (CIs) stored in the CMDB. For details about the CI parameters used in the template definition, see "CI Definition Parameters" on page 686. |
| | ➤ Defines the resources to be used in the CMDB for a CI, such as KPIs and business rules |
| | ➤ Creates the source adapter's XML file |
| Enable | Enables communication between the adapter and the external system. |

| GUI Element (A-Z) | Description |
|------------------------|---|
| Hierarchy Structure | Select one of the options to create different hierarchies: > Regular. (Default) The hierarchy structure excludes the location breakdown information from the transaction with location CIs. You can view business process profile locations in the Triage report. For details, see "Triage Report" in Using End User Management. > Transactions/locations. The hierarchy structure includes |
| | the transaction with location CIs. Use this option to view hierarchies organized by Business Process profile location. Use this option with caution as it creates additional CIs in the CMDB, which may cause capacity and performance issues. |
| | If you change the hierarchy structure from Transaction/Location to Regular after attaching BPM transaction from location CIs to other views (not to End User Locations View, or End User Monitors View), the following occurs: |
| | The Location CIs are deleted from the CMDB. The BPM Transaction from location CIs attached to parent CIs are deleted and then recreated. They still appear in the views where you attached them under their parent CIs but no longer include location information. The BPM Transaction from location CIs attached to Location CIs are removed together with the Location CIs. |
| | Note: When Business Process Monitor is working in Transaction/Location hierarchy structure, Location CIs are added to the Business Process Monitor hierarchy displayed in the End User Locations view. If you require the same geographical location for all transactions from a location, set the geographical location for the Location CI; the location is automatically propagated to all BPM Transaction from Location CIs in all profiles that fall under the Location CI. Set the geographical location in the Properties tab on the Admin > Universal CMDB > Modeling > IT Universe Manager page. |
| | Note: Displayed only when you select Business Process Monitor in the Type box. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Name | The name of the new source. By default it is Generic EMS for the Generic EMS source adapter and XML File for the XML File source adapter. Note: The name must be unique. |
| Server URL | The URL of the Gateway Server. Note: Displayed only when you select Business Process Monitor in the Type box. |
| Sync Interval | The interval (in minutes) between each automatic synchronization of the adapter with the external system. The default value is 60 minutes. |
| Туре | To create a new source adapter, select one of the following: ➤ Generic EMS ➤ XML File Hold the cursor over the query icon to view the description of the source adapter in a tooltip. When you edit one of the default source managers, its type |
| | is listed in the box. Note: Business Process Monitor, HP Diagnostics, Real User Monitor, or SiteScope source adapters are listed when you have configured them to be custom source adapters. For details, see "Work with the SiteScope Source Adapter – Workflow" on page 653. |

Real User Monitor Source Adapter

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

| GUI Element (A-Z) | Description |
|--|---|
| Edit Template | Click the Edit Template button to open the Template box. |
| | The template enables you to edit the template instance according to your organization's specific needs, for example, when defining a new source adapter based on one of the generic template types (Generic EMS or XML File). The template: |
| | ➤ Maps the entities in the data source to the configuration items (CIs) stored in the CMDB. For details about the CI parameters used in the template definition, see "CI Definition Parameters" on page 686. |
| | ➤ Defines the resources to be used in the CMDB for a CI, such as KPIs and business rules |
| | ➤ Creates the source adapter's XML file |
| Enable | Enables communication between the adapter and the external system. |
| Enable breakdown of location to end users subrange monitors | Select this option to view data collected for all end users (configured and non-configured) accessing the servers being monitored. The data is broken down by location. It can be drilled down to the end users subrange monitors. |
| | Select this option only when Show unconfigured users on the dashboard and Enable end users breakdown to subrange monitor are also selected. |
| | Note: Displayed only when you select Real User Monitor in the Type box. |

| GUI Element (A-Z) | Description |
|--|---|
| Enable end users breakdown to subrange monitor | Select this option to view data collected for configured end users accessing the servers being monitored. By default, only this parameter is set. |
| | Note: Configured end users are the users belonging to End User Groups. For details about End User Groups, see "New/Edit End-User Group Page" in <i>Using End User Management</i> . |
| | Note: Displayed only when you select Real User Monitor in the Type box. |
| Name | The name of the new source. By default it is Generic EMS for the Generic EMS source adapter and XML File for the XML File source adapter. |
| | Note: The name must be unique. |
| Show unconfigured users on the | Select this option to view data collected for all end users (configured and non-configured) accessing the servers being monitored. |
| dashboard | If Enable end users breakdown to subrange monitor is not selected the single monitor for all non-configured end users is displayed. |
| | Note: Selecting the Show unconfigured users on the dashboard option greatly increases the number of CIs included in the views using the Real User Monitor source. This can mean delays while a view hierarchy is rebuilt after a change is made to the configuration in Real User Monitor, and may cause other performance issues in HP Business Availability Center. |
| | Note: Displayed only when you select Real User Monitor in the Type box. |

Chapter 27 • Working with Source Manager

| GUI Element (A-Z) | Description |
|-------------------|--|
| Sync Interval | The interval (in minutes) between each automatic synchronization of the adapter with the external system. The default value is 60 minutes. |
| Туре | To create a new source adapter, select one of the following: Generic EMS XML File Hold the cursor over the query icon to view the description of the source adapter in a tooltip. When you edit one of the default source managers, its type is listed in the box. |
| | Note: Business Process Monitor, HP Diagnostics, Real User Monitor, or SiteScope source adapters are listed when you have configured them to be custom source adapters. For details, see "Work with the SiteScope Source Adapter – Workflow" on page 653. |

SiteScope Source Adapter

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| Edit Template | Click the Edit Template button to open the Template box. |
| | The template enables you to edit the template instance according to your organization's specific needs, for example, when defining a new source adapter based on one of the generic template types (Generic EMS or XML File). The template: |
| | ➤ Maps the entities in the data source to the configuration items (CIs) stored in the CMDB. For details about the CI parameters used in the template definition, see "CI Definition Parameters" on page 686. |
| | ➤ Defines the resources to be used in the CMDB for a CI, such as KPIs and business rules |
| | ➤ Creates the source adapter's XML file |
| Enable | Enables communication between the adapter and the external system. |
| Exclude profiles | Enter the list of SiteScope profiles you want to exclude from display in the CMDB. Use commas as delimiters. |
| | Because the CMDB may include a large number of SiteScope profiles, you can restrict the display by excluding some of those profiles. |
| | Note: You cannot exclude a SiteScope profile whose name includes a comma (,). |
| | Note: Displayed only when you select SiteScope in the Type box. |
| Name | The name of the new source. By default it is Generic EMS for the Generic EMS source adapter and XML File for the XML File source adapter. |
| | Note: The name must be unique. |

Chapter 27 • Working with Source Manager

| GUI Element (A-Z) | Description |
|-------------------|--|
| Server URL | The URL of the Gateway Server. |
| | Note: Displayed only when you select Business Process Monitor in the Type box. |
| Sync Interval | The interval (in minutes) between each automatic synchronization of the adapter with the external system. The default value is 60 minutes. |
| Туре | To create a new source adapter, select one of the following: ➤ Generic EMS ➤ XML File Hold the cursor over the query icon to view the description of the source adapter in a tooltip. When you edit one of the default source managers, its type is listed in the box. Note: Business Process Monitor, HP Diagnostics, Real User Monitor, or SiteScope source adapters are listed when you have configured them to be custom source adapters. For details, see "Work with the SiteScope Source Adapter – Workflow" on page 653. |

Generic EMS Source Adapter

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| Edit Template | Click the Edit Template button to open the Template box. |
| | The template enables you to edit the template instance according to your organization's specific needs, for example, when defining a new source adapter based on one of the generic template types (Generic EMS or XML File). The template: |
| | ➤ Maps the entities in the data source to the configuration items (CIs) stored in the CMDB. For details about the CI parameters used in the template definition, see "CI Definition Parameters" on page 686. |
| | ➤ Defines the resources to be used in the CMDB for a CI, such as KPIs and business rules |
| | ➤ Creates the source adapter's XML file |
| Enable | Enables communication between the adapter and the external system. |
| Name | The name of the new source. By default it is Generic EMS for the Generic EMS source adapter and XML File for the XML File source adapter. |
| | Note: The name must be unique. |
| Path | Generic EMS. The path to the location of the Generic EMS XML file. Do not change the default path: <business availability="" center="" directory="" gateway="" root="" server="">\CMDB\adapters\Dnodes.</business> |
| | For example, for this adapter, the path can be: D:\ <business availability="" center="" directory="" gateway="" root="" server="">\CMDB\adapters\Dnodes\Generic_EMS.xml</business> |
| | XML File. The path to the location of the user-defined XML file. The file describes the data topology. |

Chapter 27 • Working with Source Manager

| GUI Element (A-Z) | Description |
|-------------------|---|
| Sync Interval | The interval (in minutes) between each automatic synchronization of the adapter with the external system. The default value is 60 minutes. |
| Туре | To create a new source adapter, select one of the following: Generic EMS XML File Hold the cursor over the query icon to view the description of the source adapter in a tooltip. When you edit one of the default source managers, its type |
| | is listed in the box. Note: Business Process Monitor, HP Diagnostics, Real User Monitor, or SiteScope source adapters are listed when you have configured them to be custom source adapters. For details, see "Work with the SiteScope Source Adapter – Workflow" on page 653. |

XML File Source Adapter

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| Edit Template | Click the Edit Template button to open the Template box. |
| | The template enables you to edit the template instance according to your organization's specific needs, for example, when defining a new source adapter based on one of the generic template types (Generic EMS or XML File). The template: |
| | ➤ Maps the entities in the data source to the configuration items (CIs) stored in the CMDB. For details about the CI parameters used in the template definition, see "CI Definition Parameters" on page 686. |
| | ➤ Defines the resources to be used in the CMDB for a CI, such as KPIs and business rules |
| | ➤ Creates the source adapter's XML file |
| Enable | Enables communication between the adapter and the external system. |
| Name | The name of the new source. By default it is Generic EMS for the Generic EMS source adapter and XML File for the XML File source adapter. |
| | Note: The name must be unique. |
| Path | Generic EMS. The path to the location of the Generic EMS XML file. Do not change the default path: <business availability="" center="" directory="" gateway="" root="" server="">\ CMDB\adapters\Dnodes.</business> |
| | For example, for this adapter, the path can be: D:\ <business availability="" center="" directory="" gateway="" root="" server="">\CMDB\adapters\Dnodes\Generic_EMS.xml</business> |
| | XML File. The path to the location of the user-defined XML file. The file describes the data topology. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| Sync Interval | The interval (in minutes) between each automatic synchronization of the adapter with the external system. The default value is 60 minutes. |
| Туре | To create a new source adapter, select one of the following: ➤ Generic EMS ➤ XML File Hold the cursor over the query icon to view the description of the source adapter in a tooltip. When you edit one of the default source managers, its type is listed in the box. |
| | Note: Business Process Monitor, HP Diagnostics, Real User Monitor, or SiteScope source adapters are listed when you have configured them to be custom source adapters. For details, see "Work with the SiteScope Source Adapter – Workflow" on page 653. |

CI Definition Parameters

An adapter mapping definition includes some of the following information:

| Element | Description |
|-------------|---|
| basicEntity | The name of the configuration item (CI) in HP Business Availability Center. The CIs are defined in the IT Universe Manager tab in CMDB Administration, described in "IT Universe Manager Overview" on page 56. |
| contextmenu | The internal name of the context menu to be used for the item in the Dashboard application. To list the context menu names and their internal name, select Admin > Dashboard > Repositories > Context Menus. |
| dimension | The ID of a KPI to be used for the CI. If you change the KPI, check that the KPI is applicable for the item class. To list the KPI ID numbers, select Admin > Dashboard > Repositories > KPIs . |

| Element | Description |
|----------------------------|--|
| dnodeAwareDimension | Set to false for definitions not using the Dynamic Node Factory. For details, see "Customize Dynamic Node Factory Definitions" on page 672. |
| entity id | The name of the source item. |
| logic | The ID of a business rule to be used with the KPI. If you change the rule, you should ensure that the rule is applicable for the KPI. To list the business rule IDs, select Admin > Dashboard > Repositories > Business Rules. |
| | Note: In a source adapter, you can assign to a KPI only a monitor rule and not a group rule. You can assign a group rule to a KPI only in the repositories. For details, see "KPI Repository page" in <i>Using Dashboard</i> . |
| parameters | Additional parameters for the CI's KPI, or parameter values to override the parameter values defined for the business rule. |
| removeDimensionIf Obsolete | Set to true so that KPIs for the CI are removed from the view if they are no longer in use. Do not modify the value of this parameter (it should remain set to true). |
| selectors | (For monitor CIs only) use the selectors to build complex logical expressions using AND and OR logical operators. Those logical expressions are used to catch the appropriate samples brought in by the adapter, for the item. For more details, see "Define Selectors" on page 670. |

Example

The example shows the mapping of an entity named measurement to a CIT named Mercury:sitescope_measurement in the CMDB.

```
<entity id="measurement">
    <basicEntity>Mercury:sitescope measurement</basicEntity>
    <contextmenu>ssMeasurementMenu</contextmenu>
    <dimensions>
       <dimension>
         <id>1</id>
         <logics>
           <logic>
              <id>3</id>
            </logic>
         </logics>
         <selectors type="AND">
            <selector dataType="String" key="sampleType"</pre>
              operator="EQ" readOnly="true" reference="false"
              referencedProperty="sampleType" value="ss_t"/>
            <selector dataType="Long" key="u iMeasurementId"</pre>
             operator="EQ" readOnly="false" reference="true" referencedProperty="measurement id"/>
            <selector dataType="Long" key="u_iSessionId"</pre>
              operator="EQ" readOnly="false" reference="true" referencedProperty="session id"/>
         </selectors>
         <removeDimensionIfObsolete>true</removeDimensionIfObsolete>
         <dnodeAwareDimension>false</dnodeAwareDimension>
       </dimension>
    </dimensions>
  </entity>
```

Selector Parameters

Note: To modify selectors, contact HP Software Support.

Each selector may include the following information:

| Parameter | Description |
|--------------------|--|
| dataType | The type of data can be: Long, Integer, Boolean, String. |
| key | The field to be checked in the sample from the data source. |
| operator | The relational operator used by the selector expression when checking the value in the key field, for example, EQ or IN . |
| readOnly | This flag is set to true if the value for this selector is fixed (defined in the selector value field), false if the value can change. |
| reference | Indicates whether the selector should use the referenced property or not. The selector uses the referenced property if the reference flag is set to true , and ignores the referenced property if the reference flag is set to false . |
| referencedProperty | The value of the entity specified for this parameter is compared with the value of the field specified in the key parameter. This parameter is used only when the reference parameter is set to true . |
| value | The fixed value to be used by the selector. |

Source Manager Page

| Description | Enables you to configure the source adapters that map source data to objects used by HP Business Availability Center. |
|--------------------------|--|
| | To Access: Select Admin > Universal CMDB > Source Manager. |
| Important Information | To perform actions on two or more source adapters at once, select the check box to the left of each source adapter and click the buttons that appear under the source adapters area. |
| Included in Tasks | "Configure a Source Adapter – Workflow" on page 650 |
| Useful Links | "Source Manager Overview" on page 634 |

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

| GUI Element (A-Z) | Description |
|----------------------------|--|
| Custom Source Adapters | Select the appropriate custom source adapter. For details, see "Generic EMS Source Adapter Details" on page 646. |
| Default Source Adapters | Lists the preconfigured source adapters for HP Business Availability Center tools. They are automatically activated as soon as you start HP Business Availability Center. For details, see "Template Elements" on page 640. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| New Source | Click the New Source button to open the New Source Adapter dialog box that you can use to add custom source adapters For details, see "New/Edit Source Adapter Dialog Box" on page 674. |
| | To make a default source adapter available for defining new source adapters, select Admin > Platform > Setup and Maintenance > Infrastructure Settings, choose Foundations and select the Sources Configuration, and locate the appropriate entry in the Sources Configuration - Sources area. Modify the setting for the relevant source type. For example, change Add Business Process Monitor Sources to true. The change takes effect when the server is restarted. |

Default and Custom Source Adapters Sections

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| ⊘ | Opens the Edit Source dialog box where you can edit the source adapter. |
| | Note: You cannot edit a source while its status is Synchronizing. |
| X | Deletes the source adapters from the list of source adapters in the Source Manager and deletes all the CIs (that were created by the source adapter) from the CMDB. |
| | Note: You cannot delete default source adapters. |
| | Disables communication between the CMDB sources and the external system, so that hierarchy data is not updated. |
| Disable | Note: When the button is pressed, the icon toggles to Enable . |

Chapter 27 • Working with Source Manager

| GUI Element (A-Z) | Description |
|-------------------|--|
| | Enables communication between the CMDB sources and the external system, so that hierarchy data is updated. |
| Enable | Note: When you click the button, the icon toggles to Disable . |
| Sync Now | Sync now prompts the Source Manager to poll the appropriate system for updated hierarchy data. Use this button after making changes to the external source or to the source information in System Availability Management, in order to synchronize the information in the CMDB with the information in the external system. You can also wait for the automatic synchronization to take place. |
| Hard Sync | Hard sync prompts the Source Manager to re-import the complete hierarchy data. Use this button if you suspect other changes have been made since clicking the Sync Now button or since the last automatic synchronization. |
| | Note: The Hard Sync replaces only those CIs that have changed since the last Hard Sync . |
| CI Count | The number of CIs in the hierarchical tree for the source (groups, monitors, and so forth), as received from the external system. Note: A Dynamic Node Factory CI is counted as a single CI. |
| Last Update | The start date and time of the last update (synchronization) to the source CIs in the CMDB from the data sources. |
| Name | Name defined for the source adapter. |
| Next Update | The scheduled date and time for the next update to the source CIs in the CMDB from the data sources. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Status | Current status of the communication link with the external system. Possible statuses include: |
| | ➤ Enabled. Communication between the HP Business Availability Center and the external system is enabled, so that Source Manager retrieves updates to the hierarchy data. |
| | ➤ Disabled . Communication between the CMDB and the external system is disabled and no new hierarchy data is retrieved. |
| | ➤ Synchronizing. Polling the external system for configuration data. While this status holds, the entry cannot be edited or deleted. |
| | ➤ Failed. Synchronization with the external system failed and the configuration data is not updated. |
| Sync Duration | The time taken to perform the update. |
| Туре | The type of adapter used for the source. |

Chapter 27 • Working with Source Manager

Part V

View Explorer

28

Working with View Explorer

This chapter provides information on View Explorer.

Note: In IT Universe Manager, the Topology View Application, and the Modeling Studio, View Explorer is called CI Selector.

This chapter includes:

Concepts

➤ View Explorer Overview on page 698

Tasks

- ➤ Display a View in Browse Mode on page 699
- ➤ Search for CIs in Search Mode on page 700
- ➤ Modify View Explorer Display Options on page 703

Reference

➤ View Explorer User Interface on page 704

Troubleshooting and Limitations on page 716

View Explorer Overview

View Explorer presents the elements of the IT universe model in HP Business Availability Center through the medium of views. HP Business Availability Center displays View Explorer in the left pane of applications and pages, for example, Dashboard, Service Level Management, and IT Universe Manager.

When you select a view in View Explorer, the configuration items (CIs) contained in the view are displayed in a hierarchical tree format according to the relationships defined between the CIs. A view may be empty if no CIs were found matching the TQL query. For details on views, see "View Formats" on page 181.

You can use View Explorer to select views and to locate CIs. You can select a view and browse through the list of CIs, or you can search for a CI if you do not know in which view the CI is included.

The interaction between the View Explorer pane and the information presented in the right pane varies, according to the context. For example, in IT Universe Manager, information is presented for the CI selected in View Explorer; in Dashboard, information is presented for the view selected in View Explorer; in Service Level Management, and in other dialog boxes, CIs can be selected in View Explorer and added to the right pane. The context menu options also vary with the context.

Note: The functionality available for searching and browsing in View Explorer in IT Universe Manager and Topology View is different from the functionality in other applications.

For information on the components of View Explorer, see "View Explorer User Interface" on page 704.

🚏 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 706.

This task includes the following steps:

- ➤ "Prerequisites" on page 699
- ➤ "Select a View to Display" on page 699
- ➤ "Modify the CI Tree Structure" on page 699

1 Prerequisites

In the View Explorer pane, select **Browse** mode. (In IT Universe Manager or Topology View, select **View Browser**.)

2 Select a View to Display



Click the ellipsis button to open the Select view dialog box and select the view you want to display. The name of the selected view is shown in the **View** box. The CIs in the view appear in the CI tree in the lower part of the View Explorer pane. The view remains selected when you move to other applications in HP Business Availability Center.

3 Modify the CI Tree Structure

View Explorer enables you to customize the structure of the CI tree of the view (this option is not available in IT Universe Manager or Topology View):



➤ Select **Related CIs tree structure** to display the CI tree by layers within the view.



➤ Select **CI type tree structure** to display the CI tree by CI type.

Search for Cls 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 710.

This task includes the following steps:

- ➤ "Prerequisites" on page 700
- ➤ "Search by CI Name" on page 700
- ➤ "Filter the Scope of the Search" on page 701
- ➤ "Search by Related Configuration Item" on page 701
- ➤ "Search by Configuration Item Type" on page 702
- ➤ "Run the Search and Sort the Results" on page 702

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

To search for CIs by name, 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 716.
- ➤ 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.

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.



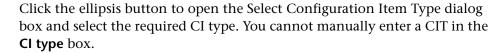
Click the ellipsis button to open the Select Configuration Item dialog box and select the required CI. You cannot manually enter a CI in the **Related to** box.

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 Business Availability Center 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.



After defining a CI in the **CI type** box, HP Business Availability Center remembers your selection until you move to a different application, or until you define a different value.

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.

When you select the required CI from the results list, the right pane displays details for the CI you selected, in the context in which you are working. To see a CI in the context of its view, right-click the CI and select **Locate CI in View**. View Explorer reverts to Browse mode and displays the view that contains the CI, with the CI selected in the view tree.

In IT Universe Manager and Topology View, when you select a CI in the search results, the CI appears in the topology map with its related CIs in the CMDB.

Modify View Explorer Display Options

You can modify the display options for View Explorer. These options are configured in the Infrastructure Settings Manager.

Important: Modifying certain settings in the Infrastructure Settings Manager can adversely affect the performance of HP Business Availability Center. Do not modify settings without first consulting HP Software Support or your HP Professional Services representative.

This task includes the following steps:

- ➤ "Prerequisites" on page 703
- ➤ "Modify Selected Settings" on page 703

1 Prerequisites

Access the Infrastructure Settings Manager by selecting Admin > Platform > Setup and Maintenance > Infrastructure Settings. Select the Foundations context and choose View Explorer from the list.

2 Modify Selected Settings

The following settings can be modified:

- ➤ Immediate Children Count. Number of children immediately displayed when expanding their parent's node in View Explorer.
- ➤ Maximal Children Count. Maximum number of children displayed under their parent's node in View Explorer.

Chapter 28 • Working with View Explorer

- ➤ Maximal search results size. Maximum number of CMDB instances that can be returned in one search operation.
- ➤ Recently Used Views List size. Maximal number of recently used views to store per user.

Note: Some of the settings are not relevant in IT Universe Manager and Topology View.

View Explorer User Interface

This section describes:

- ➤ CI Instances Dialog Box on page 704
- ➤ View Explorer on page 705

🙎 CI Instances Dialog Box

| Description | Enables you to view the CIs in your search results in a separate window. |
|--------------------------|---|
| | To access: In the CI Selector in IT Universe Manager, in CMDB Search mode, click Show CIs in table . |
| Important Information | The CI Instances dialog box displays the results of your CMDB search in tabular form. You can select the columns you want to appear in the table. The functionality of the CI Instances dialog box is the same as that for the Element Instances dialog box, which is available in the other managers. For details, see "Element Instances Dialog Box" on page 429. |

View Explorer

| Description | Enables you to select views and to locate CIs. |
|--------------------------|---|
| Description | To access: Appears in the left pane of the window, for example, the left pane of the IT Universe Manager window, the left pane of Dashboard, and the left pane of Service Level Management. Note: In IT Universe Manager, Topology View, and the |
| | Modeling Studio, View Explorer is called CI Selector. |
| Important Information | The interaction between the View Explorer pane and the information presented in the right pane varies, according to the context. For example, in IT Universe Manager, information is presented for the CI selected in View Explorer; in Dashboard, information is presented for the view selected in View Explorer; in Service Level Management, and in other dialog boxes, CIs can be selected in View Explorer and added to the right pane. View Explorer consists of two functional formats: |
| | Browse mode and Search mode. |
| | ➤ 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 dropdown window. |
| | ➤ In Search mode you can search for one or more CIs in the views or the CMDB, search for all occurrences of a CI, or filter the list of CIs that is displayed. In IT Universe Manager, you access this mode by selecting CMDB Search from the drop-down window. |
| Included in Tasks | "Display a View in Browse Mode" on page 699 |
| | "Search for CIs in Search Mode" on page 700 |

Browse Mode

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| S | Click to refresh the CI tree of the view. |
| Ф | In IT Universe Manager and Topology View, the following options are available: |
| | ➤ Refresh the data content of the hierarchical tree structure that may have been modified by other users. |
| | ➤ Rebuild the view by performing a full recalculation. Note: The recalculation may take a long time. |
| > | Click Add selected Cls to model/view to add the selected Cls to the current model or view. |
| | Note: This button only appears in the Modeling Studio. |
| Î | Click Add as related CI to add the selected CI to the model as a related CI. |
| | Note: This button is only active in the Model Editor of the Modeling Studio. |
| 69 | Click Open selected model in a new tab to open the selected model in the Model Editor. |
| | Note: This button is only active when a model is selected in the Modeling Studio. |
| 74 | Click Generate view for selected model to open the Creating New View dialog box which enables you to build a view based on the selected model. |
| | Note: This button is only active when a model is selected in the Modeling Studio. |
| | Click Show View Definition to go directly to View Manager or the Modeling Studio for the current view. |
| | Note: This button only appears in IT Universe Manager. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| | Click Show Discovery and Changes Summary to rediscover all the CIs in a selected view by manually starting the DDM jobs that originally discovered them. For details, see "Discovery and Changes Summary Dialog Box" on page 83. |
| | Note: This button only appears in IT Universe Manager. |
| | Click Generate Direct Link to View to create a direct link to the view using the Direct Links wizard. |
| | Note: This button only appears in IT Universe Manager and Topology View. |
| €1 | Choose the export format for the table data. The available options are: |
| | Excel. The table data is formatted as an .xls (Excel) file that can be displayed in a spreadsheet. PDF. The table data is exported in PDF format. RTF. The table data is exported in Rich Text Format. CSV. The table data is formatted as a commaseparated values (CSV) text file that can be displayed in a spreadsheet. Note: For the CSV formatted table data to display correctly, the comma (,) must be defined as the list separator. In Windows, to verify or modify the list separator value, open Regional Options from the Control Panel, and on the Numbers tab ensure that the comma is defined as the List Separator value. In Solaris, you can specify the list separator in the application that opens the CSV file. |
| | ➤ XML. The table data is formatted as an XML file that can be opened in a text or XML editor. |
| | Tip: To extract HTML code from the report: |
| | Save the file as HTML Open the file in an HTML editor Copy the relevant table into the target file |

Chapter 28 • Working with View Explorer

| GUI Element (A-Z) | Description |
|-------------------|---|
| | 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 555. |
| | Note: This button only appears in IT Universe Manager and Topology View. |
| | Click Asset Report to open the Asset report for the selected view. For details, see "Asset Report Overview" on page 593. |
| | Note: This button only appears in IT Universe Manager and Topology View. |
| | In IT Universe Manager and Topology View, this icon represents the Set View Parameters button. The Set View Parameters button is only active if at least one node in the selected view has a parameterized node condition. Displays the Set View Parameters dialog box where you can edit the parameter of each condition. For details, see "Set View Parameters/Set View Element Parameters Dialog Box" on page 220. |
| | In the Modeling Studio, this icon represents Open Selected View in Editor area . Click Open Selected View in Editor area to open the current view in a separate tab in the View Editor. |
| 0-1 0-1 | The Related CIs tree structure button displays the CI tree by layers within the view. |
| | Note: This button does not appear in IT Universe Manager, Topology View, or the Modeling Studio. |
| | The CI type tree structure button displays the CI tree by CI type. |
| | Note: This button does not appear in IT Universe Manager, Topology View, or the Modeling Studio. |

| GUI Element (A-Z) | Description |
|---------------------|--|
| № | 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. |
| | Note: This button does not appear in IT Universe Manager, Topology View, or the Modeling Studio. |
| * | Click the Close/Open button to hide or display the View Explorer pane. Note: This button does not appear in IT Universe Manager, Topology View, or the Modeling Studio. |
| - | 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. |
| | Enables you to move to the next or previous result of the search for the string entered in the Find Note: This feature only appears in IT Universe Manager, Topology View, and the Modeling Studio. |
| <cls></cls> | The CIs contained in the currently selected view. |
| <tooltip></tooltip> | Hold the cursor over a CI to display a tooltip with the relevant CI type. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Find | 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. |
| | Note: This feature only appears in IT Universe Manager, Topology View, and the Modeling Studio. |
| View | 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 dropdown, above the dividing line. The complete list of views appears below the line.) Alternatively, place the cursor in the list and begin typing the view name. HP Business Availability Center |
| | completes the view name, if the first few letters that you type match an existing entry. If the names of several views begin with those letters, all matching views are displayed in the list. |

Search Mode

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

| GUI Element (A-Z) | Description |
|-------------------|---|
| | Click Show Cls in Table to open a separate window with a table of the CIs in the search results. |
| | Note: This button only appears in IT Universe Manager and Topology View. |
| > | Click Add selected Cls to model/view to add the selected Cls to the current model or view. |
| | Note: This button only appears in the Modeling Studio. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Î | Click Add as related CI to add the selected CI to the model as a related CI. |
| | Note: This button is only active in the Model Editor of the Modeling Studio. |
| 69 | Click Open selected model in a new tab to open the selected model in the Model Editor. |
| | Note: This button is only active when a model is selected in the Modeling Studio. |
| 7.0 | Click Generate View for Selected Model to open the Creating New View dialog box which enables you to build a view based on the selected model. |
| | Note: This button is only active when a model is selected in the Modeling Studio. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| £ | Choose the export format for the table data. The available options are: |
| | ➤ Excel. The table data is formatted as an .xls (Excel) file that can be displayed in a spreadsheet. |
| | ➤ PDF. The table data is exported in PDF format. |
| | ➤ RTF. The table data is exported in Rich Text Format. |
| | ➤ CSV. The table data is formatted as a commaseparated values (CSV) text file that can be displayed in a spreadsheet. |
| | Note: For the CSV formatted table data to display correctly, the comma (,) must be defined as the list separator. In Windows, to verify or modify the list separator value, open Regional Options from the Control Panel, and on the Numbers tab ensure that the comma is defined as the List Separator value. In Solaris, you can specify the list separator in the application that opens the CSV file. |
| | ➤ XML. The table data is formatted as an XML file that |
| | can be opened in a text or XML editor. |
| | Tip: To extract HTML code from the report: |
| | ➤ Save the file as HTML |
| | ➤ Open the file in an HTML editor |
| | ➤ Copy the relevant table into the target file |
| | In the Related to window, click to open the Select Configuration Item dialog box, where you select the required CI. |
| | In the CI type window, click to open the Select Configuration Item Type dialog box, where you select the required CIT to search for. |
| | Note: This is not relevant in IT Universe Manager, Topology View, or the Modeling Studio. |
| | Enables you to move to the next or previous result of the search for the string entered in the Find field. |
| | Note: This feature only appears in IT Universe Manager, Topology View, and the Modeling Studio. |

| GUI Element (A-Z) | Description |
|------------------------------|--|
| <search results=""></search> | 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: |
| | Name. Contains the name of the CI. View. Contains the name of the view in which the CI appears. (In IT Universe Manager, the search results columns the name of CI Type) |
| | shown are Name and CI Type .) 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. |
| CI type | 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). |
| | In IT Universe Manager, you can search incrementally by typing the first few letters of the required CI type. |
| Find | Enter a CI name or a portion of a CI name in the Find box to locate a CI in the search results. Note: This feature only appears in IT Universe Manager, Topology View, and the Modeling Studio. |
| Name filter box | 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. Note: This is not relevant in IT Universe Manager, Topology View, or the Modeling Studio. |
| Related to | 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. Note: This is not relevant in IT Universe Manager, Topology View, or the Modeling Studio. |

Chapter 28 • Working with View Explorer

| GUI Element (A-Z) | Description |
|----------------------|---|
| Search | Click to run the search. The search results are displayed in the lower part of the View Explorer pane. |
| Search for | 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 701. |
| Search in | Specify the scope of your search. You can limit your search to the current view, or search in the most recently accessed views (by selecting All views). In Change Report, you also have an option to search the entire CMDB. The default option is Current view . Select the required option. |
| | For more information, see "Filter the Scope of the Search" on page 701. |
| | Note: This is not relevant in IT Universe Manager, Topology View, or the Modeling Studio. |
| 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, Topology View, and the Modeling Studio. |
| 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, Topology View, or the Modeling Studio. |

Context Menu Options

| Menu Item | Description |
|---|---|
| <context menu="" options="" sensitive=""></context> | The View Explorer context menu contains different options in each of the windows in which it appears. For example, in Dashboard you can open reports for the CI, and in IT Universe Manager you can attach new CIs to the CI. |
| | For details on the context menu options specific to a particular application, see the User Interface Help for that application. |
| Add | Adds the selected CI to the current model or view. |
| | Note: This feature only appears in the Modeling Studio. |
| Add as related CI | Adds the selected CI as a related CI to the current model. |
| | Note: This feature only appears in the Modeling Studio. |
| Generate View from Model | Select to create a view based on the current model. The Creating New View dialog box opens which enables you to select a perspective to apply. |
| | Note: This feature only appears in the Modeling Studio. |
| Get Related CIs | Select to view a related CIs map for the selected CI. For details, see "IT Universe Manager Context Menu" on page 95. |
| | Note: This feature only appears in the Modeling Studio. |
| Locate CI in View | When this is selected for a CI, View Explorer reverts to Browse mode and displays the view that contains the CI, with the CI selected in the view tree. |
| | Note: |
| | ➤ This option is only available in Search mode.➤ This option is not available in IT Universe Manager. |
| Open Selected Model | Opens the selected model in the Model Editor. |
| | Note: This feature only appears in the Modeling Studio. |

| Menu Item | Description |
|------------------|---|
| Properties | Opens the Properties page for the selected CI. For details, see "Configuration Item Properties Dialog Box" on page 78. |
| Show Related CIs | When this option is selected, View Explorer changes to Search mode and displays a list of the CIs that have a relationship to the original CI. This is the same as defining the original CI in the Related to box when performing a search in all views. Note: This option is not available in IT Universe Manager. |

Troubleshooting and Limitations

Unavailable Views and CIs

The View list in View Explorer may not display all views in the CMDB, or it may not display the contents of a view, for any of the following reasons:

- ➤ The View list includes only the views for which you have the necessary permissions. To set permissions, select Admin > Platform > Users and Permissions, select a user or a group and select Permissions. For more information, see "Assign Permissions" in Platform Administration.
- ➤ When using View Explorer in IT Universe Manager, Dashboard, or Service Level Management, the View list includes only those views that are assigned to that application.
- ➤ Views that are currently inactive appear in red in the View list, but they cannot be selected. In IT Universe Manager, inactive views appear in faded text.
- ➤ Out-of-the-box views for which you do not have a license may appear in the View list, but these views do not contain CIs. For information on the out-of-the-box views, see "Predefined Folders and Views" on page 183.

Note: After deleting one or more nodes from a TQL, it can take time for changes to be updated to the view; meanwhile, the removed CIs appear in the view. If you select one of these CIs before it is updated, an error message is displayed. Click the **Refresh** button to update the view.

Chapter 28 • Working with View Explorer

Part VI

Topology Map

29

Working with Topology Map

This chapter provides information on Topology Map.

This chapter includes:

Concepts

- ➤ Topology Map Overview on page 721
- ➤ Handling Large Views on page 722

Reference

➤ Topology Map User Interface on page 722

A Topology Map Overview

The Topology Map provides a graphical display of a view. All the CIs in a given layer of the view are represented by icons and the connecting lines represent relationships. You can select a CI in the Topology Map or in View Explorer in the left pane. You can also drill down in View Explorer to display different layers of the view in the Topology Map.



If an icon appears with a downward arrow in the Topology Map, there is an additional CI layer beneath it, created by a parent or child folding rule.

The toolbar and Main Menu above the Topology Map enable you to zoom in, change the layout of the Topology Map, and print the Topology Map. Additional functionality is available from the context menu by rightclicking a CI in the Topology Map or in View Explorer.

\lambda Handling Large Views

The Topology Map cannot display a view with more than 900 CIs in a single layer. When you select a view which contains a layer with more than this number of CIs, the Topology Map appears empty.

To handle large views, use one of the following methods:

- ➤ Reduce the TQL query results by redefining the view in View Manager. For details, see "Refine Node Type Dialog Box" on page 447.
- ➤ 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 199.
- ➤ Reset the maximum number of CIs allowed in the configuration parameters. Select the Foundations context in Infrastructure Settings Manager. Select the Max Object Count GUI for TS parameter under UCMDB common Viewing Settings. However, be aware that increasing the maximum number of CIs per layer may significantly slow down the redrawing of the Topology Map.

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

🍳 Topology Map User Interface

This section describes:

- ➤ Export Map to Image Dialog Box on page 723
- ➤ Layout Properties Dialog Box on page 724
- ➤ Main Menu on page 745
- ➤ Print Dialog Box on page 746
- ➤ Print Preview Dialog Box on page 747
- ➤ Print Setup Dialog Box on page 747
- ➤ Toolbar Options on page 749

🙎 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 550 |

| GUI Element (A–Z) | Description |
|---------------------------|---|
| J | 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 752. |
| 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. |
| Туре | 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 | 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. |
|--------------------------|--|
| | 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. |
| | Note : You set layout definitions for a specific layer only. The definitions cannot be saved for a different layer or a different view. |
| | To access: Select Layout > Layout Properties. |
| Important Information | Parameter values are in pixels. |

Circular Tab

| Description | 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. |
|-------------|--|
| | The Circular tab has the following areas: ➤ 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. |
| | To access: Click the Circular tab in the Layout Properties dialog box. |

| GUI Element (A–Z) | Description |
|----------------------------|--|
| Circular | Displays clusters in a circular layout style. |
| | |
| Cluster Spacing | Sets the spacing between clusters. |
| | Default value: 50 |
| | This illustration shows smaller cluster spacing. |
| | This illustration shows larger cluster spacing. |
| Cluster Size Multiplier | 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. |
| Draft | Sets the layout to draft quality. |
| Default | Sets the layout to default quality. |
| Max Number of Clusters | The maximum number of clusters in a layer. |
| Min Number Of Clusters | The minimum number of clusters in a layer. |

Chapter 29 • Working with Topology Map

| GUI Element (A–Z) | Description |
|-------------------|--|
| Node Spacing | Sets the spacing around each node within the same cluster. The larger the spacing, the more nodes there are on the cluster boundary. |
| | Default value: 10 |
| | This illustration shows smaller node spacing. |
| | This illustration shows larger node spacing. |
| Proof | Sets the layout to proof quality. |
| Symmetric | Displays clusters in a symmetric layout style. |

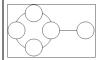
Disconnected Tab

Description

Enables you to define general layout parameters for disconnected nodes and connected components.

- ➤ 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.

This illustrates a connected component with five nodes:



This illustrates a connected component with two nodes:



This illustrates four disconnected components, each made up of a single, disconnected node:



The Disconnected tab has the following areas:

- ➤ **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.

To access: Click the **Disconnected** tab in the Layout Properties dialog box.

| 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

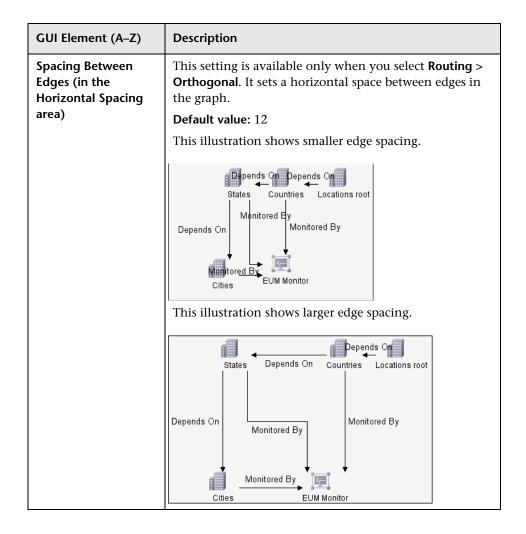
| Description | Shows the precedence relationships that can represent organizational or information management system dependencies, as well as process models, software call graphs, and work flows. The hierarchical layout emphasizes dependencies by placing the nodes at different levels. |
|--------------------------|---|
| | The Hierarchical tab has the following areas: |
| | ➤ Backward Edges area. Specifies how backward relationships are displayed in the hierarchical layout. |
| | ➤ Horizontal Spacing area. Enables you to set the minimum horizontal distance between two neighboring nodes at each level. |
| | ➤ Layout Quality area. Enables you to adjust the quality of the layout produced to fit your application's needs. The quality reflects the number of steps or the method used to produce the layout. For example, high quality is sharper but takes more time to set the layout. |
| | ➤ Level Alignment area. Enables you to set the way nodes are vertically aligned. |
| | ➤ Orientation . Enables you to set the orientation of the hierarchy. |
| | ➤ Orthogonal Routing area. Enables you to set the type of relationship between CIs. This option is useful when layers have nodes with a very large number of connecting relationships. |
| | ➤ Polyline Routing area. Routes edges as one or more straight line segments with arbitrary angles. Polyline routed edges are prevented from overlapping by adding extra segments. |
| | ➤ Vertical Spacing area. Enables you to set the minimum vertical distance between two neighboring nodes on different levels. |
| | To access: Click the Hierarchical tab in the Layout Properties dialog box. |
| Important Information | Orthogonal Routing is currently not supported. |

| GUI Element (A–Z) | Description |
|-------------------|--|
| Bottom | This illustration shows that the bottom of the nodes at the same level of the hierarchy are aligned. |
| Bottom To Top | The children are located below the parent (in the example, Alignment = Center). Monitored By Depends On Monitored By Countries Depends On Depends On Locations root |
| Center | This illustration shows that the center of the nodes at the same level of the hierarchy are aligned. |
| Default | Sets the layout to default quality. |

| GUI Element (A–Z) | Description |
|-------------------------------|---|
| Draft | Sets the layout to draft quality. |
| Left To Right | The children are located to the left of the parent (in the example, Alignment = Center). |
| | Monitored By Monitored By EUM Monitor Depends on Depends on Depends on Cities Monitored By Cities Monitored By |
| 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 | For orthogonal lines between nodes/CIs. Locations root Depends On Depends On Monitored By Monitored By Monitored By EUM Monitor |

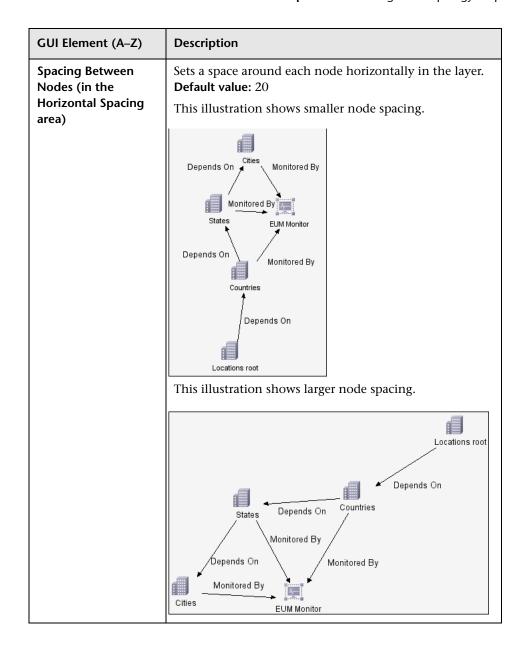
Chapter 29 • Working with Topology Map

| GUI Element (A–Z) | Description |
|-------------------|--|
| Polyline | For straight lines between nodes/CIs. Locations root Depends On Countries Depends On Monitored By Cities Monitored By EUM Monitor |
| Proof | Sets the layout to proof quality. |
| Right To Left | The children are located to the right of the parent (in the example, Alignment = Center). |
| | Monitored By EUM Monitored By Monitored By Countries Locations root |



Chapter 29 • Working with Topology Map

| GUI Element (A–Z) | Description |
|---|--|
| Spacing Between Bends | 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. Default Value : 12 |
| Spacing Between Edges (in the Vertical Spacing area) | This setting is available only when you select Routing > Orthogonal . It sets a vertical space between edges in the graph. Default value: 12 |
| Spacing Between Nodes (in the Vertical Spacing area) | Sets a vertical space around each node in the level. Default value: 28 |



Chapter 29 • Working with Topology Map

| GUI Element (A–Z) | Description |
|-------------------|--|
| Тор | This illustration shows that the top of the nodes at the same level of the hierarchy are aligned. |
| Top To Bottom | The children are located above the parent (in the example, Alignment = Center). Locations root Depends On Countries Depends On Monitored By Monitored By EUM Monitor |

| GUI Element (A–Z) | Description |
|---------------------------|--|
| Undirected Layout | Edge direction is not used to build the levels of the hierarchical drawing. |
| Variable Level Spacing | Variable level spacing adjusts the spacing between pairs of neighboring levels according to the density of edges between the levels. |
| | 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. |
| | If the routing is polyline, variable level spacing makes it easier to distinguish among edges in very dense drawings. |

Orthogonal Tab

| Description | Enables you to set orthogonal layout route relationships horizontally and vertically. This results in relationships bending at 90-degree angles only. |
|-------------|--|
| | The Orthogonal tab has the following areas: |
| | ➤ 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. |
| | To access: Click the Orthogonal tab in the Layout Properties dialog box. |

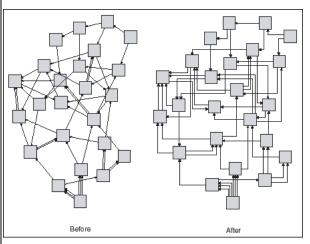
| Important | The Fix Node Sizes option is currently not supported. |
|-------------|--|
| Information | |

| 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

Description

Enables you to produce drawings that leave nodes essentially where they are, and reroute the lines orthogonally.



The Routing tab has the following areas:

- ➤ 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.

To access: Click the **Routing** tab in the Layout Properties dialog box.

| 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 |
|---|---|
| Spacing Between Edges (in the Horizontal Spacing area) | 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. |
| | Default value: 12 The following illustrates smaller line spacing: |
| | The following illustrates larger line spacing: |
| | The following mustrates ranger line spacing. |
| | |
| Spacing Between Edges (in the Vertical Spacing area) | 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. Default value: 12 |

Chapter 29 • Working with Topology Map

| GUI Element (A–Z) | Description |
|---|--|
| Spacing Between Nodes (in the Horizontal Spacing area) | Sets the horizontal space around each node in the layer. Default value: 20 The following illustrates smaller node spacing: |
| | The following illustrates larger node spacing: |
| | |
| Spacing Between Nodes (in the Vertical Spacing area) | Set the vertical space around each node in the layer. Default value: 20 |

Symmetric Tab

| Description | Displays a clear representation of complex networks. The symmetric layout emphasizes the symmetries that may occur in a graph. |
|-------------|--|
| | This tab consists of the following areas: |
| | 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. To access: Click the Symmetric tab in the Layout Properties dialog box. |

| GUI Element (A–Z) | Description |
|-------------------|------------------------------------|
| Default | Set the layout to default quality. |
| Draft | Set the layout to draft quality. |

Chapter 29 • Working with Topology Map

| GUI Element (A–Z) | Description |
|-------------------|---|
| Node Spacing | 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. |
| | Default value: 10 |
| | The following figure illustrates smaller and larger spacing. |
| | node spacing=75 node spacing=150 |
| Proof | Set the layout to proof quality. |



| Description | Contains the options for working with the topology map. |
|--------------------------|---|
| Important Information | The specific options contained within the Main Menu drop-downs are detailed in "Toolbar Options" on page 749. |

| GUI Element (A–Z) | Description |
|-------------------|--|
| Edit | Contains selection options for the topology map. |
| Layout | Contains options for changing the layout of the topology map. |
| Map Item | Contains the topology map context menu options for the current manager. |
| Operations | Contains options for printing or exporting the topology map. |
| Resources | Contains the left pane context menu options for the current manager. |
| | Note: In IT Universe Manager, this drop-down is called Configuration Items and in CI Type Manager it is called CI Types. |
| View | Enables you to hide or display the different panes of the topology map. |

Name 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: |
| | 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 747. 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 753. For details about layout properties, see "Layout Properties Dialog Box" on page 724. |
| Included in Tasks | "Print and Save a Topology Map to File" on page 550 |

| 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 550 | |

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 746. |
| Print Setup | Define the print settings for the map. For details, see "Print Setup Dialog Box" on page 747. |
| Zoom | Focus on specific details of the map. For details, see "Interactive Zoom" on page 752. |

🙎 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 550 |

| GUI Element (A–Z) | Description |
|-------------------|---------------------------------|
| Actual Size | Print the view as it really is. |
| Color | Set the text color. |

| GUI Element (A–Z) | Description |
|----------------------------|---|
| Font | Set the required font. |
| Page Setup | Set the printer settings. |
| Pages | Divide the map into rows and columns and print each section separately. Enter the number of columns and rows in the Page Columns and Page Rows boxes. |
| Print Background | Print the background behind the view. |
| Print Border | Print the map with a border. Click Color to select the required border color. |
| Print Caption | Enter the caption in the text area and click Font to select the required custom font. |
| Print Crop Marks | Print the crop marks. |
| Print Current Selection | Print the selected nodes and their relationships. |
| Print Current Window | Print the part of the view that appears in the window. |
| Print Entire Drawing | Print the complete view. |
| Print Page Numbers | Print the page numbers. |
| Position | Select the position of the caption from the Position list. |
| Zoom Level | Print the view at the current zoom level. |

1 Toolbar Options

The following table contains a description of each Topology Map toolbar option, organized alphabetically.

Note: These toolbar options are relevant for Universal CMDB applications.

| Button | Option Name | Use This Option to |
|--|-------------------------------|--|
| | Add Background | Add a background image to a view. For details, see "Add Background Image Dialog Box" on page 74. |
| | Image | To access: Select Layout > Add Background Image. |
| | | Note: This option is only active in IT Universe Manager and Topology View application. |
| △ ••••••••••••••••••••••••••••••••••• | Additions Count | 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. Siebel Gateway Siebel Component Group Container link Depend(24) Virtual - Join Siebel Web Application Note: This option appears in the toolbar in Enrichment |
| | 6 1 1 | Manager only. |
| | Calculate TQL Result Count | Calculate the number of instances found for each TQL node/relationship. |

| Button | Option Name | Use This Option to |
|--------|-------------------------------|---|
| Ð | Candidates for Deletion | Identify the CIs in the current view which are candidates for deletion with the following icon . |
| | | Note: This option appears in the toolbar in the Topology View application only. |
| | Change Label Length | Enter the maximum number of characters that the labels should contain. |
| | | To access: Select Layout > Change label length. |
| ß | 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. |
| Q | 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 552. For details on Correlation rules, see "Correlation Manager User Interface" on page 241. Note: This option appears in the toolbar in the Topology Map in the Topology View application only. |
| Î | Create Relationship | In most managers, create a relationship between two existing TQL nodes. For details, see "Add Nodes and Relationships to a TQL Query" on page 384. |
| | | In IT Universe Manager, create a relationship between existing CIs. For details, see "Attaching Existing CIs" on page 67. |
| × | 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. |
| | Direct Links Wizard | Open the Direct Links wizard, which enables you to create a direct link to a specific CI or view. For details, see "Direct Links User Interface" on page 44. |

| Button | Option Name | Use This Option to |
|----------|-------------------------|---|
| | Drag Map | Drag the view. |
| | | To access: Open the drop-down menu in the Mode box or select View > Drag Map . |
| F | Drill Down One Layer | 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 68. |
| | | Note: This option appears only in IT Universe Manager and Topology View application. |
| | Entities Tree | Toggle between hiding and displaying the manager specific entities tree at the left of the screen. |
| | | To access: Select View > Entities Tree. |
| | Export Map to Image | Save the topology map to a file. For details, see "Export Map to Image Dialog Box" on page 723. |
| | | To access: Select Operations > Export Map to Image. |
| € | Filter DB Results | Open a dialog box which displays the number of related CIs by type. Select the CI type you want to appear in the Topology Map results. |
| | | Note: This option appears only in IT Universe Manager and the Topology View application. |
| 2 | Fit to Window | Fit the complete map in the window. |
| * | Generate Related CIs | Display the Get Related CIs Report for the selected CI. For details, see "Get Related CIs Report" on page 84. |
| | Report | Note: This option appears only in IT Universe Manager and Topology View application. |

| Button | Option Name | Use This Option to |
|----------|---------------------------------|---|
| 1 | Go Up One Layer | 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 68. |
| | | Note: This option appears only in IT Universe Manager and the Topology View application. |
| | Hide All Inheritance | Toggle between showing and hiding Inheritance_f relationships and their connecting node. |
| | From Map | 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 | Toggle between showing or hiding the relationship labels. |
| | 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/Restor e 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. |
| | Interactive Zoom | Decrease the view magnification by clicking and pushing the pointer upwards. Magnify the view by clicking and pulling the pointer downwards. To access: Open the drop-down menu in the Mode box or select View > Interactive Zoom. |

| Button | Option Name | Use This Option to |
|--------|----------------------|---|
| | Layout Properties | 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 724. |
| | | To access: Select Layout > Layout Properties. |
| | Layout | Select the layout display from the list. The options are: |
| | | ➤ 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. |
| | | Note: Select Layout > Save Layout to save the selected layout. |
| | | For further details about each of the options, see "Layout Properties Dialog Box" on page 724. |
| | Map overview | Open a small window with a copy of the topology map. This is useful in large views when zooming in. |
| | | To access: Select Layout > Map Overview. |
| | Navigation | Take the pointer to the next connected CI/CIT/TQL node in a clockwise direction. |
| | | ➤ Left-click to move in a clockwise direction. |
| | | ➤ Right-click to point to the next CI/CIT/node/pattern in a clockwise direction. |
| | | To access: Open the drop-down menu in the Mode box or select View > Navigation . |
| | | Note: You can use this option only on CI/CIT/nodes/patterns that are connected by relationships. |
| * | New CI | Define a new unrelated CI. For details, see "Working with CIs" on page 61. |
| | | Note: This option appears in the toolbar in IT Universe Manager only. |

| Button | Option Name | Use This Option to |
|---------------------|---------------------------------|--|
| * | New Related CI | Define a new related CI. For details, see "Working with CIs" on page 61. Note: This option appears in the toolbar in IT Universe Manager only. |
| | Place in Center | Place the selected CI/node/CIT/pattern in the center of the map. To access: Select Layout > Place in Center. |
| | Print | Print the contents of the topology map. For details, see "Print Dialog Box" on page 746. To access: Select Operations > Print |
| | Print Preview | Preview the contents of the map before printing. To access: Select Operations > Print Preview. |
| | Print Setup | Define print settings for printing the topology map. For details, see "Print Setup Dialog Box" on page 747. |
| | | To access: Select Operations > Print Setup |
| £ <mark>∕a</mark> n | Remove Enrichment Results | Remove the instances created from an Enrichment rule from the CMDB. Note: This option appears in the toolbar in Enrichment Manager only. |
| | Save Layout | Save changes to the layout. To retrieve the layout you have saved, select Manual Layout. To access: Select Layout > Save Layout. Note: This option appears in the toolbar in IT Universe Manager |
| N | Select | and Topology View application only. Select a CI/CIT/TQL node or multiple CIs/CITs/TQL nodes. To access: Open the drop-down menu in the Mode box or select View > Select. |
| | Select All | Select all the CIs and relationships in a selected layer. To access: Select Edit > Select All. |
| | Select All Nodes | Select all the nodes in a selected layer. To access: Select Edit > Select All Nodes. |

| Button | Option Name | Use This Option to |
|------------|---------------------------|---|
| | Select Columns | Enables you to select the columns to be displayed. For details, see, "Select Columns Dialog Box" in <i>Reference Information</i> . |
| | | Note: This option is displayed in Text mode of IT Universe Manager only. |
| (F) | Set Number of Hops | Open a dialog box which enables you to set the degree of separation of the related CIs to appear in the Related in DB selection. |
| | | Note: This option appears in the toolbar in IT Universe Manager and Topology View application only. |
| (b) | Show Changes in Map | Display an indicator next to each CI that was added or changed within the selected period as follows: |
| | | ➤ ¹ Indicator for an added CI ➤ △ Indicator for a changed CI |
| | | 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. |
| | | For details on selecting the period, see "Change Timeframe" on page 750. |
| | | Note: This option appears in the toolbar in Topology View application only. |
| Q= | Show Schedule Info | Display the scheduling information for the selected job. For details, see "Discovery Scheduler Dialog Box" in <i>Discovery and Dependency Mapping Guide</i> . |
| | | Note: This option appears in the toolbar in the Dependency Map tab of DDM. For details, see "Dependency Map Tab" in <i>Discovery and Dependency Mapping Guide</i> . |
| ≜ ↑ | Sort Order | Enables you to set the order of the visible columns. For details, see, "Sort Column Content Dialog Box" in <i>Reference Information</i> . |
| | | Note: This option is displayed in Text mode of IT Universe Manager and the Topology View application only. |

| Button | Option Name | Use This Option to |
|--------|---------------------|--|
| | Straighten | Straightens any selected relationship between two nodes that has angles. |
| | | To access: Select Layout > Straighten. |
| | User Preferences | Opens the User Preferences dialog box which enables you to reset warning message preferences. For details, see "User Preferences Dialog Box" on page 461. To access: Select Edit > User Preferences. |
| | Zoom | 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. To access: Open the drop-down menu in the Mode box or select View > Zoom. |

Part VII

Federation and Reconciliation

30

Introduction to Federated CMDB

This chapter provides information on the Federated CMDB functionality.

This chapter includes:

Concepts

- ➤ Federated CMDB Overview on page 760
- ➤ Adapters on page 760
- ➤ Retrieving Data from Multiple Data Stores on page 761
- ➤ Retrieving Attributes from an External Data Store on page 762
- ➤ Mapping Information on page 763

Tasks

- ➤ Work with Federated Data Workflow on page 764
- ➤ Change the Encrypted Password of a Federated Adapter on page 765

Reference

➤ Federated CMDB User Interface on page 766

Federated CMDB – Overview

CMDB implementations often involve federation, which is the inclusion of data in the CMDB from other sources, in such a way that the source of the data retains control of the data.

You use federated CMDB to answer the following types of questions:

- ➤ Which hosts in a specific application (for example, SAP) have changed more than a certain number of times in a certain time period?
- ➤ Which application names have changed more than a certain number of times in a certain time period?
- ➤ Which hosts in the model have changed more than a certain number of times in a certain time period?

Adapters

You set up adapters to work with data that is federated from different CMDB sources, using the HP Business Availability Center API. For details, see "The HP Universal CMDB Web Service API" in Solutions and Integrations.

You can use the following, predefined adapters to federate different CMDB sources:

- **BACKPIsAdapter.** Select to define an adapter that enables a user to create a FTQL to retrieve, in an external application, the status and values of KPIs that are connected to CIs. For details on the task, see Chapter 34, "Viewing KPIs in External Applications."
- **CmdbChangesAdapter.** Select to define a source adapter that queries the UCMDB for changes. The adapter runs on federated TQLs and the UCMDB History database/schema. (For details on limitations, see "The CmdbChanges Adapter" on page 928.)
- **CmdbHistoryAdapter.** Select to define an adapter that retrieves data from a UCMDB History database. Note: the History Adapter does not support replication, that is, you cannot use this adapter to define a replication job (to copy data from one data store to another one).

- ➤ CmdbRmiAdapter. Select to define an adapter that uses an RMI API to retrieve data from an external CMDB data store. Note: This adapter supports federated replication only by default. To support federated queries, contact HP Software Support.
- ➤ CmdbSoapAdapter. Select to define an adapter that uses a SOAP API to retrieve data from an external CMDB data store. Note: This adapter does not support federated queries and can be used only as a target in federated replication.
- ➤ ServiceDeskAdapter. Select to define an adapter that supports the retrieval of data from HP ServiceCenter and HP Service Manager. This adapter connects to, and receives data from, ServiceCenter/Service Manager using the Web Service API. For details on working with this adapter, see Chapter 32, "The HP ServiceCenter/Service Manager Adapter."
- ➤ GenericDBAdapter. Platform for configuring a database adapter that integrates with any type of relational database and enables running federated TQLs against the databases. For details on working with this adapter, see Chapter 33, "The Generic Database Adapter."

The Federation Framework SDK acts as a mediator between HP Business Availability Center and the adapters; and as a container for the federated adapters. For details, see "The Federation Framework SDK" on page 781.

For details on choosing an adapter when creating a data store, see "Data Stores Tab" on page 767.

Retrieving Data from Multiple Data Stores

During FTQL calculation, you can retrieve data for the same CIT from several data stores. The data can be retrieved from the local UCMDB and from an external data store, or from several external data stores.

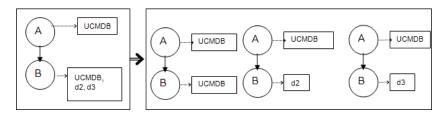
The data can be retrieved by the same adapter from several locations or by several adapters from several locations.

Each CI that is retrieved from an external data store includes an attribute (Created By) to show from which data store the CI has been retrieved.

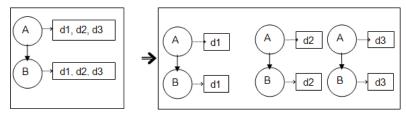
For details on mapping information, see "Mapping Information" on page 763.

Limitations

- ➤ When a virtual link exists between two data stores, HP Universal CMDB supports mapping in the following cases only:
 - ➤ The UCMDB data store lies at one end of the link and multiple data stores lie at the other end. The Cartesian product is calculated for A's data store (UCMDB) and B's data stores (UCMDB, d2, d3).



➤ The same data stores lie at both ends of the link. The link is an internal link of each data store and no mapping is required.



➤ Data that is retrieved from several data stores is not reconciled. If two data stores include the same CIT, the CIT appears twice in HP Universal CMDB. If two data stores include the same attribute, only one of the attributes is federated with the UCMDB.

Retrieving Attributes from an External Data Store

- ➤ You can retrieve the attributes of a CI from an external data store, when the core CI data is stored in the UCMDB.
- ➤ The core data store must be the UCMDB.

- ➤ The CIT must be located in a data store for its attributes to be defined.
- ➤ The same attributes can be retrieved from multiple data stores.

 For details on retrieval options, see the CI Type Retrieval Mode field in the "Supported CI Types Tab" on page 772.
- ➤ You cannot map a CIT to an external CIT and to the external CIT's attributes.
- ➤ A CIT can support external attributes if the adapter (that is federating the CIT data) supports mapping information (reconciliation) for this CIT.

Use Cases

- ➤ You need to discover the SMS or Altiris desktops in your system. The desktop CIT is a core CIT and is already synchronized with the UCMDB. However, you do not want to store all the desktop data in the UCMDB as this is inefficient and unnecessary. It is enough to store core attributes such as name and MAC address in the UCMDB, and to define the other details of the desktops as external attributes in two data stores: SMS and Altiris.
- ➤ VMware creates virtual machines that contain a virtual machine monitor (hypervisor) that allocates hardware resources dynamically and transparently. Multiple operating systems can run concurrently on a single physical computer. Since the allocation resources (for example, memory) are dynamic, DDM cannot discover these resources (DDM runs once every 24 hours and the resource data can change hourly). To enable HP Universal CMDB to always be updated with real-time data, the solution is to divide the data into two: the core data of the virtual hosts should be discovered and placed in the UCMDB; the resource attributes should be retrieved from the external source. In this use case, the data for these attributes is retrieved from two data stores: UCDMB and VMware.

3 Mapping Information

Federated queries should use the Mapping Engine to unify the shallow CIs (the core attributes of a CI) from the core data store with the attributes from the external data store.

For details on the Mapping Engine, see "Federation Framework Flow for FTQL" on page 786.

For details on selecting attributes to be included in the federation, see "Supported CI Types Tab" on page 772.

P Work with Federated Data – Workflow

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

This section includes the following topics:

- ➤ "Prerequisites" on page 764
- ➤ "Create a Data Store" on page 764
- ➤ "Replicate the Data Store" on page 765
- ➤ "Build a View" on page 765
- ➤ "View Instances in IT Universe Manager" on page 765
- ➤ "View Reports" on page 765

1 Prerequisites

Set up the adapter. For details, see "Add an Adapter for a New External Data Store" on page 804. For details on existing adapters, see "Adapters" on page 760.

2 Create a Data Store



Access Admin > Universal CMDB > Settings > Federated CMDB. Click the Add button to open the New Data Store dialog box. For details, see "New Data Store Wizard" on page 769.

3 Replicate the Data Store

Use the data store for replication. Access **Admin > Universal CMDB > Settings > Federated CMDB > Replication Jobs** tab. Click the **Add** button to open the Replication Job dialog box. For details, see "Replication Job Dialog Box" on page 775.

4 Build a View

For details, see "View Manager Overview" on page 180.

5 View Instances in IT Universe Manager

For details, see "IT Universe Manager Overview" on page 56.

6 View Reports

For details, see "Topology Report Manager Overview" on page 300.

P Change the Encrypted Password of a Federated Adapter

When defining a new data store adapter, a user must enter a password. This password is encrypted by default and encryption is entirely transparent to the user.

The following procedures explain how to generate a new key file and change an existing key file. HP Business Availability Center includes a default key so that these procedures are optional.

Note: During the upgrade process from a version with unencrypted passwords, the passwords are encrypted.

The encryption key is located at C:\hp\UCMDB\UCMDBServer\j2f\fcmdb\fkey.bin.

To generate a new key file:

1 Launch the Web browser and enter the following address:

http://<machine name or IP address>.<domain_name>:8080/jmx-console

where **<machine** name or **IP** address> is the machine on which HP Business Availability Center is installed. You may have to log in with the user name and password.

- **2** Click the **Topaz** > **service=FCmdb Config Services** link.
- **3** In the JMX MBEAN View page, locate the following operation: java.lang.String generateNewKeyFile().
- **4** In the **customer id** field, enter **1**.
- **5** Click **Invoke**. A message is displayed informing you that a new key file is generated and has been loaded into the application.

To change the key file:

- **1** Prepare a key file and note the location.
- **2** In the JMX MBEAN View page, locate the following operation: java.lang.String importKeyFile().
- **3** In the **customerId** field, enter **1**; in the **newKeyFileLocation** field, enter the full path to the new key.
- **4** Click **Invoke**. A message is displayed.

🔍 Federated CMDB User Interface

This section describes:

- ➤ Data Stores Tab on page 767
- ➤ Federated CMDB Window on page 768
- ➤ New Data Store Wizard on page 769
- ➤ Replication Job Dialog Box on page 775
- ➤ Replication Job Statistics Window on page 776

➤ Replication Jobs Tab on page 778

Q Data Stores Tab

| Description | Enables you to edit existing data stores or to create new stores. To access: Admin > Universal CMDB > Settings > Federated CMDB > Data Stores tab. |
|--------------------------|---|
| Important Information | Data Stores includes the following tabs: Properties. Enables you to configure an adapter that accesses external data sources. For details, see "Properties Tab" on page 770. Supported CI Types. Enables you to choose which CITs are to be supported by the data store. For example, if a federated TQL (FTQL) includes a node that represents a specific CIT, the instances of this CIT are accepted from this external data store. For details, see "Supported CI Types Tab" on page 772. Supported Queries. Enables you to choose which queries should be supported by this data store for data replication. For details, see "Supported Queries Tab" on page 774. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| * | Add a data store. For details, see "New Data Store Wizard" on page 769. |
| × | Delete a data store. |
| | Click to save changes. |
| Refresh | Click to refresh the page. |

Chapter 30 • Introduction to Federated CMDB

| GUI Element (A-Z) | Description |
|---|---|
| 0 | Click to reload, if changes have been made to the adapter. |
| <list defined<br="" of="">Adapters></list> | Name. The name you give to the data store. Adapter. The type of adapter for this data store. |
| View | For details, see: ➤ "Data Stores Tab" on page 767 ➤ "Supported CI Types Tab" on page 772 |

Example 2 Federated CMDB Window

| Description | Enables you to define external data stores and create replication jobs. |
|--------------------------|---|
| | To access: Admin > Universal CMDB > Settings > Federated CMDB. |
| Important Information | You create a data store with the New Data Store wizard. For details, see "New Data Store Wizard" on page 769. |
| Included in Tasks | "Work with Federated Data – Workflow" on page 764 |
| Useful Links | ➤ "Data Stores Tab" on page 767 ➤ "Replication Jobs Tab" on page 778 ➤ "Adapters" on page 760 |

New Data Store Wizard

| Enables you to define a data store that uses an adapter to access external data sources. |
|--|
| To access: Admin > Universal CMDB > Settings > Federated CMDB > Data Stores tab > click the Add button. |
| Depending on the adapter's function, use one of the following adapters to define a data store: |
| ➤ CmdbChangesAdapter. The adapter supports federated replication only and can be used as a source, therefore, you must fill in the Properties tab and the Supported Queries tab. |
| ➤ CmdbHistoryAdapter. The adapter supports federated TQL queries only, therefore you must fill in the Properties tab and the Supported CI Types tab. |
| ➤ CmdbRmiAdapter. The adapter supports both federated replication and federated queries, therefore you must fill in the Properties tab, the Supported CI Types tab, and the Supported Queries tab. (By default, this adapter supports replication only.) |
| ➤ CmdbSoapAdapter. The adapter supports federated replication only and can be used as a target, therefore you must fill in the Properties tab. |
| ➤ ServiceDeskAdapter. The adapter supports federated TQL queries only, therefore you must fill in the Properties tab and the Supported CI Types tab. |
| ➤ GenericDBAdapter. |
| "Work with Federated Data – Workflow" on page 764 |
| "Retrieving Data from Multiple Data Stores" on page 761 "Retrieving Attributes from an External Data Store" on page 762 "Adapters" on page 760 |
| |

Properties Tab

| Description | Enables you to select the type of adapter, and to define the connection information for the external data store you are defining. |
|--------------------------|---|
| | To access: Admin > Universal CMDB > Settings > Federated CMDB > Data Stores tab. Click the New Data Store button. |
| Important Information | All enabled fields are mandatory. |
| Useful Links | "Adapters" on page 760 |

| GUI Element(A–Z) | Description |
|------------------------|--|
| Adapter | Choose the adapter to retrieve the external data from an external data store. |
| Test connection button | Click to test that you have entered valid information. |
| Customer ID | For Business Availability Center, 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 Business Availability Center version. |

| GUI Element(A–Z) | Description |
|------------------|--|
| Next button | Click to continue defining the adapter. |
| | Note: If you did not test the connection, it is automatically tested when you click Next . |
| | 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: |
| | Message: Adapter does not support Federated Query. Adapter does not support Replication Job as a source. Data Store will be used only as target. |
| | Click OK , then click Finish . |
| Password | Enter the password needed to access the external data store to which you want to connect. If you set up the system to accept an encrypted password, the password you enter in this field is encrypted and saved to the database. |
| | For details on encrypted passwords, see "Change the Encrypted Password of a Federated Adapter" on page 765. |
| Port | Enter the port through which you are accessing the external data store (if required). |
| | For the BACKPIsAdapter , enter the number of the RMI port. The default is 29601. |
| URL | Use this field to define a specific URL to connect to the external data store. |
| User | Enter the user name needed to access the external data store to which you want to connect. |

Supported CI Types Tab

| Description | Enables you to choose which CITs or attributes are to be supported by the data store. For example, if a federated TQL (FTQL) includes a node that represents a specific CIT, the instances of this CIT are accepted from this external data store. |
|--------------------------|--|
| | To access: Admin > Universal CMDB > Settings > Federated CMDB > Data Stores tab. Click the Supported CI Types tab. |
| Important Information | This page is displayed when the selected adapter supports federated queries. |
| Included in Tasks | "Work with Federated Data – Workflow" on page 764 |
| Useful Links | "Retrieving Attributes from an External Data Store" on page 762 |

| GUI Element (A-Z) | Description |
|-----------------------------|--|
| 9 | Represents instance federation, that is, CITs are federated. |
| a | Represents attribute federation, that is, federation is run at the level of the attributes of a CIT. |
| <list cits="" of=""></list> | This list includes all CITs that are supported by the adapter. |
| | When queried by an FTQL, the CITs you select here are configured to retrieve the data from this external data store. |
| | Select the CITs to be supported by this data store. |
| | For BACKPIsAdapter, select Real Time KPI. |

| GUI Element (A-Z) | Description |
|---------------------------|--|
| CI Type Retrieval Mode | ➤ Retrieve CIs of selected CI Type. All a CI's data, including all its attributes, are retrieved from the data store. Retrieve CIs of the CI Type from the UCMDB too. |
| | ➤ Retrieve selected attributes. The selected attributes are retrieved from the data store. The CIs must already exist in the UCMDB. |
| | Retrieve the attribute from the UCMDB too. |
| | Note: |
| | ➤ All CITs (and their child CITs) included in a data store definition must use the same retrieval mode. |
| | ➤ You cannot select both CITs and attributes for the same data store. |
| CI Types | The CIT hierarchy. |
| | Right-click the CIT to define a new data store of the same data store type. |
| Select Attributes | You can define which attributes of an external CIT are to be included in the federation: |
| | ➤ In the CI Type Retrieval Mode pane, select Retrieve selected attributes. |
| | ➤ In the Select Attributes list, select the attributes that are to be included in the federation. |
| | ➤ Save the changes. |
| | Note : Attributes are defined in the CIT Manager. For details, see "Add/Edit Attribute Dialog Box" on page 273. |

Supported Queries Tab

| Description | Displays a list of queries that are supported by the adapter. Enables you to choose which queries should be supported by this data store for data replication. |
|--------------------------|--|
| | To access: Admin > Universal CMDB > Settings > Federated CMDB > Data Stores tab. Click the Supported Queries tab. |
| Important Information | This page is displayed when an adapter is selected that supports federated replication and can be used as a source. |
| Included in Tasks | "Work with Federated Data – Workflow" on page 764 |

| GUI Element (A-Z) | Description |
|--|--|
| ® ‡ | 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<br="">names></list> | This list includes all queries that are supported by the adapter. During replication job configuration, queries you select here are visible. Select the queries to be included in the configured data store. |
| | Visible. The query is visible in the Replication Job dialog box for the current data store. |

Replication Job Dialog Box

| Description | Enables you to replicate data between two data stores. To access: Admin > Universal CMDB > Settings > Federated CMDB > Replication Jobs. Click the Add button. |
|--------------------------|--|
| Important Information | For successful replication, if you use CMDB adapters for replication (SOAP or RMI), the CIT class model in the target (the machine to which the data is imported, to be federated) must be identical to the class model in the source (the machine from which the data is exported). To add specific CIs only from a TQL during a replication job, you must configure the required condition on those CIs. Then, you must configure the same conditions for the relationship TQLs that are linked to the CIs. |
| Included in Tasks | "Work with Federated Data – Workflow" on page 764 |

| GUI Element (A-Z) | Description |
|----------------------------|---|
| Name | Enter a name to identify the replication job. |
| Replication Job Queries | Active. Select to use this query in the replication job. Name. The query name. Description. The description of the query. |
| | ➤ Permit Deletion in Target. Permits deletion of CIs and relationships on the target machine if they have been deleted in the source query result. |

| GUI Element (A-Z) | Description |
|-------------------|--|
| Source Data Store | The data store for the data that is to be brought over and replicated to the data on the target machine. |
| | Only data stores that have adapters that support replication and can be used as a source are displayed here. |
| | Click Details to view information about the data store. |
| Target Data Store | The data store to which the data that is brought in from the source machine should be replicated. |
| | Only data stores that have adapters that support replication and can be used as a target are displayed here. |

Replication Job Statistics Window

| Description | Enables you to view statistics for a selected replication job to verify whether replication is successful. |
|--------------------------|--|
| | To access: Admin > Universal CMDB > Settings > Federated CMDB > Replication Jobs tab. Select a replication job and click the Statistics icon in the toolbar. |
| Important Information | Click a row to view error messages for a specific replication job. |

| GUI Element (A-Z) | Description |
|-------------------|---|
| Ad hoc | Yes. The replication job was run by Scheduler or by the user clicking the Ad hoc icon in the Replication Jobs tab. |
| Full replication | Yes. The user chose to retrieve all appropriate data in the source to the target, without taking the last run of the replication job into consideration. |
| Job Name | Name given to the replication job. |

| GUI Element (A-Z) | Description |
|---|--|
| Replication Job Statistics per Query | 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 fcmdb.synchronizer.log file, located in the following folder: |
| | <pre><hp \fcmdb\<="" availability="" business="" center="" directory="" pre="" root=""></hp></pre> |
| | ➤ Replication Start Time. The time the replication job started running replication for the current query. |
| | ➤ Replication Stop Time. The time the replication job stopped running replication for the current query. |
| | ➤ Updated. The number of CIs and relationships that were updated in the target data store during the last replication job. |
| | ➤ Added. The number of CIs and relationships that were added in the target data store during the last replication job. |
| | Removed. The number of CIs and relationships that were removed in the target data store during the last replication job. Note: The CIs and relationships are removed from the target only if Permit Deletion in Target is selected in the Replication Job definition. Has Error. Yes. Click to open the Replication Error |
| | dialog box that displays the reason for the failure. |
| Source Data Store | The ID of the source data store. |
| Status | Can be SUCCEEDED or FAILED. |
| Target Data Store | The ID of the target data store. |

Replication Jobs Tab

| Description | Enables you to define the replication jobs that contain the source data store, target data store, and queries, whose results should be replicated. |
|--------------------------|--|
| | To access: Admin > Universal CMDB > Settings > Federated CMDB > Replication Jobs tab. |
| Important Information | You can set up a schedule to run a replication job. For details, see "Scheduler Actions" on page 524. |

| GUI Element (A-Z) | Description |
|-----------------------|---|
| New Replication Job | Click to add a replication job. For details, see "Replication Job Dialog Box" on page 775. |
| Delete Selected Items | Click to delete a replication job. |
| New Data Store | Click to open the New Data Store dialog box. For details, see "New Data Store Wizard" on page 769. |
| Save | Click to save the changes. |
| Refresh | Click to refresh the page. |
| (4 (C) | Click to test that replication is successful: |
| | ➤ 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. |
| | Note: This feature is useful when testing a replication job as you are developing it. During production, you should use the Scheduler to run the replication job. For details, see "Schedule Tab" on page 779. |

| GUI Element (A-Z) | Description |
|-------------------------------------|--|
| Statistics | Click to view replication job statistics about the selected replication job. For details, see "Replication Job Statistics Window" on page 776. |
| Filter <show all=""></show> | To filter the list of tasks, choose from the list and type in the first letters in the by box. |
| <right-click menu=""></right-click> | For details, see the explanations for the buttons in this table. |
| | Duplicate Replication Job . Enter a name for the duplicate job and make changes to it as necessary. Save the job. |
| Tasks Table | Name. The name you give to the replication job. |
| | Source Data Store. The ID of the source data store. |
| | Target Data Store . The ID of the target data store. |
| | Queries. The queries that are used for replication in this replication job. |

Properties Tab

| Description | Enables you to edit a replication job. |
|--------------------------|---|
| | To access: Admin > Universal CMDB > Settings > Federated CMDB > Replication Jobs tab. Click the Properties tab. |
| Important Information | For details, see "Replication Job Dialog Box" on page 775. |

Schedule Tab

| Description | Enables you to set a schedule to run replication jobs. |
|--------------|---|
| | To access: Admin > Universal CMDB > Settings > Federated CMDB > Replication Jobs tab. Click the Schedule tab. |
| Useful Links | Chapter 15, "Scheduler" |

Chapter 30 • Introduction to Federated CMDB

| GUI Element (A-Z) | Description |
|-------------------|--|
| * | Click to add a schedule. For details, see "Job Definitions Dialog Box" on page 525. For details on setting a replication job action, see "Action Definition Dialog Box" on page 523. |
| | Click to edit an existing schedule. For details, see "Job Definitions Dialog Box" on page 525. |
| × | Delete a schedule. |
| Active | The schedule runs at the defined time. |
| Job Definition | A description of the job. |
| Last Run Time | The previous time that the schedule ran. |
| Name | The name of the schedule. |
| Next Run Time | The date and time that the schedule will next run. |
| Schedule | The description of the schedule. |

31

The Federation Framework SDK

This chapter provides information on the Federation Framework functionality, which uses an API to retrieve information from federated sources.

This chapter includes:

Concepts

- ➤ Federation Framework Overview on page 782
- ➤ Adapter and Mapping Interaction with the Federation Framework on page 785
- ➤ Federation Framework Flow for FTQL on page 786
- ➤ Federation Framework Flow for Replication on page 798
- ➤ The HP Release Control Federation Adapter on page 799
- ➤ Adapter Interfaces on page 803

Tasks

➤ Add an Adapter for a New External Data Store on page 804

Reference

➤ Adapter Capabilities on page 815

Federation Framework – Overview

Note:

- ➤ The term **relationship** is equivalent to the term **link**.
- ➤ The term **CI** is equivalent to the term **object**.
- ➤ A graph is a collection of nodes and links.
- ➤ For a glossary of definitions and terms, see "Glossary."

The Federation Framework provides two main capabilities:

- **Federation on the fly.** All queries are run over original data stores and results are built on the fly in HP Business Availability Center.
- ➤ Data Replication. Replicates data (topological data and CI properties) from one data store to another.

Both action types require an adapter for each data store, which can provide the specific capabilities of the data store and retrieve and/or update the required data. Every request to the data store is made through its adapter.

This section includes the following topics:

- ➤ "Federation on the Fly" on page 782
- ➤ "Data Replication" on page 784

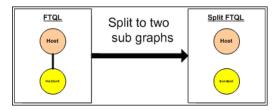
Federation on the Fly

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

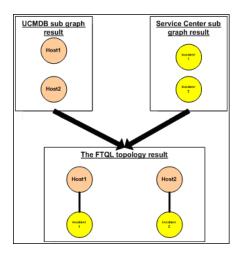
A federated TQL query uses adapters that represent external data stores, to create appropriate external relationships between different external data store CIs and HP Business Availability Center CIs.

Example of Federation on the Fly Flow

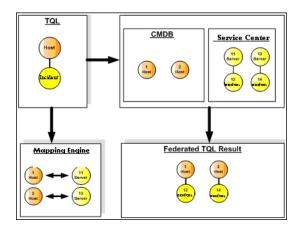
1 The Federation Framework splits a Federated TQL (FTQL) into several subgraphs, where all nodes in a subgraph refer to the same data store. Each subgraph is connected to the other subgraphs by a virtual relationship (but itself contains no virtual relationships).



2 After the FTQL is split into subgraphs, the Federation Framework calculates each subgraph's topology and connects two appropriate subgraphs by creating virtual relationships between the appropriate nodes.



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



Data Replication

You replicate data if you have several data stores with a large amount of data, and another data store that uses a view with data from these data stores.

In data replication, data stores are divided into two categories: source and target. Data is retrieved from the source data store and updated to the target data store. The replication is based on query names, that is, data is synchronized between the source data store and target data store and is retrieved by a query name in the source data store. For example, in HP Business Availability Center, the query name is the name of the TQL. However, in another data store the query name can be a code name that returns data. The adapter is designed to correctly handle the query name.

Each query name in the source data store can be defined as an exclusive query. This means that the CIs and relationships in the query results are unique in the target data store, and no other query can bring them to the target. The adapter of the source data store supports specific queries, and can retrieve the data from this data store. The adapter of the target data store enables the update of retrieved data on this data store.

The replication process flow includes the following steps:

- **1** Retrieves the topology result with signatures from the source data store.
- **2** Compares the new results with the previous results.
- **3** Retrieves a full layout (that is, all CI properties) of CIs and relationships, for changed results only.
- **4** Updates the target data store with the received full layout of CIs and relationships. If any CIs or relationships are deleted in the source data store and the query is exclusive, the replication process removes the CIs or relationships in the target data store as well.

Adapter and Mapping Interaction with the Federation Framework

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

This section includes the following topics:

- ➤ "Adapter Lifecycle" on page 785
- ➤ "Adapter assist Methods" on page 786

Adapter Lifecycle

An adapter instance is created for each external data store. The adapter begins its lifecycle with the first action applied to it (such as, calculate TQL or retrieve/update data). When the **start** method is called, the adapter receives environmental information, such as the data store configuration, logger, and so on. The adapter lifecycle ends when the data store is removed from the configuration, and the **shutdown** method is called. This means that the adapter is stateful and can contain the connection to the external data store if it is required.

Adapter assist Methods

The adapter has several **assist** methods that can add external data store configurations. These methods are not part of the adapter lifecycle and create a new adapter each time they are called.

- ➤ The first method tests the connection to the external data store for a given configuration.
- ➤ The second method is relevant only for the source adapter and returns the supported queries for replication.
- ➤ The third method is relevant only for FTQL and returns supported external classes by the external data store.

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

Federation Framework Flow for FTQL

This section includes the following topics:

- ➤ "Definitions and Terms" on page 786
- ➤ "Mapping Engine" on page 787
- ➤ "FTQL Adapter" on page 787
- ➤ "Flow Diagrams" on page 788

Definitions and Terms

Reconciliation data. The rule for matching between CIs of the specified type that are received from UCMDB and external data store. The reconciliation rule can be of three types:

- ➤ **ID reconciliation.** This can be used only if the external data store contains the UCMDB id of reconciliation objects.
- ➤ **Property reconciliation.** This is used when the matching can be done by properties of the reconciliation CI type only.

➤ **Topology reconciliation.** This is used when you need the properties of additional CITs (not only of the reconciliation CIT) to perform a matching on reconciliation CIs. For example, you can perform reconciliation of the host type by the ip_address property that belongs to the ip CIT.

Reconciliation object. The object is created by the adapter according to received reconciliation data. This object should refer to some external CI and is used by Mapping Engine to connect between the external CIs to the UCMDB CIs.

Reconciliation CI type. The type of the CIs that represent reconciliation objects. These CIs must be stored in both UCMDB and in the external data stores.

Mapping engine. A component that identifies relations between CIs from different data stores that have virtual relationship among them. The identification is performed by reconciling between UCMDB Reconciliation objects and external CIs Reconciliation objects.

Mapping Engine

Federation Framework uses the Mapping Engine to calculate the FTQL. The Mapping Engine connects between CIs that are received from different data stores and are connected by virtual relationships. The Mapping Engine also provides reconciliation data for the virtual relationship. One end of the virtual relationship must refer to the Universal CMDB. The type of this end will be reconciliation type. For the calculation of the two sub graphs, a virtual relationship can start from any end node.

FTQL Adapter

The FTQL adapter will be requested to bring two kinds of data from external data store: external CIs data and reconciliation objects that belong to external CIs.

External CIs data. The external data that does not exist in UCMDB. It is the target data of the external data store for the UCMDB.

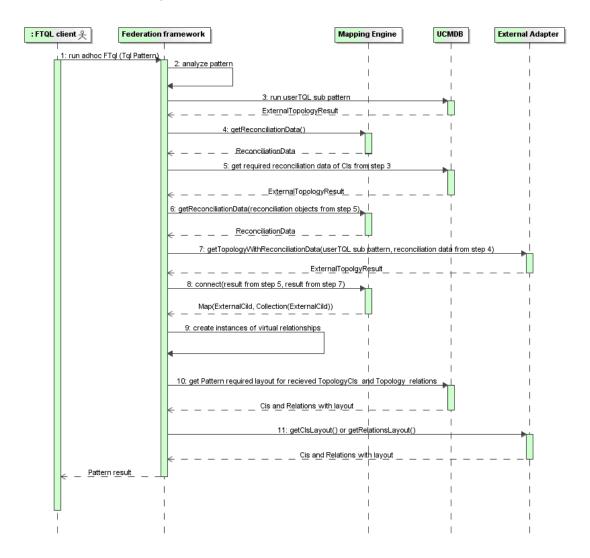
Reconciliation objects data. The auxiliary data that is used by the federation framework to connect between UCMDB CIs and external data. Each reconciliation object should refer to an External CI. The type of the reconciliation objects is the type (or subtype) of one of the virtual relationship end which data is retrieved from UCMDB. Reconciliation objects should fit to reconciliation data the adapter receive. It can be one of three types: IdReconciliationObject, PropertyReconciliationObject, and TopologyReconciliationObject.

Flow Diagrams

The following two diagrams illustrate the Federation Framework, the Universal CMDB, the adapter, and the Mapping Engine. The FTQL in the example diagrams has only one virtual relationship, so that only the Universal CMDB and one external data store are involved in the FTQL. In the first diagram the calculation begins at the Universal CMDB and in the second diagram at the external adapter. Each step in the diagram has reference to the appropriate method call of the adapter or mapping engine interface.

The Calculation Starts at the HP Universal CMDB End

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

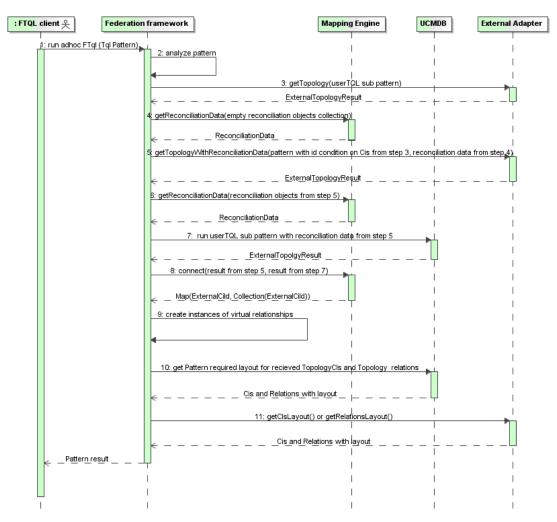


The numbers in this image are explained below:

- **1** The Federation Framework receives a call for a FTQL calculation.
- **2** The Federation Framework analyzes the pattern, finds the virtual relationship, and divides the original TQL into two sub-patterns—one for the Universal CMDB and one for the external data store.
- **3** The Federation Framework requests the topology of the sub-TQL from the Universal CMDB.
- **4** After receiving the topology results, the Federation Framework calls the appropriate Mapping Engine for the current virtual relationship and requests reconciliation data. The reconciliationObject parameter is empty at this stage, that is, no condition should be added to reconciliation data in this call. The returned reconciliation data defines what data is needed to match between the reconciliation CIs from UCMDB and external data store. The reconciliation data can be one of three following types:
 - ➤ 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 from the Universal CMDB.
- **6** The Federation Framework calls the Mapping Engine to retrieve the reconciliation data. In this state (by contrast with step 3), the Mapping Engine receives the the reconciliation objects from step 5 as parameters. The Mapping Engine translates the received reconciliation object to the condition on the reconciliation data.
- **7** The Federation Framework requests the topology of the sub-TQL from the external data store. The external adapter receives as a parameter the reconciliation data from step 6.

- **8** The Federation Framework calls the Mapping Engine to connect between the received results. The firstResult parameter is the external topology result received from UCMDB in step 5 and the secondResult parameter is the external topology result received from the External Adapter in step 7. The Mapping Engine returns a map where External CI ID from the first data store (the Universal CMDB in our case) is mapped to the External CI IDs from the second (external) data store.
- **9** For each mapping, the Federation Framework creates a virtual relationship.
- **10** After the calculation of the FTQL results (only at the topology stage), the Federation Framework retrieves the original TQL layout for the resulting CIs and relationships from the appropriate data stores.

The Calculation Starts at the External Adapter End



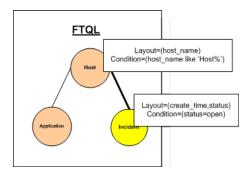
- **1** The Federation Framework receives a call for a FTQL calculation.
- **2** The Federation Framework analyzes the pattern, finds the virtual relationship, and divides the original TQL into two sub-patterns one for the Universal CMDB and one for the external data store.

- **3** The Federation Framework requests the topology of the sub-TQL from the External Adapter. The returned ExternalTopologyResult is not supposed to contain any reconciliation object, since the reconciliation data is not part of the request.
- **4** After receiving the topology results, the Federation Framework calls the appropriate Mapping Engine with the current virtual relationship and requests reconciliation data. The reconciliationObjects parameter is empty at this state it means that no condition should be added to reconciliation data in this call. The returned reconciliation data defines what data is needed to match between the reconciliation CIs from UCMDB and external data store. The reconciliation data can be one of three following types:
 - ➤ 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 objects for the CIs that were received in step 3 from the external data store. The Federation Framework calls getTopologyWithReconciliationData() method in the External Adapter, where the requested topology is one node topology with CIs received in step 3 as ID condition and reconciliation data from the step 4.
- **6** The Federation Framework calls the Mapping Engine to get the reconciliation data. In this state (in contrast with step 3), the Mapping Engine receives the reconciliation objects from step 5 as parameters. The Mapping Engine translates the received reconciliation object to the condition on the reconciliation data.
- **7** The Federation Framework requests the topology of the sub-TQL with reconciliation data from the step 6 from the UCMDB.

- **8** The Federation Framework calls the Mapping Engine to connect between the received results. The firstResult parameter is the external topology result received from External Adapter at step 5 and the secondResult parameter is the external topology result received from the UCMDB at step 7. The Mapping Engine returns a map where External CI ID from the first data store (the external data store in our case) is mapped to the External CI IDs from the second (UCMDB).
- **9** For each mapping, the Federation Framework creates a virtual relationship.
- **10** After the calculation of the FTQL results (only at the topology stage), the Federation Framework retrieves the original TQL layout for the resulting CIs and relationships from the appropriate data stores.

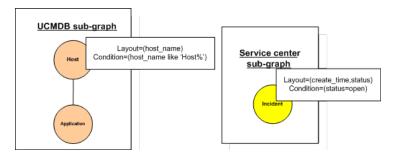
Example of Federation Framework Flow for FTQL

This example explains how to view all open incidents on specific hosts. The ServiceCenter data store is the external data store. The host instances are stored in the 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 the Universal CMDB.

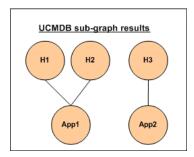


Note: For attribute federation, the adapter's getTopology method is called. The reconciliation data is adapted in the user TQL (in this case, the CI element).

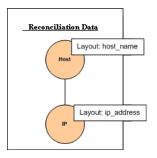
1 After analyzing the pattern, the Federation Framework recognizes the virtual relationship between Host and Incident and splits the FTQL into two subgraphs:



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

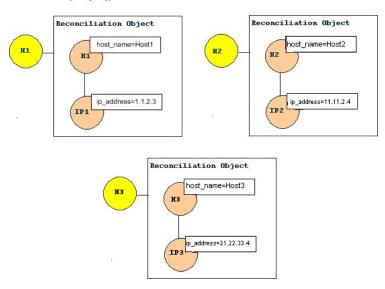


3 The Federation Framework requests from the appropriate Mapping Engine the reconciliation data for the first data store (HP Business Availability Center) that contains the information to connect between received data from two data stores. The reconciliation data in this case is:

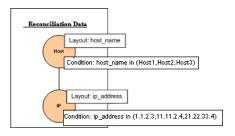


4 The Federation Framework creates one node topology query with Host node and ID conditions on it from the previous result (host_id in H1, H2, H3), and runs this query with required reconciliation data on HP Business Availability Center. The result includes Host CIs that are relevant to the ID condition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

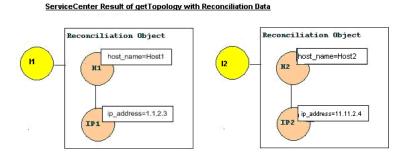
result of getTopology with ReconciliationData

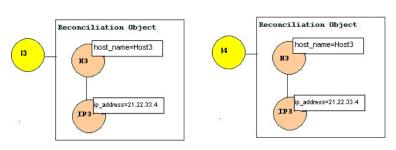


5 The reconciliation data for ServiceCenter should contain a condition for host_name and ip_address that is derived from the reconciliation objects received from HP Business Availability Center:

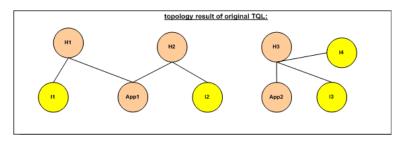


6 The Federation Framework runs the ServiceCenter subgraph with the reconciliation data to request the topology and appropriate reconciliation objects, and receives the following results:





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 Business Availability Center and ServiceCenter.

Federation Framework Flow for Replication

This section includes the following topics:

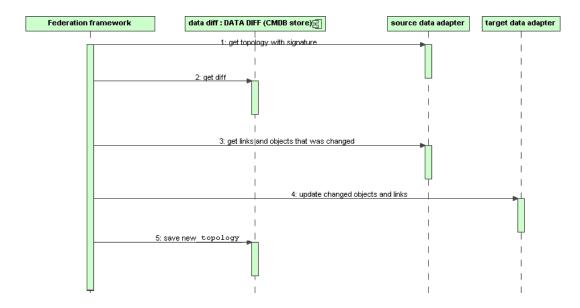
- ➤ "Definitions and Terms" on page 798
- ➤ "Flow Diagram" on page 798

Definitions and Terms

Signature. Denotes the state of properties in the CI. If changes are made to property values in a CI, the CI signature must also be changed. "CI signature" helps detect whether a CI has changed without retrieving and comparing all CI properties. Both the CI and "CI signature" are provided by the appropriate adapter. The adapter is responsible to change CI signature when CI properties are altered.

Flow Diagram

The following sequence diagram illustrates the interaction between the Federation Framework and the source and target adapters in a replication flow:



- 1 The Federation Framework receives the topology for the query result from the source adapter. The adapter recognizes the query by its name and runs it on the external data store. The topology result contains the ID and signature for each CI and relationship in the result. The ID is the logical ID that defines the CI as unique in the external data store. The signature should be modified if the CI or relationship is modified.
- **2** The Federation Framework uses signatures to compare the newly received topology query results with the saved ones, and to determine which CIs have changed.
- **3** After the Federation Framework finds the CIs and relationships that have changed, it calls the source adapter with the IDs of the changed CIs and relationships as a parameter to retrieve their full layout.
- **4** The Federation Framework sends the update to the target adapter. The target adapter updates the external data source it represents with the received data.
- **5** After the update, the Federation Framework saves the last query result.

The HP Release Control Federation Adapter

The HP Release Control Federation adapter supports the retrieval of data from HP Release Control. Every request to HP Release Control to calculate a federated query is made through this adapter. The adapter supports the **Planned Change** CI type. You use **service desk** links to create the query.

The following use cases describe how the adapter can be employed:

- ➤ A user needs to display **planned changes to any CI** within a specific time frame.
- ➤ A user needs to display planned changes to specified system Cls.

 In this case, HP Business Availability Center retrieves changes that directly change system Cls and does not retrieve changes that indirectly affect system Cls.
- ➤ A user needs to display planned changes to a specified business CI.

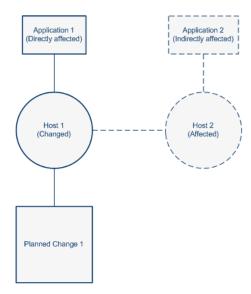
 In this case, HP Business Availability Center retrieves changes that directly affect business CIs and does not retrieve changes that indirectly affect business CIs.

In all of the above cases, HP Business Availability Center retrieves parent changes and independent tasks. HP Business Availability Center does not retrieve tasks that are included in a parent request.

Example

The following example illustrates some of the use cases. Assume there is one planned change in HP Release Control, **Planned Change 1**.

- ➤ Planned Change 1 is performed on Host 1.
- ➤ **Application 1** runs on **Host 1** and is therefore directly affected by the change.
- ➤ Host 2 is connected to Host 1 and may be affected by Planned Change 1 but no actual change is made to Host 2.
- ➤ Application 2 runs on Host 2 and may be indirectly affected by the change.



If the user runs a query to retrieve planned changes to **Host 1** or **Application 1**, HP Universal CMDB displays **Planned Change 1**, because this change directly affects those CIs.

If the user runs a query to retrieve planned changes to **Host 2** or **Application 2**, HP Business Availability Center does not display any changes because there are no changes that directly affect those CIs.

This section includes the following topics:

- ➤ "Configuring the Federation Adapter" on page 801
- ➤ "Retrieving Planned Change Attributes" on page 802
- ➤ "Adding Custom Fields to the Federation Adapter" on page 802

Configuring the Federation Adapter

This section describes how to configure the HP Release Control Federation adapter to work with HP Universal CMDB.

To configure the adapter:

- **1** Deploy the following file in the Package Manager:
 - <Release Control installation directory>\conf\uCmdb -<version_number>-extensions\federation\rc_federation.zip

For details, see Chapter 14, "Package Manager."

- 2 Copy the <Release Control installation directory>\conf\uCmdb -<version-number>-extensions\federation\CcmChangeAdapter directory to the following location:
 - <BAC installation directory>\HPBAC\fcmdb\CodeBase
- **3** Reload the **CcmChangeAdapter** in the HP Business Availability Center JMX console.
- **4** In HP Business Availability Center go to **Settings** > **Federated CMDB** and configure the **CcmChangeAdapter**. Enter the following required details:
 - ➤ Name. The logical name of the adapter.
 - ➤ **Host**. The URL of HP Release Control.
 - **User.** The user name of an administrator user in HP Release Control.
 - ➤ **Password**. The password of the administrator user specified above.

Retrieving Planned Change Attributes

HP Business Availability Center contains a list of the **planned change** attributes in the selected in the **CI Type Manager Attributes** tab. HP Business Availability Center retrieves **planned change** attributes from HP Release Control using the following rule:

HP Business Availability Center converts all underscores (_) in the attribute names and converts them to hyphens (-) and searches through the HP Release Control fields for matching fields. The list of fields in HP Release Control is located in the Administrator module **Fields** tab.

In addition, specific attribute properties are mapped to specific fields in the **convertfields.properties** file, located in the **CcmChangeAdapter** directory. You can map additional attributes to fields HP Release Control in this file.

Adding Custom Fields to the Federation Adapter

This section explains how to add custom fields to the Federation adapter.

To add new custom fields to the Federation adapter:

- 1 In HP Release Control, add the relevant fields in the Administrator module **Fields** tab. For more information about adding custom fields, refer to the *HP Release Control Installation and Configuration Guide*.
- **2** In HP Business Availability Center, locate the **planned change** CI type and add the new attribute names.
 - ➤ Use the same name for the attribute as you used for the custom field that you created in HP Release Control. However, if you used a hyphen (-) in the field name, substitute the hyphen for an underscore (_) in the name of the attribute.
 - ➤ To use an attribute name that is different from the custom field name, you can map the attribute name to a specific field name in the convertfields.properties file, located in the CcmChangeAdapter directory.

Adapter Interfaces

This section includes the following topics:

- ➤ "Definitions and Terms" on page 803
- ➤ "Adapter Interfaces for FTQL" on page 803
- ➤ "Adapter Interfaces for Replication" on page 804

Definitions and Terms

The External relation. The relation between two external CI types that are supported by the same adapter.

Adapter Interfaces for FTQL

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

A **oneNode topology interface** is used when the adapter does not support any external relations. That is, the adapter is never meant to receive a request with more than one external CI. All OneNode interfaces are created to simplify the workflow; for those cases where you need to use a more extensive query, use the PatternTopology interface.

A **Pattern topology interface** is used when the adapter supports more than one external CI type and supports at least one relation type between supported external CI types. That is, the adapter should implement the Pattern Topology interface if it intends receiving queries for external data with relations.

OneNode Interfaces

The following interfaces have different types of reconciliation data:

- ➤ OneNodeTopologyIdReconciliationDataAdapter. Use if the adapter supports a single-node TQL and the reconciliation between data stores is calculated by the ID.
- ➤ OneNodeTopologyPropertyReconciliationDataAdapter. Use if the adapter supports a single-node TQL and the reconciliation between data stores is done by the properties of one CI.

➤ OneNodeTopologyDataAdapter. Use if the adapter supports a single-node TQL and the reconciliation between data stores is done by topology.

PatternTopology Interfaces

The following interfaces have different types of reconciliation data:

- ➤ PatternTopologyIdReconciliationDataAdapter. Use if the adapter supports a complex TQL and the reconciliation between data stores is done by the ID.
- ➤ PatternTopologyPropertyReconciliationDataAdapter. Use if the adapter supports a complex TQL and the reconciliation between data stores is done by single-node properties.
- ➤ PatternTopologyDataAdapter. Use if the adapter supports a complex TQL and the reconciliation between data stores is done by topology.
- ➤ **SortResultDataAdapter.** Use if you can sort the resulting CIs in the external data store.
- ➤ FunctionalLayoutDataAdapter. Use if you can calculate the functional layout in the external data store.

Adapter Interfaces for Replication

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

Add an Adapter for a New External Data Store

This task explains how to define an adapter to support a new external data source.

This task includes the following steps:

- ➤ "Model Supported Adapter Classes for CIs and Relationships in the CMBD Class Model" on page 805
- ➤ "Define Valid Relationships for Virtual Relationships" on page 805

- ➤ "Define an Adapter Configuration" on page 806
- ➤ "Implement the Adapter" on page 808
- ➤ "Implement the Mapping Engine" on page 809
- ➤ "Add Jars Required for Implementation to the Class Path" on page 809
- ➤ "Deploy the Adapter" on page 809
- ➤ "Redeploy the Adapter" on page 810
- ➤ "Write Implementations for the ServiceCenter Adapter and Mapping Engine" on page 815

1 Model Supported Adapter Classes for CIs and Relationships in the CMBD Class Model

As an adapter developer, you should:

- ➤ have knowledge of the hierarchy of the HP Business Availability Center CI types to understand how external CITs are related to the HP Business Availability Center CITs
- ➤ model the external CITs in the CMDB class model
- ➤ add the definitions for new CI types and their relationships
- ➤ define valid relationships in the CMDB class model for the valid relationships between adapter inner classes. (The CITs 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 CIT definitions to the CMDB class model, see "CI Type Manager" on page 261.

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 Business Availability Center data, that is, define your virtual relationships. You can do this by adding a valid relationship, where one end of the relationship does not refer to your adapter supported classes. A valid relationship for a virtual relationship is different from a regular valid relationship only in that it has a qualifier that defines a Mapping Engine class implementation.

Example of Valid Relationship Definition

In the following example of a valid relationship definition, the relation of type history_link between instances of type it_world to instances of type HistoryChange is valid. To connect between instances of these types the Federation Framework should use the HistoryMappingEngine implementation class:

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 815.
- ➤ **Fields to connect.** Defines the fields that the user must supply to connect to the external data store.
- ➤ **Default mapping engine.** Defines the default mapping engine for virtual relationships. Relevant only for FTQL-supported adapters.

See the schema folder for the schema of the adapter configuration.

Example of Adapter Configuration Definition

Example of an adapter configuration definition:

```
<adapter-config adapter-id="CmdbRmiAdapter">
     <class-name>com.mercury.topaz.adapters.cmdb.CmdbRmiAdapter</class-
name>
         <adapter-capabilities>
             <support-federated-query>
                 <supported-classes>
                     <supported-class is-derived="true" all-attributes-supported="true"</p>
name="hostresource"/>
                 </supported-classes>
                     <topology>
                          <pattern-topology>
                              <functional-layout/>
                          </pattern-topology>
                          <advanced-capabilities>
                              <calculated-attribute></calculated-attribute>
                          </advanced-capabilities>
                     </topology>
                     <result>
                          <sort-result/>
                     </result>
             </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 jars to your class path:

➤ federation_api.jar

7 Deploy the Adapter

a Deploy the adapter package. For general details on deploying a package, see "Deploy a Package" on page 494.

The package should contain the following entities:

➤ New CIT definition (optional):

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

The new CIT definitions are located in the class folder in the package.

➤ New data type definition (optional):

Used only if the new CITs require new data types.

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

➤ New valid relationships definition (optional):

Used only if the adapter supports the federated TQL.

The new valid relationships definitions are located in the validlinks folder in the package.

The virtual relationship is defined as a valid relationship and can include a data item named mapping_engine_class, which defines the mapping engine fully-qualified class name.

- ➤ The adapter configuration definition XML file should be located in the adapter folder in the package.
- ➤ **Descriptor.** Defines the package definitions.

- **b** Deploy your code:
 - ➤ Create a class that implements all required adapter interfaces.
 - ➤ Implement a mapping engine (if you are writing a federated query adapter).
 - ➤ Place your compiled classes (normally a jar file) together with all your based-on *.jar files in the <HP Business Availability Center root directory>\fcmdb\CodeBase\<adapter id> folder.

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

➤ If you create your own configuration file, you should also use the <HP Business Availability Center root directory>\fcmdb\CodeBase\ <adapter id> folder as your root folder.

8 Redeploy the Adapter

The adapter definitions and implementation may become altered as a result of external class definitions, changes in adapter capabilities, or changes in implementation. If this happens, redeploy the definitions or implementations.

- **a** Redeploy an adapter package.
 - If your external classes definition or adapter definition was altered, create an updated adapter package and redeploy it using the package mechanism. For details, see "Deploy a Package" on page 494.
- **b** Redeploy your code.

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

- ➤ Create updated *.jar or configuration files, and place them in the <HP Business Availability Center root directory>\fcmdb\CodeBase \<adapter id> folder.
- ➤ Call the next JMX method with the appropriate customer ID and adapter ID:

FCmdb Config Services > loadOrReloadCodeBaseForAdapterId.

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 Business Availability Center class model hierarchy. The entities refer to IT processes, so it makes sense to put them under the IT Process CIT. RFC refers to IT change, so put the RFC class definition under the IT Change CIT. There is no relationship between Incident, Problem, and RFC CITs, so do not add definitions for such relationships.
- 2 Determine to which CITs in HP Business Availability Center you want to relate the ServiceCenter entities. For the purpose of this example, the only relevant entity is Host. Add a valid relationship for each of the following pairs: [Host, Incident], [Host, Problem], [Host, RFC]. Each valid relationship should have a qualifier with the Mapping Engine implementation class name that supports connection between the ends of this relationship. It can be the same Java class for all three cases or three different classes, depending on your implementation.
- **3** Define the adapter configuration XML file.
 - **a** Define the adapter ID.

For this example, assume the ID is ServiceCenterAdapter and the class implementation is adapter. ServiceCenterAdapterImpl. The beginning of the configuration adapter file is:

- **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"</pre>
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"</pre>
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"</pre>
name="problem">
         <supported-conditions>
             <attribute-operators attribute-name="status">
                  <operator>EQUEL</operator>
              </attribute-operators>
         </supported-conditions>
     </supported-class>
</supported-classes>
```

➤ Define the topology that the ServiceCenter adapter supports. Because there are no relationships between the ServiceCenter entities, it is sufficient that the ServiceCenter adapter support single-node topology. For simplicity's sake, assume that the ServiceCenter adapter has no advanced capabilities and cannot calculate the value of calculated attributes. The topology element definition is as follows:

```
<topology>
<one-node-topology/ >
</topology>
```

- ➤ For simplicity's sake, assume that ServiceCenter does not support sorting. Therefore, the capability should not contain the element result.
- **c** Add the element that defines the information required for the ServiceCenter adapter to connect to ServiceCenter. Assume this includes host, port, and user. Because the password for ServiceCenter can be empty, do not define this field as required. However, the ServiceCenter adapter checks this field, and if a value exists, it uses the password value to connect. The fields-to-connect element has the following definition:

```
<fields-to-connect>
    <field>host</field>
    <field>port</field>
    <field>user</field>
</fields-to-connect>
```

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-</pre>
supported="false" name="incident">
                          <supported-conditions>
                              <attribute-operators attribute-name="status">
                                   <operator> EQUAL </operator>
                              </attribute-operators>
                          </supported-conditions>
                      </supported-class>
                      <supported-class is-derived="true" all-attributes-</pre>
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-</p>
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>
```

9 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

This section describes adapter capabilities:

- ➤ **Support federated query.** Included in adapter capabilities if the adapter implementation supports FTQL. Federated query capabilities include:
 - ➤ Supported classes. Defines the supported classes in the federated query. The supported class definition includes supported class name, whether derived classes of this class are also supported, and the possible condition operations for class attributes. 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.

Chapter 31 • The Federation Framework SDK

32

The HP ServiceCenter/Service Manager Adapter

This chapter provides information on the HP ServiceCenter/Service Manager Adapter, version 1.0. The Adapter is compatible with HP Business Availability Center, version 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.

This chapter includes:

Concepts

- ➤ Adapter Usage on page 818
- ➤ The Adapter Configuration File on page 819

Tasks

- ➤ Deploy the Adapter on page 828
- ➤ Deploy the ServiceDesk Adapter on page 829
- ➤ Add an Attribute to the ServiceCenter/Service Manager CIT on page 835

Adapter Usage

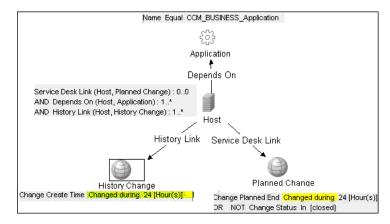
The ServiceCenter/Service Manager Adapter supports the retrieval of data from HP ServiceCenter and HP Service Manager. This adapter connects to, and receives data from, ServiceCenter/Service Manager using the Web Service API. Every request to ServiceCenter/Service Manager to calculate a federated query is made through this adapter.

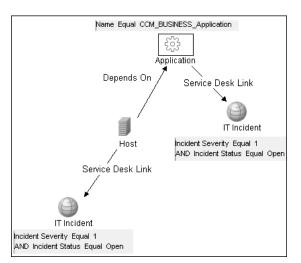
The Adapter supports three external CI types: Incident, Problem, and Planned Change. The adapter retrieves the CIs of these types from ServiceCenter/Service Manager with the required layout and by a given filter (using reconciliation and/or a CI filter). Each of these CITs can be related to one of the 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 823). 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 835).

The following use cases (that include TQL examples) describe how the Adapter can be employed:

1 A user needs to display all unplanned changes to all hosts running a specific application during the last 24 hours:





2 A user needs to see all open critical incidents on an application and its hosts:

The Adapter Configuration File

The Adapter configuration file serviceDeskConfiguration.xml is located in the following directory:

<HP Business Availability Center root directory>\fcmdb\CodeBase **\ServiceDeskAdapter**

This file contains three parts:

- 1 The first part, which is defined by the ucmdbClassConfigurations element, contains the external CIT configuration that the Adapter supports. For details, see "External CITs Configuration" on page 820.
- **2** The second part, defined by the reconciliationClassConfigurations element, contains reconciliation data information for appropriate UCMDB CITs. For details, see "Reconciliation Data Configuration" on page 823.
- **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 827.

Important: The adapter is delivered without a default configuration file. Before defining a data store, you must prepare the appropriate file, according to the version of ServiceCenter/Service Manager you are working with:

➤ Locate the ...\fcmdb\CodeBase\ServiceDeskAdapter folder.

This folder contains three configuration files: serviceDeskConfiguration.xml.6.xx for ServiceCenter version 6.xx serviceDeskConfiguration.xml.7.0x for Service Manager version 7.0x serviceDeskConfiguration.xml.7.1x for Service Manager version 7.1x

➤ Delete the suffix of the appropriate configuration file. For example, if you are working with Service Manager 7.0x, locate the serviceDeskConfiguration.xml.7.0x file and delete .7.0x, so that the new name of the file is serviceDeskConfiguration.xml.

External CITs Configuration

Each CIT that is supported by the Adapter is defined in the first section of the Adapter configuration file.

This section, ucmdbClassConfiguration, represents the only supported CIT configuration. This element contains the CIT name as defined in the UCMDB class model (the ucmdbClassName attribute), mapping for all its attributes (the attributeMappings element), and a private configuration for a specific connector implementation (the classConnectorConfiguration element):

- ➤ The ucmdbClassName attribute defines the UCMDB class model name.
- ➤ The attributeMappings element contains attributeMapping elements.

The attributeMapping element defines the mapping between the UCMDB model attribute name (the ucmdbAttributeName attribute) to an appropriate ServiceCenter/Service Manager attribute name (the serviceDeskAttributeName attribute).

For example:

<a tributeMapping 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, & mp; replacing &).

The useful fields of the Service Manager classConnectorConfiguration element are as follows:

- ➤ The device_key_property_names element contains the fields names in the WSDL information of the current object that can contain the device ID (for example, ConfigurationItem). Each field should be added as a device_key_property_name element.
- ➤ The id_property_name element contains the field name in the WSDL information that contains the ID of the current object.

The following example shows the ucmdbClassConfiguration section of the serviceDeskConfiguration.xml file. The section includes the ucmdbClassName element for the Incident CIT with a ServiceCenter connector implementation:

```
<ucmdbClassConfiguration ucmdbClassName="it_incident">
      <attributeMappings>
         <attributeMapping ucmdbAttributeName="incident_id"
serviceDeskAttributeName="IncidentID"/>
         <attributeMapping ucmdbAttributeName="incident brief description"
serviceDeskAttributeName="BriefDescription"/>
         <attributeMapping ucmdbAttributeName="incident_category"
serviceDeskAttributeName="Category"/>
         <attributeMapping ucmdbAttributeName="incident severity"
serviceDeskAttributeName="Severity"/>
         <attributeMapping ucmdbAttributeName="incident open time"
serviceDeskAttributeName="OpenTime"/>
         <attributeMapping ucmdbAttributeName="incident_update_time"
serviceDeskAttributeName="UpdatedTime"/>
         <attributeMapping ucmdbAttributeName="incident_close_time"
serviceDeskAttributeName="ClosedTime"/>
         <attributeMapping ucmdbAttributeName="incident status"
serviceDeskAttributeName="IMTicketStatus"/>
       </attributeMappings>
<classConnectorConfiguration>
         <![CDATA] <class configuration
connector class name="com.mercury.topaz.fcmdb.adapters.serviceDeskAdapter.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>
```

Adding an Attribute to a CIT

When adding an attribute to the UCMDB model for a Adaptersupported 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.

Chapter 32 • The HP ServiceCenter/Service Manager Adapter

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:

 $com.mercury.topaz.fcmdb.adapters.serviceDeskAdapter.mapping.impl. \\ HostlpMappingEngine$

The reconciliationClassConfiguration element can contain one of the following elements:

➤ The reconciliationByld 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:

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:

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 subelement of OR element type. The comparison between OR expressions is calculated by these priorities.

For example:

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, & DATA) amp; 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:

You should also change the value of the concreteMappingImplementationClass attribute of the reconciliationClassConfiguration element to:

="com.mercury.topaz.fcmdb.adapters.serviceDeskAdapter.mapping.impl.HostlpMappingEngine"

Global Configuration

The third section of the Adapter configuration file contains the global configuration for the specific connector implementation.

This configuration, globalConnectorConfig, should be wrapped by CDATA if it contains some special XML characters (for example, & replacing &).

The useful fields of the Service Manager globalConnectorConfig element are as follows:

1 The **date_pattern** element contains the date pattern that the Service Manager is working with.

The default is MM/dd/yy HH:mm:ss.

If the date pattern is wrong, an FTQL returns wrong date condition results.

2 The **time_zone** element defines the time zone of Service Manager. The default is the UCMDB server time zone.

To check the Service Manager date pattern and time zone:

- a Service Manager version 7: Access Menu Navigation > System Administration > Base System Configuration > Miscellaneous > System Information Record. Click the Date Info tab.
- **b** ServiceCenter version 6.1: Access Menu Navigation > Utilities > Administration > Information > System Information. Click the Date Info tab.
- **3** The max_query_length element defines the maximal query length in a Service Manager Web service request. The default value is 1000000.
- **4** The **name_space_uri** element defines the name space URI to connect to the Service Manager Web service. The default value is http://servicecenter.peregrine.com/PWS.
- **5** The **web_service_suffix** element defines the Service Manager Web service center URI suffix. The default value is **sc62server/ws**. It is used when the URL is created.

Deploy the Adapter

This section describes a typical deployment of the adapter.

This section includes the following steps:

- **1** "Deploy the ServiceDesk Adapter" on page 829
 - **a** "Extract the Adapter Implementation Files and Deploy the Package" on page 829
 - **b** "Add a ServiceCenter/Service Manager External Data Source" on page 830

- **c** "Configure HP ServiceCenter 6.2" on page 830 (when connecting to HP ServiceCenter)
- **d** "Configure HP Service Manager 7.0" on page 833 (when connecting to HP Service Manager)
- **2** "Add an Attribute to the ServiceCenter/Service Manager CIT" on page 835
 - a "Add an Attribute to the Business Availability Center Model" on page 836
 - **b** "Export Attributes from HP ServiceCenter by Changing the Configuration" on page 837 (when connecting to HP ServiceCenter)
 - **c** "Export Attributes from HP Service Manager by Changing the Configuration" on page 839 (when connecting to HP Service Manager)
 - **d** "Modify the Adapter Configuration File" on page 842
 - **e** "Load the Changes" on page 843

P Deploy the ServiceDesk Adapter

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

This section includes the following steps:

- ➤ "Extract the Adapter Implementation Files and Deploy the Package" on page 829
- ➤ "Add a ServiceCenter/Service Manager External Data Source" on page 830
- ➤ "Configure HP ServiceCenter 6.2" on page 830
- ➤ "Configure HP Service Manager 7.0" on page 833

1 Extract the Adapter Implementation Files and Deploy the Package

- **a** Verify the location of the following folder and file:
 - ➤ ServiceDeskAdapter
 - ➤ serviceDeskAdapter.zip

- **b** Move the **serviceDeskAdapter.zip** package to the following directory: <**HP Business Availability Center root directory>\mam_lib\packages**.
- C Deploy the serviceDeskAdapter.zip package: Log in to Business
 Availability Center and access the Package Manager (Admin > Universal
 CMDB > Settings > Package Manager). Select the package and click the
 Deploy button.
 - For details on deploying packages, see "Deploy a Package" on page 498.
- d Move the ServiceDeskAdapter folder to the following directory:
 <HP Business Availability Center root directory>\fcmdb\CodeBase

2 Add a ServiceCenter/Service Manager External Data Source

In this step, you add an external data store.

a In Business Availability Center, access the Federated CMDB window:
 Admin > Universal CMDB > Settings > Federated CMDB.



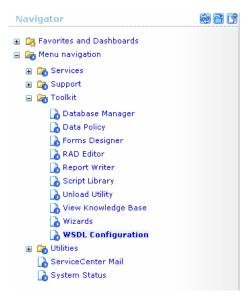
- **b** Click the button to add a data store. In the Data Store dialog box that opens, choose the **ServiceDeskAdapter** and fill in the mandatory fields. For help with this dialog box, see "Data Stores Tab" on page 767.
- **c** Continue to "Configure HP ServiceCenter 6.2" on page 830 or "Configure HP Service Manager 7.0" on page 833.

3 Configure HP ServiceCenter 6.2

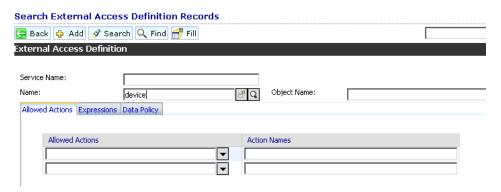
If you are connecting to HP ServiceCenter, perform the following procedure.

a Open HP ServiceCenter, then the ServiceCenter client.

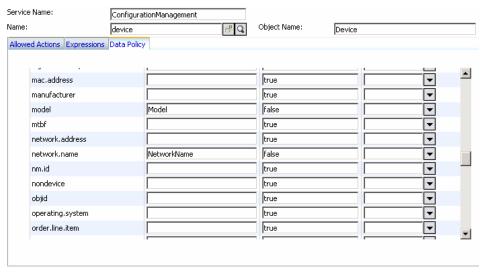
b Display WSDL Configuration in the Navigator (Main Menu > Menu navigation > Toolkit):



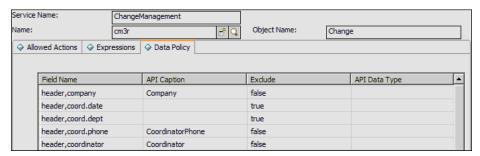
c In the Name field, enter **device** and press **Enter**:



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



- **e** After saving, click the **Cancel** button.
- **f** In the Object Name field type **Change** and press **Enter**.
- **g** Select the Data Policy tab and ensure that:
 - ➤ The header,coordinator attribute is not empty (its value should be Coordinator). Change the value to false.



- ➤ The header,orig.operator attribute is not empty (its value should be OpenedBy). Change the value to false.
- **h** Save the changes.

i Restart ServiceCenter: Select Start > Programs > ServiceCenter 6.2 > Server > Console to open the ServiceCenter Console.



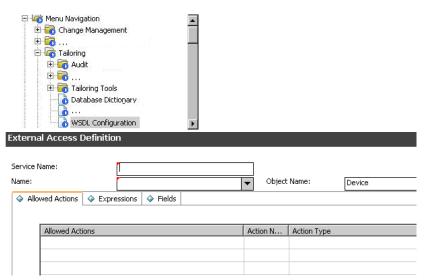
- **j** Click **Stop** and then **Start**.
- **k** Continue to "Add an Attribute to the Business Availability Center Model" on page 836.

4 Configure HP Service Manager 7.0

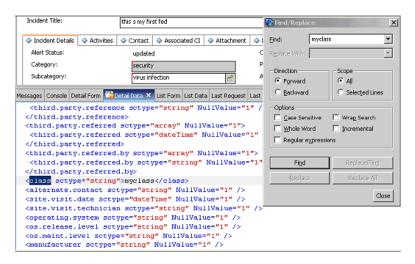
If you are connecting to HP Service Manager, perform the below procedure.

- **a** Import the **SCR41399_SM70.unl** unload file. To do so, in Service Manager, click **Menu Navigation** > **Tailoring** > **Database Manager**.
 - ➤ Right-click the detail button and select Import/Load.
 - ➤ In the HP Service Manager File Load/Import, click **Specify File** and locate the **SCR41399_SM70.unl** unload file on the Service Manager DVD. The file is loaded via the file browser.
 - ➤ Enter the description in the **Import Description** box.
 - ➤ Select winnt in the File Type list.
 - ➤ Select a display option.
 - ➤ Click **Load FG** to start loading.
- **b** Open the HP Service Manager client.

c Display **WSDL Configuration** in the Navigator (**Main Menu > Menu navigation > Tailoring**) and in the Object Name field:



➤ Enter **Device** and press ENTER. Click 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.



- ➤ Enter **Change** and press ENTER. Click the **Fields** tab and ensure that the header,orig.operator attribute appears in the **Field** list with OpenedBy as its caption and the header,coordinator attribute appears in the **Field** list with Coordinator as its caption. If this attribute does not appear in the Field list, add it and save your changes.
- ➤ Enter **Problem** and press ENTER. Click the **Fields** tab and ensure that the status attribute appears in the **Field** list with Status as its caption and the affected.ci(ci.device.name) attribute appears in the **Field** list with CiDeviceName as its caption. If this attribute does not appear in the Field list, add it and save your changes.
- **d** After saving, click the **Cancel** button.
- **e** Continue to "Add an Attribute to the Business Availability Center Model" on page 836.

** 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.

This section includes the following steps:

- ➤ "Add an Attribute to the Business Availability Center Model" on page 836
- ➤ "Export Attributes from HP ServiceCenter by Changing the Configuration" on page 837

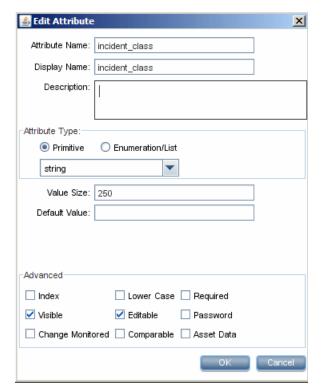
Chapter 32 • The HP ServiceCenter/Service Manager Adapter

- ➤ "Export Attributes from HP Service Manager by Changing the Configuration" on page 839
- ➤ "Modify the Adapter Configuration File" on page 842
- ➤ "Load the Changes" on page 843

1 Add an Attribute to the Business Availability Center Model

a Add the new attribute to Business Availability Center: Edit the Incident CIT: Select Admin > Universal CMDB > Modeling > CI Type Manager. In View Explorer, select IT Process > IT Incident.





b Select the Attribute tab and add the new attribute:

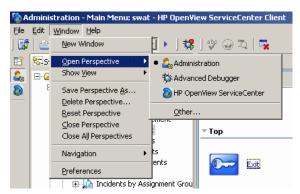
c Continue to "Export Attributes from HP ServiceCenter by Changing the Configuration" on page 837 or "Export Attributes from HP Service Manager by Changing the Configuration" on page 839.

2 Export Attributes from HP ServiceCenter by Changing the Configuration

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

a In HP ServiceCenter, open the ServiceCenter client.

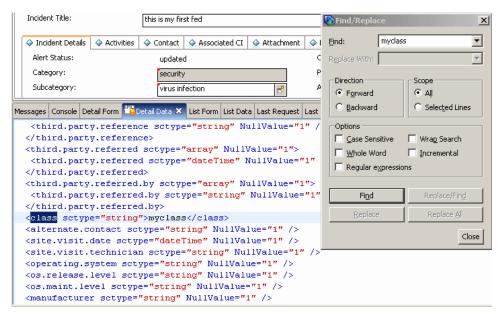
b Select Window > Open Perspective > Administration:



c Select **Incident Management > All Open Incidents**, and select one of the incidents you created.

Note: Verify that the value in the Class field is the one that you want to report to Business Availability Center.

d Search for the value you entered in the Class field (that is, **myclass**), in the XML file displayed below. This is the CI name in ServiceCenter.

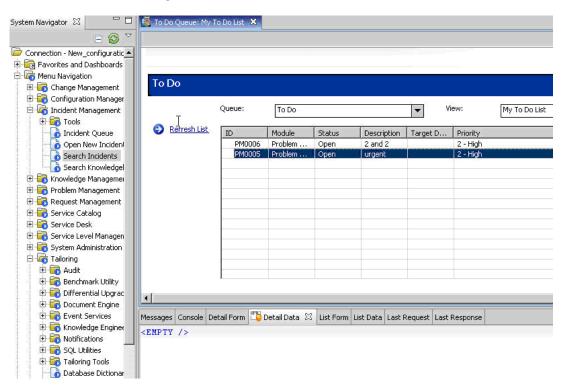


- Display WSDL Configuration in the Navigator (Main Menu > Menu navigation > Toolkit). Locate the Object Name field, enter Incident and press Enter.
- **f** Select the **Data Policy** tab. Enter a name for the CI mentioned in the XML file (that is, **class**). Change the value to **false**. Save your changes.
- **g** Restart ServiceCenter: Select **Start** > **Programs** > **ServiceCenter 6.2** > **Server** > **Console** to open the ServiceCenter Console.
- **h** Click **Stop** and then **Start**.
- i Continue to "Modify the Adapter Configuration File" on page 842.

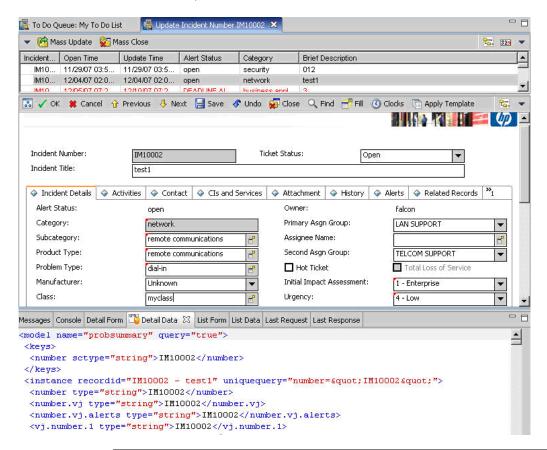
3 Export Attributes from HP Service Manager by Changing the Configuration

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

a In the HP Service Manager client, restore the bottom right pane by clicking the **Restore** button. Click the **Detail Data** tab.

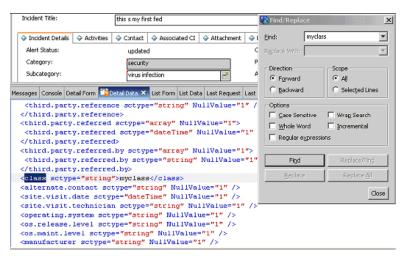


b Open one of the incidents you created: Select **Incident Management** > **Search Incidents**. Click the search button (you can filter the fields to limit the search).



Note: Verify that the value in the Class field is the one that you want to report to Business Availability Center.

c Search for the value you entered in the Class field (that is, **myclass**), in the XML file displayed below. This is the CI name in Service Manager.



- **d** Display **WSDL Configuration** in the Navigator (**Main Menu > Menu Navigation > Tailoring**). Locate the Object Name field, enter **Incident** and press ENTER.
- e Select the Data Policy tab.
- **f** Select the **Fields** tab and ensure that the CI name mentioned in the XML file (that is, **class**) appears in the Field list with **ClassName** as its caption. If this attribute does not appear in the Field list, add it and save your changes.
- **g** Restart the HP Service Manager 7.00 Server service.
- **h** Continue to "Modify the Adapter Configuration File" on page 842.

4 Modify the Adapter Configuration File

Perform this procedure for all configurations.

a Edit the ServiceDeskConfiguration.xml file in <HP Business Availability Center root directory>\fcmdb\CodeBase \ServiceDeskAdapter **b** Add the new attribute line under the Incident area: Locate the following marker:

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

c Add the following line:

```
<attributeMapping ucmdbAttributeName="incident_class" ServiceDeskAttributeName="ClassName"/>
```

where:

- ucmdbAttributeName="incident_class" is the value defined in the CI
 Type Manager
- ➤ ServiceDeskAttributeName="ClassName" is the valued defined in ServiceCenter/Service Manager
- **d** Continue to "Load the Changes" on page 843.

5 Load the Changes

Perform this procedure to load changes.

a Launch the Web browser and enter the following address:

http://<machine name or IP address>:8080/jmx-console/

where <machine name or IP address> is the machine on which Business Availability Center is installed.

Note: In the case of a distributed deployment, the machine name is the machine on which the Data Processing server is installed.

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

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

33

The Generic Database Adapter

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

This chapter includes:

Concepts

- ➤ Database Adapter Overview on page 846
- ➤ Non-supported TQL Queries on page 846
- ➤ Reconciliation on page 847
- ➤ Hibernate as JPA Provider on page 850

Tasks

- ➤ Deploy a Database Adapter Minimal Method on page 852
- ➤ Deploy a Database Adapter Advanced Method on page 859

Reference

- ➤ The Federated Database Configuration Files on page 884
- ➤ The adapter.conf File on page 885
- ➤ The simplifiedConfiguration.xml File on page 885
- ➤ The orm.xml File on page 893
- ➤ The reconciliation_rules.txt File on page 897
- ➤ The transformations.txt File on page 898
- ➤ The persistence.xml File on page 899
- ➤ The discriminator.properties File on page 901
- ➤ The replication_config.txt File on page 902

Chapter 33 • The Generic Database Adapter

- ➤ The fixed_values.txt File on page 902
- ➤ Out of the Box Converters on page 902
- ➤ Plugins on page 906
- ➤ Configuration Examples on page 906
- ➤ Federated Database Log Files on page 919
- ➤ External References on page 921

Troubleshooting and Limitations on page 921

\lambda Database Adapter – Overview

The purpose of this adapter is to enable integration with any kind of relational database management system (RDBMS) and to run a federated TQL query and replication jobs 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 persistence provider.

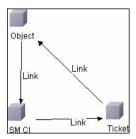
The databases supported by the generic database adapter are Oracle, Microsoft SQL Server, and MySQL.

Non-supported TQL Queries

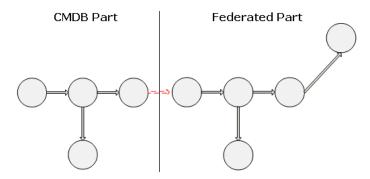
The following limitations exist on the federated CMDB only:

- ➤ subgraphs are not supported
- > compound relationships are not supported
- ➤ cycles or cycle parts are not supported

The following TQL is an example of a cycle:



- ➤ Function layout is not supported.
- ➤ 0..0 cardinality is not supported.
- ➤ The Joinf relationship is not supported.
- ➤ Qualifier conditions are not supported.
- ➤ To connect between two CIs, a relationship in the form of a table or foreign key must exist in the external database source.



Reconciliation

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

Mapping. Each attribute in the UCMDB is mapped to a column in the data source.

Although mapping is done directly, transformation functions on the mapping data are also supported. You can add new functions through the Java code (for example, lowercase, uppercase). The purpose of these functions is to enable value conversions (values that are stored in the CMDB in one format and in the federated database in another format).

Note:

- ➤ To connect the UCMDB and external database source, an appropriate association must exist in the database. For details, see "Prerequisites" on page 860.
- ➤ Reconciliation with CMDB id is also supported.

Reconciliation rules take the form of OR and AND conditions. You can define these rules on several different nodes (for example, host is identified by host name from host AND/OR ip address from ip).

The following options find a match:

- ➤ Ordered match. The reconciliation expression is read from left to right. Two OR sub-expressions are considered equal if they have values and they are equal. Two OR sub-expressions are considered not equal if both have values and they are not equal. For any other case there is no decision, and the next OR sub-expression is tested for equality.
 - host_name OR ip_address. If both the UCMDB and the data source include host_name and they are equal, the hosts are considered as equal. If both have host_name but they are not equal, the hosts are considered not equal without testing the ip_address. If either the UCMDB or the data source is missing host name, the ip_address is checked.
- ➤ **Regular match.** If there is equality in one of the OR sub-expressions, the UCMDB and the data source are considered equal.
 - **host_name OR ip_address.** If there is no match on host_name, ip_address is checked for equality.

For complex reconciliations, where the reconciliation entity is modeled in the class model as several CITs with relationships (such as host), the mapping of a superset node includes all relevant attributes from all modeled CITs.

Note: As a result, there is a limitation that all reconciliation attributes in the data source should reside in tables that share the same primary key.

Another limitation states that the reconciliation TQL should have no more than two nodes. For example, the host > ticket TQL has a host in the UCMDB and a ticket in the data source.

To reconcile the results, host_name must be retrieved from the host and/or ip_address must be retrieved from the IP address. A new mapping is made from this federated multinode host towards the database host table and from the ticket to the database ticket. In this case, the multinode is the superset of all attributes needed for reconciliation (host_name + ip_address).

If the host_name in the CMDB is in the format of *.m.com, a converter can be used from CMDB to the federated database, and vice versa, to convert these values.

The host_id column in the database ticket table is used to connect between the two entities (the defined association can also be made in a host table):

| DB Host | |
|------------|-------------------------------|
| PK host_id | |
| | ex_host_name ex_ip_address |

| DB Ticket | |
|-----------|-----------|
| PK | ticket_id |
| | host_id |

Note: Both tables must be part of the federated RDBMS source and not the CMDB database.

Hibernate as JPA Provider

Hibernate is an object-relational (OR) mapping tool, which enables mapping Java classes to tables over several types of relational databases (for example, Oracle and Microsoft SQL Server). For details, see "Functional Limitations" on page 922.

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 851.

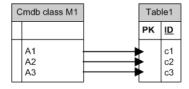
For our purposes, there is no need to create Java classes. The mapping is defined from the CMDB class model CITs to the database tables.

Examples of Object-Relational Mapping

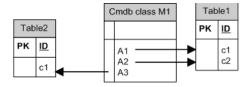
The following examples describe object-relational mapping:

Example of 1 CMDB class mapped to 1 database table

Class M1, with attributes A1, A2, and A3, is mapped to table 1 columns c1, c2, and c3. This means that any M1 instance has a matching raw in table 1.

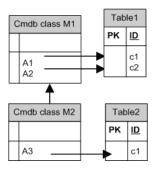


Example of 1 CMDB class mapped to 2 database tables



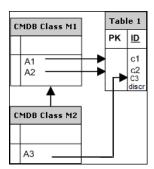
Example of inheritance

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



Example of single table inheritance with discriminator

An entire hierarchy of classes is mapped to a single database table, whose columns comprise a super-set of all attributes of the mapped classes. The table also contains an additional column (Discriminator), whose value indicates which specific class should be mapped to this entry.



Associations

There are three types of associations: one-to-many, many-to-one and many-to-many. To connect between the different database objects, one of these associations must be defined by using a foreign key column (for the one-to-many case) or a mapping table (for the many-to-many case).

Usability

As the JPA schema is very extensive, a streamlined XML file is provided to ease definitions.

Chapter 33 • The Generic Database Adapter

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

🦒 Deploy a Database Adapter – Minimal Method

Note: When building an adapter for the first time, you should use this method. The **orm.xml** file that is automatically generated as a result of running this method is a good example that you can use when working later with the advanced method.

The following procedure describes a method of mapping the class model in the UCMDB to an RDBMS. You would use this minimal method when you need to:

- ➤ Federate a single node such as a host attribute.
- ➤ Demonstrate the Generic Database Adapter capabilities.

This method:

- ➤ supports one-node federation only
- ➤ supports many-to-one relationships only

This task includes the following steps:

- ➤ "Prerequisites" on page 853
- ➤ "Extract the Database Adapter Configuration File" on page 853
- ➤ "Deploy the Adapter Package" on page 853
- ➤ "Deploy the Adapter" on page 853
- ➤ "Create a CI Type" on page 853
- ➤ "Create the Relationships" on page 853
- ➤ "Configure the adapter.conf File" on page 854
- ➤ "Configure the simplifiedConfiguration.xml File" on page 854
- ➤ "Continue with the Procedure" on page 858

1 Prerequisites

For details, see Prerequisites in "Deploy a Database Adapter – Advanced Method" on page 859.

2 Extract the Database Adapter Configuration File

For details, see "Extract the Database Adapter Configuration File" on page 863.

3 Deploy the Adapter Package

For details, see "Deploy the Adapter Package" on page 866.

4 Deploy the Adapter

For details, see "Deploy the Adapter" on page 867.

5 Create a CI Type

For details, see "Create a CI Type" on page 869.

6 Create the Relationships

For details, see "Create the Relationships" on page 871.

7 Configure the adapter.conf File

In this step, you change the settings in the adapter.conf file so that the data is federated automatically.

- **a** Open the following file in a text editor: <**HP Business Availability Center** root directory>\fcmdb\Codebase\MyAdapter\META-INF\adapter.conf.
- **b** Locate the following line: use.simplified.xml.config=<true/false>.
- c Change to use.simplified.xml.config=true.

8 Configure the simplifiedConfiguration.xml File

In this step you configure the simplifiedConfiguration.xml file by mapping between the CIT in the UCMDB and the fields in the RDBMS table.

a Open the following file in a text editor: <**HP Business Availability Center** root directory>\fcmdb\Codebase\MyAdapter\META-INF\ simplifiedConfiguration.xml.

b This file includes a template that you use for each entity to be mapped:

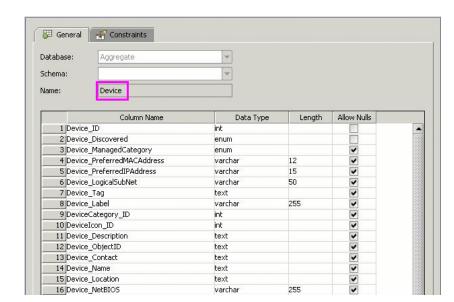
```
<cmdb-class cmdb-class-name="host" default-table-name="[table_name]">
    <primary-key column-name="[column_name]"/>
    <reconciliation-by-two-nodes connected-node-cmdb-class-name="ip" cmdb-
link-type="contained">
        <or is-ordered="true">
            <attribute cmdb-attribute-name="host hostname" column-
name="[column name]" ignore-case="true"/>
            <connected-node-attribute cmdb-attribute-name="ip address"</pre>
column-name="[column name]"/>
        </or>
    </reconciliation-by-two-nodes>
</cmdb-class>
<class cmdb-class-name="[cmdb class name]" default-table-
name="[default_table_name]" connected-cmdb-class-name="host" link-class-
name="container f">
    <foreign-primary-key column-name="[column name]" cmdb-class-primary-key-
column="[column name]"/>
    <primary-key column-name="[column name]"/>
    <attribute cmdb-attribute-name="[cmdb attribute name]" column-
name="[column name]" from-cmdb-
converter="com.mercury.topaz.fcmdb.adapters.dbAdapter.dal.transform.impl.Generi
cEnumTransformer(generic-enum-transformer-example.xml)" to-cmdb-
converter="com.mercury.topaz.fcmdb.adapters.dbAdapter.dal.transform.impl.Generi
cEnumTransformer(generic-enum-transformer-example.xml)"/>
    <attribute cmdb-attribute-name="[cmdb attribute name]" column-
name="[column name]"/>
    <attribute cmdb-attribute-name="[cmdb attribute name]" column-
name="[column name]"/>
</class>
```

- **c** Make changes to the attributes as follows:
 - ➤ The CIT name in Universal CMDB (cmdb-class-name) and the corresponding table name in the RDBMS (default-table-name):

```
<cmdb-class cmdb-class-name="host" default-table-name="Device">
```

The cmdb-class-name attribute is taken from the host CIT:





The default-table-name attribute is taken from the Device table:

➤ The unique identifier in the RDBMS:

primary-key column-name="Device_ID"/>

➤ The reconciliation rule (reconciliation-by-two-nodes):

<reconciliation-by-two-nodes connected-node-cmdb-class-name="ip" cmdb-link-type="contained">

➤ The reconciliation attribute in Universal CMDB (cmdb-attribute-name) and in the RDBMS (column-name):

<connected-node-attribute cmdb-attribute-name="ip_address" columnname="[column_name]"/> ➤ The name of the CIT (cmdb-class-name) and the name of the corresponding table in the RDBMS (default-table-name). Also the CMDB relationship (connected-cmdb-class-name) and the CIT relationship (link-class-name):

```
<class cmdb-class-name="sw_sub_component" default-table-
name="SWSubComponent" connected-cmdb-class-name="host" link-class-
name="container_f">
```

➤ The primary key and the foreign key:

```
<foreign-primary-key column-name="Device_ID" cmdb-class-primary-key-column="Device_ID"/>
```

➤ The unique identifier in the RDBMS:

➤ The mapping between the Universal CMDB attribute (cmdb-attribute-name) and the column name in the RDBMS (column-name):

```
<attribute cmdb-attribute-name="last_access_time" column-
name="SWSubComponent_LastAccess TimeStamp"/>
```

d Save the file.

9 Continue with the Procedure

For the rest of the procedure, see the following sections:

- ➤ "Load the Adapter" on page 878
- ➤ "Create a Data Store" on page 879
- ➤ "Create a View" on page 879
- ➤ "Calculate the Results" on page 881
- ➤ "View Results" on page 881
- ➤ "View Reports" on page 883
- ➤ "Enable Log Files" on page 883

🚏 Deploy a Database Adapter – Advanced Method

The following procedure describes the complete method of mapping the class model in the UCMDB to tables in an RDBMS.

This task includes the following steps:

- ➤ "Prerequisites" on page 860
- ➤ "Extract the Database Adapter Configuration File" on page 863
- ➤ "Deploy the Adapter Package" on page 866
- ➤ "Deploy the Adapter" on page 867
- ➤ "Create a CI Type" on page 869
- ➤ "Create the Relationships" on page 871
- ➤ "Configure the orm.xml File" on page 873
- ➤ "Map the Relationships" on page 875
- ➤ "Configure the reconciliation_rules.txt File" on page 878
- ➤ "Load the Adapter" on page 878
- ➤ "Create a Data Store" on page 879
- ➤ "Create a View" on page 879
- ➤ "Calculate the Results" on page 881
- ➤ "View Results" on page 881
- ➤ "View Reports" on page 883
- ➤ "Enable Log Files" on page 883

1 Prerequisites

To validate that you can use the database adapter with your database, check the following:

➤ The reconciliation classes and their attributes (also known as multinodes) exist in the database. For example, if the reconciliation is run by host name, verify that there is a table that contains a column with host names. If the reconciliation is run according to host cmdb_id, verify that there is a column with CMDB IDs that matches the CMDB IDs of the hosts in the CMDB. For details on reconciliation, see "Reconciliation" on page 847.

| ID | HOST_NAME | IP_ADDRESS |
|-----|----------------------|--------------|
| 31 | BABA | 16.59.33.60 |
| 33 | ext3.devlab.ad | 16.59.59.116 |
| 46 | LABM1MAM15 | 16.59.58.188 |
| 72 | cert-3-j2ee | 16.59.57.100 |
| 102 | labm1sun03.devlab.ad | 16.59.58.45 |
| 114 | LABM2PCOE73 | 16.59.66.79 |
| 116 | CUT | 16.59.41.214 |
| 117 | labm1hp4.devlab.ad | 16.59.60.182 |

➤ To correlate two CITs with a relationship, there must be correlation data between the CIT tables. The correlation can be either by a foreign key column or by a mapping table. For example, to correlate between host and ticket, there must be a column in the ticket table that contains the host ID, a column in the host table with the ticket ID that is connected to it, or a mapping table whose end1 is the host ID and end2 is the ticket ID. For details on correlation data, see "Hibernate as JPA Provider" on page 850.

| The following | table shows | the foreign l | 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.

Chapter 33 • The Generic Database Adapter

In the following example, the tables share the same primary key called ${\sf CARD_ID}:$

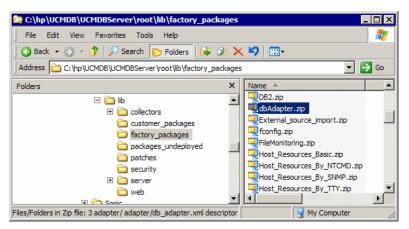
| CARD_ID | CARD_TYPE | CARD_NAME |
|---------|---------------------------|--|
| 1 | Serial Bus Controller | Intel ® 82801EB USB Universal Host Controller |
| 2 | System | Intel ® 631xESB/6321ESB/3100 Chipset LPC |
| 3 | Display | ATI ES1000 |
| 4 | Base System Peripheral | HP ProLiant iLO 2 Legacy Support Function |

| CARD_ID | CARD_VENDOR |
|---------|--------------------------------|
| 1 | Hewlett-Packard Company |
| 2 | (Standard USB Host Controller) |
| 3 | Hewlett-Packard Company |
| 4 | (Standard system devices) |
| 5 | Hewlett-Packard Company |

2 Extract the Database Adapter Configuration File

In this step, you locate the generic database adapter package and make a copy of it.

a Locate the **dbAdapter** package in **<HP Business Availability Center root directory>\mam_lib\factory_packages**.



b Extract the package to a local temporary directory:



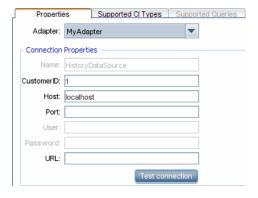
c Open the **adapter\db_adapter.xml** file in a text editor.

This file includes the fields that are needed to connect to the data store. You can use this file as a template (recommended) or you can create a new XML file from scratch.

d Locate the **adapter-id** attribute and replace the name:

```
<adapter-config adapter-id="MyAdapter">
     <class-name>com.mercury.topaz.fcmdb.adapters.dbAdapter.DBAdapter
</class-name>
         <adapter-capabilities>
             <support-federated-query>
                 <supported-classes>
                 </supported-classes>
                     <topology>
                         <pattern-topology>
                         </pattern-topology>
                     </topology>
             </support-federated-query>
         </adapter-capabilities>
         <fields-to-connect>
             <field>host</field>
             <field>customerId</field>
             <field>port</field>
             <field>url</field>
         </fields-to-connect>
         <default-mapping-engine>
com.mercury.topaz.fcmdb.adapters.dbAdapter.reconciliation.mapping engine.
DBMappingEngine</default-mapping-engine>
</adapter-config>
```

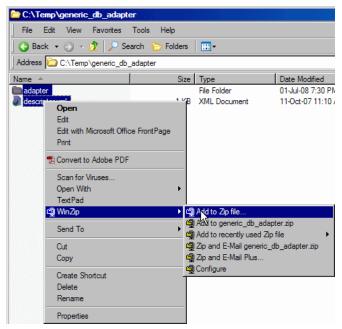
There are no restrictions on the name, such as case or special characters. The name you enter here appears in the list of adapters in the Data Stores pane in HP Business Availability Center:



For details, see "Data Stores Tab" on page 767.

Important: For consistency's sake and for ease of use, use this name when saving the file and when defining the adapter.

e Create a *.zip file:



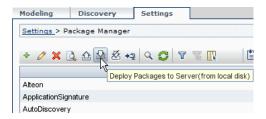
f Give the zip file the same name as you gave to the **attribute-id** attribute, as described in step d on page 864.

Note: The descriptor xml file is a default file that exists in every package.

3 Deploy the Adapter Package

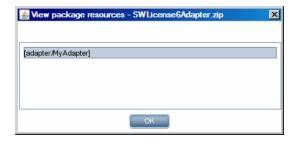
In this step you deploy the package in Package Manager.

- a Save the new package that you created in the previous step in the following folder: <HP Business Availability Center root directory> \mam_lib\customer_packages.
- **b** In HP Business Availability Center, access Package Manager. For details, see "Package Manager Window" on page 511.
- **c** Deploy the adapter: click the **Deploy Packages to Server** icon:



Click **Add** and browse to your adapter package. Click **Open** then **OK** to display the package in the Package Manager.

d Verify that the XML file contents is recognized by Package Manager: select your package in the list and click **View package resources**.

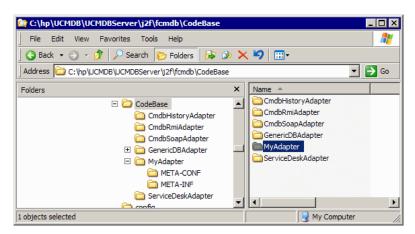


The package contains the adapter XML file only.

4 Deploy the Adapter

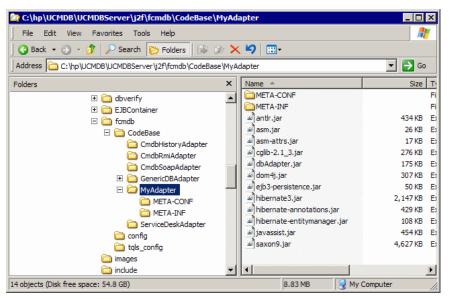
In this step, you create the connection between the logic and the definition of the adapter.

a Copy the generic database adapter folder under the <**HP Business**Availability Center root directory>\fcmdb\Codebase folder and rename it to the name of your adapter (the same name that you gave to the adapter-id field you changed in step d on page 864):

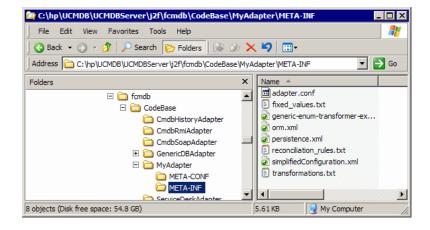


Chapter 33 • The Generic Database Adapter

This folder contains the jar files that execute the federation logic, for example, the adapter name, the queries and classes in Universal CMDB and the fields in the RDBMS that the adapter supports.



b Open the new adapter folder and drill down to the META-INF folder:



This folder contains the files that run the adapter. The **orm.xml** file maps the Universal CMDB class model to the actual columns and tables in the RDBMS.

5 Create a CI Type

In this step you create a federated CIT that is to be mapped to data in the RDBMS (the external data source).

- **a** In HP Business Availability Center, access the CI Type Manager and create a new CI Type. For details, see "Create a CI Type" on page 265.
- **b** Add the necessary attributes to the CIT, such as last access time, vendor, and so on. These are the attributes that the adapter will retrieve from the external data source and bring into HP Business Availability Center views.

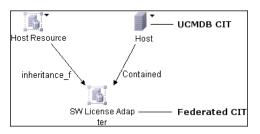
Example of creating a host_card CIT

```
<?xml version="1.0" encoding="UTF-8"?>
<Class class-name="host_card" display-name="Host Card" description="">
<Class-Qualifiers/>
<Class-Type>OBJECT</Class-Type>
<Derived-From class-name="hostresource"/>
<Attributes>
     <a href="Attribute name="card class" display-name="Card Class" description=""</a>
type="string">
         <Attribute-Qualifiers/>
     </Attribute>
     <a href="Attribute name="card vendor" display-name="Card Vendor" description=""</a>
type="string">
         <Attribute-Qualifiers/>
     </Attribute>
     <a href="Attribute name="card">Attribute name="card</a> name" display-name="Card Name" description=""
type="string">
         <Attribute-Qualifiers/>
     </Attribute>
</Attributes>
<Attribute-Overrides>
     <a href="Attribute-Override"></a> name="display label" is-partially-override="true">
         <Attribute-Qualifiers>
              <a href="Attribute-Qualifier name="CALCULATED_ATTRIBUTE">
                  <Data-Items>
                       <Data-Item name="FUNCTION"</pre>
type="string">card name</Data-Item>
                  </Data-Items>
              </Attribute-Qualifier>
         </Attribute-Qualifiers>
     </Attribute-Override>
</Attribute-Overrides>
</Class>
```

6 Create the Relationships

In this step you add a relationship between the HP Business Availability Center CIT and the new CIT that represents the data to be federated from the external data source.

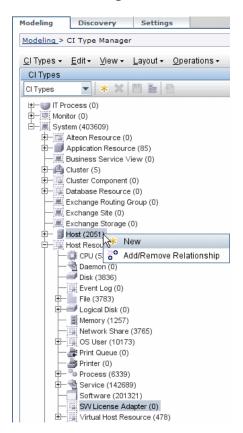
Add appropriate, valid relationships to the new CIT. For details, see "Add/Remove Relationship Dialog Box" on page 276.

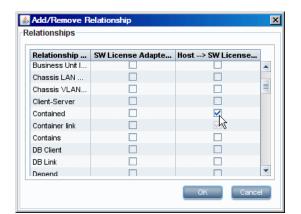


Note: At this stage, you cannot yet view the federated data, as you have not yet defined the method for bringing in the data.

Example of creating a Contained relationship

a In the CIT Manager, select the two CITs:





b Create a **Contained** relationship between the two CITs:

Example of Contained Relationship between host_card and host

7 Configure the orm.xml File

In this step, you map the CITs in the Universal CMDB to the tables in the RDBMS.

Tip: We recommend that when building an adapter for the first time, you use the simplified method. The **orm.xml** file that is automatically generated as a result of running that method is a good example that you can use now when working with the advanced method. For details, see "Deploy a Database Adapter – Minimal Method" on page 852.

- **a** Open **orm.xml** in an XML or text editor. This file, by default, contains a template that you use to map as many CITs and tables as needed for the federation.
- **b** Make changes to the file according to the data entities to be mapped. For details, see the following example.

For details of naming conventions, see "Naming Conventions" on page 897.

Example of Entity Mapping Between the Class Model and the RDBMS

Note: Attributes that do not have to be configured are omitted from the following examples.

➤ The name and class of the Universal CMDB CIT.

```
<entity name="host" class="generic_db_adapter.host">
```

➤ The name of the table in the RDBMS.

➤ The column name of the unique identifier in the RDBMS table.

```
<column name="Device ID"/>
```

➤ The name of the attribute in the Universal CMDB CIT.

```
<basic name="host hostname">
```

➤ The name of the table field in the external data source.

```
<column name="Device Name"/>
```

➤ The name of the new CIT you created in "Create a CI Type" on page 869.

```
<entity name="MyAdapter" class="generic_db_adapter.MyAdapter">
```

➤ The name of the corresponding table in the RDBMS.

➤ The two primary key nodes.

```
<id class="generic_db_adapter.IDClass2PK_SW_Adapter">
```

➤ The unique identity in the RDBMS.

➤ The attribute name in the Universal CMDB CIT and the name of the corresponding attribute in the RDBMS:

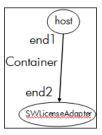
```
<basic name="license_required">
        <column updatable="false" insertable="false"
name="MyAdapter_LicenseRequired"/>
```

8 Map the Relationships

In this step you map relationships in Universal CMDB to the relationships in the RDBMS. For details on relationships, see "Example of Relationship Mapping Between the Class Model and the RDBMS" on page 877.

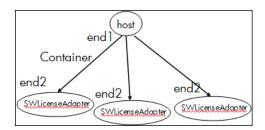
You make changes to the orm.xml file according to the relationships to be mapped. You define the same relationships in Universal CMDB as exist in the RDBMS, according to the use case. The following relationships can be mapped:

➤ One to one:



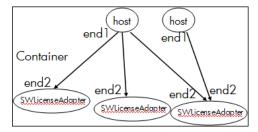
The code for this type of relationship is:

➤ Many to one:



The code for this type of relationship is:

➤ Many to many:



The code for this type of relationship is:

```
<many-to-one name="end1" target-entity="host">
    <join-column name="Device_ID" />
</many-to-one>
<many-to-one name="end2" target-entity="sw_sub_component">
    <join-column name="Device_ID" />
    <join-column name="Version_ID" />
</many-to-one>
```

Example of Relationship Mapping Between the Class Model and the RDBMS

➤ The name and class of the Universal CMDB relationship:

```
<entity name="host_contained_MyAdapter"
class="generic_db_adapter.host_contained_MyAdapter">
```

➤ The name of the RDBMS table where the relationship is performed.

➤ The unique ID in the RDBMS:

➤ The relationship type and the Universal CMDB CIT:

```
<many-to-one target-entity="host" name="end1">
```

➤ The primary key and foreign key fields in the RDBMS:

```
<join-column updatable="false" insertable="false" referenced-column-
name="[column name]" name="Device ID"/>
```

9 Configure the reconciliation_rules.txt File

In this step you define the rules by which the adapter reconciles the Universal CMDB and the RDBMS.

- **a** Open META-INF\reconciliation_rules.text in a text editor.
- **b** Make changes to the file according to the CIT you are mapping. For example, to map a host CIT, use the following expression:

multinode[host] ordered expression[^host hostname]

Note:

- ➤ If the data in the database is case sensitive, do not delete the control character (^).
- ➤ Check that each opening square bracket has a matching closing bracket.

10 Load the Adapter

In this step you load the adapter onto the HP Business Availability Center machine.

Note: Every time you make a change to the adapter, you must redeploy it using the JMX console.

a On the HP Business Availability Center server machine, launch the Web browser and enter the following address:

http://<machine name or IP address>.<domain name>:8080/jmx-console

where <machine name or IP address> is the machine on which HP Business Availability Center is installed. You may have to log in with the user name and password.

- **b** Click the **service=Fcmdb Config Services** link under the Topaz section.
- **c** In the JMX MBEAN View page, locate the **loadOrReloadCodeBaseForAdaptorId()** operation.
- **d** In the customerID field, enter 1.
- **e** In the adaptorId field, enter **MyAdapter**. (This is the name you gave to the adapter.)
- f Click Invoke.

11 Create a Data Store

In this step you check that the federation is working, that is, that the connection is valid and that the XML file is valid. However, this check does not verify that the XML is mapping to the correct fields in the RDBMS.

- **a** In HP Business Availability Center access the Federated CMDB page (Settings > Federated CMDB).
- **b** Create a data source. For details, see "Data Stores Tab" on page 767. The Data Store dialog box displays all CITs that support federation.

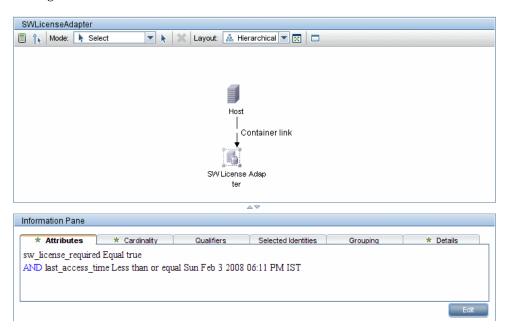
12 Create a View

In this step you create a view that enables you to view instances of the CIT.

- a In HP Business Availability Center access the View Manager (Admin > Universal CMDB > Modeling > View Manager).
- **b** Create a view. For details, see "Create a Template Based View" on page 196.

Chapter 33 • The Generic Database Adapter

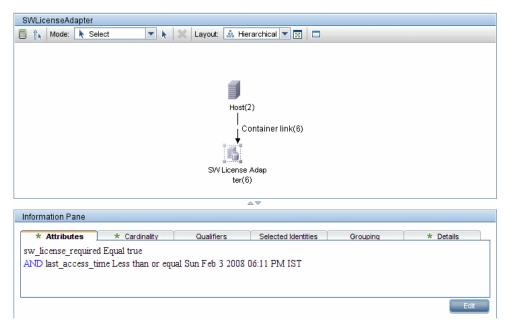
c You can add conditions to the TQL, for example, the last access time is greater than six months:



13 Calculate the Results

In this step you check the results.

a From the View Manager calculate results: click the Calculate TQL result count button.



b Click the **Preview** button to view the CIs in the CIT.

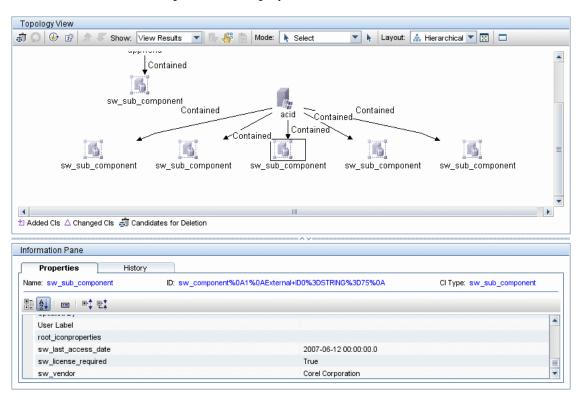
14 View Results

In this step you view the results and debug problems in the procedure. For example, if nothing is shown in the view, check the definitions in the orm.xml file; remove the relationship attributes and reload the adapter.

a In HP Business Availability Center access the Topology View (Universal CMDB > Application > Topology View).

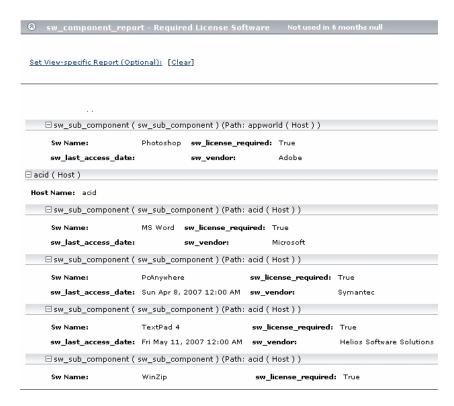
Chapter 33 • The Generic Database Adapter

b The Properties tab displays the results of the federation:



15 View Reports

In this step you view Topology reports. For details, see Chapter 25, "Topology Report."



16 Enable Log Files

To understand the calculation flows, adapter lifecycle, and to view debug information, you can consult the log files. For details, see "Federated Database Log Files" on page 919.

The Federated Database Configuration Files

The files discussed in this section are located under the <**HP Business**Availability Center root directory>\fcmdb\CodeBase\GenericDBAdapter

\META-INF folder.

This section includes the following topics:

- ➤ "General Configuration" on page 884
- ➤ "Advanced Configuration" on page 884
- ➤ "Hibernate Configuration" on page 884
- ➤ "Simple Configuration" on page 885

General Configuration

➤ adapter.conf. The adapter configuration file. For details, see "The adapter.conf File" on page 885.

Advanced Configuration

- ➤ orm.xml. The object-relational mapping file in which you map between CMDB CITs and database tables. For details, see "The orm.xml File" on page 893.
- ➤ reconciliation_rules.txt. Contains the reconciliation rules. For details, see "The reconciliation rules.txt File" on page 897.
- ➤ 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 898.

Hibernate Configuration

➤ persistence.xml. Used to override out of the box Hibernate configurations. For details, see "The persistence.xml File" on page 899.

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 885.

🖎 The adapter.conf File

This file contains the following settings:

➤ use.simplified.xml.config=false. true: uses simplifiedConfiguration.xml.

Note: Usage of this file means that orm.xml, transformations.txt, and reconciliation_rules.txt are replaced with less capabilities.

- ➤ dal.ids.chunk.size=300. Do not change this value.
- ➤ dal.use.persistence.xml=false. true: the adapter reads the Hibernate configuration from persistence.xml.

Note: It is not recommended to override the Hibernate configuration.

🍳 The simplifiedConfiguration.xml File

This file is used for simple mapping of CMDB classes to database tables. The template for editing the file is located under the <HP Business Availability Center root directory>\j2f\fcmdb\CodeBase\GenericDBAdapter\META-INF folder.

This section includes the following topics:

- ➤ "Example of the XSD File" on page 886
- ➤ "The Template" on page 889

➤ "Limitations" on page 892

Example of the XSD File

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- edited with XMLSPY v5 rel. 3 U (http://www.xmlspy.com) by Nimrod (Mercury Interactive) -->
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"</p>
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"</p>
maxOccurs="unbounded"/>
                                 </xs:sequence>
                             </xs:complexType>
                         </xs:element>
                         <xs:element ref="attribute"/>
                    </xs:choice>
```

```
<xs:attribute name="is-ordered" type="xs:boolean" use="optional"</pre>
default="false"/>
                </xs:complexTvpe>
            </xs:element>
            <xs:element name="and">
                 <xs:complexType>
                     <xs:sequence>
                         <xs:element ref="attribute" minOccurs="2" maxOccurs="unbounded"/>
                     </xs:sequence>
                 </xs:complexType>
            </xs:element>
        </xs:choice>
    </xs:complexType>
</xs:element>
<xs:element name="primary-key">
    <xs:complexType>
         <xs:attribute name="column-name" type="xs:string" use="required"/>
    </xs:complexType>
</xs:element>
<xs:element name="attribute">
    <xs:complexType>
        <xs:complexContent>
            <xs:extension base="attribute-type"/>
         </xs:complexContent>
    </xs:complexType>
</xs:element>
<xs:complexType name="attribute-type">
    <xs:attribute name="table-name" type="xs:string" use="optional"/>
    <xs:attribute name="column-name" type="xs:string" use="required"/>
    <xs:attribute name="CMDB-attribute-name" type="xs:string" use="required"/>
    <xs:attribute name="from-CMDB-converter" type="xs:string" use="optional"/>
    <xs:attribute name="to-CMDB-converter" type="xs:string" use="optional"/>
    <xs:attribute name="ignore-case" type="xs:boolean" use="optional" default="false"/>
</xs:complexType>
<xs:complexType name="class-type"/>
<xs:element name="or">
    <xs:complexType>
         <xs:choice minOccurs="2" maxOccurs="unbounded">
            <xs:element ref="and"/>
            <xs:element ref="attribute"/>
            <xs:element ref="connected-node-attribute"/>
        </xs:choice>
         <xs:attribute name="is-ordered" type="xs:boolean" use="optional" default="false"/>
    </xs:complexType>
</xs:element>
<xs:element name="and">
```

```
<xs:complexType>
        <xs:choice minOccurs="2" maxOccurs="unbounded">
            <xs:element ref="attribute"/>
            <xs:element ref="connected-node-attribute"/>
        </xs:choice>
   </xs:complexType>
</xs:element>
<xs:element name="reconciliation-by-two-nodes">
    <xs:complexType>
        <xs:sequence>
            <xs:choice>
                <xs:element ref="attribute"/>
                <xs:element ref="connected-node-attribute"/>
                <xs:element ref="or"/>
                <xs:element ref="and"/>
            </xs:choice>
        </xs:sequence>
        <xs:attribute name="connected-node-CMDB-class-name" type="xs:string" use="required"/>
        <xs:attribute name="CMDB-link-type" type="xs:string" use="required"/>
        <xs:attribute name="link-direction" use="optional" default="main-to-connected">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:enumeration value="main-to-connected"/>
                    <xs:enumeration value="connected-to-main"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:attribute>
   </xs:complexType>
</xs:element>
<xs:element name="connected-node-attribute" type="attribute-type"/>
<xs:element name="CMDB-class">
   <xs:complexType>
        <xs:sequence>
            <xs:element ref="primary-key" maxOccurs="unbounded"/>
            <xs:choice>
                <xs:element ref="reconciliation-by-single-node"/>
                <xs:element ref="reconciliation-by-two-nodes"/>
            </xs:choice>
        </xs:sequence>
        <xs:attribute name="CMDB-class-name" type="xs:string" use="required"/>
        <xs:attribute name="default-table-name" type="xs:string" use="required"/>
   </xs:complexType>
</xs:element>
<xs:element name="foreign-primary-key">
   <xs:complexType>
        <xs:attribute name="CMDB-class-primary-key-column" type="xs:string" use="required"/>
```

```
<xs:attribute name="column-name" type="xs:string" use="required"/>
    </xs:complexType>
</xs:element>
</xs:schema>
```

The Template

The **CMDB-class-name** property is the multinode type (the node to which federated CITs connect in the TQL):

reconciliation-by-two-nodes. Reconciliation can be done using one node or two nodes. In this case example, reconciliation uses two nodes.

connected-node-CMDB-class-name. The second class type needed in the reconciliation TQL.

CMDB-link-type. The relationship type needed in the reconciliation TQL.

link-direction. The direction of the relationship in the reconciliation TQL (from host to ip or from ip to host):

```
<reconciliation-by-two-nodes connected-node-CMDB-class-name="ip" CMDB-link-type="contained" link-direction="main-to-connected">
```

The reconciliation expression is in the form of ORs and each OR includes ANDs.

is-ordered. Determines if reconciliation is done in order form or by a regular OR comparison.

```
<or is-ordered="true">
```

If the reconciliation property is retrieved from the main class (the multinode), use the **attribute** tag, otherwise use the **connected-node-attribute** tag.

ignore-case. true: when data in the Universal CMDB class model is compared with data in the RDBMS, case does not matter:

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**):

Example of Simple Mapping

```
<?xml version="1.0" encoding="UTF-8"?>
<qeneric-DB-adapter-config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"</pre>
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-</p>
type="contained">
        <or>
            <a tribute CMDB-attribute-name="host hostname" column-name="Device Name"/>
            <connected-node-attribute CMDB-attribute-name="ip address" column-</p>
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 Seg"/>
    <primary-key column-name="hwCards Seg"/>
    <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 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-kev 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 Seg"/>
    <a tribute CMDB-attribute-name="scsi device name" column-name="hwSCSIDeviceName"/>
    <a tribute CMDB-attribute-name="scsi device vendor" column-name="hwSCSIDeviceVendor"/>
    <a tribute CMDB-attribute-name="scsi device type" column-name="hwSCSIDeviceType"/>
</class>
</generic-DB-adapter-config>
```

Limitations

- ➤ Can be used to map one node TQLs only (in the database source). For example, you can run a host > ticket and a ticket TQL. To bring the hierarchy of nodes from the database, you must use the advanced orm.xml file.
- ➤ Only one-to-many relations are supported. For example, you can bring one or more tickets on each host. You cannot bring tickets that belong to more than one host.
- ➤ You cannot connect the same class to different types of CMDB CITs. For example, if you define that ticket is connected to host, it cannot be connected to application as well.

The orm.xml File

This file is used for mapping CMDB CITs to database tables.

A template to use for creating a new file is located in the <**HP Business Availability Center root directory**>\fcmdb\Codebase\MyAdapter\META-INF\ folder.

This section includes the following topics:

- ➤ "The Template" on page 893
- ➤ "Multiple ORM files" on page 897
- ➤ "Naming Conventions" on page 897

The Template

```
<?xml version="1.0" encoding="UTF-8"?>
<entity-mappings xmlns="http://java.sun.com/xml/ns/persistence/orm"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" version="1.0"
xsi:schemaLocation="http://java.sun.com/xml/ns/persistence/orm
http://java.sun.com/xml/ns/persistence/orm_1_0.xsd">
<description>Generic DB adapter orm</description>
```

Do not change the package name.

```
<package>generic_DB_adapter</package>
```

entity. The Universal CMDB CIT name. This is the multinode entity.

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

```
<entity name="host" class="generic_DB_adapter.host">
```

Use a secondary table if the entity is mapped to more than one table.

```
<secondary-table name=""/>
<attributes>
```

For a single table inheritance with discriminator, use the following code:

```
<inheritance strategy="SINGLE_TABLE"/>
<discriminator-value>host</discriminator-value>
<discriminator-column name="[column_name]"/>
```

Attributes with tag **id** are the primary key columns. Make sure that the naming convention for these primary key columns are **idX** (id1, id2, and so on) where **X** is the column index in the primary key.

```
<id name="id1">
```

Change only the column name of the primary key.

basic. Used to declare the CMDB attributes. Make sure to edit only **name** and **column_name** properties. The expression is located in the reconciliation_rules.txt file:

```
<br/>
```

For a single table inheritance with discriminator, map the extending classes as follows:

```
<entity name="[cmdb class name]" class="generic DBdb adapter.nt" name="nt">
    <discriminator-value>nt</discriminator-value>
    <attributes/>
</entity>
<entity class="generic_DB_adapter.unix" name="unix">
    <discriminator-value>unix</discriminator-value>
    <attributes/>
</entity>
<entity name="[CMDB_class_name]"</pre>
class="generic DB adapter.[CMDB[cmdb class name]">
    <secondary-table name=""/>
    <attributes>
        <id name="id1">
            <column updatable="false" insertable="false" name="[column name]"/>
            <generated-value strategy="TABLE"/>
        </id>
        <id name="id2">
            <column updatable="false" insertable="false" name="[column name]"/>
            <generated-value strategy="TABLE"/>
        </id>
        <id name="id3">
            <column updatable="false" insertable="false" name="[column name]"/>
            <generated-value strategy="TABLE"/>
        </id>
```

The following example shows a CMDB attribute name with no prefix:

This is a relationship entity. The naming convention is **end1Type_linkType_end2Type**. In this example **end1Type** is **host** and the **linkType** is **container_f**.

The target entity is the entity that this property is pointing to. In this example, **end1** is mapped to **host** entity.

many-to-one. Many relationships can be connected to one host.

join-column. The column that contains **end1** IDs (the target entity IDs).

referenced-column-name. The column name in the target entity (**host**) that contain the IDs that are used in the join column.

one-to-one. One relationship can be connected to one [CMDB_class_name].

Multiple ORM files

Multiple mapping files are supported from version 7.5.1. Each mapping file name should end with **orm.xml**. All mapping files should be placed under the META-INF folder of the adapter.

Naming Conventions

- ➤ In each entity, the class property must match the name property with the prefix of generic DB adapter.
- ➤ Primary key columns must take names of the form idX where X = 1, 2, ..., according to the number of primary keys in the table.
- ➤ If an entity has more than one primary key column, you must add an id class as a 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 attribute names even as regards case.
- ➤ The relationship name takes the form end1Type_linkType_end2Type.
- ➤ CMDB CITs, which are also reserved words in Java, should be prefixed by gdba_. For example, for the CMDB CIT goto, the ORM entity should be named gdba_goto.

The reconciliation_rules.txt File

This file is used to configure the reconciliation rules.

Each row in the file represents a rule. For example:

multinode[host] expression[^host.host_hostname OR ip.ip_address] end1_type[host] end2_type[ip] link_type[contained]

The multinode is filled with the multinode name (the CMDB CIT that is connected to the federated database CIT in the TQL).

This expression includes the logic that decides whether two multinodes are equal (one multinode in the UCMDB and the other in the database source).

The expression is composed of ORs or ANDs.

The convention regarding attribute names in the expression part is [className].[attributeName]. For example, attribute ip_address in the ip class is written ip.ip address.

For an ordered match (if the first OR sub-expression returns an answer that the multinodes are not equal, the second OR sub-expression is not compared), then use ordered expression instead of expression.

To ignore case during a comparison, use the control sign (^) sign.

The parameters end1_type, end2_type and link_type are used only if the reconciliation TQL contains two nodes and not just a multinode. In this case, the reconciliation TQL is end1_type > (link_type) > end2_type.

There is no need to add the relevant layout as it is taken from the expression.

№ The transformations.txt File

This file contains all the converter definitions.

The format is that each line contains a new definition.

The Template

entity[[CMDB_class_name]] attribute[[CMDB_attribute_name]] to_DB_class[com.mercury.topaz.fcmdb.adapters.dbAdapter.dal. transform.impl.GenericEnumTransformer(generic-enum-transformer-example.xml)] from_DB_class[com.mercury.topaz.fcmdb.adapters.dbAdapter.dal.transform.impl. GenericEnumTransformer(generic-enum-transformer-example.xml)]

entity. The entity name as it appears in the orm.xml file.

attribute. The attribute name as it appears in the orm.xml file.

to_DB_class. The full, qualified name of a class that implements the interface

com.mercury.topaz.fcmdb.adapters.dbAdapter.dal.transform.FcmdbDalTra nsformerToExternalDB. 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 "Out of the Box Converters" on page 902.

The persistence.xml File

This file is used to override the default Hibernate settings and to add support for database types that are not out of the box (OOB database types are Oracle Server, Microsoft MSSQL Server, and MySQL).

If you need to support a new database type, make sure that you supply a connection pool provider (the default is c3p0) and a JDBC driver for your database (put the *.jar files in the adapter folder).

To see all available Hibernate values that can be changed, check the org.hibernate.cfg.Environment class.

Example of the persistence.xml file

```
<persistence xmlns="http://java.sun.com/xml/ns/persistence"</pre>
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">
    cproperties>
        <!-- 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.password" value="CMDB"/>
        <!--connection pool properties"/-->
        property name="hibernate.c3p0.min size" value="5"/>
        continue = "hibernate.c3p0.timeout" value = "300"/>
        property name="hibernate.c3p0.max statements" value="50"/>
        property name="hibernate.c3p0.idle test period" value="3000"/>
        <!--The dialect to use-->
        property name="hibernate.dialect"
value="org.hibernate.dialect.OracleDialect"/>
    </properties>
</persistence-unit>
</persistence>
```

🍳 The discriminator.properties File

This file maps each supported CI type (that is also used as a discriminator value in orm.xml) to a comma-separated list of possible corresponding values of the discriminator column.

Example of discriminator mapping

The discriminator.properties file includes the following code:

```
host=10001, 10005,10010,10011,10012
nt=10002,10003
unix=10004,10006,10008
```

The orm.xml file includes the following code:

The [discriminator_column] attribute is calculated as follows:

- ➤ The discriminator column of the corresponding table contains 10002 for a certain entry. The entry is mapped to the **nt** CIT.
- ➤ The discriminator column of the corresponding table contains 10006 for a certain entry. The entry is mapped to the unix CIT.
- ➤ The discriminator column of the corresponding table contains 10010 for a certain entry. The entry is mapped to the **host** CIT.

Note that the **host** CIT is also the parent of **nt** and **unix**.

The replication_config.txt File

This file contains a comma-separated list of CI and relationship types whose property conditions are supported by the replication plugin. For details, see "Plugins" on page 906.

🙎 The fixed_values.txt File

This file enables you to configure fixed values for specific attributes of certain CITs. In this way, each of these attributes can be assigned a fixed value that is not stored in the database.

The file should contain zero or more entries of the following format:

entity[<entityName>] attribute[<attributeName>] value[<value>]

For example:

entity[ip] attribute[ip domain] value[DefaultDomain]

Out of the Box Converters

You can use the following converters (transformers) to convert federated queries and replication jobs to and from database data.

This section includes the following topics:

- ➤ "The enum-transformer Converter" on page 903
- ➤ "The SuffixTransformer Converter" on page 905
- ➤ "The PrefixTransformer Converter" on page 905
- ➤ "The BytesToStringTransformer Converter" on page 905

The enum-transformer Converter

This converter uses an XML file that is given as an input parameter.

The XML file maps between hard-coded CMDB values and database values (enums). If one of the values does not exist, you can choose to return the same value, return null, or throw an exception.

Use one XML mapping file for each entity attribute.

Note: This converter can be used for both the to_DB_class and from_DB_class fields in the transformations.txt file.

Example of the input file XSD

```
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"</p>
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:attribute name="non-existing-value-action" use="required">
             <xs:simpleType>
                 <xs:restriction base="xs:string">
                     <xs:enumeration value="return-null"/>
                     <xs:enumeration value="return-original"/>
                     <xs:enumeration value="throw-exception"/>
                 </xs:restriction>
             </xs:simpleType>
        </xs:attribute>
    </xs:complexType>
</xs:element>
<xs:element name="value">
    <xs:complexType>
        <xs:attribute name="CMDB-value" type="xs:string" use="required"/>
        <xs:attribute name="external-DB-value" type="xs:string" use="required"/>
    </xs:complexType>
</xs:element>
</xs:schema>
```

Example of Converting sys Value to System Value

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

If the value does not exist in the XML file (for example, the string demo), the converter returns the same input value it receives.

The SuffixTransformer Converter

This converter is used to add or remove suffixes from the CMDB or federated database source value.

There are two implementations:

- ➤ com.mercury.topaz.fcmdb.adapters.dbAdapter.dal.transform.impl.AdapterToC mdbAddSuffixTransformer. Adds the suffix (given as input) when converting from federated database value to CMDB value and removes the suffix when converting from CMDB value to federated database value.
- > com.mercury.topaz.fcmdb.adapters.dbAdapter.dal.transform.impl.AdapterToC mdbRemoveSuffixTransformer. Removes the suffix (given as input) when converting from federated database value to CMDB value and adds the suffix when converting from CMDB value to federated database value.

The PrefixTransformer Converter

This converter is used to add or remove a prefix from the CMDB or federated database value.

There are two implementations:

- ➤ com.mercury.topaz.fcmdb.adapters.dbAdapter.dal.transform.impl.AdapterToC mdbAddPrefixTransformer. Adds the prefix (given as input) when converting from federated database value to CMDB value and removes the prefix when converting from CMDB value to federated database value.
- ➤ com.mercury.topaz.fcmdb.adapters.dbAdapter.dal.transform.impl.AdapterToC mdbRemovePrefixTransformer. Removes the prefix (given as input) when converting from federated database value to CMDB value and adds the prefix when converting from CMDB value to federated database value.

The BytesToStringTransformer Converter

This converter is used to convert byte arrays in the UCMDB to their string representation in the federated database source.

The converter is:

com.mercury.topaz.fcmdb.adapters.dbAdapter.dal.transform.impl.CmdbToAdapterBytesToStringTransformer.

1 Plugins

The generic database adapter supports the following plugins:

- ➤ A mandatory plugin for full topology synchronization.
- ➤ A mandatory plugin for synchronizing changes in topology.
- ➤ A mandatory plugin for synchronizing layout.
- ➤ An optional plugin to retrieve supported queries for synchronization. If this plugin is not defined, all TQL names are returned.
- ➤ An internal, optional plugin to change the TQL definition and TQL result.
- ➤ An internal, optional plugin to change a layout request and CIs result.
- ➤ An internal, optional plugin to change a layout request and relationships result.

The plugins are configured using the **plugins.txt** file under the META-INF folder of the adapter.

🙎 Configuration Examples

This section gives examples of configurations.

This section includes the following topics:

- ➤ "Use Case" on page 906
- ➤ "Single Node Reconciliation" on page 907
- ➤ "Two Node Reconciliation" on page 909
- ➤ "Using a Primary Key that Contains More Than One Column" on page 914
- ➤ "Using Transformations" on page 917

Use Case

Use case. A TQL is:

host > (container_f) > host_card

where:

host is the UCMDB entity

host_card is the federated database source entity

container_f is the relationship between them

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

Single Node Reconciliation

In this example the reconciliation is run against the host_hostname property.

Simplified Definition

The multinode is the host and it is emphasized by the special tag **CMDB-class**.

```
<?xml version="1.0" encoding="UTF-8"?>
<generic-DB-adapter-config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"</pre>
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>
            <a tribute 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 Seg"/>
    <attribute CMDB-attribute-name="card class" column-name="hwCardClass"/>
    <a tribute CMDB-attribute-name="card vendor" column-name="hwCardVendor"/>
    <attribute CMDB-attribute-name="card" name" column-name="hwCardName"/>
</class>
</generic-DB-adapter-config>
```

Advanced Definition

The orm.xml File

Pay attention to the addition of the relationship mapping. For details, see the definition section in "The orm.xml File" on page 893.

Example of the orm.xml File

```
<?xml version="1.0" encoding="UTF-8"?>
<entity-mappings xmlns="http://java.sun.com/xml/ns/persistence/orm"</pre>
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">
    <attributes>
        <id name="id1">
            <column name="Device ID" insertable="false" updatable="false"/>
            <generated-value strategy="TABLE"/>
        </id>
        <basic name="host hostname">
            <column name="Device Name"/>
        </basic>
    </attributes>
</entity>
<entity class="generic DB adapter.host card" name="host card">
    <attributes>
        <id name="id1">
            <column name="hwCards Seg" 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 name="card name">
            <column name="hwCardName" insertable="false" updatable="false"/>
        </basic>
    </attributes>
</entity>
```

```
<entity class="generic DB adapter.host container f host card"</pre>
name="host container f host card">
    <attributes>
        <id name="id1">
            <column name="hwCards_Seq" insertable="false" updatable="false"/>
            <generated-value strategy="TABLE"/>
        <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 897.

multinode[host] expression[host.host_hostname]

The transformation.txt File

This file remains empty as no values need to be converted in this example.

Two Node Reconciliation

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

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

Simplified Definition

The reconciliation is host hostname OR ip address:

```
<?xml version="1.0" encoding="UTF-8"?>
<generic-DB-adapter-config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"</pre>
xsi:noNamespaceSchemaLocation="../META-CONF/simplifiedConfiguration.xsd">
<CMDB-class CMDB-class-name="host" default-table-name="Device">
    <reconciliation-by-two-nodes connected-node-CMDB-class-name="ip" CMDB-link-</p>
type="contained">
        <or>
            <attribute CMDB-attribute-name="host_hostname" column-
name="Device Name"/>
            <connected-node-attribute CMDB-attribute-name="ip_address" column-</pre>
name="Device PreferredIPAddress"/>
    </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 Seg"/>
    <a tribute CMDB-attribute-name="card class" column-name="hwCardClass"/>
    <a tribute 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"</pre>
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-</p>
type="contained">
        <and>
            <attribute CMDB-attribute-name="host hostname" column-
name="Device Name"/>
            <connected-node-attribute CMDB-attribute-name="ip_address" column-</pre>
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 Seg"/>
    <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"</p>
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-</p>
type="contained">
        <or>
            <connected-node-attribute CMDB-attribute-name="ip address" column-</p>
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-</p>
column="Device ID"/>
    <primary-key column-name="hwCards Seg"/>
    <a tribute CMDB-attribute-name="card class" column-name="hwCardClass"/>
    <attribute CMDB-attribute-name="card_vendor" column-name="hwCardVendor"/>
    <attribute CMDB-attribute-name="card" name" column-name="hwCardName"/>
</class>
</generic-DB-adapter-config>
```

Advanced Definition

The orm.xml File

Since the reconciliation expression is not defined in this file, the same version can be used for both OR and AND and for ip address alone.

Example of the orm.xml File

```
<id name="id1">
            <column name="Device ID" insertable="false" updatable="false"/>
            <generated-value strategy="TABLE"/>
        </id>
        <basic name="host_hostname">
            <column name="Device Name" insertable="false" updatable="false"/>
        </basic>
        <basic name="ip_ip_address">
            <column name="Device_PreferredIPAddress" insertable="false" updatable="false"/>
        </basic>
    </attributes>
</entity>
<entity class="generic DB adapter.host card" name="host card">
    <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"</pre>
name="host container f host card">
    <attributes>
        <id name="id1">
            <column name="hwCards Seg" 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>
```

Chapter 33 • The Generic Database Adapter

```
</entity>
</entity-mappings>
```

The reconciliation_rules.txt File

For more information, see "The reconciliation_rules.txt File" on page 897.

multinode[host] expression[ip.ip_address OR host.host_hostname] end1_type[host] end2_type[ip] link_type[contained]

multinode[host] expression[ip.ip_address AND host.host_hostname] end1_type[host] end2_type[ip] link_type[contained]

multinode[host] expression[ip.ip_address] end1_type[host] end2_type[ip] link_type[contained]

The transformation.txt File

This file remains empty as no values need to be converted in this example.

Using a Primary Key that Contains More Than One Column

If the primary key is composed of more than one column, the following code is added to the XMLS definitions:

Simplified Definition

There is more than one primary key tag and for each column there is a tag.

```
<?xml version="1.0" encoding="UTF-8"?>
<generic-DB-adapter-config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"</p>
xsi:noNamespaceSchemaLocation="../META-CONF/simplifiedConfiguration.xsd">
<CMDB-class CMDB-class-name="host" default-table-name="Device">
    <reconciliation-by-two-nodes connected-node-CMDB-class-name="ip" CMDB-link-</p>
type="contained">
        <or>
            <attribute CMDB-attribute-name="host_hostname" column-
name="Device Name"/>
            <connected-node-attribute CMDB-attribute-name="ip_address" column-</pre>
name="Device PreferredIPAddress"/>
    </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-</p>
column="Device ID"/>
    primary-key column-name="Device ID"/>
    <primary-key column-name="hwBusesSupported Seq"/>
    <primary-key column-name="hwCards Seg"/>
    <attribute CMDB-attribute-name="card class" column-name="hwCardClass"/>
    <attribute CMDB-attribute-name="card vendor" column-name="hwCardVendor"/>
    <attribute CMDB-attribute-name="card" name" column-name="hwCardName"/>
</class>
</generic-DB-adapter-config>
```

Advanced Definition

The orm.xml File

A new id entity is added that maps to the primary key columns. Entities that use this id entity must add a special tag.

If you use a foreign key for such a primary key, you must map between each column in the foreign key to a column in the primary key.

For details, see "The orm.xml File" on page 893.

Example of the orm.xml File

```
<?xml version="1.0" encoding="UTF-8"?>
<entity-mappings xmlns="http://java.sun.com/xml/ns/persistence/orm"</pre>
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">
    <attributes>
        <id name="id1">
            <column name="Device ID" insertable="false" updatable="false"/>
            <generated-value strategy="TABLE"/>
        </id>
        <basic name="host_hostname">
            <column name="Device Name"/>
        </basic>
    </attributes>
</entity>
<entity class="generic DB adapter.host card" name="host card">
    <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 Seg" insertable="false" updatable="false"/>
            <generated-value strategy="TABLE"/>
        </id>
        <basic name="card class">
            <column name="hwCardClass" insertable="false" updatable="false"/>
        </basic>
        <basic name="card vendor">
            <column name="hwCardVendor" insertable="false" updatable="false"/>
        </basic>
        <basic name="card name">
            <column name="hwCardName" insertable="false" updatable="false"/>
        </basic>
    </attributes>
</entity>
```

```
<entity class="generic DB adapter.host contained host card" name="host contained host card">
    <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 Seg" 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"</p>
updatable="false"/>
            <join-column name="hwBusesSupported Seq" referenced-column-
name="hwBusesSupported Seg" insertable="false" updatable="false"/>
            <join-column name="hwCards Seg" referenced-column-name="hwCards Seg"
insertable="false" updatable="false"/>
        </one-to-one>
    </attributes>
</entity>
</entity-mappings>
```

Using Transformations

In the following example, the generic **enum** transformer is converted from values 1, 2, 3 to values a, b, c respectively in the host_hostname column.

The mapping file is generic-enum-transformer-example.xml.

```
<enum-transformer CMDB-type="string" DB-type="string" non-existing-value-
action="return-original" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="../META-CONF/generic-enum-transformer.xsd">
<value CMDB-value="1" external-DB-value="a"/>
<value CMDB-value="2" external-DB-value="b"/>
<value CMDB-value="3" external-DB-value="c"/>
</enum-transformer>
```

Simplified Definition

```
<?xml version="1.0" encoding="UTF-8"?>
<generic-DB-adapter-config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"</p>
xsi:noNamespaceSchemaLocation="../META-CONF/simplifiedConfiguration.xsd">
<CMDB-class CMDB-class-name="host" default-table-name="Device">
    <reconciliation-by-two-nodes connected-node-CMDB-class-name="ip" CMDB-link-</p>
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-</p>
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 Seg"/>
    <attribute CMDB-attribute-name="card class" column-name="hwCardClass"/>
    <attribute CMDB-attribute-name="card vendor" column-name="hwCardVendor"/>
    <attribute CMDB-attribute-name="card" name" column-name="hwCardName"/>
</class>
</generic-DB-adapter-config>
```

Advanced Definition

There is a change only to the transformation.txt file.

The transformation.txt File

Make sure that the attribute names and entity names are the same as in the orm.xml file.

entity[host] attribute[host hostname]

to_DB_class[com.mercury.topaz.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.Gene ricEnumTransformer(generic-enum-transformer-example.xml)]

💐 Federated Database Log Files

To understand the calculation flows and adapter lifecycle, and to view debug information, you can consult the following log files.

This section includes the following topics:

- ➤ "Log Levels" on page 919
- ➤ "Log Locations" on page 920

Log Levels

You can configure the log level for each of the logs.

Open the following file in a text editor: **<HP Business Availability Center root directory>**\j2f\conf\core\Tools\log4j\fcmdb\fcmdb.gdba.properties.

The default log level is **ERROR**:

#loglevel can be any of DEBUG INFO WARN ERROR FATAL loglevel=ERROR

➤ To increase the log level for all log files, change loglevel=ERROR to loglevel=DEBUG or loglevel=INFO.

➤ To change the log level for a specific file, change the specific **log4j** category line accordingly. For example, to change the log level of fcmdb.gdba.dal.sql.log to **INFO**, change

log4j.category.fcmdb.gdba.dal.SQL=\${loglevel},fcmdb.gdba.dal.SQL.appender

to:

log4j.category.fcmdb.gdba.dal.SQL=INFO,fcmdb.gdba.dal.SQL.appender

Log Locations

The log files are located in the following directory: <**HP Business Availability** Center root directory>\j2f\log\fcmdb\.

➤ Fcmdb.gdba.log

The adapter lifecycle log. Gives details about when the adapter started or stopped, and which CITs are supported by this adapter.

Consult for initiation errors (adapter load/unload).

➤ fcmdb.log

Consult for exceptions.

➤ cmdb.log

Consult for exceptions.

➤ Fcmdb.gdba.mapping.engine.log

The mapping engine log. Gives details about the reconciliation TQL that the mapping engine uses, and the reconciliation topologies that are compared during the connect phase.

Consult this log when a TQL gives no results even though you know there are relevant CIs in the database, or the results are unexpected (check the reconciliation).

➤ Fcmdb.gdba.TQL.log

The TQL log. Gives details about the TQLs and their results.

Consult this log when a TQL does not return results and the mapping engine log shows that there are no results in the federated data source.

➤ Fcmdb.gdba.dal.log

The DAL lifecycle log. Gives details about CIT generation and database connection details.

Consult this log when you cannot connect to the database or when there are CITs or attributes that are not supported by the query.

> Fcmdb.gdba.dal.command.log

The DAL operations log. Gives details about internal DAL operations that are called. (This log is similar to cmdb.dal.command.log).

> Fcmdb.gdba.dal.SQL.log

The DAL SQL queries log. Gives details about called JPAQLs (object oriented SQL queries) and their results.

Consult this log when you cannot connect to the database or when there are CITs or attributes that are not supported by the query.

➤ Fcmdb.gdba.hibrnate.log

The Hibernate log. Gives details about the SQL queries that are run, the parsing of each JPAQL to SQL, the results of the queries, data regarding Hibernate caching, and so on. For details on Hibernate, see "Hibernate as JPA Provider" on page 850.

External References

For details on the JavaBeans 3.0 specification, see http://jcp.org/aboutJava/communityprocess/final/jsr220/index.html.

Troubleshooting and Limitations

Note the following limitations:

JPA Limitations

- ➤ All tables must have a primary key column.
- ➤ CMDB class attribute names must follow the JavaBeans naming convention (for example, names must start with lower case letters).

- ➤ Two CIs that are connected with one relationship in the class model must have direct association in the database (for example, if host is connected to ticket there must be a foreign key or linkage table that connects them).
- ➤ Several tables that are mapped to the same CIT must share the same primary key table.

Functional Limitations

- ➤ You cannot create a manual relationship between the CMDB and federated CITs. To be able to define virtual relationships, a special relationship logic must be defined (it can be based on properties of the federated class).
- ➤ Federated CITs cannot inherit from a multinode (in most cases this means a new federated CIT cannot be created underneath the Host CIT)
- ➤ Federated CITs cannot inherit from another federated CIT, unless they are both located in the same data store.
- ➤ To view federated data, you must add the federated CIT itself to a TQL, and not its parent CIT. (If you use the parent CIT, the federated instances will not appear in the results.)
- ➤ Federated CITs cannot be trigger CITs in a correlation rule but they can be included in a correlation TQL.
- ➤ A federated CIT can be part of an enrichment TQL, but cannot be used as the node on which enrichment is performed (you cannot add, update, or delete the federated CIT).
- ➤ Properties from the CI Type list are not supported.
- ➤ Using a class qualifier in a condition is not supported.
- ➤ Subgraphs are not supported.
- ➤ Compound relationships are not supported.
- ➤ The external CI CMDB id is composed from its primary key and not its key attributes.
- ➤ A column of type bytes cannot be used as a primary key column in Microsoft SQL Server.

34

Viewing KPIs in External Applications

This chapter explains how to retrieve the status and value of HP Business Availability Center KPIs when working in an external application. You can view the results in your application, or you can use the results in calculations, statistics, and so on.

This chapter includes:

Tasks

➤ Set Up an Adapter to View KPIs in an External Application on page 923

P Set Up an Adapter to View KPIs in an External Application

This task describes how to set up the BACKPIsAdapter.

This task includes the following steps:

- ➤ "Create an Adapter Instance" on page 923
- ➤ "View the Attributes in the CIT Manager" on page 924
- ➤ "Define a TQL" on page 925
- ➤ "Consume KPIs in External Application" on page 925

1 Create an Adapter Instance

In HP Business Availability Center, in the Data Store, create an adapter instance with the **BACKPIsAdapter**. In the second stage, choose the **Real Time KPI** CIT. For details, see "Data Stores Tab" on page 767.

2 View the Attributes in the CIT Manager

The following attributes are used by the Real Time KPI CIT:

- ➤ **kpi_name.** The name of the KPI, for example, Availability, Performance.
- ➤ **kp_source.** The origin of the KPIs, for example, HP Business Availability Center.
- ➤ numeric_value. The numeric value of the KPI as calculated by the KPI business logic rule, for example, 0, 100, 3.2. (This value is optional.)
- ➤ status. The status of the KPI as calculated by the business logic rule (can be one of the following values: OK, WARNING, MINOR, MAJOR, CRITICAL, NONE).
- ➤ value_units. The measurement unit of the NumericValue field, for example, %, \$. (This value is optional.)
- ➤ additional_info. A string containing information about the KPIs.
- ➤ calculation_method. A description of the calculation method, in this case a description of the rule.
- ➤ last_update_change. The date when the status last changed.
- ➤ threshold_operator. This attribute contains enum operators: na, =, >, <, <=, >=.
- ➤ threshold_ok. The range of values that defines the OK KPI status.
- ➤ threshold_warning. The range of values that defines the WARNING KPI status.
- ➤ threshold_minor. The range of values that defines the MINOR KPI status.
- ➤ threshold_major. The range of values that defines MAJOR KPI status.
- ➤ threshold_critical. The range of values that defines the CRITICAL KPI status.

For details on working with the CIT Manager, see "CI Type Manager" and "CI Type Attributes."

For details on KPI rules, see "Business Rule Repository" in Using Dashboard.

3 Define a TQL

Define a TQL using the **Real Time KPI** CIT. For details, see "Define a TQL Query" on page 382.

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.

Chapter 34 • Viewing KPIs in External Applications

35

Troubleshooting and Limitations

This chapter includes troubleshooting and limitations for the Federated CMDB functionality.

This chapter includes:

Reference

➤ Federated CMDB Troubleshooting and Limitations on page 927

Federated CMDB Troubleshooting and Limitations

This section includes the following topics:

- ➤ "All Adapters" on page 928
- ➤ "The RMI Adapter" on page 928
- ➤ "The CmdbChanges Adapter" on page 928

All Adapters

- ➤ When changes are made in View Manager and these changes affect the results of a TQL, federated CIs in the view are not updated. This is because federated TQLs are calculated ad-hoc only and are not updated when a view is recalculated. To update the federated CIs, select the view in View Explorer and click the **Rebuild View** button. (Note that the recalculation may take a long time.) For details, see "Browse Mode" on page 706.
- ➤ When configuring a local UCMDB data store, if your RMI adapter also supports federated queries, do not choose CITs in the CITs Supported by Adapter dialog box. (You should add an adapter for the local UCMDB data store only if you want to use it for replication jobs).
- ➤ Do not choose a CIT to be supported by an external data store if instances of this CIT exist in the local UCMDB, as this can lead to state inconsistency. For example, if there are instances of the CPU CIT in the local UCMDB, you must not choose the CPU when defining an external data store, even if the selected adapter supports it.
- ➤ When configuring a replication job between two CMDBs, verify that the class model is the same in the two CMDBs.

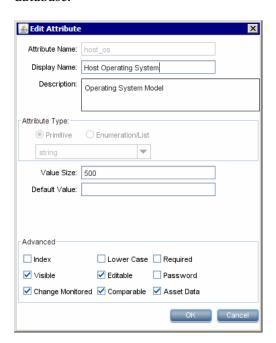
The RMI Adapter

➤ When using the RMI adapter, the version of the CMDB running on the configured host must be the same as the version of the UCMDB.

The CmdbChanges Adapter

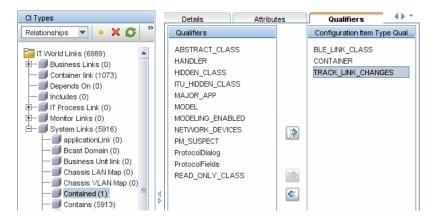
- ➤ The adapter does not support any property condition beside the root_class IN ... condition on the Root node.
- ➤ A query should contain one CI that is labeled **Root**, or one or more relations that are labeled **Root**.
 - The root node is the main CI that is synchronized; the other nodes are the contained CIs of the main CI. For example, when synchronizing hosts, the host node is labeled as root and the host resources are not root.
- ➤ The TQL graph must not have cycles.
- ➤ The TQL must contain only the Root CI and optional CIs that are directly connected to it.

- ➤ A query that is used to synchronize relations should have the cardinality 1...* and an OR condition between the relations.
- ➤ The adapter does not support compound relations.
- ➤ All CI attributes to be replicated must have the **Change Monitored** check box selected (STATIC qualifier) so that they can be written to the History database.



Chapter 35 • Troubleshooting and Limitations

➤ Each relation must include the **TRACK_LINK_CHANGES** qualifier so that it can be written to the History database:



36

Introduction to Reconciliation

This chapter provides information on Reconciliation.

This chapter includes:

Concepts

- ➤ Reconciliation Overview on page 931
- ➤ Host Reconciliation Rules on page 931
- ➤ Cluster Reconciliation Rules on page 932
- ➤ Software Element Reconciliation Rules on page 933

A Reconciliation – Overview

Reconciliation is a process of identifying and matching entities from different data stores (DDM, DDMi, ticketing, and so on). It is designed to avoid duplicate CIs.

The following sections include details of the out-of-the-box reconciliation rules:

Host Reconciliation Rules

➤ Any host in UCMDB is identified either by an IP address or a strong ID value (such as a MAC address or hardware ID):

Hosts identified by an IP address are considered incomplete (the Host Is Complete attribute has a false value).

Chapter 36 • Introduction to Reconciliation

Hosts identified by a strong ID are considered complete. If a host has several MAC addresses, DDM uses the lowest MAC address as the identifier.

- ➤ An incomplete host can be reconciled with a complete host by its IP address, or with an incomplete host that has the same ID.
- ➤ A complete host can be reconciled with an incomplete host by its IP address, or with a complete host that has the same ID.
- ➤ When an incomplete host exists in the CMDB and a complete host is reported, the complete host replaces the incomplete host and the topology (related CIs) that is connected to the incomplete host is moved to the new, complete host.
- ➤ When a complete host exists in the CMDB and an incomplete host is reported, the properties of the incomplete host are copied to the complete host that is already in the CMDB.

Note: Properties are updated according to the conflict resolution policy.



Cluster Reconciliation Rules

- ➤ A Cluster Server is a complete host.
- ➤ If an incomplete host is identified by its IP with two complete hosts, and one of these hosts is a cluster, the incomplete host is identified with the cluster only.
- ➤ If a Cluster Server and a complete host are connected to the same VIP (virtual IP), all software elements that include the VIP in the application ip attribute move from the physical complete host to the Cluster Server.

Software Element Reconciliation Rules

- ➤ Software Element CITs are considered to be either of a strong type or a weak type:
 - **Strong Type Software Element CITs.** These CITs are specialized (they are derived from the Software Element CIT) and include more attributes, different identification rules, a display label, and so on.
 - ➤ Weak Type Software Element CITs. These CITs are CI instances of the Software Element CI Type itself. They include basic configuration attributes only. Also, only one instance of each software component type can exist in the model. That is, you cannot model two different Oracle instances on a single host using a weak type software element.
- ➤ A reconciliation mechanism handles the mapping of weak type software elements to their corresponding strong type, once they are discovered. This mechanism enables DDM to detect the existence of software by one method, and report additional details about the software when it is discovered using another method, knowing the two CIs will eventually be merged in the UCMDB.
- ➤ The reconciliation mechanism relies on a shared attribute value between the weak type and strong type: the **Name** attribute (data name). All software elements (strong or weak) are created with a distinguishing name: when a strong software element is discovered on a host containing a weak software element with the same name, the weak software element is merged with the strong one.

Chapter 36 • Introduction to Reconciliation

Index

| A | Add/Edit Attribute dialog box 273 |
|---|---|
| Action Definition dialog box | Add/Edit Relationship dialog box 420 |
| Scheduler 523 | Add/Remove Relationship dialog box 276 |
| | adding |
| adapter add for new external data store 804 | Enrichment nodes and relationships |
| | to a TQL query 385 |
| adapter capabilities 815 | nodes and relationships to a TQL |
| adapter templates | query 384, 608 |
| modify 658 | Affected Nodes dialog box |
| overview 635 | Correlation Manager 242 |
| relationships 668 | aging mechanism |
| adapter.conf 885 | for CIs 64 |
| adapters 760 | Asset report |
| configuration file in | overview 593 |
| ServiceCenter/Service Manager 819 | Asset report page 594 |
| deployment for ServiceCenter/Service | Attribute Columns dialog box |
| Manager 828 | Topology Report Manager 313 |
| deployment of ServiceDesk adapter | attribute operator definitions 400 |
| 829 | attribute properties |
| generating a new encryption key file | grouping CIs by 191 |
| 765 | attribute states |
| interaction with the federation | defining 534 |
| framework 785 | attributes |
| interfaces 803 | retrieving from external data source |
| packages 492 | 762 |
| usage in ServiceCenter/Service | Available Templates 203, 204, 208, 211, 213 |
| Manager 818 | Available Templates 203, 204, 200, 211, 213 |
| Add /Edit Relationship Folding Rule dialog | |
| box 200 | В |
| Add Attributes dialog box | BMC PATROL 637 |
| Topology Report Manager 311 | browse mode |
| Add Background Image dialog box 74 | displaying a view 699 |
| Add Compound Dependency dialog box 425 | business CI models 132 |
| Add Compound Relationship dialog box 415 | building 141, 144 |
| Add Function dialog box | Business Process Monitor |
| Topology Report Manager 312 | source details 639 |
| Add Impact Relationship dialog box 419 | business view |
| Add Join Relationship dialog box 422 | building 185 |
| | Danianis 100 |

| C | Qualifiers tab 285 |
|---|---------------------------------------|
| CA Unicenter 637 | Triplets tab 287 |
| calculated relaionship types | CI Types |
| impact modeling 472 | assigning a calculated relationship |
| Calculated relationships | 268 |
| creating 268 | assigning icons 266 |
| change history of a CI | assigning qualifiers 266, 267, 268 |
| viewing 604 | attributes 263 |
| change history of a relationship | creating 265 |
| viewing 605 | customizing the menu 266, 267 |
| Change report 601 | defining 265, 267, 268 |
| CI History page 606 | defining default labels 266, 268 |
| overview 601 | overview 262 |
| Change Report page 602 | relationships 264 |
| Changed Applications report 615 | setting attributes 265, 267 |
| Changed Views report 617 | view descriptions 272 |
| child CIs | CI/Relationship History dialog box 75 |
| hidden 137 | Circular tab |
| Choose Operation for Selected Item dialog | Layout Properties dialog box 724 |
| box 147 | CIs |
| Choose Resources to Export dialog box | adding to Discovery job 95, 108 |
| Package Manager 502 | attaching existing 67 |
| CI comparison | automatic deletion with aging |
| overview 583 | mechanism 64 |
| CI Conditional Search dialog box 148 | comparing 584 |
| CI definition parameters 686 | creating 69 |
| CI History page | creating new in view 61 |
| Change report 606 | creating non-related CIs 61 |
| CI Lifecycle | creating related CIs 61 |
| Filter dialog box 566 | deleting 62, 95 |
| filter results 560 | hidden in Dashboard 137 |
| generate data 560 | properties 63 |
| overview 560 | removing from Discovery job 95, 109 |
| CI Lifecycle page 563 | CMBD Utilization report 618 |
| CI Lifecycle report 562 | CMDB 22 |
| CI Properties dialog box 78 | audit short log 28 |
| CI Selector | concepts 21 |
| see View Explorer | creating new CIs 61 |
| CI Type log 26 | DAL Log 30 |
| CI Type Manager 261, 276 | enrichment log 29 |
| Attached Menu tab 290 | general log 25 |
| Attributes tab 283 | log files 24 |
| context menu 280 | notification logs 27 |
| Default Label tab 293 | Operation Statistics Log 31 |
| Details tab 282 | plug-in log 30 |
| Icon tab 288 | relationships for CIs 65 |

| server parameters 24 | context menu options |
|--|---|
| CMDB configuration parameters 33, 47 | TQL 393 |
| aging 35 | converters |
| CIT settings 38 | generic database adapter 902 |
| CITs 36 | Correlation Definition dialog box |
| data model 38 | Correlation Manager 243 |
| general server 39 | Correlation Manager |
| History database 42 | Affected Nodes dialog box 242 |
| History database purging 44 | Correlation Definition dialog box 243 |
| monitoring 45 | Details dialog box 254 |
| notification 46 | overview 233 |
| overview 34 | Correlation Manager user interface 241 |
| plug-in 50 | Correlation Manager window 245 |
| quota 50 | Correlation results |
| TQLs 406 | retrieving 540 |
| CMDB system TQL parameters 53 | Correlation rules |
| Compaq Insight Manager (CIM) 637 | create 235 |
| Compare CIs | validation of TQL queries 464 |
| Find CI by Label dialog box 588 | Correlation Rules window 551 |
| Select CI dialog box 589 | create |
| Compare CIs user interface 585 | a package 493 |
| Compare CIs window 586 | Create Calculated Relationship wizard 281 |
| Compare Snapshots | Create Configuration Item Type wizard 281 |
| Find CI by Label dialog box 581 | Attached Menu page 290 |
| Snapshot of <view> dialog box 582</view> | Attributes page 283 |
| Compare Snapshots user interface 575 | Default Label page 293 |
| Compare Snapshots window 576 | Details page 282 |
| comparing CIs 584 | Icon page 288 |
| comparing snapshots 574 | Qualifiers page 285 |
| composite selectors | Create Enumeration Definition dialog box |
| DNode definition key 127 | 295 |
| compound relationship 380 | Enumeration definition area 296 |
| compound relationships | Create List Definition dialog box 295 |
| defining 386 | list definition area 295 |
| Conditions of Related CIs dialog box 150 | Create New Correlation Rule/ Correlation |
| configuration file | Rule Properties/ Save As Correlation |
| for ServiceCenter/Service Manager | Rule wizard |
| adapter 819 | Rule Groups page 258 |
| configuration files for the generic database | Create New Correlation Rule/Correlation |
| adapter 884 | Rule Properties/Save As Correlation |
| configuration items 23 | Rule wizard |
| configuration management database | Rule Base TQL Attributes page 257 |
| (CMDB) 22 | Rule General Attributes page 256 |
| contents and format | Create New Enrichment Rule wizard |
| of packages 491 | Rule Base TQL page 371 |
| | Rule General Attributes page 369 |

| Create New Package/Edit Package wizard | Details dialog box |
|--|---------------------------------------|
| Package Manager 503 | Correlation Manager 254 |
| Package Properties page 503 | Disconnected tab |
| Resource Selection page 504 | Layout Properties dialog box 727 |
| Selection Summary page 508 | Discovery job |
| Create New Report wizard | adding to a CI 95 |
| Report Base TQL page 319 | removing from CIs 95 |
| Report General Attributes page 317 | Discovery Status tab |
| Report Titles page 318 | in Model Management 83 |
| Create Relationship wizard 281 | discriminator.properties 901 |
| Create Reveal Path dialog box 151 | displaying deployed packages |
| create views based on impact modeling | using the JMX console 500 |
| impact modeling 474 | DNode definition key |
| Creating New View dialog box 152 | CI templates 120 |
| Cron expressions 521 | components 120 |
| | defining composite selectors 127 |
| D | generators 120 |
| | overview 118 |
| Dashboard | relationship templates 120 |
| configuring source adapters 650 | Dynamic Node Factory |
| data store | defining 129 |
| add adapter for new external 804 | definitions 672 |
| creating 769 | DNode definition key 118 |
| data stores | how it works 115 |
| retrieving data from multiple 761 | resource 636 |
| Data Stores tab 767 | Selector Expression dialog box 111 |
| database adapter | when to use 116 |
| configuration examples 906 | working with 113 |
| Database Breakdown report 620 | |
| Decay status | E |
| prevent CIs from changing status to | |
| 654 | Edit Attribute dialog box |
| Decay Timeout | Topology Report Manager 314 |
| changing the value 673 | Edit Reveal Path dialog box 151 |
| defining | Edit Source Adapter dialog box 674 |
| compound relationships 386 | editing pane |
| join relationships 389 | View Manager 225 |
| map printing settings 747 | Element Instances dialog box 429 |
| subgraph definitions 391 | Element Instances page |
| Delete Candidates Overview Report 622 | TQL Node wizard 460 |
| deploy | Enrichment Manager |
| a package 494 | Node/Relationship Definition dialog |
| deployed packages | box 372 |
| displaying using the JMX console 500 | overview 351 |
| deploying | Enrichment Manager user interface 357 |
| packages using the JMX console 498 | Enrichment Manager window 358 |

| Enrichment nodes and relationships | fixed_values.txt 902 |
|--------------------------------------|--|
| adding to a TQL query 385 | folders |
| Enrichment rules | predefined 183 |
| define 354 | folding rules |
| validations 385 | adding to relationships 68 |
| enumeration definitions 298 | |
| creating 269 | G |
| sample 269 | u |
| Export package dialog box | generic database adapter |
| Package Manager 509 | converters 902 |
| export packages 494 | deployment, advanced method 859 |
| using the JMX console 500 | deployment, minimal method 852 |
| g g | federated database configuration files |
| _ | 884 |
| F | overview 846 |
| federated adapter | plugins 906 |
| generating a new encryption key file | reconciliation 847 |
| 765 | Generic EMS |
| federated adapters 760 | hierarchies 647 |
| federated CMDB | when to use 638, 660 |
| federation framework flow for FTQL | Generic EMS source adapter 646 |
| 786 | Get Related CIs report 84 |
| federation framework flow for | Gold Master report |
| replication 798 | overview 567 |
| mapping information 763 | Gold Master report definition |
| overview 760 | creating 310 |
| troubleshooting and limitations 927 | Gold Master report page 568 |
| workflow 764 | Gold Master report pane 315 |
| Federated CMDB window 768 | group by |
| federated database adapter | nested groups 191 |
| supported TQL queries 846 | 0 1 |
| troubleshooting 921 | •• |
| federation framework | Н |
| adapter and mapping interaction 785 | Hewlett-Packard (HP) OpenView 637 |
| adapter interfaces 803 | Hibernate mapping tool 850 |
| Filter CI Instances dialog box 432 | hidden child CIs 137 |
| Filter CIs dialog box | Hidden CIs dialog box 153 |
| Topology Report Manager 314 | Hierarchical tab |
| Filter dialog box | Layout Properties dialog box 729 |
| Package Manager 510 | History database log 29 |
| Scheduler 524 | Host Dependency report |
| Find CI by Label dialog box | overview 597 |
| Compare CIs 588 | Host Dependency report page 598 |
| Compare Snapshots 581 | Host OS Breakdown report 624 |
| Find dialog box | HP OpenView Service Navigator 637 |
| Package Manager 511 | - |
| U U | |

| HP Release Control federation adapter 799 | K |
|---|---|
| HP Systems Insight Manager (HP SIM) 637 | KPIs |
| | view in external application 923 |
| I | 11 |
| impact layer 468 | L |
| impact modeling | Layout Properties dialog box 724 |
| calculated relationship types 472 | Circular tab 724 |
| create views based on impact | Disconnected tab 727 |
| modeling 474 | Hierarchical tab 729 |
| impact rules 468 | Orthogonal tab 737 |
| propagation reversal 470 | Routing tab 739 |
| Impact modeling overview 467 | Symmetric tab 743 |
| impact rules | Layout Settings dialog box 435 |
| impact modeling 468 | linking nodes to application CIs 187 |
| Insert Relationship dialog box 85 | list definitions 298 |
| Relationship page 86 | creating 269 |
| instance views. See perspective based views | List of Dependent Views dialog box 201 |
| integration | log files 24 |
| with third-party sources 637 | for federated database 919 |
| invisible child CIs 137 | logs |
| IT Universe | changing log levels 32 |
| large views 722 | lifecycle 25 |
| relationships 65 | quota 26 |
| views 57, 59 | severity levels 32 |
| IT Universe Manager | ,, |
| CI Properties dialog box 78 | |
| overview 56 | М |
| Topology Map 91 | Major Application Type Breakdown report |
| IT Universe Manager window 90 | 625 |
| IT Universe model | Manage CI Watchpoints dialog box 154 |
| populating 56 | managed views |
| | persistent 176, 205, 209, 214 |
| J | map printing settings |
| | defining 747 |
| Job Definitions dialog box | mapping |
| Scheduler 525 | interaction with the federation |
| Job Scheduler window Scheduler 529 | framework 785 |
| | merging identical instances 192 |
| join relationship 381 Join Relationship Condition dialog box 433 | Model Editor 155 |
| join relationships | Model Management |
| defining 389 | Discovery Status tab 83 |
| demining 507 | Modeling Studio |
| | overview 132 |
| | Modeling Studio page 162 |
| | |

| models | 0 |
|---|--|
| building 477 | Open Model dialog boy 165 |
| dependencies on other CIs 481 | Open Model dialog box 165 |
| grouping in 481 | Open Saved Reveal Path dialog box 166 |
| preconfigured 479 | Open View dialog box 167 |
| models and perspectives 476 | orm.xml 893 |
| Monitor CIs 1 | Orthogonal tab |
| role in a view 190 | Layout Properties dialog box 737 |
| monitoring views 637 | overview |
| | Topology Query Language 378 View Explorer 698 |
| N | Overview reports 613 |
| Network Device Breakdown report 627 | overview 613 |
| New CI dialog box 98 | Overview reports user interface 614 |
| New Correlation Rule /Correlation Rule | |
| Properties/Save As Correlation Rule | P |
| wizard 255 | |
| New Data Store wizard 769 | package |
| New Enrichment Rule/Enrichment Rule | create 493 |
| Properties/Save As Enrichment Rule | deploy 494 |
| wizard 368 | Package Manager |
| New Model dialog box 164 | Choose Resources to Export dialog |
| New Perspective wizard 202 | box 502 |
| New Report/Report Properties/Save As Report | Create New Package/Edit Package |
| wizard | wizard 503 |
| 317 | Export package dialog box 509 |
| New Source Adapter dialog box 674 | Filter dialog box 510 |
| New Template wizard 206 | Find dialog box 511 |
| New TQL Node page | Package Manager user interface 501 |
| TQL Node wizard 454 | Package Manager window 511 |
| New TQL Relationship page | Package Properties page |
| TQL Node wizard 456 | Create New Package/Edit Package |
| New View wizard 210 | wizard 503 |
| | packages |
| New Watchpoint dialog box 164 | administration overview 490 |
| Node/Relationship Definition dialog box | contents and format 491 |
| Enrichment Manager 372 | deploying using the JMX console 498 |
| Node/Relationship Properties dialog box 436 nodes | export 494 |
| | export using the JMX console 500 |
| and relationships 23 | for federated cmdb adapters 492 |
| nodes and relationships | resources 495 |
| adding to a TQL query 384, 608 | troubleshooting and limitations 516 |
| Number of Changes report 628 | undeploying using the JMX console |
| | 499 |
| | password |
| | generating a new encryption key file |
| | for a federated adapter 765 |

| pattern views | regular expressions |
|---|---|
| creating 198 | adding to default label 294 |
| permissions | Related CIs in Database Map 106 |
| Source Manager 650 | Related CIs in View Map 106 |
| persistence.xml 899 | Relationship Folding Rules dialog box 218 |
| perspective based views | relationship rules |
| building 134 | defining multiple 218 |
| including and excluding child CIs 135 | Relationships |
| Perspective Properties wizard 202 | creating 266 |
| perspectives | relationships |
| creating 195 | about 65 |
| predefined 184 | adding folding rules 68 |
| plugins | creating 66, 69 |
| generic database adapter 906 | deleting 68 |
| previewing topology map | hierarchical 66 |
| before printing 747 | view descriptions 272 |
| printing | visible, in TQL queries 418, 424 |
| topology map contents 746 | relationships details 668 |
| propagation reversal | Remove Resources page |
| impact modeling 470 | Undeploy Package Resource wizard 514 |
| Q | Replication Job dialog box 775 |
| • | Replication Job Statistics window 776 |
| Query Definition/Save Query As/Query | Replication Jobs tab 778 |
| Properties dialog box | replication_config.txt 902 |
| Query Manager 339 | Report Base TQL page |
| Query Manager | Create New Report wizard 319 |
| overview 337 | Report General Attributes page |
| Query Definition/Save Query | Create New Report wizard 317 |
| As/Query Properties 339 | Report Node Definition dialog box |
| user interface 339 | Topology Report Manager 330 |
| Query Manager window 342 | Report rule |
| | defining 300 |
| R | Report Titles page |
| Real User Monitor | Create New Report wizard 318 |
| hierarchies 642 | Resource Selection page |
| | Create New Package/Edit Package |
| source adapter details 641 reconciliation | wizard 504 |
| cluster rules 932 | resources in packages 495 |
| host rules 932 | Reveal CIs dialog box 169 |
| | revealing CIs 137 |
| overview 931 software element rules 933 | root causes 234 |
| | Routing tab |
| reconciliation_rules.txt 897 Refine Node Type dialog box 447 | Layout Properties dialog box 739 |
| Refine Node Type dialog DOX 447 | |

| Rule Base TQL Attributes page | Select Hours dialog box |
|--------------------------------------|---|
| Create New Correlation Rule/ | Scheduler 531 |
| Correlation Rule Properties/Save As | Select Relationship Type dialog box 448 |
| Correlation Rule wizard 257 | Selection Summary page |
| Rule Base TQL page | Create New Package/Edit Package |
| Create New Enrichment Rule wizard | wizard 508 |
| 371 | selector parameters 689 |
| Rule General Attributes page | selectors |
| Create New Correlation Rule/ | definitions 670 |
| Correlation Rule Properties/ Save | ServiceCenter/Service Manager |
| As Correlation Rule wizard 256 | adapter deployment 828 |
| Create New Enrichment Rule wizard | add attribute to CIT 835 |
| 369 | ServiceDesk adapter |
| Rule Groups page | deployment 829 |
| Create New Correlation Rule/ | Set Node Order dialog box |
| Correlation Rule Properties/ Save | Topology Report Manager 332 |
| As Correlation Rule wizard 258 | Set Parameter Values dialog box |
| Run Correlation dialog box 552 | Topology report 609 |
| run tasks periodically | Set Parameterized Values Summary page |
| Scheduler 520 | Set Report Parameters wizard 334 |
| | Set Parameters on page |
| • | Set Report Parameters wizard 333 |
| S | Set Report Parameter dialog box |
| Save As Perspective wizard 202 | Topology Report Manager 333 |
| Save As Template wizard 206 | Set Report Parameters wizard |
| Save As View wizard 210 | Set Parameterized Values Summary |
| Save Reveal Path dialog box 151 | page 334 |
| Save Snapshot dialog box 555 | Set Parameters on page 333 |
| saving to file | Set View Parameters dialog box 220 |
| Topology Map 723 | Set View-specific Report dialog box |
| Scheduler | Topology Report Manager 334 |
| Action Definition dialog box 523 | setting parameters 215 |
| define tasks to run periodically 520 | simplifiedConfiguration.xml 885 |
| Filter dialog box 524 | SiteScope |
| Job Definitions dialog box 525 | hierarchies 645 |
| Job Scheduler window 529 | source adapter details 644 |
| overview 519 | SiteScope host discovery 656 |
| Select Days dialog box 531 | SiteScope monitor |
| Select Hours dialog box 531 | set to report to HP Business |
| Scheduler user interface 522 | Availability Center 653 |
| search tool | SiteScope profile |
| using 700 | synchronize 654 |
| Select CI dialog box | SIteScope source adapter |
| Compare CIs 589 | backward compatibility 655 |
| Select Days dialog box | SiteScope source adapter |
| Scheduler 531 | customizing 673 |
| | 0 |

| work with 653 | templates |
|--|--|
| snapshot comparison | adapter 658 |
| overview 573 | creating 193 |
| Snapshot of <view> dialog box</view> | Dynamic Node Factory 672 |
| Compare Snapshots 582 | Tivoli TEC 637 |
| snapshots | Topology Map 91, 721 |
| comparing 574 | Main menu 745 |
| taking of view 549 | overview 721 |
| Software Elements Search dialog box 171 | previewing before printing 747 |
| source adapter | printing and saving 550 |
| activities 635 | saving to file 723 |
| Generic EMS 646 | toolbar options 749 |
| third-party 637 | topology map contents |
| Source Adapters | printing 746 |
| customize 637 | Topology Query Language 378 |
| Source Manager 633 | overvew 378 |
| overview 634 | Topology Query Language (TQL) user |
| permissions 650 | interface 414 |
| user interface 674 | Topology report |
| Source Manager page 690 | overview 607 |
| State Manager | Set Parameter Values dialog box 609 |
| overview 533 | Topology Report Manager |
| State Manager dialog box 535 | Add Attributes dialog box 311 |
| State Manager user interface 534 | Add Function dialog box 312 |
| Subgraph Condition Definition dialog box | Attribute Columns dialog box 313 |
| 449 | Edit Attribute dialog box 314 |
| subgraph definition 382 | Filter CIs dialog box 314 |
| Subgraph Definition dialog box 451 | Report Node Definition dialog box |
| subgraph definitions | 330 |
| defining 391 | Set Node Order dialog box 332 |
| Summary Selection page | Set Report Parameter dialog box 333 |
| Undeploy Package Resource wizard | Set View-specific Report dialog box |
| 515 | 334 |
| Symmetric tab | troubleshooting and limitations 335 |
| Layout Properties dialog box 743 | Topology Report Manager overview 300 |
| System Type Manager 264 | Topology Report Manager user interface 310 |
| System Type Manager dialog box 297 | Topology Report Manager window 321 |
| , , , , , | Topology Report page 610 |
| т | Topology reports user interface 609 |
| | Topology View |
| template | overview 540 |
| Dynamic Node Factory 118 | Topology View Application user interface |
| template based views | 550 |
| creating 196 | Topology View Application window 556 |
| Template Properties wizard 206 | TQL |
| | audit short/detailed log 404 |

| circular queries 463 | upgraded views 485 |
|--|--|
| context menu options 393 | User Preferences dialog box 461 |
| incremental detailed logs 406 | Using Modeling Studio 476 |
| incremental splitter logs 405 | |
| incremental statistics log 404 | V |
| logs 402 | - |
| pattern log 402 | validation restrictions |
| pattern statistics log 403 | TQL queries 462 |
| queries, circular 463 | View Base TQL 203, 207, 212 |
| queries, validation restrictions 462 | View Editor 172 |
| queries, visible relationships 418, 424 | View Explorer 697, 705 |
| queries, visible TQL nodes 437, 459 | Browse mode 706 |
| self relationships 421, 424, 462 | configuration 703 |
| supported queries in federated | displaying a view 699 |
| database adapter 846 | limitations and troubleshooting 716 |
| TQL Node Properties page | overview 698 |
| TQL Node wizard 457 | Search mode 710 |
| TQL Node wizard 453 | unavailable views 716 |
| Element Instances page 460 | using the search tool 700 |
| New TQL Node page 454 | view formats 181 |
| New TQL Relationship page 456 | View General Attributes 202, 206, 210 |
| TQL Node Properties page 457 | View Manager |
| TQL nodes | defining multiple relationship rules |
| visible, in TQL queries 437, 459 | 218 |
| TQL query | editing pane 225 |
| define 339, 382 | Node/Relationship Grouping dialog |
| transformations.txt 898 | box 216 |
| trigger node 234 | overview 180 |
| troubleshooting and limitations | page 221 View Proporties dialog boy 175 |
| packages 516 | View Properties dialog box 175 |
| Topology Report Manager 335 | View Properties wizard 210 view-based discovery 70 |
| View Explorer 716 | views |
| views 232 | based on a CI collection 143 |
| | based on a model 143 |
| U | creating new CIs 61 |
| Undeploy Package Resource wizard 514 | creating non-related CIs 61 |
| Remove Resources page 514 | creating related CIs 61 |
| Summary Selection page 515 | displaying 699 |
| undeploying packages | factory 183 |
| using the JMX console 499 | in IT Universe 57 |
| Update Enumeration Definition dialog box | large 722 |
| 295 | lifecycle 58 |
| enumeration definition area 296 | limitations and troubleshooting 232 |
| Update List Definition dialog box 295 | predefined 183 |
| list definition area 295 | pre-defined monitoring views 637 |
| not definition area 270 | pre defined monitoring views 657 |

Index

rediscovering 70 relationships in 65 tree structure 59 unavailable views 716 visible node 459 visible relationship 418, 424

W

watchpoints 137 Watchpoints Updates dialog box 176 working with Topology Map 721

X

XML File adapter template details 648 source adapter details 648 when to use 639