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MERCURY BUSINESS AVAILABILITY CENTER™

Integrating with Third-Party Applications

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Mercury Business Availability Center

Integrating with Third-Party Applications

Version 6.5

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Integrating with Third-Party Applications

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PART III: WORKING WITH MERCURY BUSINESS AVAILABILITY CENTER EMS ADAPTERS

Welcome to Integrating with Third-Party Applications

This guide introduces third-party integrations, describes how to work with the Generic Data Engine API to extract data from Mercury Business Availability Center for use with third-party or custom tools, and explains how to integrate alerts generated by Mercury Business Availability Center into an EMS console.

How This Guide is Organized

The guide contains the following parts:

Part I Introduction

Introduces the various types of third-party integrations that can be performed with Mercury Business Availability Center.

Part II Working with Data APIs

Describes how to use the Mercury Business Availability Center generic data engine API to extract data from Mercury Business Availability Center for use with third-party or custom tools as well as how to use the CMDB API to read/write data from/to the CMDB.

Part III Working with Mercury Business Availability Center EMS Adapters

Describes how to integrate Mercury Business Availability Center with different EMS applications, to send Mercury Business Availability Center alerts to the EMS console.

Who Should Read This Guide

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

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

Readers of this guide should be knowledgeable about enterprise system administration and Mercury Business Availability Center.

Getting More Information

For information on using and updating the Mercury Business Availability Center Documentation Library, reference information on additional documentation resources, typographical conventions used in the Documentation Library, and quick reference information on deploying, administering, and using Mercury Business Availability Center, refer to *Getting Started with Mercury Business Availability Center*.

Part I

Introduction

1

Introduction to Integrating with Third-Party Applications

Mercury Business Availability Center enables you to perform several types of integrations. The list below describes each integration and where to get more information.

- **Generic Data Engine API.** Enables extraction of data from the Mercury Business Availability Center database for use with third-party or custom tools. For details, see "Working with Data APIs" on page 5.
- **CMDB API.** Enables writing configuration item definitions and topological relations to the CMDB (Configuration Management Database), and querying the information with TQL and ad hoc queries. For details, see "Working with the CMDB API" on page 39.
- **EMS adapters.** Enable integrating alerts generated by Mercury Business Availability Center into an EMS console. For details, see "Working with Mercury Business Availability Center EMS Adapters" on page 71.
- **EMS integrations using SiteScope Integration Monitors.** Enable collecting data from EMS systems using SiteScope Integration Monitors and feeding the data into Mercury Business Availability Center. For details, see "Working with SiteScope Integration Monitors" in *Configuring SiteScope Monitors*.
- **Deep transaction tracing.** Provides a monitoring layer for collecting information about the behavior of Business Process Monitor transactions within the target machine, achieved through integration with Bristol's TransactionVision application. The resulting information is displayed in the Deep Transaction Tracing view in Dashboard. For details, see "Administering Deep Transaction Tracing" in *Application Administration*.

Part II

Working with Data APIs

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Working with the Generic Data Engine API

Note to Mercury Managed Services customers: For details on how to use the Generic Data Engine API in a Managed Services environment, contact Mercury Managed Services Support.

This chapter explains how to work with the Generic Data Engine API to extract data from Mercury Business Availability Center for use with third-party or custom tools.

Using the Generic Data Engine API

Note: Users of the Generic Data Engine API should be familiar with:

- SQL
- the SOAP specification (if using the Web Service)
- an object-oriented programming language such as C++ or Java (if using the Web Service)
- Mercury Business Availability Center administration and applications

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The Generic Data Engine enables you to retrieve data from Mercury Business Availability Center profile databases by sending a query using the following methods:

- **Web browser.** The request is sent as an HTML query and the data is returned as HTML or as a CSV (Comma Separated Values) file that can be opened with Microsoft Excel or processed with a custom tool.
- **Web Service.** The return object contains the data in CSV format.

Creating Queries

You can create queries to send to the Generic Data Engine using the OpenAPI Query Builder or by building them manually.

The OpenAPI Query Builder provides a graphical interface that facilitates the building of HTML queries, which can then be sent to the Generic Data Engine using a Web browser. For details, see Chapter 3, “The OpenAPI Query Builder.”

For information on creating queries manually and query syntax and limitations, see Chapter 4, “Creating Sample Queries.”

Getting Metadata on the Samples

To create a query, you must know the data representation of the sample. For information on commonly queried samples, see "Samples" in *Reference Information*.

Users with special reporting needs can retrieve a list of all samples and their fields using the MBean Inspector. Access the MBean Inspector page by entering the following URL in your browser:

```
http://<server>[:port]/jmx-
console/HtmlAdaptor?action=inspectMBean&name=Topaz%3Aservice%3DMeta-Data+Manager
```

The default port number is 8080. If this port is incorrect, consult your system administrator for the correct port number.

On the MBean Inspector page, click the **Invoke** button next to the operation **showMetaDataDBMapping**. The bean returns a list of fields in each sample.

Permissions

Either the System Viewer or Superuser role is required to access the data. If the user name passed in the query does not have these rights, the response is an authentication error.

Calling the Web Service

The Generic Data Engine Web Service enables submitting a query consisting of a username, password, and an SQL-like select statement. The engine returns an error description if it cannot parse the statement or if there is a problem running the query. If there is no error, the results of the query are returned.

SOAP programmers can access the WSDL at:

```
http://<server>[:port]/topaz/gdeopenapi/services/GdeWsOpenAPI?wsdl
```

The port specification is only necessary for non-standard installations. Consult your system administrator for the correct port number.

For information about creating the query, see Chapter 4, "Creating Sample Queries."

Querying with a Browser

When querying with a browser, the getData service is called with the URL:

```
http://<server>[:port]/topaz/gdeopenapi/GdeOpenApi?method=getData&user=<username>&password=<password>&query=<query>
```

or with the optional result type parameter:

```
http://<server>[:port]/topaz/gdeopenapi/GdeOpenApi?method=getData&user=<username>&password=<password>&query=<query>&resultType=csv
```

The port specification is only necessary for non-standard installations. Consult your system administrator for the correct port number.

The default return type is HTML. If `resultType=csv` is specified, a comma separated values file is returned.

For information about creating the query, see "Creating Sample Queries" on page 19.

Data Returned

The same data is returned whether the request is made from a browser or with the Web Service. For the Web Service, the data resides in the return object, and with a browser, the data resides in the response body.

Web Service Return Object

The Web Service return object contains the following:

- **retval.** The data or an error message.
- **errorCode.** The error code (type int). Possible error codes are:
  - 0 - Success
  - 100 - Authorization error

- 101 - Processing error
- 102 - Open API has been disabled

- **origRowCount.** The actual number of rows the query should have returned (type int). If the number of rows to be returned exceeds the maximum, the **origRowCount** field is set to the actual number of rows that the query would have returned had the maximum not been exceeded.

Web Browser Response Body

When the query is submitted from a browser, the response CSV or HTML contains the data, or error code and message. If the number of rows to be returned exceeds the maximum, the last row of the data is Returned *X* of *Y* rows, where *X* is the number of rows returned and *Y* is the actual number of rows that fulfil the conditions of the query. If there is an error at the engine level, the HTTP success code is returned, but the body of the response is <error code>, <error message>.

Setting Maximum Number of Rows Returned

The maximum number of rows returned can be configured in the Infrastructure Settings Manager. To modify the maximum number of rows returned, select **Admin** > **Platform** > **Setup and Maintenance** > **Infrastructure Settings**, choose **Foundations**, select **Generic Data Engine Open API**, and locate the **Maximum Rows** entry in the Generic Data Engine Open API Settings table. Modify the value to the required number of rows.

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The OpenAPI Query Builder

Note to Mercury Managed Services customers: This section is not relevant to Mercury Managed Services customers.

This chapter describes how to use the OpenAPI Query Builder to create Generic Data Engine API queries.

Introducing the OpenAPI Query Builder

The OpenAPI Query Builder is a Web interface that assists in creating queries, which can then be sent via a Web browser to the Generic Data Engine to extract data from the Mercury Business Availability Center profile database.

Accessing the OpenAPI Query Builder

The OpenAPI Query Builder is located in the User Reports tab of the following Mercury Business Availability Center applications:

- Service Level Management
- End User Management

➤ System Availability Management

To access the OpenAPI Query Builder, in any of the above applications, select the User Reports tab and click **OpenAPI Query Builder**.

Permissions

To access the OpenAPI Query Builder page, a user must have Administrator or Superuser permissions.

For a query to access the data using the Generic Data Engine API, the user and password parameters passed in the query must be those of a user with either System Viewer or Superuser permissions. (For details on setting permissions in the Permissions Manager, see "Configuring User Permissions" in *Platform Administration*.) When creating a query using the OpenAPI Query Builder, the user and password parameters of the current user are automatically added to the query URL. Thus if the current user is not a System Viewer or Superuser, the login parameters in the query must be modified to those of either a System Viewer or Superuser. Otherwise, the response to the query is an authentication error.

Creating Queries Using the OpenAPI Query Builder

The following steps describe how to use the OpenAPI Query Builder to create a query that can be sent via a Web browser to the Generic Data Engine API. For a list of query limitations, see "Query Limitations" on page 21.

1 Select the time range and granularity of the data to be extracted from the database.

Using the time range selector bar, specify the time range for which you want to extract data.

If you want returned data grouped according to a specific granularity setting (for example, if you want data for the past day grouped per hour), specify a granularity setting and select **Return data per specified granularity**.

For details on using the time range selector bar, see "Choosing the Tracking Range and Granularity" in *Working with Applications*.

2 Select the type of data you want to extract from the database.

From the **Sample type** list, select a data sample type. For a description of the available sample types, see "Samples" in *Reference Information*.

3 Select the data fields of the chosen sample type that you want to extract from the database and the functions to perform on the data. For detailed descriptions of the available data fields per sample type, see "Samples" in *Reference Information*.

Tip: When adding fields to the query, select them in the order in which you want the data columns to appear, from left to right, in the returned output.

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a From the **Field name** list, select a data field.

b Where applicable, from the **Function** list select the function that you want applied to the data. For example, to return average response time, select **Response Time** from the **Field name** list and **AVG** from the **Function** list.

For a description of the supported functions, see "Supported SQL Syntax" on page 20.

c If required, modify the alias name for the field in the **Alias name** box to suit the function applied to the field. For example, if you chose **AVG** from the **Function** list, modify the alias name to say Avg Response Time.

d Click **Add** to add the data field to the query.

e Optionally, once a data field is added to the query, you can edit the field alias and field formula values directly in the **Fields to Return** table. For example, to display returned response time in seconds rather than milliseconds, edit the field formula for Response Time, **dResponseTime**, as follows: dResponseTime / 1000.

f Repeat the above steps for each data field you want to add to the query.

g If required, click the **Delete** button to delete a data field from the query.

4 Apply filters to the extracted data.

Tip: Click **Preview** to see all returned results before applying filters. To limit the number of returned values, select a short time range.

Note:

- When manually defining a filter that consists of strings containing white space or special characters (for example, where bb_guid IN (a b, c)), you must enclose the white space or special character string with quotes (for example, where bb_guid IN ('a b', c)). When you create filters on the Filter Builder page, Mercury Business Availability Center automatically adds the quotes. Special characters are defined as any characters other than digits, letters, and the following characters: "_", "$", "#".
- When defining a filter that consists of strings containing one or more single quote characters, you must add a second single quote character beside each instance. For example, change szTransactionName = ('Login_to_O'brien') to szTransactionName = ('Login_to_O''brien').

---

a Click **Filter Builder** to apply filters to the data that the query will extract.

b From the **Field** list, select a field to which you want to apply a filter. For example, select **Profile Name** to filter the query to only return data for specific profiles (rather than all profiles in the database), or select **Response Time** to filter the query to return only response time data above or below a specific value (rather than all response times).

c In the **Operator** list, select the required operator. For a description of the supported operators, see "Supported SQL Syntax" on page 20.

Note: The LIKE operator does not work for the Profile Name field.

---

d In the **Value** box, specify the required value. For example, if you are filtering the query by transaction name, specify a specific transaction. If you use the LIKE operator, you can use the * wildcard character to return like results (for example, a value of *westcoast* would return all transactions whose name included the string **westcoast**).

When available, use the **Add Values** button to select from a predefined list of values. The Add Values button is enabled for fields whose lookup value is defined as **true** in the sample metadata in the database (generally for final, discreet values).

e Click **And** to add additional **And** filters. Click **Add 'Or' Expression** to add additional **Or** filters.

f Click **OK** when all filters are defined.

g If required, click **Clear All** on the main OpenAPI Query Builder page to clear the filter string.

5 Select additional display options.

- From the **Return results in time zone** list, select the time zone in which you want the data displayed.
- From the **Result format** list, select whether you want data returned in HTML format or CSV format.

6 Verify the query.

- Click **Preview** for a preview of the data that the query will return.
- Click **Display Query** to view the query URL.
- Click **Clear Form** to clear the query and start again.

7 Run the query.

a Click **Display Query** to view the query URL.

b Copy and paste the query URL into the Web browser address box and run it.

Depending on the selected result format, the data will be returned either in the Web browser window or in a CSV file (which you can save as required).

Tip: Save the query URLs you build in a separate file, since the queries built using the OpenAPI Query Builder cannot be saved.

4

Creating Sample Queries

This chapter explains how to manually create queries used by the Generic Data Engine API to extract data from Mercury Business Availability Center profile databases.

Queries for the Generic Data Engine

The Generic Data Engine is a Mercury Business Availability Center component that creates an interface for samples so that they appear as virtual database tables and the sample fields appear as virtual database table fields. This component allows you to query samples using SQL. These queries can be used with the Web Service and to create custom Excel reports.

For more information, see:

- Chapter 2, "Working with the Generic Data Engine API"
- Chapter 3, "The OpenAPI Query Builder"
- "Samples" in *Reference Information*
- "Integrating Microsoft Excel Reports in Mercury Business Availability Center" in *Working with Applications*

Supported SQL Syntax

The language supported is a subset of SQL and supports these keywords, modifiers, and operators:

- SELECT
- WHERE
- FROM
- TOP
- HAVING
- Aliasing with the AS keyword
- Logical operators OR , AND , NOT
- DISTINCT modifier
- IN operator. Inner selects can be used to return the values for the IN operator.
- BETWEEN operator
- IS NULL (IS NOT NULL is not supported)
- LIKE. Note that the wildcard character is the asterisk (*). Do not use the percent sign (%). The asterisk can not be used by itself (LIKE *). It must be used with other characters.
- Comparators: =, IS, !=, <>, >, >=, <, <=
- Functions: MAX, MIN, SUM, COUNT, AVG, STDDEV, SUMOFSQR, LOG, CEIL, FLOOR, MOD, SQRT, REPLACENULL, IF, and the "byTime Function" described on page 23.
- ORDER BY and the ASC and DESC modifiers

Query Limitations

The following limitations apply to queries submitted to the service:

- Composite expressions in the SELECT clause using parenthesis are not supported. For example, you cannot select (a+b)/c. Use of parentheses for function arguments is supported, for example, max(a+b).
- Only one monitor type can be selected in a single query.
- The asterisk (*) is not supported as a wildcard character except in combination with the LIKE operator. It is supported as the multiplication operator.
- Inner selects and joins are not supported, with one exception: an inner select can be used to return the values for an IN clause.
- The ORDER BY clause requires a column number, for example ORDER BY 1. ORDER BY column name is not supported.
- The engine requires that queries contain a time limitation in the WHERE clause.
- The GROUP BY clause is not supported. It is unnecessary because the engine treats all fields that do not have an aggregate function as GROUP BY fields.
- When manually defining a filter that consists of strings containing white space or special characters (for example, where bb_guid IN (a b, c)), you must enclose the white space or special character string with quotes (for example, where bb_guid IN ('a b', c)). When you create filters on the Filter Builder page, Mercury Business Availability Center automatically adds the quotes. Special characters are defined as any characters other than digits, letters, and the following characters: "_", "$", "#".
- When defining a filter that consists of strings containing one or more single quote characters, you must add a second single quote character beside each instance. For example, change szTransactionName = ('Login_to_O'brien') to szTransactionName = ('Login_to_O''brien').
- The columns in the returned data are labeled Column 0, Column 1, and so on. To return meaningful column labels, use the SQL AS operator. For example, Select time_stamp as TimeStamp. With this use of the AS operator, the column label is TimeStamp.

Date-Time Values

Time in queries and return data is specified in seconds since January 1, 1970. You can use Microsoft Excel to understand the time values.

Time is most commonly used for time stamp fields.

To get a GMT time for use in a query, enter the date and time in a Date-formatted cell and in another cell, formatted as General, enter the formula:

```
=(<date cell> - 25569 ) * 86400
```

To correct for a local time zone, add the time zone offset times 3600 seconds to the result. For example, for Central Europe (GMT + 2):

```
=(<date cell> - 25569 ) * 86400 + ( 2 * 3600 )
```

To view a time value from a query as a GMT date in Excel, use a Date format for the cell and enter the formula:

```
=<time stamp> / 86400 + 25569
```

To correct for a local time zone, subtract the time zone offset times 3600 seconds from the time stamp. For example, for the Eastern United States, standard time (GMT - 3):

```
=(<time stamp> - ( -3 * 3600 ) )/ 86400 + 25569
```

byTime Function

The Generic Data Engine SQL supports the function **byTime**, which returns data grouped by time periods. For example, if you build a query that returns the average response time of a transaction for the past day, without the byTime function one value would be returned; using the byTime function, you could request to view the average response time of the transaction for each hour of the past day, in which case a value would be returned for each hour of the past 24 hours.

The function syntax is:

byTime(<*timefield* >, <*step value*>, <*number of step*>, <*offset*>)

Argument	Description
timefield	Usually a timestamp field
step value	One of: -1 - Time not set 10 - Second 20 - Minute 30 - Hour 40 - Day 50 - Week 60 - Month 70 - Quarter 80 - Year
number of step	The number of the units specified in *step value* to group.
offset	Time zone offset from GMT in hours. Positive numbers indicate time zones East of GMT. Negative numbers indicate time zones West of GMT.

For example, to return one value for each 3 days, corrected to two hours East of GMT:

byTime(time_stamp, 40, 3, 2)

Configuration

You can configure the Generic Data Engine Open API options at **Admin** > **Platform** > **Setup and Maintenance** > **Infrastructure Settings** > **Foundations** > **Generic Data Engine Open API**. You can set the maximum number of data rows returned, as well as disable use of the Generic Data Engine Open API.

Generic Data Engine Query Examples

Below are several examples of query URLs that retrieve different types of data from the database.

Example of ss_t Sample

This example illustrates retrieving the average value for SiteScope samples on a given measurement and monitor.

http://myServer/topaz/gdeopenapi/GdeOpenApi?method=getData&user=admin&password=admin&query=select szMeasurementName, szMonitorName, avg(dValue) from ss_t where u_iStatus=1 and time_stamp > 123456 and szMeasurementName = ‘myMeasurmentName’ and szMonitorName = ‘myMonitorName’

Example of trans_t Sample

This example illustrates retrieving the average response time, grouped by minutes and offset to GMT + 3 for Springfield_infra_ems_login transactions in the Springfield_Location profile on for a given period from BPM data.

http://myServer/topaz/gdeopenapi/GdeOpenApi?method=getData&user=admin&password=admin&query=select byTime(time_stamp, 20, 1, 3.0), profile_name as ProfileName, szTransactionName as TransactionName, AVG(dResponseTime) from trans_t where time_stamp>=1126594800.64 and time_stamp<1126596000.64 and profile_name='Springfield_Location' and szTransactionName='Springfield_infra_ems_login'

Example of rum_server_t Sample

This example illustrates retrieving a list of all rum_server_t samples in a given day that failed on a specified server:

http://myServer/topaz/gdeopenapi/GdeOpenApi?method=getData&user=admin&password=admin&query=select time_stamp, engine_name, server_name from rum_server_t where availability=0 and total_hits > 0 and time_stamp > 1041379200 and time_stamp < 1136197020 and server_name = 'myServerName'

Example of rum_page_t Sample

This example illustrates retrieving the total server time for each URL as measured by RUM.

http://myServer/topaz/gdeopenapi/GdeOpenApi?method=getData&user=admin&password=admin&query=select page_url, sum(tot_server_time) from rum_page_t where time_stamp > 1041379200 and time_stamp < 1136197020 &resultType=csv

Legacy Queries

From Mercury Business Availability Center version 6.0, it is possible to write SQL queries directly on samples, which serve as virtual database tables, as described in "Queries for the Generic Data Engine" on page 19. To maintain older reports, use the information in this section.

Structure of the Query

The query begins with the URL of the OpenAPI.jsp:
http://<server_name>/topaz/openapi/OpenAPI.jsp

Following this is a series of query **parameter=value** pairs. The pairs are separated with an ampersand (**&**). You build the query using required and optional parameters.

You can also add filter parameters. For details, see "Filter Parameters" on page 36.

➤ **Required Parameters.** The following parameters are required:

username	The name of the Mercury Business Availability Center user running the query.
password	The password of the Mercury Business Availability Center user running the query
function	The type of the data to receive. One of: **transactions** – Business Process Monitor response time data **transactions_breakdown** – Business Process Monitor transaction breakdown data **sitescope** – SiteScope measurement data **routings** – WebTrace routing data **hops** – WebTrace hop data **transactions_error** – Business Process Monitor transaction error data **alerts** – Business Process Monitor alert data **components_breakdown** – Business Process Monitor component breakdown data
rowDataType	The type of aggregation to use. One of: **row** – raw data **hour** – hourly aggregated data **day** – daily aggregated data The type of aggregation cannot be a larger unit than the one specified with the optional parameter, stepValueType.

profileIds	The IDs of the profiles for which to get data. Separate multiple IDs with a comma (,). For example: profileIds=2,7,9 To extract a profile's ID from the database: 1 Open the page http://<servername>:8080/jmx-console/index.jsp in a Web browser, where <**servername**> represents the name of the Mercury Business Availability Center server. 2 In the **Topaz** list, click the link **service=OAPI Services**. 3 Invoke **com.mercury.infra.db.tools.oapiservices. ProfileMapping getProfiles()** to retrieve the profile ID information.
Time range either *from* and *to* or *lastPeriod*	Either use *from* and *to* to specify the start and end of the period, or use *lastPeriod* to specify the period or periods ending at the time the query is called. The time format for *from* and *to* is: dd/MM/yyyy HH:mm:ss *lastPeriod* is one of: **hour** **day** **week** **month** **quarter** **year** To specify more that one unit of *lastPeriod*, use the parameter numStepUnit together with *lastPeriod*.

➤ **Optional Parameters.** The following parameters are optional:

numStepUnit	Used with <italic>lastPeriod to indicate the number of periods included in the data. For example, get data for the last two days with: lastPeriod=day&numStepUnit=2
resultType	The output file format. One of: **html** **xml** **csv** The default is **html**.
stepValueType	The unit of time by which the data is grouped. One of: **minute** **hour** **day** **week** **month** Use *stepValueType* in conjunction with *stepValue* to see a larger grouping than that specified with rowDataType.
stepValue	The number of the time units specified by *stepValueType* by which to group. For example stepValueType=hour&stepValue=8 groups the data by 8-hour periods. The default is 1.
dateFormat	The format for date value output (that is, the way the date and time are displayed in the report). For example, MM/dd/yyyy%20HH:mm:ss The "%20" indicates a space. (A space is ASCII character number 32, written 20 in hexadecimal.)
timeZone	A time zone specification in the form: *&timezone=<time zone value from below time zone list>* For example: &timezone=Europe/London

Time Zone List

ACT
AET
AGT
ART
AST
Africa/Abidjan
Africa/Accra
Africa/Addis_Ababa
Africa/Algiers
Africa/Asmera
Africa/Bamako
Africa/Bangui
Africa/Banjul
Africa/Bissau
Africa/Blantyre
Africa/Brazzaville
Africa/Bujumbura
Africa/Cairo
Africa/Casablanca
Africa/Ceuta
Africa/Conakry
Africa/Dakar
Africa/Dar_es_Salaam
Africa/Djibouti
Antarctica/McMurdo
Antarctica/Palmer
Antarctica/Rothera
Antarctica/South_Pole
Antarctica/Syowa
Antarctica/Vostok
Arctic/Longyearbyen
Asia/Aden
Asia/Almaty
Asia/Amman
Asia/Anadyr
Asia/Aqtau
Asia/Aqtobe
Asia/Ashgabat
Asia/Ashkhabad
Asia/Baghdad
Asia/Bahrain
Asia/Baku
Asia/Bangkok
Asia/Beirut
Asia/Bishkek
Asia/Brunei
Asia/Calcutta
Asia/Choibalsan
Etc/GMT0
Etc/Greenwich
Etc/UCT
Etc/UTC
Etc/Universal
Etc/Zulu
Europe/Amsterdam
Europe/Andorra
Europe/Athens
Europe/Belfast
Europe/Belgrade
Europe/Berlin
Europe/Bratislava
Europe/Brussels
Europe/Bucharest
Europe/Budapest
Europe/Chisinau
Europe/Copenhagen
Europe/Dublin
Europe/Gibraltar
Europe/Helsinki
Europe/Istanbul
Europe/Kaliningrad
Europe/Kiev

Africa/Douala
Africa/El_Aaiun
Africa/Freetown
Africa/Gaborone
Africa/Harare
Africa/Johannesburg
Africa/Kampala
Africa/Khartoum
Africa/Kigali
Africa/Kinshasa
Africa/Lagos
Africa/Libreville
Africa/Lome
Africa/Luanda
Africa/Lubumbashi
Africa/Lusaka
Africa/Malabo
Africa/Maputo
Africa/Maseru
Africa/Mbabane
Africa/Mogadishu
Africa/Monrovia
Africa/Nairobi
Africa/Ndjamena
Africa/Niamey
Africa/Nouakchott

Asia/Chongqing
Asia/Chungking
Asia/Colombo
Asia/Dacca
Asia/Damascus
Asia/Dhaka
Asia/Dili
Asia/Dubai
Asia/Dushanbe
Asia/Gaza
Asia/Harbin
Asia/Hong_Kong
Asia/Hovd
Asia/Irkutsk
Asia/Istanbul
Asia/Jakarta
Asia/Jayapura
Asia/Jerusalem
Asia/Kabul
Asia/Kamchatka
Asia/Karachi
Asia/Kashgar
Asia/Katmandu
Asia/Krasnoyarsk
Asia/Kuala_Lumpur
Asia/Kuching

Europe/Lisbon
Europe/Ljubljana
Europe/London
Europe/Luxembourg
Europe/Madrid
Europe/Malta
Europe/Minsk
Europe/Monaco
Europe/Moscow
Europe/Nicosia
Europe/Oslo
Europe/Paris
Europe/Prague
Europe/Riga
Europe/Rome
Europe/Samara
Europe/San_Marino
Europe/Sarajevo
Europe/Simferopol
Europe/Skopje
Europe/Sofia
Europe/Stockholm
Europe/Tallinn
Europe/Tirane
Europe/Tiraspol
Europe/Uzhgorod

Africa/Ouagadougou
Africa/Porto-Novo
Africa/Sao_Tome
Africa/Timbuktu
Africa/Tripoli
Africa/Tunis
Africa/Windhoek
America/Adak
America/Anchorage
America/Anguilla
America/Antigua
America/Araguaina
America/Aruba
America/Asuncion
America/Atka
America/Barbados
America/Belem
America/Belize
America/Boa_Vista
America/Bogota
America/Boise
America/Buenos_Aires
America/Cambridge_Bay
America/Cancun
America/Caracas
America/Catamarca
Asia/Kuwait
Asia/Macao
Asia/Macau
Asia/Magadan
Asia/Makassar
Asia/Manila
Asia/Muscat
Asia/Nicosia
Asia/Novosibirsk
Asia/Omsk
Asia/Oral
Asia/Phnom_Penh
Asia/Pontianak
Asia/Pyongyang
Asia/Qatar
Asia/Qyzylorda
Asia/Rangoon
Asia/Riyadh
Asia/Riyadh87
Asia/Riyadh88
Asia/Riyadh89
Asia/Saigon
Asia/Sakhalin
Asia/Samarkand
Asia/Seoul
Asia/Shanghai
Europe/Vaduz
Europe/Vatican
Europe/Vienna
Europe/Vilnius
Europe/Warsaw
Europe/Zagreb
Europe/Zaporozhye
Europe/Zurich
GB
GB-Eire
GMT
GMT0
Greenwich
HST
Hongkong
IET
IST
Iceland
Indian/Antananarivo
Indian/Chagos
Indian/Christmas
Indian/Cocos
Indian/Comoro
Indian/Kerguelen
Indian/Mahe
Indian/Maldives

America/Cayenne
America/Cayman
America/Chicago
America/Chihuahua
America/Cordoba
America/Costa_Rica
America/Cuiaba
America/Curacao
America/Danmarkshavn
America/Dawson
America/Dawson_Creek
America/Denver
America/Detroit
America/Dominica
America/Edmonton
America/Eirunepe
America/El_Salvador
America/Ensenada
America/Fort_Wayne
America/Fortaleza
America/Glace_Bay
America/Godthab
America/Goose_Bay
America/Grand_Turk
America/Grenada
America/Guadeloupe
Asia/Singapore
Asia/Taipei
Asia/Tashkent
Asia/Tbilisi
Asia/Tehran
Asia/Tel_Aviv
Asia/Thimbu
Asia/Thimphu
Asia/Tokyo
Asia/Ujung_Pandang
Asia/Ulaanbaatar
Asia/Ulan_Bator
Asia/Urumqi
Asia/Vientiane
Asia/Vladivostok
Asia/Yakutsk
Asia/Yekaterinburg
Asia/Yerevan
Atlantic/Azores
Atlantic/Bermuda
Atlantic/Canary
Atlantic/Cape_Verde
Atlantic/Faeroe
Atlantic/Jan_Mayen
Atlantic/Madeira
Atlantic/Reykjavik
Indian/Mauritius
Indian/Mayotte
Indian/Reunion
Iran
Israel
JST
Jamaica
Japan
Kwajalein
Libya
MET
MIT
MST
MST7MDT
Mexico/BajaNorte
Mexico/BajaSur
Mexico/General
Mideast/Riyadh87
Mideast/Riyadh88
Mideast/Riyadh89
NET
NST
NZ
NZ-CHAT
Navajo
PLT

America/Guatemala	Atlantic/South_Georgia	PNT
America/Guayaquil	Atlantic/St_Helena	PRC
America/Guyana	Atlantic/Stanley	PRT
America/Halifax	Australia/ACT	PST
America/Havana	Australia/Adelaide	PST8PDT
America/Hermosillo	Australia/Brisbane	Pacific/Apia
America/Indiana/Indianapolis	Australia/Broken_Hill	Pacific/Auckland
America/Indiana/Knox	Australia/Canberra	Pacific/Chatham
America/Indiana/Marengo	Australia/Darwin	Pacific/Easter
America/Indiana/Vevay	Australia/Hobart	Pacific/Efate
America/Indianapolis	Australia/LHI	Pacific/Enderbury
America/Inuvik	Australia/Lindeman	Pacific/Fakaofo
America/Iqaluit	Australia/Lord_Howe	Pacific/Fiji
America/Jamaica	Australia/Melbourne	Pacific/Funafuti
America/Jujuy	Australia/NSW	Pacific/Galapagos
America/Juneau	Australia/North	Pacific/Gambier
America/Kentucky/Louisville	Australia/Perth	Pacific/Guadalcanal
America/Kentucky/Monticello	Australia/Queensland	Pacific/Guam
America/Knox_IN	Australia/South	Pacific/Honolulu
America/La_Paz	Australia/Sydney	Pacific/Johnston
America/Lima	Australia/Tasmania	Pacific/Kiritimati
America/Los_Angeles	Australia/Victoria	Pacific/Kosrae
America/Louisville	Australia/West	Pacific/Kwajalein
America/Maceio	Australia/Yancowinna	Pacific/Majuro

America/Managua	BET	Pacific/Marquesas
America/Manaus	BST	Pacific/Midway
America/Martinique	Brazil/Acre	Pacific/Nauru
America/Mazatlan	Brazil/DeNoronha	Pacific/Niue
America/Mendoza	Brazil/East	Pacific/Norfolk
America/Menominee	Brazil/West	Pacific/Noumea
America/Merida	CAT	Pacific/Pago_Pago
America/Mexico_City	CET	Pacific/Palau
America/Miquelon	CNT	Pacific/Pitcairn
America/Monterrey	CST	Pacific/Ponape
America/Montevideo	CST6CDT	Pacific/Port_Moresby
America/Montreal	CTT	Pacific/Rarotonga
America/Montserrat	Canada/Atlantic	Pacific/Saipan
America/Nassau	Canada/Central	Pacific/Samoa
America/New_York	Canada/East-Saskatchewan	Pacific/Tahiti
America/Nipigon	Canada/Eastern	Pacific/Tarawa
America/Nome	Canada/Mountain	Pacific/Tongatapu
America/Noronha	Canada/Newfoundland	Pacific/Truk
America/North_Dakota/Center	Canada/Pacific	Pacific/Wake
America/Panama	Canada/Saskatchewan	Pacific/Wallis
America/Pangnirtung	Canada/Yukon	Pacific/Yap
America/Paramaribo	Chile/Continental	Poland
America/Phoenix	Chile/EasterIsland	Portugal
America/Port-au-Prince	Cuba	ROK
America/Port_of_Spain	EAT	SST

America/Porto_Acre
America/Porto_Velho
America/Puerto_Rico
America/Rainy_River
America/Rankin_Inlet
America/Recife
America/Regina
America/Rio_Branco
America/Rosario
America/Santiago
America/Santo_Domingo
America/Sao_Paulo
America/Scoresbysund
America/Shiprock
America/St_Johns
America/St_Kitts
America/St_Lucia
America/St_Thomas
America/St_Vincent
America/Swift_Current
America/Tegucigalpa
America/Thule
America/Thunder_Bay
America/Tijuana
America/Tortola
America/Vancouver
ECT
EET
EST
EST5EDT
Egypt
Eire
Etc/GMT
Etc/GMT+0
Etc/GMT+1
Etc/GMT+10
Etc/GMT+11
Etc/GMT+12
Etc/GMT+2
Etc/GMT+3
Etc/GMT+4
Etc/GMT+5
Etc/GMT+6
Etc/GMT+7
Etc/GMT+8
Etc/GMT+9
Etc/GMT-0
Etc/GMT-1
Etc/GMT-10
Etc/GMT-11
Etc/GMT-12
Etc/GMT-13
Singapore
SystemV/AST4
SystemV/AST4ADT
SystemV/CST6
SystemV/CST6CDT
SystemV/EST5
SystemV/EST5EDT
SystemV/HST10
SystemV/MST7
SystemV/MST7MDT
SystemV/PST8
SystemV/PST8PDT
SystemV/YST9
SystemV/YST9YDT
Turkey
UCT
US/Alaska
US/Aleutian
US/Arizona
US/Central
US/East-Indiana
US/Eastern
US/Hawaii
US/Indiana-Starke
US/Michigan
US/Mountain

America/Virgin	Etc/GMT-14	US/Pacific
America/Whitehorse	Etc/GMT-2	US/Pacific-New
America/Winnipeg	Etc/GMT-3	US/Samoa
America/Yakutat	Etc/GMT-4	UTC
America/Yellowknife	Etc/GMT-5	Universal
Antarctica/Casey	Etc/GMT-6	VST
Antarctica/Davis	Etc/GMT-7	W-SU
Antarctica/DumontDUrville	Etc/GMT-8	WET
Antarctica/Mawson	Etc/GMT-9	Zulu

Filter Parameters

There can be one **filters** clause in the query. It is not required. If there is more than one filter in the clause, the filters are separated by a semicolon (;).

A filter consists of a report column name, a filter type, the number of patterns in the list, and a list of patterns. Each element in a filter is separated by a semicolon (;).

For example:

```
filters=MonitorTitle;in;2;9,12;Measurement;in;1;18
```

means:

```
select where (MonitorTitle equals 9 or 12) and (Measurement equals 18)
```

The following filter parameters are available:

General Filter Types	These types can be used with numerical or text columns. **in** – Data is included in the report if it equals one of the items in the list of patterns. **not_in** – Data is included in the report if it does not equal any item in the list of patterns.
Text Filter Types	This type can be used with text columns. **like** – Data is included in the report if it matches the pattern. When **like** is used, the number of patterns in the list must be one (1). The wildcard, asterisk (*****), can be used with **like**. For example: filters=Host Name;like;1;ServerNum*
Numeric Filter Types	These types can be used with numerical columns. **bigger** **smaller** **equals**

Query Examples

Example 1:

http://<server_name>/topaz/openapi/OpenAPI.jsp?
username=fitzwilliam&password=darcy&function=transactions&profileIds=33&
lastPeriod=hour&rowDataType=raw&dateFormat=MM/dd/yyyy HH:mm:ss

Example 2:

http://<server_name>/topaz/openapi/OpenAPI.jsp?
username=fitzwilliam&password=darcy&function=transactions&profileIds=33&
from=10/12/2002 14:00:00&to=10/12/2002 15:00:00& rowDataType=raw&
dateFormat=MM/dd/yyyy%20HH:mm:ss

Example 3:

http://<server_name>/topaz/openapi/OpenAPI.jsp?username=fitzwilliam&password=darcy&function=sitescope&profileIds=35&lastPeriod=day&numStepUnit=2&&rowDataType=hour&dateFormat=MM/dd/yyyy%20HH:mm:ss&filters=MonitorTitle;in;1;9;Measurement;in;1;18&stepValueType=hour&stepValue=6

5

Working with the CMDB API

Note to Mercury Managed Services customers: For details on how to use the CMDB API in a Managed Services environment, contact Mercury Managed Services Support.

This chapter explains how to work with the CMDB API to extract configuration data from Mercury Universal CMDB (Configuration Management Database) for use with third-party or custom tools, or to write data to the database.

Using the CMDB API

The CMDB API is a SOAP API used to integrate between the Mercury Universal CMDB and other applications. The API provides methods to add, remove, and update CIs (configuration items) and relations in the CMDB, and methods to query the CMDB base on TQL (topology query language).

The API also provides methods to query the CMDB. There are three types of queries:

- Queries that require topological information use a TQL, either previously defined in the CMDB, or passed by the client for ad hoc processing. Ad hoc queries are usually TQL definitions from the database that the client extracts and then uses the definition in the SOAP call.
- Queries on a single CI type based on a condition are used when topology is not important.
- The third type is queries on the topology surrounding a specific CI. This can be done with a TQL, but the APIs are faster and simpler. For example, you can query for all the neighbors or all descendents of a given CI that meet some criteria.

Note:

The CMDB API is not compatible with an Apache AXIS client for versions later than AXIS 1.2.

Users of the CMDB API should be familiar with:

- the SOAP specification
- an object-oriented programming language such as C++ or Java
- Mercury Application Mapping
- CMDB
- Mercury Business Availability Center administration and applications

---

Uses of the API

The API can be used to fulfill a number of business requirements. For example:

- A third party asset management tool may update the Mercury CMDB with information available only to that tool, thereby unifying the data with data collected by Mercury applications.
- A number of third party systems might populate the Mercury CMDB to create a central CMDB that can track changes and perform impact analysis.
- A third party system might create CIs and relations according to its business logic, then write the data to the CMDB to take advantage of the CMDB query capabilities.

Permissions

To use the web service, the client must pass a user and password defined in the files in folder <install directory>\AppServer\webapps\cmdb_openapi.war\WEB-INF\classes. Enter the data in files cmdb-open-api-users.properties and cmdb-open-api-roles.properties.

Calling the Web Service

The CMDB Web Service enables calling server-side methods using standard SOAP programming techniques. The engine returns an error description if it cannot parse the statement, or if there is a problem invoking the method. If there is no error, the results of the invocation are returned.

SOAP programmers can access the WSDL at:

http://<server>[:port]/cmdb_openapi/services/cmdb?wsdl

The port specification is only necessary for non-standard installations. Consult your system administrator for the correct port number.

The URL for calling the service is:

http://<server>[:port]/cmdb_openapi/services/cmdb

CMDB Parameter Format

All methods take a cmdb-context input parameter.

Data in the CMDB consists of data objects and links.

Data can be organized in cmdb-graphs and tql-result-maps as output and data-containers as input. The calling program should also define the data-layout.

TQL calculations return a tql-result-map.

CMDB API methods can throw a SoapFault exception. The error message, error code, and exception message fields may be populated. No specific CMDB exceptions are thrown.

All methods use CMDB IDs. An ID can be a real ID, a temporary ID, or an empty ID. A real ID is a string of 32 characters representing a hexadecimal number. A temporary ID can be any string. An empty ID means no value is assigned to the parameter.

A real ID identifies an entity that is stored in the CMDB.

A temporary ID does not represent an existing entity in the CMDB and must not be the same as any real ID. Note that when a temporary ID is used, if an existing data object can be identified by the other properties, that object is used as appropriate for the context as though it had been identified with a real ID.

Note that ID properties must be set during object or link creation and they are part of object or link ID calculation. Properties that have the REQUIRED attribute in the class module definition in the CIT manager must be set during object or link creation but are not part of object or link ID calculation.

cmdb-context

CMDB API services get a cmdb-context parameter. This parameter specifies the caller and the customer to receive the request. The inner parameters are:

- CUSTOMERID. An integer that denotes the customer number for whom the request is invoked.

➤ CALLERAPPLICATION. A string that identifies the client that invokes the method. The caller application is used for logging and trouble-shooting. No server logic is performed with this parameter.

object

An object is composed of an ID, an object type, and a collection of object properties.

The ID can be a real CMDB ID, a temporary ID, or an empty ID.

If a real CMDB ID is used, set the ISCMDBID flag to true.

The client can assign a temporary ID to an object that will be referenced by either of the two ends of a link. In this case, set the ISCMDBID flag to false.

An empty ID is used to enter a data object that is not referenced by any link in the CMDB. Where the object is not referenced, only the object type and properties are set.

link

A link contains an ID, a link type, two end IDs, and a properties collection.

The link ID can be a real CMDB ID, a temporary ID, or empty. The link type is the name of the CMDB class from which the link is instantiated.

The two link end IDs may not be empty IDs. If the first is a real CMDB ID, set ISEND1IDCMDBID true. If the second is a real ID, set ISEND2IDCMDBID to true.

If you set the link properties only so that the link can be identified, and not to update data, the ID properties alone are sufficient. To add or update a link, the ID and those properties that have the REQUIRED attribute in the class module definition in the CIT manager must be entered. Other properties are optional. If a real CMDB ID is set in the link and it is used in a remove operation, properties are not used.

cmdb-graph

A CMDB graph is a collection of objects and the links connecting these objects.

data-container

A data container has CMDBOBJECTS, CMDBLINKS, and a REFERENCEDOBJECTS collection. The objects and links are written to the CMDB.

Referenced objects are used to define the ends of links or ID reference attributes of objects, for example, the root_container. The data in referenced objects is not written to the CMDB. If the client has no real IDs for the links' ends, it can set temporary IDs for the ends and define referenced objects for these temporary IDs.

data-layout

The data layout defines the subset of objects and links and their properties to return. The data layout consists of ELEMENT-TYPE-LAYOUT entries for the objects and links.

An ELEMENT-TYPE-LAYOUT contains a TYPE-TO-LAYOUT map, the ALLLAYOUT flag, the PROPQUALIFIERS property qualifiers collection, and the KEYS key property names list.

The TYPE-TO-LAYOUT MAP is a list of TYPE (class name) and ELEMENT-SIMPLE-LAYOUT pairs. Each type can be linked to a specific simple layout.

If the ALLLAYOUT flag is true, all properties of all classes are returned, regardless of other layout settings. There is a significant performance penalty for setting this flag true. If the flag is false, all properties specified or implied by any of the other properties are returned.

The PROPQUALIFIERS property qualifiers list indirectly specifies the properties to be returned. Properties that have one of the specified qualifiers are returned.

The properties named in the KEYS list are returned regardless of their class name.

properties

The collection of properties, called PROPS in the wsdl, is divided into collections of properties according to data type. For example: StrProps is a collection of strings, IntProps is a collection of integers.

tql-result-map

The TQL result map is the result of a TQL calculation. It contains data according to node and links numbers defined in the TQL pattern definition. The map contains the CHUNKED flag, the CHUNKSINFO chunk information, the OBJECTSRESULTENTRIES objects results list, and the LINKSRESULTENTRIES links results list.

The CHUNKED flag is true if the result map is large and should be retrieved in chunks. If so, only the chunk information is used in processing the map. If the flag is false, the data is in the objects results list and links results list of this result map.

The chunk information is sent as the request identifier in each chunk request if CHUNKED is true.

The entries in the objects result entries list contain a node number defined in the TQL definition and a list of the objects that belong to this node.

The entries in the links result entries contain a link node number defined in the TQL definition and a list of the links that belong to this link node.

Chunking is never more than two layers deep. One map that is chunked has its information passed in the objects results and links results lists of a number of partial maps, none of which is chunked itself.

CMDB Module Methods

This section includes the following topics:

- CMDB Module Update Methods. For details, see below.
- CMDB Module Query Methods. For details, see page 47.

CMDB Module Update Methods

modelUpdateAddOrUpdateData

modelUpdateAddOrUpdateData adds or updates objects and links in the data container. If objects or links do not exist in the container, they are added. If they already exist, they are updated with the new data.

Input:

- cmdb-context
- data-container

Output:

- Map. A map of key strings and value strings. The key is a temporary ID and the value is the real CMDB ID. The temporary ID is known to the client because it is initially generated by the client. The Map can be used to get the corresponding real CMDB ID.

modelUpdateUpdateData

modelUpdateUpdateData updates the objects and links that are in the data container. If any of the objects or links do not exist in the CMDB, an exception is thrown.

Input:

- cmdb-context
- data-container

modelUpdateRemoveDataIfExist

modelUpdateRemoveDataIfExist removes the objects and links that are in the data container. If any of the objects or links do not exist in the CMDB, an exception is thrown.

Input:

- cmdb-context
- data-container

CMDB Module Query Methods

modelQueryCalcTqlByDefinition

modelQueryCalcTqlByDefinition performs an ad-hoc calculation of the specified TQL and returns a TQL result map.

Input:

- cmdb-context
- tqlDefinition string. The CMDB graph XML defines the TQL.

Output:

- tql-result-map

modelQueryGetCIsByCondition

modelQueryGetCIsByCondition returns a tql-result-map of all data objects that match the specified conditions. modelQueryGetCIsByCondition returns only objects, not links.

Input:

- cmdb-context
- elementCondition. The condition to be matched in order to return CIs. An element-condition consists of three parameters. All parameters specified must be true for the condition to be met. The parameters are:
  - classCondition. The name of the class for which to retrieve CIs. If parameter ISDERIVED is true, CIs of all descendant classes are also returned. Otherwise only CIs of given class will be returned. This parameter is required.
  - idsCondition. The CMDB ids of the CIs to be retrieved. This parameter is optional.
  - propertyConditions. Specifications of conditions based on CIs' properties. All property conditions must be met for this parameter to be true. This parameter is optional.

- elementTypeLayout. The layout of CIs to retrieve.

  Output:

- tql-result-map. The matching objects are returned in node number 1.

modelQueryGetTqlResultByTqlName

modelQueryGetTqlResultByTqlName returns the existing result of the specified active TQL, or performs an ad hoc calculation of any TQL in the CMDB.

Input:

- cmdb-context
- tqlName. The name of the TQL in the CMDB for which to get the result
- isToRunAdHoc (boolean). Sets whether to use existing results or force an ad hoc run. If the value is **true**, the TQL is run ad hoc whether it is active or not. If false, the existing results of the active TQL are used.

  Output:

- tql-result-map

modelQueryGetTqlResultChunk

modelQueryGetTqlResultChunk retrieves a chunk of a tql-result-map. Use this method when ISCHUNKED is true in the result map returned by another method.

Input:

- cmdb-context
- tql-chunk-request. The request has an integer index named CHUNKTORETRIEVE, and CHUNKINFO. The client should not create this CHUNKINFO, but use the chunk information returned in the tql-result-map returned by methods like modelQueryGetTqlResultByTqlName or modelQueryCalcTqlByDefinition.

Output:

- The tql-result-map of the requested chunk. This map is never chunked, so the isChunked flag and chunk information should be ignored. Only the objects results entries and the links results entries contain useful information.

modelQueryGetDirectAssociations

modelQueryGetDirectAssociations returns the neighbors of the specified CMDB source object.

Input:

- cmdb-context
- wsSourceCmdbObject. The source CMDB data object for which to return the direct associations.
- depth. The maximum depth of neighbors in the cmdb-graph to return.
- wsDataLayout. A data-layout for the results. The result contains the objects and links that are direct associates of the source object.
- The wsTqlPatternInfo. The tql-pattern-info is a filter for associations that fit the pattern or a specified node in the pattern. If the direct associations should be retrieved over the whole CMDB model, set this parameter to null. The TQL Pattern Information consists of:

  tqlName. The name of the TQL from which to retrieve direct associations.

  nodeNumber (integer). The node number in the specified TQL where the source object is located.

Output:

- tql-result-map. Objects are returned in node number 1 and links are returned in node number 2. The map can be chunked.

modelQueryGetDirectDependencies

modelQueryGetDirectDependencies returns a cmdb-graph of all CIs connected directly to the given object by links of type CONTAINER or type CONTAINED.

Input:

- cmdb-context
- The source CMDB data object. The object whose dependencies to return.
- data-layout. Defines the layout of the result to return. The result contains the objects and links that are direct dependencies of the source object.

Output:

The cmdb-graph of all direct dependencies of the source object.

Use Cases and Examples

There are two categories of use, updating the CMDB and querying the CMDB. The following examples assume two systems:

Mercury CMDB server

A third party system that contains a repository of CIs (configuration items).

Population of the Mercury CMDB

A third party system can update the Mercury CMDB by:

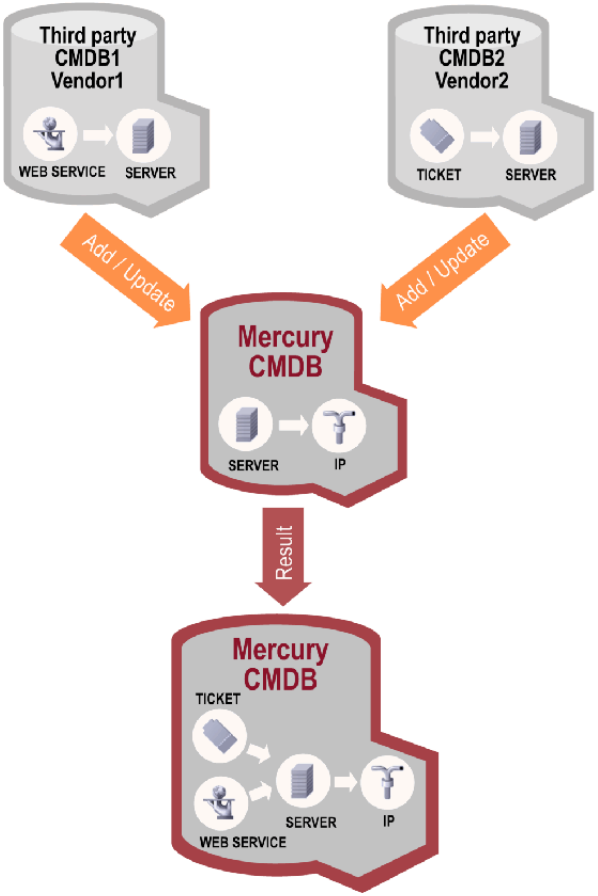
- Populating the Mercury CMDB with new CIs and Relations based on the class definition already defined in Mercury CMDB
- Removing CIs and Relations from the Mercury CMDB
- Updating existing CIs and Relations in the Mercury CMDB

Use cases:

- A third party asset management updates the Mercury CMDB with information available only in asset management
- A number of third party systems populate the Mercury CMDB to create a central CMDB that can track changes and perform impact analysis
- A third party system creates CIs and Relations according the third party business logic to leverage the CMDB query capabilities

Update use case diagram

Third party asset management systems update the Mercury CMDB with information available only in asset management.



After the update process is complete, the CMDB can be queried and you can discover that there is a ticket that may affect a web service.

Update Code Example

```
package demo;

import client.generated.*;
import client.generated.Object;

import javax.xml.rpc.ServiceException;
import java.rmi.RemoteException;

/**
 * ************************************************
 * The CmdbUpdateApiSimpleDemo class is an example
 * of updating the CMDB.
 * ************************************************
 */
public class CmdbUpdateApiSimpleDemo {

  private int _customerID = 1;
  private String _callerApp = "CmdbUpdateApiSimpleDemo";

  /**
   * This example adds a document, then creates a
   * link between a host that is already
   * in the CMDB and this new document.
   * @param hostKey      The key of the host
   * @throws             ServiceException
   * @throws             RemoteException
   */
  public void add(String hostKey) throws
    ServiceException, RemoteException {

    // Create the data container.
    DataContainer dataContainer = new DataContainer();

    // Create the reference to the host that is
    // already in the CMDB.
    String hostID = "ref1";
    Object host = new Object();
```

```
host.setType("host");
host.setID(hostID);
host.setIsCmdbID(false);


// Set the properties of the host.
StrProp hostKeyProp = new StrProp();
hostKeyProp.setK("host_key");
hostKeyProp.setV(hostKey);
StrProp[] stringHostProps = {hostKeyProp};
Props hostProps = new Props();
hostProps.setStrProps(stringHostProps);
host.setProps(hostProps);

Object[] hostArr = {host};
Objects refObjects = new Objects(hostArr);
dataContainer.setReferencedObjects(refObjects);

// Create the document.
String docID = "ID2";
Object document = new Object();
document.setType("document");
document.setID(docID);
document.setIsCmdbID(false);

// Set the properties of the document and add
// it to the dataContainer.
StrProp documentNameProp = new StrProp();
documentNameProp.setK("data_name");
documentNameProp.setV("doc_"+hostKey);
StrProp documentContainerProp = new StrProp();
documentContainerProp.setK("root_container");
documentContainerProp.setV(hostID);
StrProp[] stringDocProps =
  {documentNameProp,documentContainerProp};
Props docProps = new Props();
docProps.setStrProps(stringDocProps);
document.setProps(docProps);
Object[] docArr = {document};
```

```
  Objects objects = new Objects(docArr);
  dataContainer.setCmdbObjects(objects);

  // Create the link and add it to the data container.
  Link link = new Link();
  link.setType("container_f");
  link.setID("ID3");
  link.setEnd1ID(hostID);
  link.setEnd1IDIsCmdbID(false);
  link.setEnd2ID(docID);
  link.setEnd2IDIsCmdbID(false);
  Link[] linkArr = {link};
  Links links = new Links(linkArr);
  dataContainer.setCmdbLinks(links);

  // Update the CMDB.
  getCmdbOpenApi().modelUpdateAddOrUpdateData
     (getCmdbContext(),dataContainer);
}

/**
 * This example updates the host's DNS name property.
 * @param hostKey    The key of the host
 * @throws           ServiceException
 * @throws           RemoteException
 */
public void update(String hostKey) throws
  ServiceException, RemoteException {

  // Create the data container.
  DataContainer dataContainer = new DataContainer();

  // Create the host object.
  Object host = new Object();
  host.setType("host");
  host.setID("ID1");
  host.setIsCmdbID(false);
```

```
  // Create the key properties because
  // the real CMDB ID is unknown.
  StrProp hostKeyProp = new StrProp();
  hostKeyProp.setK("host_key"); // Property "host_key"
  hostKeyProp.setV(hostKey);

  // Create the property to be updated and set
  // the new value.
  StrProp hostDnsProp = new StrProp();
  hostDnsProp.setK("host_dnsname");
  hostDnsProp.setV("newDnsName");

  // Create the collection of properties and add
  // it to the host object.
  StrProp[] hostStringProps = {hostKeyProp,hostDnsProp};
  Props hostProps = new Props();
  hostProps.setStrProps(hostStringProps);
  host.setProps(hostProps);

  // Add the host to the data container.
  Object[] objectsArray = {host};
  dataContainer.setCmdbObjects(new Objects(objectsArray));

  // Update the CMDB.
  getCmdbOpenApi().modelUpdateUpdateData
     (getCmdbContext(),dataContainer);
}

/**
 * This example removes the specified host.
 * @param hostKey    The key of the host
 * @throws          ServiceException
 * @throws          RemoteException
 */
public void remove(String hostKey)
   throws ServiceException, RemoteException {

  // Create the data container
  DataContainer dataContainer = new DataContainer();
```

```
  // Create the host object
  Object host = new Object();
  host.setType("host");
  host.setID("ID1");
  host.setIsCmdbID(false);


  // Create the key properties because
  // the real CMDB ID is unknown.
  StrProp hostKeyProp = new StrProp();
  hostKeyProp.setK("host_key");
  hostKeyProp.setV(hostKey);

  // Create the collection of properties and add
  // it to the host object.
  StrProp[] hostStringProps = {hostKeyProp};
  Props hostProps = new Props();
  hostProps.setStrProps(hostStringProps);
  host.setProps(hostProps);

  // Add the host to the data container.
  Object[] objectsArray = {host};
  dataContainer.setCmdbObjects(new Objects(objectsArray));

  // Update the CMDB.
  getCmdbOpenApi().modelUpdateRemoveDataIfExist
     (getCmdbContext(),dataContainer);
}

private CmdbOpenApi getCmdbOpenApi()
   throws ServiceException {

  // Create the CMDB API.
  CmdbOpenApiServiceLocator cmdbOpenApiServiceLocator =
     new CmdbOpenApiServiceLocator();
  return cmdbOpenApiServiceLocator.getcmdb();
}
```

```
  private CmdbContext getCmdbContext(){
    return new CmdbContext(_callerApp,_customerID);
  }
}
```

Querying the Mercury CMDB

There are many approaches to queries. For example:

The client gets the result of a TQL that is defined in the CMDB or passes a TQL definition to CMDB. This approach is used for a complex queries, for example, topology queries.

For an ad hoc query, the calling party provides a TQL. Usually, the calling party exports a TQL definition and then uses it in the ad hoc query.

For simple queries where topology is not important, a single CI type is queried based on a condition. This type of query returns a list of CIs, rather than a graph.

The topology surrounding a specific CI is queried using APIs, for example, modelQueryGetDirectAssociations or modelQueryGetDirectDependencies. This information can also be extracted with a TQL query.

The CMDB can be queried for all the neighbors of a given CI in a specified range. For example, the query can be performed over a specific TQL that returns all neighbors in context of a SAP application, or a TQL that returns all neighbors in the CMDB.

The CMDB can be queried for direct decadents, that is, items that are contained by the CI. For example, querying a host CI returns the host's disks.

Use cases:

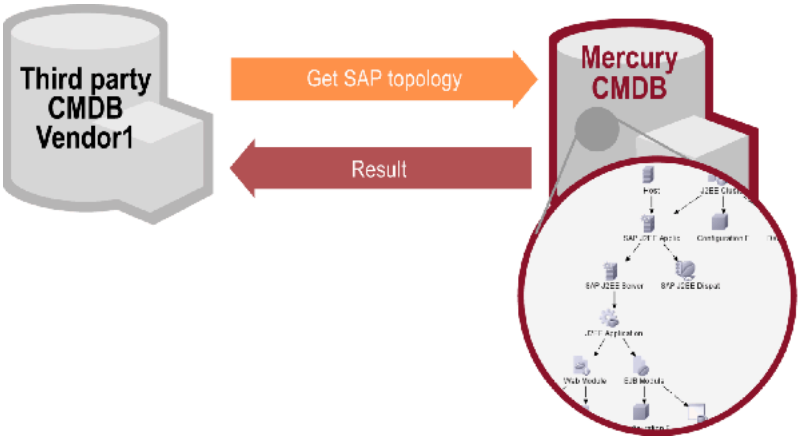
A third party system gets the CIs and Relations that represent the SAP system by getting the results of the SAP TQL.

A third party system gets the list of Oracle servers that have been added or changed in the last five hours.

A third party system gets the list of servers whose host name contains the substring “lab”.

A third party system finds the relations to a given CI by getting its neighbors.

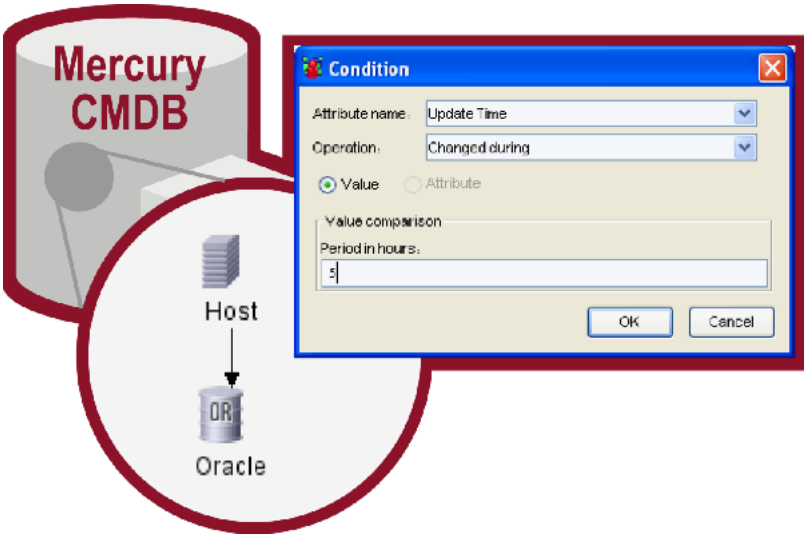
Getting all CIs and Relations from SAP



Finding Changed Oracle Servers

A third party system that monitors servers running the Oracle database manager gets a list of the servers running Oracle.exe that had been added or changed in the last five hours by running an ad hoc query.

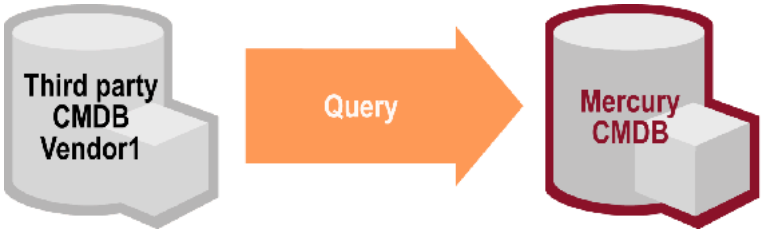
Create a TQL and export it to XML.



A third party application runs the query based on the exported XML.

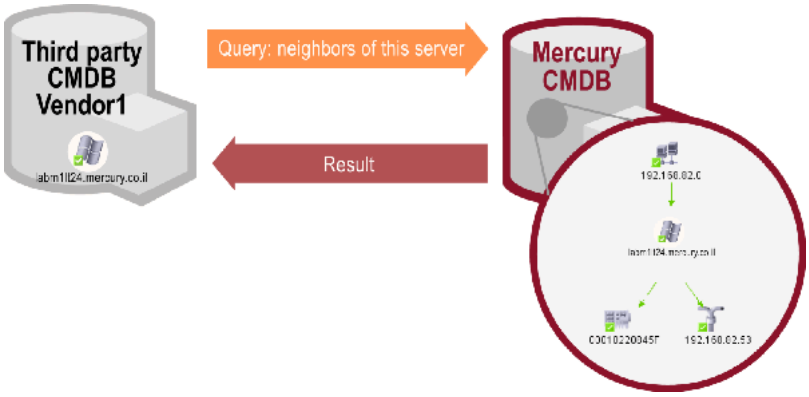
Finding hosts with a host name LIKE %Lab%

A third party system gets a list of servers that have a host name containing the substring “lab” by performing a condition-based query based host type and host name.



Finding relations of CIs to a given CI.

A third party system containing CIs queries the CMDB on relations of a given CI to other CIs by performing a get-neighbors query on the CMDB.



Query Code Example

```
package demo;

import client.generated.*;
import client.generated.Object;

import javax.xml.rpc.ServiceException;
```

```
import java.rmi.RemoteException;

/**
 * ***************************************
 * The CmdbQueryApiSimpleDemo class is an
 * example of getting data from the CMDB.
 * ***************************************
 */
public class CmdbQueryApiSimpleDemo {

  private int _customerID = 1;
  private String _callerApp = "CmdbQueryApiSimpleDemo";

  /**
   * Runs the specified TQL and prints the resulting map.
   * @throws ServiceException
   * @throws RemoteException
   */
  public void getTqlResultByTqlDefinition(String tqlDefinition)
    throws ServiceException, RemoteException {

    CmdbOpenApi api = getCmdbOpenApi();
    CmdbContext cmdbContext = getCmdbContext();

    // Run the query in the CMDB.
    TqlResultMap tqlResultMap =
      api.modelQueryCalcTqlByDefinition(cmdbContext,tqlDefinition);

    // Print the results.
    printAllTqlResultMapChunks(tqlResultMap,api,cmdbContext);

  }

  /**
   * Runs the "Host Resources" TQL and prints the
   * resulting map.
   * @throws RemoteException
   * @throws ServiceException
   */
```

```
public void getTqlResultByTqlName()
  throws RemoteException, ServiceException {

  CmdbOpenApi api = getCmdbOpenApi();
  CmdbContext cmdbContext = getCmdbContext();
  String tqlname = "Host Resources";

  // Run the query in the CMDB
  TqlResultMap tqlResultMap =
     api.modelQueryGetTqlResultByTqlName(cmdbContext, tqlname,false);

  // Print the results
  printAllTqlResultMapChunks(tqlResultMap,api,cmdbContext);
}

/**
 * Gets all the neighbors of the host and prints
 * the resulting map.
 * @param hostKey     The host's key
 * @throws           ServiceException
 * @throws           RemoteException
 */
public void getDirectAssociations(String hostKey)
  throws ServiceException, RemoteException {

  CmdbOpenApi api = getCmdbOpenApi();
  CmdbContext cmdbContext = getCmdbContext();

  // Create the host object
  // Because the real CMDB ID is not known,
  // sends ID properties.
  Object host = new Object();
  host.setType("host");
  host.setIsCmdbID(false);
  StrProp hostKeyProp = new StrProp();
  hostKeyProp.setK("host_key");
  hostKeyProp.setV(hostKey);
  StrProp[] hostStringProps = {hostKeyProp};
  Props hostProps = new Props();
```

```
  hostProps.setStrProps(hostStringProps);
  host.setProps(hostProps);

  // Create the layout
  ElementTypeLayout elementTypeLayout =
    new ElementTypeLayout();
  elementTypeLayout.setKeys
    (new String[]{"data_name","display_label"});
  DataLayout dataLayout =
    new DataLayout(elementTypeLayout,elementTypeLayout);

  // Run the query over the entire CMDB model and
  // not over a pattern result.
  TqlResultMap tqlResultMap =
     api.modelQueryGetDirectAssociations
        (cmdbContext, host,2,dataLayout,null);
  printTqlResultMap(tqlResultMap);
}

 /**
 * Gets all the direct dependencies of the host
 * and outputs the objects and links.
 * @param hostKey     The host's key
 * @throws            ServiceException
 * @throws            RemoteException
 */
public void getDirectDependencies(String hostRealCmdbID)
  throws ServiceException, RemoteException {

  CmdbOpenApi api = getCmdbOpenApi();
  CmdbContext cmdbContext = getCmdbContext();

  // Create the host object.
  Object host = new Object();
  host.setType("host");
  host.setID(hostRealCmdbID);
  host.setIsCmdbID(true);

  // Create the layout.
```

```
  ElementTypeLayout elementTypeLayout =
    new ElementTypeLayout();
  elementTypeLayout.setKeys
    (new String[]{"data_name","display_label"});
  DataLayout dataLayout =
    new DataLayout(elementTypeLayout,elementTypeLayout);

  // Run the query.
  CmdbGraph cmdbGraph =
    api.modelQueryGetDirectDependencies
      (cmdbContext, host, dataLayout);
  System.out.println("found objects: "+cmdbGraph.getCmdbObjects());
  System.out.println("found links: "+cmdbGraph.getCmdbLinks());
}

/**
 * Gets all Configuration Items whose type is either
 * host or a type derived from host
 * and prints the resulting map.
 * @throws RemoteException
 * @throws ServiceException
 */
public void getCIsByClassConditionOnly()
  throws RemoteException, ServiceException {

  CmdbOpenApi api = getCmdbOpenApi();
  CmdbContext cmdbContext = getCmdbContext();

  // Create the class condition: host or derived from host.
  ClassCondition classCondition =
    new ClassCondition("host", Boolean.TRUE);

  // Build the element condition. It includes only
  // the class condition.
  ElementCondition elementCondition =
    new ElementCondition(classCondition, null, null);

  // Run the query and print the results.
  TqlResultMap tqlResultMap =
```

```
    api.modelQueryGetCIsByCondition
      (cmdbContext, elementCondition,
      getElementTypeLayoutForObjects());
  printAllTqlResultMapChunks(tqlResultMap,api,cmdbContext);
}

/**
 * Gets all Configuration Items whose ID is in
 * the input array and
 * whose type is either
 * host or a type derived from host,
 * and prints the resulting map.
 * @param cmdbIDs - array of CMDB IDs
 * @throws ServiceException
 * @throws RemoteException
 */
public void getCIsByClassConditionAndIdsCondition(String[] cmdbIDs)
  throws ServiceException, RemoteException {

  CmdbOpenApi api = getCmdbOpenApi();
  CmdbContext cmdbContext = getCmdbContext();

  // Create the class condition: host or derived from host.
  ClassCondition classCondition =
    new ClassCondition("host", Boolean.TRUE);

  // Create the IdsCondition according to the input.
  IdsCondition idsCondition = new IdsCondition(cmdbIDs);

  // Build the element condition. It includes the class
  // condition and the IDs condition.
  ElementCondition elementCondition =
    new ElementCondition(classCondition, idsCondition, null);

  // Run the query and print the result.
  TqlResultMap tqlResultMap =
    api.modelQueryGetCIsByCondition
      (cmdbContext, elementCondition,
      getElementTypeLayoutForObjects());
```

```
  printAllTqlResultMapChunks(tqlResultMap,api,cmdbContext);
}

/**
 * Gets all Configuration Items whose type is either host
 * or a type derived from host and which have the specified
 * DNS name property, prints the resulting map.
 * @throws ServiceException
 * @throws RemoteException
 */
public void getCIsByClassConditionAndPropertyCondition
  (String dnsName)
  throws ServiceException, RemoteException {

 CmdbOpenApi api = getCmdbOpenApi();
 CmdbContext cmdbContext = getCmdbContext();

 // Create the class condition: host or derived from host.
 ClassCondition classCondition =
  new ClassCondition("host", Boolean.TRUE);

 // Create the property condition with EqualOperator.
 StrPropCondition dnsNameCondition =
  new StrPropCondition();
 dnsNameCondition.setPropName("host_dnsname");
 dnsNameCondition.setConditionOperator(new EqualOperator());
 dnsNameCondition.setValue(dnsName);
 PropConditions propConditions =
  new PropConditions(new PropCondition[]{dnsNameCondition});

 // Build the element condition. It includes the class
 // condition and the property condition.
 ElementCondition elementCondition =
  new ElementCondition(classCondition, null, propConditions);

 //Run the query and print the results
 TqlResultMap tqlResultMap =
  api.modelQueryGetCIsByCondition
    (cmdbContext, elementCondition,
```

```
      getElementTypeLayoutForObjects());
  printAllTqlResultMapChunks(tqlResultMap,api,cmdbContext);
}

/**
 * Gets all chunks in the TqlResultMap and send
 * them to be printed.
 * @param  tqlResultMap
 * @param  api
 * @param  cmdbContext
 * @throws RemoteException
 */
private void printAllTqlResultMapChunks
   (TqlResultMap tqlResultMap, CmdbOpenApi api,
    CmdbContext cmdbContext)
   throws RemoteException {

  //If chunked, send each individual chunk to be printed.
  if (tqlResultMap.isChunked()) {
    ChunksInfo chunksInfo = tqlResultMap.getChunksInfo();
    int chunkNum = chunksInfo.getChunksNum();
    for (int i = 0; i < chunkNum; i++) {

      //Get each chunk and send its map to be printed.
      TqlChunkRequest tqlChunkRequest =
        new TqlChunkRequest();
      tqlChunkRequest.setChunkInfo(chunksInfo);
      tqlChunkRequest.setChunkToRetrieve(i);
      tqlResultMap =
        api.modelQueryGetTqlResultChunk
          (cmdbContext, tqlChunkRequest);
      printTqlResultMap(tqlResultMap);
    }
  }
  //If not chunked, send the map as-is to be printed.
  else {
    printTqlResultMap(tqlResultMap);
  }
}
```

```
/**
 * Prints a TqlResultMap.
 * @param tqlResultMap
 */
private static void printTqlResultMap(TqlResultMap tqlResultMap){

  ObjectsResultEntry[] objectsResultEntries =
    tqlResultMap.getObjectsResultEntries();
  for (int i=0;i<objectsResultEntries.length;i++){
        System.out.println
          ("TQL object node number:
            "+objectsResultEntries[i].getElementNum());
        System.out.println
          ("Objects in the node:
            "+objectsResultEntries[i].getObjects());
    }
    LinksResultEntry[] linksResultEntries =
      tqlResultMap.getLinksResultEntries();
  for (int i=0;i<linksResultEntries.length;i++){
        System.out.println
          ("TQL link node number:
           "+linksResultEntries[i].getElementNum());
        System.out.println
           ("Links in the node:
            "+linksResultEntries[i].getLinks());
    }

  }

/**
 * Returns the layout for objects.
 * @return ElementTypeLayout  The layout for objects.
 */
private static ElementTypeLayout getElementTypeLayoutForObjects() {
     ElementTypeLayout elementTypeLayout =
       new ElementTypeLayout();
     elementTypeLayout.setKeys
       (new String[]{"data_name", "display_label"});
```

```
        return elementTypeLayout;
    }

  /**
   * Returns CmdbOpenApi
   * @return CmdbOpenApi
   * @throws ServiceException
   */
  private CmdbOpenApi getCmdbOpenApi() throws ServiceException {
    // Create the CMDB API
    CmdbOpenApiServiceLocator cmdbOpenApiServiceLocator =
      new CmdbOpenApiServiceLocator();
    return cmdbOpenApiServiceLocator.getcmdb();
  }

  /**
   * Returns the CmdbContext according to customer
   * ID and caller application.
   * @return CmdbContext
   */
  private CmdbContext getCmdbContext(){
    return new CmdbContext(_callerApp,_customerID);
  }
}
```

Part III

Working with Mercury Business Availability Center EMS Adapters

6

Introducing Mercury Business Availability Center EMS Adapters

EMS adapters enable you to integrate alerts generated by Mercury Business Availability Center into your EMS console. These alerts can then be used in the standard alert-processing procedure used in the EMS application.

Note to Mercury Managed Services customers: For details on acquiring EMS adapters, contact Mercury Managed Services Support.

You can send Mercury Business Availability Center alerts to EMS applications with the following adapters:

- **BMC PATROL Adapter.** For details, see Chapter 7, "Sending Mercury Business Availability Center Alerts to BMC PATROL."
- **CA Unicenter Adapter.** For details, see Chapter 8, "Sending Mercury Business Availability Center Alerts to CA Unicenter."
- **HP Openview VantagePoint Operations (OVO) Adapter.** For details, see Chapter 9, "Sending Mercury Business Availability Center Alerts to HP Openview VantagePoint Operations."
- **IBM Tivoli Enterprise Console (TEC) Adapter.** For details, see Chapter 10, "Sending Mercury Business Availability Center Alerts to Tivoli TEC."

Note: For details on assigning alerts in Mercury Business Availability Center, see "How Do I Set Up a Report and Alert Delivery System?" in *Getting Started with Mercury Business Availability Center*.

7

Sending Mercury Business Availability Center Alerts to BMC PATROL

This chapter explains how to configure Mercury Business Availability Center to send alerts to BMC PATROL.

About Sending Mercury Business Availability Center Alerts to BMC PATROL

You install the Mercury Business Availability Center SNMP Adapter on the BMC PATROL Agent(s) to which you want to send alerts. You then direct SNMP traps generated by the Core Server to the BMC PATROL Agent(s). For details on directing SNMP traps, see "Sending an SNMP Trap When the Alert Is Triggered" on page 245.

You do not have to install the SNMP Adapter on every BMC PATROL Agent in the BMC PATROL domain: a single agent per domain should suffice. However, if required, you can install the SNMP Adapter on several agents, to achieve higher availability.

Installing the Mercury Business Availability Center SNMP Adapter on the BMC PATROL Agent(s)

Once installed, the SNMP Adapter receives alerts (in the form of SNMP traps) from Mercury Business Availability Center and forwards them to the event management engine of the BMC PATROL Agent(s) on which the SNMP Adapter operates.

To install the Mercury Business Availability Center adapter on BMC PATROL:

1. Copy the Mercury Business Availability Center SNMP Adapter Knowledge Module (TOPAZ_SNMP_ADAPTER.km) to the knowledge module location of both the BMC PATROL Console and BMC PATROL Agent(s).

   TOPAZ_SNMP_ADAPTER.km is included in the Adapter files. The file is located on the Mercury Business Availability Center Documentation and Utilities CD-ROM in the \tools_and_utilities\EMS\BmcPatrol\TSA folder. Once the knowledge module is loaded into BMC PATROL, TOPAZ_SNMP_ADAPTER.km is accessible via the BMC PATROL developer console.

2. Load the Mercury Business Availability Center SNMP Adapter on the BMC PATROL Agent(s) using the BMC PATROL Developer Console. For exact details, refer to the BMC PATROL documentation.

Installation Troubleshooting

BMC PATROL Agent(s) output(s) the following system message (number(s) on the left may vary): 20040502153419 SNMP NOT ACTIVE.

The SNMP Trap service is not enabled on the BMC PATROL Agent on which the SNMP Adapter is installed. Enable the SNMP Trap service on that agent, or use a different BMC PATROL Agent. Refer to the BMC PATROL documentation for details on installing and enabling the SNMP trap service on BMC PATROL Agents.

BMC PATROL Agent(s) output(s) the following system message (number(s) on the left may vary): 20040502154044 SnmpListener, Line# 130: snmp_trap_listen: cannot open socket for listening 20040502154044 Listen status = ERR, Errno = 94.

Another SNMP trap service is using the SNMP trap port. Disable that service or change the UDP port that is used for trap reception (in that case, you must reconfigure Mercury Business Availability Center).

BMC PATROL Agent(s) output(s) the following system message (number(s) on the left may vary): 20040502154044 Error: Can't recognize Alert Type Id X (where X is a number).

The Mercury Business Availability Center SNMP Adapter receives an SNMP trap that is not recognized as a valid Mercury Business Availability Center alert. This is normal behavior.

Note: For testing purposes, you may want to enable auxiliary SNMP traps to be processed. This can be achieved by changing the KM environment variable **RAW_DATA** to **TRUE**.

8

Sending Mercury Business Availability Center Alerts to CA Unicenter

This chapter explains how to configure Mercury Business Availability Center to send alerts to CA Unicenter.

About Sending Mercury Business Availability Center Alerts to CA Unicenter

To send alerts to the CA Unicenter application, you can use one of the following methods:

- Sending a Mercury Business Availability Center Alert as an SNMP Trap to the Unicenter Management server
- Sending a Mercury Business Availability Center Alert Using the Unicenter cawto Command

For details on directing SNMP traps, see "Sending an SNMP Trap When the Alert Is Triggered" in *Platform Administration*.

Sending a Mercury Business Availability Center Alert as an SNMP Trap

The following procedure explains how to configure Unicenter to pick up the SNMP traps sent to the Event Management host.

To configure Unicenter:

1 Enable the Unicenter **CATrapD** (SNMP trap daemon) to pick up the raw SNMP traps.

2 Configure Event Management (Message Records and Actions) to format the traps according to the Mercury Business Availability Center MIB. This requires knowledge of the Mercury Business Availability Center MIB that is part of the Core Server installation. The file resides on the Mercury Business Availability Center Documentation and Utilities CD-ROM in the \tools_and_utilities\SNMP_MIBS\amAlerts5.mib folder.

To configure the Management Server host:

You must create a message record to fit the SNMP trap sent by Mercury Business Availability Center.

1 Create a **[file name].def** file and save the following line in it:

```
define msgrec msgid="%CATD_I_060, SNMPTRAP: -c * 5233 * * 6 1 * *"
type="MSG" msgnode="*" desc="AM Alert Transaction Response Time"
cont='N' msgact='Y' wcsingle='?' wcmany='*' case="y" regexp="n"
```

2 Load the file as part of the message records in Event Management by using the command:

```
cautil –f [file name].def
oprcmd opreload
```

3 To receive and display SNMP traps from third party devices in the Unicenter Event Console, you must enable the SNMP Trap Service. Select **Unicenter Enterprise Management** > **Configuration** > **Settings**. Change the **SNMP Trap Server Activated** flag to **Yes**.

To configure Mercury Business Availability Center:

1. To configure the alerts that are to be sent to the Unicenter Event Management host, access the Alert Wizard: Select **Admin** > **Platform** > **Alerts** > **Alerts**.
2. Create an alert according to the instructions in "Creating an Alert Scheme" on page 198.
3. Select the **Send SNMP trap** check box and define the EMS IPs. For details, see "Sending an SNMP Trap When the Alert Is Triggered" on page 245.

Sending a Mercury Business Availability Center Alert Using the Unicenter cawto Command

---

Note to Mercury Managed Services customers: This procedure is not relevant for Mercury Managed Services customers. Instead, Mercury Managed Services customers should use the SiteScope command line monitor. To use that monitor, consult Mercury Managed Services Support.

This command line utility is available after you install the Unicenter Event Management Agent on the Mercury Business Availability Center machine.

Note: You use the **cawto** command to send a message to the Windows console or the system console without waiting for a reply. To send a message and wait for a reply, use the Event Management **cawtor** command.

To configure the CA Unicenter Console:

You do not need to configure the Unicenter Event Management host. Verify that the **cawto** command is sent to the Unicenter Event Management node which must handle it: open the Event Management Console and look for the event that was sent with the **cawto** command.

To configure Mercury Business Availability Center:

1. To configure the alerts that are to be sent to the Unicenter Event Management host, access the Alert Wizard: Select **Admin** > **Platform** > **Alerts and Recipients** > **Alerts**.
2. Create an alert according to the instructions in "Creating an Alert Scheme" in *Platform Administration*.
3. Continue to the section "Running an Executable File When the Alert is Triggered" in *Platform Administration*. During this procedure, you must select the **Run executable file** check box and define the alert action in the Alert Wizard. When asked to enter the command line required to run the executable file, use the Unicenter **cawto** command line.

Note: Consult the Unicenter documentation about the parameters for the **cawto** command line and how they can be activated.

The following example shows how to create a **cawto** command that sends the Mercury Business Availability Center alert to Unicenter:

```
C:\tng\bin\cawto.exe –s "" –v W –n <node> "Alert <AlertName> for
<ProfileName> was triggered because: <TriggerCause>"
```

where:

-s <source> – Identifies the application that is the source of the event. In the above example, **<source>** is **Mercury Business Availability Center**.

-v <value> – Severity of the event. When viewing events in the CA Message console, icons are displayed to the left of the events indicating the severity status. In the above example, **<value>** is **W** (Warning). Severity values can be one of the following:

Informational	I
Success	S
Warning	W

Error	E
Failure	F

You can set up the translation from Mercury Business Availability Center severity to Unicenter severity according to the following rules:

	Unicenter
Informational	I
Warning	W
Minor	E
Major	E
Critical	F

-n <node> – Node to which the message is directed if the node is not the node the user is on.

<AlertName>, **<ProfileName>**, **<TriggerCause>** are Mercury Business Availability Center alert variables.

Configuration Troubleshooting

I have a custom or third party MIB. What exactly will loading it on the DSM, using the LDMIB command, enable me to do?

Products:

- Unicenter NSM

  Version: 3.0

  OS: WIN/NT, WIN2000, HP, AIX, SUN, LINUX, SCO, SINIX, TRU64

- Unicenter TNG

  Version: 2.2, 2.4, 2.4.2

OS: WIN/NT, WIN2000, HP, AIX, SUN, LINUX, SCO, SINIX, TRU64

Solution:

Run **ldmib** on a custom MIB to give the following functionality:

- the ability to run **objectview** against that MIB. This requires that the MIB also be copied into the **%AGENTWORKS_DIR\services\config\mibs** directory on the machine from which **objview** is being run.
- the ability to run **mibbrowse** against that MIB.

Please note that no trap translation automatically occurs by loading an MIB. This requires DSM policy. You could use message records and actions to translate the **CATrapD** messages on the EM console to work around the need for DSM policy. This would then require enabling **CATrapD** by accessing the EM settings and turning on **SNMP trap server activated**.

I have been receiving many messages on the event console that have an unreadable format, such as '%CATD_I_060, SNMPTRAP: -c public 791 172.20.0.18 mail.npc.net 2 0.' What are they?

Products:

- Unicenter NSM

  Version: 3.0

  OS: WIN/NT, WIN2000

- Unicenter TNG

  Version: 2.2, 2.4, 2.4.2

  OS: WIN/NT, WIN2000

Solution:

These are raw SNMP traps that the **CATrapD** daemon picks up. They may be generated by any SNMP enabled device or agent. **CATrapD** is enabled when you access the EM settings and enable **SNMP trap server activated**. Normally the DSM interprets the important ones but others do not warrant a separate translated message in the console. The reference guide lists the numbers at the end of these traps and what they stand for.

They are:

0	Coldstart	The sending SNMP entity has reinitialized itself, indicating that the agent's configuration may be changed This is typically a restart due to a crash or major fault.
1	WarmStart	The sending SNMP entity has reinitialized itself, but the agent's configuration has not been altered. This is typically a routine restart.
2	linkDown	The communications link has failed.
3	linkUp	The communications link has come up.
4	Authentication	The agent has received an incorrect community name. Failure from a manager.
5	EGP Neighbor	The external gateway protocol (EGP) neighbor is down. Loss.
6	Enterprise	An enterprise-specific event has occurred. Specific (Requires a specific trap type to identify).

I want to receive and display SNMP traps from third party devices in the Event Console?

Products:

➤ Unicenter TNG

Version: 2.1, 2.2, 2.4

OS: WIN/NT, WIN2000

Solution:

To receive and display SNMP traps from third party devices in the Unicenter Event Console, you must enable the SNMP Trap Service. Select **Unicenter Enterprise Management** > **Configuration** > **Settings**. Change the **SNMP Trap Server Activated** flag to **Yes**.

9

Sending Mercury Business Availability Center Alerts to HP Openview VantagePoint Operations

This chapter explains how to configure Mercury Business Availability Center to send alerts to HP Openview VantagePoint Operations.

About Sending Mercury Business Availability Center Alerts to HP Openview VantagePoint Operations

To send alerts to HP Openview VantagePoint Operations (OVO), you must install an HP agent on the Core Server. Preconfigure the agent to send events to the management server via **opcmsg**. In HP terminology this means that the agent should have the **opcmsg** template assigned and distributed to it.

To send alerts to HP OVO, verify the following:

➤ An HP agent is installed on your Core Server host. For details, see the next section.

If no HP agent is installed, you must install it. For details, see "Installing the HP OVO Agent on the Core Server Machine" on page 89.

➤ The HP agent is configured to send events to the HP OVO management server via **opcmsg**. For details, see "Assigning and Distributing the opcmsg Template to the Mercury Business Availability Center Host" on page 90.

Verifying the Presence of the HP OVO Agent

When sending alerts to the HP OpenView Management Server, Mercury Business Availability Center utilizes HP's **opcmsg** command. This is a command that is used by HP OVO agents to communicate with the management server. You verify that an HP OVO agent is installed on the Mercury Business Availability Center server by running **opcmsg**.

To verify the availability of the opcmsg command:

1 On the Core Server, open a command window.

2 In the command window write **opcmsg** and press **Enter**. The possible results of this command are as follows:

➤ **opcmsg** is not recognized as an internal or external command, operable program or batch file.

Reason and Solution: The HP OVO agent is not installed on the machine. Follow the steps in "Installing the HP OVO Agent on the Core Server Machine" on page 89 and "Assigning and Distributing the opcmsg Template to the Mercury Business Availability Center Host" on page 90.

➤ The following message is displayed:
The ITO Message Command is not configured on this system. Contact your ITO Administrator to configure it. (OpC30-913)

Reason and Solution: The HP OVO is installed on the machine but is not configured to send **opcmsg** messages. Follow the steps in "Assigning and Distributing the opcmsg Template to the Mercury Business Availability Center Host" on page 90.

➤ The following message is displayed:
The application parameter is required. (OpC30-903)
The object parameter is required. (OpC30-904)
The msg_text parameter is required. (OpC30-905)

Usage:
opcmsg [-help] [-id] severity=normal|warning|minor|major|critical] application=<application> object=<object> msg_text=<text> [msg_grp=<message group>] [node=<node>] [service_id=<svcid>] [-option <var>=<value>]* (OpC30-900)

Reason: The HP OVO is installed on the machine and is configured to send **opcmsg** messages.

Installing the HP OVO Agent on the Core Server Machine

Make sure that the Core Server machine host is a part of a node group in HP OVO or you will not be able to see any of the alerts.

To install the HP OVO Agent:

1. On the Mercury Business Availability Center server, verify that an FTP service is running with write permissions.
2. On the HP OVO Management Server, locate the host in the HP OVO ITO Node Bank window and select it. If the host is not defined, you must first define it.
3. From the Actions menu, select **Agents** and then **Install/Update SW & Config**.

4 Select the **Agent Software** check box in the Components area. Verify that the host you selected appears in the list box on the right and that the **Nodes in list requiring update** check box above it is selected. Click **OK**.

5 In the window that opens, provide HP OVO with a user name and password that has administrative privileges for the Mercury Business Availability Center host.

6 Follow the on-screen instructions. You will need to point to the location of the file.

7 On the Mercury Business Availability Center server, note that you have to manually run the **opc_inst.bat** file placed in a temporary directory in your FTP root directory.

Assigning and Distributing the opcmsg Template to the Mercury Business Availability Center Host

The following procedure explains how to assign and distribute the opcmsg template to a Mercury Business Availability Center host. Once you have performed this procedure, you can set up Mercury Business Availability Center to send alerts to HP OVO. For details, see "Sending a Mercury Business Availability Center Alert Using the HP OVO Agent opcmsg Command" on page 91.

To assign and distribute opcmsg:

1 On the HP OVO Management Server, locate the Core Server host in the HP OVO ITO Node Bank and select it. Select **Actions** > **Agents** > **Assign templates**.

2 Click **Add** and verify that the probe host appears in the list box to the left.

3 Click the **Open Template Window** button.

4 In the template window, select **Default**, double-click the appropriate operating system name, and select **opcmsg(1|3)**.

5 Return to the Add Configuration window and click **Get template selection**. You should now see **opcmsg(1|3)** appearing in the list box to the right.

6 Click the **OK** button in the Add Configuration and Define Configuration windows.

7 Return to the Node Bank window and select **Agents** > **Install/Update SW & Config** from the Actions menu. Verify that the Mercury Business Availability Center host is still selected.

8 Select the templates check box, and click **OK**.

A message should be displayed in your HP OVO message browser reporting that the templates have been distributed successfully to the host.

Sending a Mercury Business Availability Center Alert Using the HP OVO Agent opcmsg Command

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Note to Mercury Managed Services customers: This procedure is not relevant for Mercury Managed Services customers. Instead, Mercury Managed Services customers should use the SiteScope command line monitor. To use that monitor, consult Mercury Managed Services Support.

This command line utility is available after you install the HP OVO Agent on the Mercury Business Availability Center Core Server machine. For details, see "Installing the HP OVO Agent on the Core Server Machine" on page 89.

You use the opcmsg command to send a message to the Windows console or the system console without waiting for a reply.

To configure Mercury Business Availability Center alerts:

1 To configure the alerts that are to be sent to the HP OVO host, access the Alert Wizard: Select **Admin** > **Platform** > **Alerts and Recipients** > **Alerts**.

2 Create an alert according to the instructions in "Creating an Alert Scheme" in *Platform Administration*.

3 Continue to the section "Running an Executable File When the Alert is Triggered" in *Platform Administration*. During this procedure, you must select the **Run executable file** check box and define the alert action in the Alert Wizard. When asked to enter the command line required to run the executable file, use the HP OVO Agent opcmsg command line:

```
opcmsg [-help] [-id] severity=normal|warning|minor|major|critical]
application=<application> object=<object> msg_text=<text>
[msg_grp=<message group>] [node=<node>] [service_id=<svcid>]
[-option <var>=<value>]* (OpC30-900)
```

The opcmsg command defines three mandatory parameters: object, application, and message text. In addition you can use:

severity. Can be one of the following severities: normal, warning, minor, major, or critical.

msg_grp. The name of the message group defined in HP OVO.

node. Used to define the node from which this alert was sent.

service_id. Used to assign the alert to a specific HP Service Navigator service.

-option <var>=<value>. One or more key value pairs used by the OVO's automatic and operator-initiated actions.

10

Sending Mercury Business Availability Center Alerts to Tivoli TEC

This chapter explains how to configure Mercury Business Availability Center to send alerts to Tivoli TEC.

About Sending Mercury Business Availability Center Alerts to Tivoli TEC

You can integrate alerts with the IBM Tivoli Enterprise Console (TEC) application.

To send alerts to the Tivoli TEC management server, Mercury Business Availability Center utilizes Tivoli's **postzmsg, postemsg, wpostzmsg, or wpostemsg** commands. For details on these commands, refer to the Tivoli Web site (http://publib.boulder.ibm.com/tividd/td/tec/SC32-1232-00/en_US/HTML/ecormst02.htm). The recommended command to use is **postzmsg** as it can be copied to and run from any machine and it buffers events if the TEC server is unavailable.

The **wpostzmsg** and **wpostemsg commands** are commands used by the managed node to communicate with the management server. Therefore the Mercury Business Availability Center server must be a Tivoli End Point (that is, the Tivoli software agent must be installed on the machine).

The command used is called from the **run_exe** command.

Setting Up Tivoli TEC

To send alerts to Tivoli TEC, you must verify that:

- Tivoli End Point is installed on the Core Server host, if using the **wpostzmsg** or **wpostemsg** commands.
- An ACP profile has been distributed to the Tivoli End Point on the Core Server host.
- The command being used is located on the machine from which the alert is being sent.
  - If using the **postzmsg** or **postemsg** command, it can be located anywhere on the machine. You can verify that the command is present by running the following:

```
Usage: postzmsg { -S <server> | -f <config_file> } [-r <severity>]
[-m <message> ] [<slot_name=value>, ...] <class> <source>
```

- If using the **wpostzmsg** or **wpostemsg** command, it should be located under the directory **<Drive>:\Program Files\Tivoli\lcf\bin\<platform>\bin**. Using one these commands requires the Tivoli environment to be sourced, so the command must be run from a batch file.

To send an alert to Tivoli TEC:

1. Create a **baroc** file which describes the event class of the alert, and deploy it on your Tivoli Tec. For more information on the baroc file format, refer to the Tivoli TEC documentation.

2 Copy the **postzmsg** or **postemsg** command to the Mercury Business Availability Center server. If using the **wpostzmsg** or **wpostemsg** command, install a Tivoli End Point on the Mercury Business Availability Center server (the End Point brings the **wpostzmsg** and **wpostemsg** executables with it).

3 Run the command by creating the appropriate command line. For example, if using the **postzmsg** command:

```
postzmsg -S server -r CRITICAL description="<AlertDescription>"
triggerCause="<TriggerCause>" hostname="cookie"
topazProfileName="<ProfileName>" Topaz_Alert Topaz
```

You can create and use a configuration file to specify various parameters. For details on running the commands, refer to the Tivoli Web site (http://publib.boulder.ibm.com/tividd/td/tec/SC32-1232-00/en_US/HTML/ecormst02.htm).

Sending a Mercury Business Availability Center Alert Using the Tivoli End Point postemsg Command

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Note to Mercury Managed Services customers: This procedure is not relevant for Mercury Managed Services customers. Instead, Mercury Managed Services customers should use the SiteScope command line monitor. To use that monitor, consult Mercury Managed Services Support.

This command line utility is available after you install Tivoli End Point on the Mercury Business Availability Center Core Server machine.

You use the postemsg command to send a message to the Windows console or the system console without waiting for a reply.

To configure Mercury Business Availability Center:

1 To configure the alerts that are to be sent to the Tivoli TEC host, access the Alert Wizard: Select **Admin** > **Platform** > **Alerts and Recipients** > **Alerts**.

2 Create an alert according to the instructions in "Creating an Alert Scheme" in *Platform Administration*.

3 Continue to the section "Running an Executable File When the Alert is Triggered" in *Platform Administration*. During this procedure, you must select the **Run executable file** check box and define the alert action in the Alert Wizard. When asked to enter the command line required to run the executable file, use the Tivoli End Point postemsg command line:

```
postemsg { -S <server> | -f <config_file> } [-r <severity>]
[-m <message> ] [<slot_name=value>, ...] <class> <source>
```

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