



CHAPTER 2

Writing a Report

Writing a report for Prime Performance Manager requires careful planning and following the report writing steps in the correct order. In this chapter, we walk you through the steps for modifying a prepackaged system report—`cpu.xml`, and help you to develop, test, and debug your own reports.

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General Recommendations

You should:

- Do initial development of a new report XML file offline from any server until the basic structure of the report file is ready. Then deploy it to the staging server for initial testing and debugging.
- Avoid developing reports on a live system. Use a staging system for developing new reports and then, once the report is verified to be working correctly, deploy it to your production servers.

Summary of Steps for Writing a Report

1. Copy an existing report from the `/opt/CSCOppm-gw/etc/pollers/system` directory to the `/opt/CSCOppm-gw/etc/pollers/user` directory.
 - If needed, modify the `UserCapability.xml` file for the report.
 - If you are using a new MIB, compile the MIB.

2. Code a properties file for the report.
3. Code the report.
4. Enable the report using the system GUI.
5. Test and debug your report.

Determining Which MIBs are Required

Cisco Prime Performance Manager comes with over 400 Cisco and industry standard MIBs.

To determine if the MIB that you need for your report is available:

-
- Step 1** Review the list of MIBs on the gateway.
- To display a list of compiled MIBs, from the Help menu, choose **Reports** and then select **SNMP MIBs**.
 - All compiled MIBs are located in the in the `/opt/CSCOppm-gw/etc/mibs` directory gateway.
- Step 2** If you need to add a MIB:
- a. Copy the MIB to the gateway server.
 - b. Compile the MIB.

See [Compiling a MIB, page 2-2](#) for the procedure for compiling a MIB.
- Step 3** If you are modifying one of the precoded reports, make sure that there is an entry in the `SystemCapability.xml` file that references the report. If you need to change the system capability setting for the file, make any changes in the `UserCapability.xml` file.



Note

Do not modify the `SytemCapability.xml` file.

Compiling a MIB

If you are developing a report that a requires a new MIB (a MIB not provided with the Cisco Prime Performance Manager distribution), then you must compile the MIB before you can use it for reports.

To compile a MIB:

-
- Step 1** As root user, copy the MIB to the `/opt/CSCOppm-gw/etc/mibs` directory.
- Step 2** Enter the following command to suspend unit-gateway file synchronization.
- ```
/opt/CSCOppm-gw/bin/ppm syncunits disable
```
- Step 3** Enter the following command to compile the MIBs in the system:
- ```
# /opt/CSCOppm-gw/bin/ppm compilemibs
```
- The `compilemibs` command creates an `snmpinfo.dat` file
- Step 4** Fix any errors discovered in the MIB or reload the compiled mibs (`snmpinfo.dat`).

Step 5 Enter the following command to restart unit-gateway file synchronization:

```
# /opt/CSCOppm-gw/bin/ppm syncunits enable
```

You can now develop a report that references the MIB.

Determining the Statistics to Report

To determine which key performance indicators (KPIs) to report for the devices that you are monitoring:

Step 1 Look at the compiled MIBs.

Step 2 Based on your reporting requirements, determine which MIB variables to poll.

Step 3 Check whether the KPIs you want to report on are covered in existing reports.

Creating the Report XML and Properties Files

The XML file that you create can be:

- A new file based on a copy of an existing Prime Performance Manager report.
- A modification of a user-defined report that already exists for your installation.



Warning

Do not modify the report files or properties files in the `/opt/CSCOppm-gw/etc/pollers/system` directory.

To create the report files:

Step 1 If you are modifying an existing prepackaged report, copy the `.xml` file for the report and its associated `.properties` file from the `/opt/CSCOppm-gw/etc/pollers/system` directory to the `/opt/CSCOppm-gw/etc/pollers/user` directory or to a working directory of your own choice.

Step 2 Rename the copied files. Make sure that they have unique filenames that are not duplicated in the `/opt/CSCOppm-gw/etc/pollers/system` directory.

Step 3 If you are using an existing user developed file in the `/user` directory, copy and rename the file and its associated `.properties` file.

Coding the Report

Now you are ready to code your report. The following sections take you through the `cpu.xml` file. This is an existing Prime Performance Manager report file that serves as our “Hello World” example for report writing. We also describe an associated file, the `cpu.properties` file.

- The `cpu.xml` file sets up polling of a standard Cisco MIB—`CISCO-PROCESS-MIB.my`, which reports on active system processes. It also uses the Cisco entity MIB, `CISCO-ENTITY-MIB.my`.

- The `cpu.properties` file serves only one purpose. That is, to define variables and text strings that the system uses to display the CPU reports.

Before we start, note these points:

- Since this section is a tutorial, we start with the basics—a walkthrough of the XML elements that you'll use in your reports.
- Certain advanced topics, such as coding a `UserCapability.xml` file modeled on the `SystemCapability.xml` file provided on the Prime Performance Manager gateway, are covered in detail in later sections of this guide.
- Later in this chapter you will find a reference section on typical report writing tasks (See [Coding the Report, page 2-3](#) for typical report writing tasks)—some of these tasks are also covered in the tutorial.



Tip

While working with the sample report, you can save time by keeping the online report help for the `cpu.xml` file open in your browser. To see the help page for `cpu.xml`, go to the Cisco Prime Performance Manager reports tree, choose **CPU** to bring up the CPU report, then click the report help tool:



[Example 2-1](#) shows the `cpu.xml` file.

Example 2-1 The `cpu.xml` File

```
<?xml version="1.0"?>
<!-- Copyright (c) 2011 Cisco Systems, Inc. All rights reserved. -->

<!-- MIBS Used

      CISCO-PROCESS-MIB.my
      ENTITY-MIB.my

-->

<ns:PollerList
  xmlns:ns="http://cisco.com/ppm/poller">

  <Poll name="CPU" reportId="CPU">

    <Criteria>CISCO_PROCESS_MIB</Criteria>

    <PollDefinition>

      cpmCPUTotalTable = poll("cpmCPUTotalIndex,
                             cpmCPUTotalPhysicalIndex,
                             cpmCPUTotal15minRev,
                             cpmCPUTotal1minRev");

      cpmCPUThresholdTable = poll("cpmCPUTotalIndex,
                                  cpmCPUThresholdClass,
                                  cpmCPURisingThresholdValue,
                                  cpmCPUFallingThresholdValue");

      cpmCPUThresholdTable =
        cpmCPUThresholdTable.filter(cpmCPUThresholdClass == 1);

      cpmCPUTotalTable =
        cpmCPUTotalTable.leftJoin(cpmCPUThresholdTable,
        (cpmCPUTotalTable.cpmCPUTotalIndex == cpmCPUThresholdTable.cpmCPUTotalIndex));
```

```

</PollDefinition>

<ProcessPollResult>

    setCpuInfo();

    fiveMinUtil      = cpmCPUTotal5minRev / 100;
    oneMinUtil       = cpmCPUTotal1minRev / 100;
    risingThreshold  = cpmCPURisingThresholdValue / 100;
    fallingThreshold = cpmCPUFallingThresholdValue / 100;

</ProcessPollResult>

<ProcessDBSummary name="CPU" baseTableName="CPU">

    <Var name="CPUSlot"      type="Integer" key="true">cpuSlot</Var>
    <Var name="CPUNum"      type="Integer" key="true">cpuNum</Var>
    <Var name="CPUDescr"    type="String" key="true">cpuDescr</Var>

    <Var name="CPUUtilMax5min" type="Double" operation="Max">fiveMinUtil</Var>
    <Var name="CPUUtilAvg5min" type="Double" operation="Avg">fiveMinUtil</Var>

    <Var name="CPUUtilMax1min" type="Double" operation="Max">oneMinUtil</Var>
    <Var name="CPUUtilAvg1min" type="Double" operation="Avg">oneMinUtil</Var>

    <Var name="CPURisingThreshold" type="Double">risingThreshold</Var>
    <Var name="CPUFallingThreshold" type="Double">fallingThreshold</Var>

</ProcessDBSummary>

</Poll>

<CSV name="CPU" location="gateway" listen="CPU">
    <Column name="Slot">CPUSlot</Column>
    <Column name="Number">CPUNum</Column>
    <Column name="Description">CPUDescr</Column>

    <Util name="CPUUtilMax5min">CPUUtilMax5min</Util>
    <Util name="CPUUtilAvg5min">CPUUtilAvg5min</Util>
    <Util name="CPUUtilMax1min">CPUUtilMax1min</Util>
    <Util name="CPUUtilAvg1min">CPUUtilAvg1min</Util>

    <Column name="CPURisingThreshold">CPURisingThreshold</Column>
    <Column name="CPUFallingThreshold">CPUFallingThreshold</Column>
</CSV>

<!-- *** CPU Utilization *** -->

<WebReport name="wrnCPUUtil"
    category="level1Resources,level2CPU"
    reportId="CPU"
    context="Network,Node,CPUSlot,CPUNum,CPUDescr"
    textProps="cpu"
    sortWeight="2">

<Criteria>CISCO_PROCESS_MIB</Criteria>

<GraphView>
    <GraphSummary title="gstCPUUtil" />
    <Graph title="gtCPUUtilAvg" >
        <Util name="genCPUUtilAvg">CPUUtilAvg5min</Util>
    </Graph>
    <Graph title="gtCPUUtilPeak" >

```

```

        <Util name="genCPUUtilPeak">CPUUtilMax5min</Util>
    </Graph>
    <LeafGraph title="gtCPUUtil" >
        <Util name="genCPUUtilAvg">CPUUtilAvg5min</Util>
        <Util name="genCPUUtilPeak">CPUUtilMax5min</Util>
    </LeafGraph>
</GraphView>

<TableView baseTable="CPU">
    <IdLabel/>
    <Label colSpan="2" name="cpuUtil5Min" />
    <Label colSpan="2" name="cpuUtil1Min" />
    <Label colSpan="2" name="cpuUtilThresh" />
    <HeaderRow/>

    <Link name="node" context="Node">fqdnid</Link>
    <Link name="slot" context="CPUSlot">CPUSlot</Link>
    <Link name="cpu" context="CPUNum">CPUNum</Link>
    <Link name="cpuDes" context="CPUDESCR">CPUDESCR</Link>
    <Time/>

    <Util default="true" name="avg"> CPUUtilAvg5min</Util>
    <Util name="peak"> CPUUtilMax5min</Util>

    <Util name="avg"> CPUUtilAvg1min</Util>
    <Util name="peak"> CPUUtilMax1min</Util>

    <Util name="rising"> CPURisingThreshold</Util>
    <Util name="falling">CPUFallingThreshold</Util>
</TableView>

</WebReport>

</ns:PollerList>

```

Main Elements of Report XML

The `cpu.xml` report has seven main sections:

- **Comments**— The top of the `cpu.xml` file contains a comment that identifies the MIBs polled. However, you can place comments anywhere in the XML file.

All of the report sections are specified within one XML section called `PollerList`. The first line of the `PollerList` section specifies “`http://cisco.com/ppm/poller.`” Always include this as stated in the sample reports. You can provide more than one `Poll` section.

The `Poll` section is the main element of the XML file, and encapsulates four sections.

`Poll` is a complex element type that contains elements defined in the *EventPoller.xsd* schema file, within the `Processor` element:

- **Criteria Section**—Specifies a capability value that is defined in the *SystemCapability.xml* file or the *UserCapability.xml* file.
See [Specify the MIB Criteria \(Criteria Section\)](#), page 2-8.
- **PollDefinition Section**—Calls report macros that create a virtual table where polling results are stored.
See [Specify the Poll Name and Report Name \(Poll Element\)](#), page 2-8.

- **ProcessPollResult Section**—Calls reporting macros and performs operations that modify or format the polling data using formulas or other methods.
See [Specify Poll Processing Results \(ProcessPollResult Section\), page 2-10](#).
- **ProcessDBSummary Section**—Sets up and manipulates the table and row format for a virtual table that holds the polled data for the report. At the end of each defined processing interval, the system writes the table data for that processing interval to the physical database on the gateway.
See [Assign the Data to the Database Schema \(ProcessDBSummary Section\), page 2-10](#).

The final two sections specify the appearance and format of the user reports.

- **CSV**—Specifies the layout of the CSV file that users create when they view the file in the `opt/CSCOppm-gw/reports` directory.
See [Specify the CSV Output File and Format \(CSV Section\), page 2-12](#).
- **WebReport**—Specifies the attributes of the graphical report that users see when they select the Graph View option. The WebReport section contains:
 - **Attributes**—These specify the name of the report in Prime Performance Manager menus, where in the report tree the report appears, where the report data comes from, the Properties file for the web report, and so on.
See [Specifying the Attributes for the WebReport Section, page 2-13](#).
 - **GraphView**—Specifies the attributes of the graph view that users see when they select the Graph View option.
See [Coding the GraphView Section, page 2-14](#).
 - **TableView**—Specifies the attributes of the table view that users see when they select the Table view option.
See [Coding the TableView Section, page 2-15](#).

Report Macros

You can use the report macros provided with the Prime Performance Manager gateway in your XML code. Some of the report macros can be used only in specific sections of the XML. For reference information on the report macros, see [Chapter 5, “Reports Macro Reference.”](#)

Add a Comment Stating the MIBs Used for the Report

At the top of your report, include a comment that identifies the MIBs polled for your report. The `cpu.xml` file contains the following comments:

```
<!-- MIBS Used

        CISCO-PROCESS-MIB.my
        ENTITY-MIB.my

-->
```

The extension of the MIBs used should have a `.my` or `.mib` suffix.

Specify the MIB Criteria (Criteria Section)

This section deals with an advanced topic in report coding: specifying the criteria used to process the MIBs for your report.

The *SystemCapability.xml* specifies the default MIB processing criteria for Prime Performance Manager reports. Do not edit the *SystemCapability.xml* file. If you need to modify MIB processing criteria, edit the *UserCapability.xml* file and specify your processing criteria there.

To add a new capability or criteria, add an entry similar to the following to *UserCapability.xml*:

```
CISCO_PROCESS_MIB = isTableNotEmpty("cpmCPUTotalTable");
```

This entry will check if the MIB table *cpmCPUTotalTable* on the device has data and set the *CISCO_PROCESS_MIB* capability if it does. Or you can add:

```
UDP_MIB = hasVar("udpInDatagrams");
```

This entry sets the *UDP_MIB* capability if the MIB variable *udpInDatagrams* exists on the device.

Specify the Poll Name and Report Name (Poll Element)

The Poll element:

- Specifies the name of the poller and the Report ID, for example:

```
name="CPU" reportId="CPU"
```

Make sure to assign a unique name for the poller and the report ID.

For example, if you copy the *cpu.xml* file another XML file in your */user* directory, give the poller and the report ID a new name that is not duplicated in the */opt/CSCOppm-gw/etc/pollers/system* directory or the */opt/CSCOppm-gw/etc/pollers/user* directory.

- Is a complex XML element that contains the next main XML sections that set up polling and processing of polling results.

Specify the MIB Variables to Poll (PollDefinition Section)

Now we will look at a critical part of the sample report code—the *PollDefinition* section. In this section, we set up the actual polling that is done for the report and assign the polled data to internal database tables that Prime Performance Manager uses to generate the reports.

[Example 2-2](#) shows the *PollDefinition* section of our *cpu.xml* report.

Example 2-2 PollDefinition Section

```
<PollDefinition>
```

```
    cpmCPUTotalTable = poll("cpmCPUTotalIndex,
                           cpmCPUTotalPhysicalIndex,
                           cpmCPUTotal15minRev,
                           cpmCPUTotal1minRev");

    cpmCPUThresholdTable = poll("cpmCPUTotalIndex,
                                cpmCPUThresholdClass,
                                cpmCPURisingThresholdValue,
                                cpmCPUFallingThresholdValue");
```



```

cpmCPUThresholdTable =
    cpmCPUThresholdTable.filter(cpmCPUThresholdClass == 1);

cpmCPUTotalTable =
    cpmCPUTotalTable.leftJoin(cpmCPUThresholdTable,
(cpmCPUTotalTable.cpmCPUTotalIndex == cpmCPUThresholdTable.cpmCPUTotalIndex));

</PollDefinition>

```

This section polls specific variable in the *CISCO-PROCESS-MIB.my* and stores them in two tables:

- cpmCPUTotalTable
- cpmCPUThresholdTable.

The MIB objects are standard objects in the CISCO-PROCESS-MIB that provide CPU load monitoring. For additional information and comments, refer to the *CISCO-PROCESS-MIB.my* file.

The POLL Macro

The actual polling is done using the POLL macro. This macro has the following syntax:

```
POLL(arg1, arg2 ... argn)
```

where the arguments are a list of MIB variables to be polled, enclosed in quotes.

The FILTER Macro

Next, the PollDefinition section calls a macro that is defined for PollDefinition objects, the FILTER macro:

```

cpmCPUThresholdTable =
    cpmCPUThresholdTable.filter(cpmCPUThresholdClass == 1);

```

The FILTER macro has the following syntax:

```
FILTER(object, arg1)
```

Where *object* is the table object passed to the macro and *arg1* specifies the filtering criterion. Here we are filtering on the cpmCPUThresholdClass. CPU data for objects in the table that have a cpmCPUThresholdClass value of 1 is retained, and objects and their data that do not match are removed from the table.

Now we have two tables: a cpmCPUTotalTable and a cpmCPUThresholdTable. To maximize processing efficiency, we want to combine these two tables into one virtual table. The next line in the PollDefinition section does that:

```

cpmCPUTotalTable =
    cpmCPUTotalTable.leftJoin(cpmCPUThresholdTable,
(cpmCPUTotalTable.cpmCPUTotalIndex == cpmCPUThresholdTable.cpmCPUTotalIndex))

```

This is done by calling the LEFTJOIN macro. This macro looks at the cpmCPUThresholdTable and the cpmCPUTotalTable, and if the index values are the same, joins rows from the two tables into one table.

Now we have one table that contains all of the data that we want to process.

The LEFTJOIN Macro

The LEFTJOIN macro has the following syntax:

```
LEFTJOIN (object, arg1, arg2)
```

where *object* and *arg1* are tables and *arg2* is the condition whether each row has a match.

The macro returns the resulting joined tables of *object* and *arg1*.

A row from *object* and a row from *arg1* are joined together if the condition (*arg2*) is true. However, each object row will be retained in the resulting table even if it does not match any row from the object specified in *arg1*.

Specify Poll Processing Results (ProcessPollResult Section)

The ProcessPollResult section sets up variables to manipulate the data and processes it to obtain the information for the CPU report.

Example 2-3 shows the ProcessPollResult section of the cpu.xml file.

Example 2-3 ProcessPollResult Section

```
<ProcessPollResult>

    setCpuInfo();

    fiveMinUtil      = cpmCPUTotal15minRev / 100;
    oneMinUtil       = cpmCPUTotal1minRev / 100;
    risingThreshold  = cpmCPURisingThresholdValue / 100;
    fallingThreshold = cpmCPUFallingThresholdValue / 100;

</ProcessPollResult>
```

This is what we need to do:

1. We want to calculate percentage values for CPU average utilization over two of the time intervals defined in the CISCO-PROCESS-MIB: `cpmCPUTotal15minRev` and `cpmCPUTotal1minRev` (5 minute intervals and 1 minute intervals).
2. We also want to calculate percentage values for CPU average peak utilization. The data used to calculate this number is in the `cpmCPURisingThresholdValue` and `cpmCPUFallingThresholdValue` values.
3. We start by calling the SETCPUINFO macro. In the absence of a specified index, this macro simply sets the CPU description, CPU number, and CPU slot for each CPU whose data is returned in the table.

The percentage figures used to determine CPU average utilization and CPU average peak utilization are calculated by dividing the data for each MIB variable by 100.

We now have the data that we want to display in our Prime Performance Manager reports.

Now we want to assign the calculated values to the Prime Performance Manager gateway's database. This is done in the next section of the XML code—the ProcessDBSummary section.

Assign the Data to the Database Schema (ProcessDBSummary Section)

The ProcessDBSummary section sets up table rows in our virtual data table that put the data in the order it will be shown in our reports.

Example 2-4 shows the ProcessDBSummary section for the cpu.xml report.

Example 2-4 ProcessDBSummary Section

```
<ProcessDBSummary name="CPU" baseTableName="CPU">
```

```

<Var name="CPUSlot"      type="Integer" key="true">cpuSlot</Var>
<Var name="CPUNum"      type="Integer" key="true">cpuNum</Var>
<Var name="CPUDescr"    type="String" key="true">cpuDescr</Var>

<Var name="CPUUtilMax5min" type="Double" operation="Max">fiveMinUtil</Var>
<Var name="CPUUtilAvg5min" type="Double" operation="Avg">fiveMinUtil</Var>

<Var name="CPUUtilMax1min" type="Double" operation="Max">oneMinUtil</Var>
<Var name="CPUUtilAvg1min" type="Double" operation="Avg">oneMinUtil</Var>

<Var name="CPURisingThreshold" type="Double">risingThreshold</Var>
<Var name="CPUFallingThreshold" type="Double">fallingThreshold</Var>

</ProcessDBSummary>

```

The first line of the ProcessDBSummary section specifies the name of the poll and the name of the report.

The rest of the code in the ProcessDBSummary section basically sets up the columns that will be set up in each row of the virtual database.

The code used in our cpu.xml report is actually modeled on a “boilerplate” ProcessDBSummary section that is defined in the *process.xml* file. You can copy code from the *process.xml* file into other reports that display CPU process information, but do not modify the *process.xml* file.

The operations specified in the operation variables for some of the table columns are defined in the *EventPoller.xsd* schema file.

The code sets up the table columns in variables that set up the columns. For example, the first three lines of the section set up the CPU slot number, CPU number, and CPU description.

```

<Var name="CPUSlot"      type="Integer" key="true">cpuSlot</Var>
<Var name="CPUNum"      type="Integer" key="true">cpuNum</Var>
<Var name="CPUDescr"    type="String" key="true">cpuDescr</Var>

```

Two of the columns used for the Average Utilization and Peak Utilization parts of the report require calculation of an average value and a maximum value. These are specified by the lines that contain operation="Max" or operation = "Avg" as shown below:

```

<Var name="CPUUtilMax5min" type="Double" operation="Max">fiveMinUtil</Var>
<Var name="CPUUtilAvg5min" type="Double" operation="Avg">fiveMinUtil</Var>

<Var name="CPUUtilMax1min" type="Double" operation="Max">oneMinUtil</Var>
<Var name="CPUUtilAvg1min" type="Double" operation="Avg">oneMinUtil</Var>

```

The polling data and the values calculated from it are retained in the virtual table in memory so as to be available for any CPU reports that users select in the Prime Performance Manager user interface.

At the end of each defined polling interval, the data for the virtual table set up for the specified polling interval is written to the physical database on the Prime Performance Manager gateway.

At this point, we have extracted the data from the variables polled for the MIB, manipulated the data, and set up the tables for the reporting on each polled device.

Now we are ready to specify how the reports look. This is done in the next two sections—the CSV section and the WebReport section.

Specify the CSV Output File and Format (CSV Section)

The CSV section specifies the layout of the data that is written to a comma separated value (CSV) file when users select the CSV report option.

[Example 2-5](#) shows the CSV section of the `cpu.xml` report.

Example 2-5 CSV Section

```
<CSV name="CPU" location="gateway" listen="CPU">
  <Column name="Slot">CPUSlot</Column>
  <Column name="Number">CPUNum</Column>
  <Column name="Description">CPUDescr</Column>

  <Util name="CPUUtilMax5min">CPUUtilMax5min</Util>
  <Util name="CPUUtilAvg5min">CPUUtilAvg5min</Util>
  <Util name="CPUUtilMax1min">CPUUtilMax1min</Util>
  <Util name="CPUUtilAvg1min">CPUUtilAvg1min</Util>

  <Column name="CpurisingThreshold">CpurisingThreshold</Column>
  <Column name="CpufallingThreshold">CpufallingThreshold</Column>
</CSV>
```

The first line of the CSV section specifies three values:

- The name of the CSV file.
- The location of the report, in this case the Prime Performance Manager gateway.
- The listen variable, which base table name is being used.

The remaining lines in the CSV section simply specify the text string or database column data

```
Column name="Slot">CPUSlot</Column>
  <Column name="Number">CPUNum</Column>
  <Column name="Description">CPUDescr</Column>

  <Util name="CPUUtilMax5min">CPUUtilMax5min</Util>
  <Util name="CPUUtilAvg5min">CPUUtilAvg5min</Util>
  <Util name="CPUUtilMax1min">CPUUtilMax1min</Util>
  <Util name="CPUUtilAvg1min">CPUUtilAvg1min</Util>

  <Column name="CpurisingThreshold">CpurisingThreshold</Column>
  <Column name="CpufallingThreshold">CpufallingThreshold</Column>
```

Now we are ready to set up the web reports.

Set up the Web Reports (WebReport and TableView Sections)

The WebReport section (or XML element) includes:

- **Attributes**—Specify the name of the report in Prime Performance Manager menus, where in the report tree the report appears, where the report data comes from, the Properties file for the web report, and so on
- **GraphView Section**—Sets up the graph view for the report.
- **TableView Section**—Sets up the table view for the report.

Specifying the Attributes for the WebReport Section

The attributes for the WebReport section specify key information that determines where the report is displayed and what data it uses.

The attributes set values that are specified in the Properties file for the XML report. For more details on the Properties file for the cpu.xml report, see [Specifying the Attributes for the WebReport Section, page 2-13](#).

[Example 2-6](#) shows the attributes specified for the WebReport section of the cpu.xml file.

Example 2-6 WebReport Attributes

```
<WebReport name="wrnCPUUtil"
  category="level1Resources,level2CPU"
  reportId="CPU"
  context="Network,Node,CPUSlot,CPUNum,CPUDescr"
  textProps="cpu"
  sortWeight="2">
```

The code shown in [Example 2-6](#) sets these attributes:

- **name**—Specifies a unique name, which is specified in the Properties file (cpu.properties). This is the report name that appears in Prime Performance Manager menus.
- **category**—Specifies where the report appears in the Prime Performance Manager report tree. For example, category="level1Resources,level2CPU" specifies that the CPU report will appear under the Resources report category, and will be identified by the text "CPU."
- **context**—Specifies the drill-down options available with the report and where the report can appear.
- **textProps**—Specifies the name of the Properties file to use: cpu.properties.
- **sortWeight**—Specifies the order of the report within the category to which it is assigned.

The line sortWeight=2 specifies order in which the report types appear in the Reports list.

How the Properties File is Used

Properties files have only one purpose: to set up variables to hold text strings displayed in the web GUI when users select the Graph View or the Table View.



Note

CSV names are given within the CSV column/util tag in the XML and not in the properties file.

[Example 2-7](#) shows the properties file for the cpu.xml report.

Example 2-7 cpu.properties File

```
level1Resources = Resources
level2CPU       = CPU

#CPU Utilization
wrnCPUUtil     = CPU Utilization
gstCPUUtil     = CPU Utilization

gtCPUUtilAvg   = CPU Average Utilization

genCPUUtilAvg  = Average Utilization
```

```

gtCPUUtilPeak    = CPU Average Peak Utilization
gtCPUUtil        = CPU Average and Peak Utilization
genCPUUtilPeak   = Peak Utilization

avg              = Avg
peak            = Peak

rising          = Rising
falling         = Falling

node            = Node
slot            = Slot
cpu             = CPU
cpuDes         = CPU Description

cpuUtil5Min     = 5 Min Util
cpuUtil1Min     = 1 Min Util
cpuUtilThresh  = Threshold

```

Coding the GraphView Section

The GraphView section sets up the report graph view, including:

- The graph summary table title.
- The graph title and the column names for the graph to be plotted.
- The leaf graph, if applicable.

You should specify the text that is displayed using variables defined in the properties file for the report, as shown in [Example 2-8](#).

[Example 2-8](#) shows the GraphView section of the cpu.xml report.

Example 2-8 GraphView Section

```

<GraphView>
  <GraphSummary title="gstCPUUtil" />
  <Graph title="gtCPUUtilAvg" >
    <Util name="genCPUUtilAvg">CPUUtilAvg5min</Util>
  </Graph>
  <Graph title="gtCPUUtilPeak" >
    <Util name="genCPUUtilPeak">CPUUtilMax5min</Util>
  </Graph>
  <LeafGraph title="gtCPUUtil" >
    <Util name="genCPUUtilAvg">CPUUtilAvg5min</Util>
    <Util name="genCPUUtilPeak">CPUUtilMax5min</Util>
  </LeafGraph>
</GraphView>

```

The GraphSummary element specifies the title that appears above the report graph in the Prime Performance Manager GUI:

```
<GraphSummary title="gstCPUUtil" />
```

This specifies that the title is as specified by the *gstCPUUtil* variable in the properties file (“CPU Utilization”).

Hiding the Summary Tables on First Report Display

If you want to hide the summary tables the first time the report is displayed, you can use the minimized attribute as in the following example:

```
<GraphSummary title="ifDashboard" minimized="true"/>
```



Note

You can override display of the summary titles on a per-user basis.

Coding the Graph Sections

The Graph sections within the GraphView section specify the text strings that will identify the two graphs shown in the graph view for the CPU report, as defined in the properties file. These are, CPU Average Utilization and CPU Average Peak Utilization.

Within the Graph section, you can:

- Simply display values “as is” from the database, by coding a Column element.
- Perform an operation on the data, by coding a Util element.

The code in the Graph sections for the cpu.xml report specifies Util values that multiply the base values by 100.

Coding a LeafGraph Section

If your report drills down through the available subreports until the lowest level is reached, and only one instance of an object you are reporting on is left, you can code a LeafGraph section to combine the different data metrics for that object in one graph.

For example, for the CPU report, users can click on the text in the CPU Description column for each processor to display a combined report called the CPU Average and Peak Utilization report. Such sub-reports are defined in a LeafGraph section.

The LeafGraph section for the CPU report is specified as follows:

```
<LeafGraph title="gtCPUUtil" >
  <Util name="genCPUUtilAvg">CPUUtilAvg5min</Util>
  <Util name="genCPUUtilPeak">CPUUtilMax5min</Util>
</LeafGraph>
```

The title attribute for the LeafGraph section specifies a variable from the properties file (gtCPUUtil) that specifies the title of the Leaf report: CPU Average and Peak Utilization.

The Util section specify the titles of two reports items shown in a table at the top of the leaf report Peak Utilization and Average Utilization, and the Util variables specify the table data that is displayed.

Coding the TableView Section

The final section of the cpu.xml report sets the format for the table view for the report.

[Example 2-9](#) shows the TableView section for the cpu.xml report.

Example 2-9 TableView Section

```
<TableView baseTable="CPU">
  <IdLabel/>
  <Label colSpan="2" name="cpuUtil5Min" />
  <Label colSpan="2" name="cpuUtil1Min" />
```

```

<Label colSpan="2" name="cpuUtilThresh" />
<HeaderRow/>

<Link name="node" context="Node">fqdnid</Link>
<Link name="slot" context="CPUSlot">CPUSlot</Link>
<Link name="cpu" context="CPUNum">CPUNum</Link>
<Link name="cpuDes" context="CPUDescr">CPUDescr</Link>
<Time/>

<Util default="true" name="avg"> CPUUtilAvg5min</Util>
<Util name="peak"> CPUUtilMax5min</Util>

<Util name="avg"> CPUUtilAvg1min</Util>
<Util name="peak"> CPUUtilMax1min</Util>

<Util name="rising"> CPURisingThreshold</Util>
<Util name="falling"> CPUFallingThreshold</Util>
</TableView>

```

Figure 2-1 shows a Table View for the CPU report.

Figure 2-1 Example of a Table View

Node	Slot	CPU	CPU Description	Timestamp EDT	5 Min Util		1 Min Util		Threshold	
					Avg	Peak	Avg	Peak	Rising	Falling
tl-dev-crs1-lsdr-1	0	1	host	Jun-06-11 13:00	76.0	77.0	73.4	76.0	0.0	0.0
tl-dev-crs1-lsdr-1	0	1	host	Jun-06-11 19:00	75.4	77.0	78.2	79.0	0.0	0.0
tl-dev-crs1-lsdr-1	0	1	host	Jun-06-11 20:00	75.0	76.0	77.4	81.0	0.0	0.0
tl-dev-crs1-lsdr-1	0	1	host	Jun-06-11 18:00	75.0	76.0	75.0	77.0	0.0	0.0
tl-dev-crs1-lsdr-1	0	1	host	Jun-06-11 12:00	75.0	77.0	75.7	80.0	0.0	0.0
tl-dev-crs1-lsdr-1	0	1	host	Jun-06-11 11:00	74.6	76.0	75.4	80.0	0.0	0.0
tl-dev-crs1-lsdr-1	0	1	host	Jun-06-11 14:00	73.4	76.0	75.2	79.0	0.0	0.0
tl-dev-crs1-lsdr-1	0	1	host	Jun-06-11 10:00	73.0	73.0	71.0	71.0	0.0	0.0
tl-dev-crs1-lsdr-1	0	1	host	Jun-06-11 09:00	73.0	73.0	71.0	71.0	0.0	0.0
tl-dev-crs1-lsdr-1	0	1	host	Jun-06-11 17:00	71.3	74.0	72.7	73.0	0.0	0.0
tl-dev-crs1-lsdr-1	0	1	host	Jun-06-11 16:00	66.0	66.0	72.0	72.0	0.0	0.0
tl-dev-crs1-lsdr-1	0	1	host	Jun-06-11 15:00	66.0	66.0	72.0	72.0	0.0	0.0
csr-e-2941a	0	0	CPU of main processor	Jun-06-11 15:00	37.8	41.0	39.8	53.0	0.0	0.0

The code in the TableView section specifies the attributes that set up the layout of the table:

- As Figure 2-1 shows, there are several headings that have two subheadings. For example, 5 Min Util has subheadings for Avg and Peak, and Threshold has subheadings for Rising and Falling.

These are specified in the three Label sections:

```

<Label colSpan="2" name="cpuUtil5Min" />
<Label colSpan="2" name="cpuUtil1Min" />
<Label colSpan="2" name="cpuUtilThresh" />

```

The `colSpans` attribute specifies that the main heading spans two subcolumns, and the names attribute specifies the variables that define the text for the headings, as specified in the properties file. For example, `cpuUtil5Min` specifies the string 5 Min Util.

- Several of the report columns contain links to other items. For example, the CPU Description column contains links that display reports for the selected CPU, and the CPU Description column contains links that display reports for the selected node.

The Link sections define these links, as follows:

```

<Link name="node" context="Node">fqdnid</Link>
<Link name="slot" context="CPUSlot">CPUSlot</Link>
<Link name="cpu" context="CPUNum">CPUNum</Link>

```


The name attribute in each Link section specifies a string, defined in a variable in the properties file, that describes the item; for example slot specifies “Slot.” The context attribute specifies a column in the ProcessDBSummary section, for example, for slot, the data column for CPUSlot is displayed.

The Time section specifies the columns from the DBSummary table that contain data for each time range report and the heading for the subcolumn. For example for the Rising subcolumn for the Threshold column, the code specifies a Util value:

```
<Util name="rising"> CPURisingThreshold</Util>
```

If you don’t want to apply a Util operation to the data, you can code a Column element instead—this will display the data unchanged.

Creating a Report with Thresholdable Fields

Many Prime Performance Manager table and graph view fields are prefixed with a + to indicate users can create thresholds using the Prime Performance Manager Threshold Editor. (For information on creating thresholds, see “Managing Thresholds” in the *Cisco Prime Performance Manager 1.2 User Guide*.)

Any numeric column value defined in the report XML file WebReport declarations can be configured as a threshold as long as the value is not a key or link value and does not have the 'thresholdable="false"' attribute.

When users create thresholds, they edit the key performance indicator (KPI) properties. The KPI can be either rising or falling. For a rising threshold, the critical alarm threshold must be higher than the major alarm threshold, and the major alarm threshold must be higher than the minor alarm. For a falling threshold, the critical alarm entry must be lower than the major alarm, and the major alarm must be lower than the minor alarm.

You can use the tcaRising attribute to create a thresholdable field with the expected rising or falling KPI value. This attribute is placed under the GraphView or TableView declaration in the report XML file. If you set tcaRising=true (default), the field’s KPI will be rising. If you set tcaRising=false, the KPI will be falling.

Fields for which you cannot use the tcaRising attribute include:

- Any LeafGraph fields.
- Any Dashboard report XML file field. Dashboard reports have *Dash.xml file names. Dashboard report fields are not supported for thresholds, so *Dash.xml files should never contain the tcaRising attribute.

Following is an example of a thresholdable field based on ping.xml

```
<!-- *** ICMP Ping Availability *** -->

<WebReport name="wrnICMPPingAvail"
  category="level1Availability,level2ICMPPing"
  reportId="ICMP_PING"
  context="Network,Node, "
  sortWeight="22"
  textProps="ping">

  <GraphView>

    <GraphSummary title="gstICMPPingAvail" />
    <Graph title="gtICMPPingAvailAvg" >
      <Util name="genICMPPingAvailAvg" default="true"
        descending="false" tcaRising="false">PingAvailability</Util>
    </Graph>
```

```

        <LeafGraph title="gtICMPPingAvailAvg" type="bar">
            <Util name="genICMPPingAvailAvg">PingAvailability</Util>
NOTE: the tcaRising attribute is not added here.
        </LeafGraph>

</GraphView>

<TableView baseTable="ICMP_PING">
    <IdLabel/>
    <Label colSpan="1" name="icmpPingAvail" />
    <Label colSpan="3" name="latency" />
    <HeaderRow/>

    <Link name="node" context="Node">fqdnid</Link>
    <Time/>

    <Util name="genICMPPingAvailAvg" default="true"
        descending="false" tcaRising="false">PingAvailability</Util>

    <Column name="avg">PingLatencyAvg</Column>
    <Column name="max">PingLatencyMax</Column>
    <Column name="min">PingLatencyMin</Column>

</TableView>

```

Providing an Online Help File

After you develop your report, you can provide an online help file for it. If you provide customized Online help for your report, it appears when users choose **Custom Help** on the Help page for reports.

To create your own online help file:

-
- Step 1** Create an HTML file that contains the title of your report. For example, if your report is named *test.xml*, create an HTML file named *test.xml.custhlp.html*.
 - Step 2** Write the content for the file.
 - Step 3** Copy the help file to the following directory on the gateway:
/opt/CSCOppm-gw/apache/share/htdocs/reportHelp/user/
-

Manually Generating the Online Help Files

If you want to manually generate the system-generated online help files, enter the following from the gateway command line:

```
ppm docreps
```

Best Practices

This section discuss some best practices to follow as you develop reports.

Do Not Edit files in the /system Directory

Do not edit the files in the */opt/CSCOppm-gw/etc/pollers/system* directory. If you want to use an existing report file and its associated property file as the starting point for a new customized report, copy the files to the */opt/CSCOppm-gw/etc/pollers/user* directory and work on them there.

Do Not Edit the SystemCapability.xml File

Do not edit the *SystemCapability.xml* file, which is located in the */opt/CSCOppm-gw/etc* directory. To modify the capabilities used for your own reports, edit the *UserCapability.xml* file as required. This file is also located in the */opt/CSCOppm-gw/etc* directory.

Add New .xml and .properties files in the user Directory

If you need to add new *.xml* files or *.properties* files, add these files and edit them in the */opt/CSCOppm-gw/etc/pollers/user* directory.

Be Careful When Modifying the Schema Used in Previous Reports

As you develop the code for your report, exercise care when modifying the schema that is used for previously developed reports. If you modify the internal schema without considering the previous coding that affects it, this might cause the internal database to become unstable and require reinitializing the database.

Use Unique Poller Names, Report IDs, and Database Table Names for Your Reports

Make sure that you always use unique poller names, report IDs and database table names for your reports. If you use an existing name, this can cause serious system issues.

Use a Properties File to Specify Common Settings

Use the *.properties* file associated with your report's XML file to specify settings that are used in more than one section of your reports or used across several reports. This ensures consistent processing and helps eliminate errors that can result from coding the same variables more than once.

Optimize Data Computations for Storage in the Database

As you develop your reports, optimize the data computations used in your reports. This saves system processing time.

Task Reference

This section provides reference information for common tasks you might perform while developing reports.

Enabling 5-Minute Reports

5-minute reports are not enabled by default. You can enable 5-minute reports by editing the XML report definition file that corresponds to the report, or you can enable 5-minute reports in the Prime Performance Manager GUI. The ProcessDBSummary section and the WebReport section require the addition of interval attributes.

Here is an example of adding the interval attribute to the CPU Utilization report to enable 5-minute reporting in the cpu.xml report definition file:

```
<ProcessDBSummary name="CPU" baseTableName="CPU"
interval="Min5Min15HourlyDailyWeeklyMonthly">
<WebReport name="wrnCPUUtil"
    category="wrcVendor,wrcCategory"
    reportId="CPU"
    context="Network,Node,CPUSlot,CPUNum,CPUDescr"
    textProps="cpu"
    sortWeight="2" interval="Min5Min15HourlyDaily">
```

The 5-minute interval is defined as

```
interval="Min5Min15MinHourlyDailyWeeklyMonthly"
```

This attribute is not defined by default and implicitly defaults to 15-minute, hourly, and daily reports.

5-minute reports can also be enabled globally through the web UI on the Reports > Reports Settings tab. The polling interval for devices generating 5-minute reports must be changed as well. Device polling intervals are set in the web UI Network Menu > Polling Group Editor.



Note

Enabling 5 minute reports will significantly increase the amount of resources required for your PPM units.

Adding a New Column to an Existing Report

To add new columns to an existing report:

- Step 1** If the required MIB attributes are not polled in the PollDefinition section, modify the polling definitions.
- Step 2** Include the formulas required as shown in [Modifying the ProcessPollResult Section, page 2-22](#).
- Step 3** Add the variables in the database table using the *Var* element in the <ProcessDBSummary> element (see [Modifying the ProcessDBSummary Section, page 2-21](#)).
- Step 4** Save the changes and restart the gateway and unit.

Modifying the ProcessDBSummary Section

To add a variable in the ProcessDBSummary section:

- Step 1** If the required MIB attributes are not polled in the PollDefinition section, modify the polling definitions (see [Modifying Poll Definitions, page 2-21](#)).
- Step 2** If formula is required add it in the ProcessPollResult section (see [Modifying the ProcessPollResult Section, page 2-22](#).)
- Step 3** Add the variable using *Var* as given in the following example:

Example 1: For variables for which formula calculation is not required, we add code in the ProcessDBSummary section as follows.

```
<ProcessDBSummary name="CPU" baseTableName="CPU">
<Var name="CPUSlot" type="Integer" key="true">cpuSlot</Var>
</ProcessDBSummary>
```

Example 2: For variables for which formula calculation is required, add formulas in the ProcessPollResult section (See [Modifying the ProcessPollResult Section, page 2-22](#)) and to the ProcessDBSummary section as shown below:

```
<ProcessPollResult>

    fiveMinUtil      = cpmCPUTotal5minRev / 100;

</ProcessPollResult>

<ProcessDBSummary name="CPU" baseTableName="CPU">

    <Var name="CPUUtilMax5min" type="Double" operation="Max">fiveMinUtil</Var>
    <Var name="CPUUtilAvg5min" type="Double" operation="Avg">fiveMinUtil</Var>
</ProcessDBSummary>
```

Modifying Poll Definitions

To modify poll definitions:

- Step 1** Include the MIB table name in the MIBLevel section from which the MIB attribute is to be polled.

For example:

```
<Criteria>CISCO_PROCESS_MIB</MIBLevel>
```

Here, CISCO_PROCESS_MIB is the MIB table name.

- Step 2** Include the poll function in the PollDefinition section as shown below:

```
cpmCPUTotalTable = poll("cpmCPUTotalIndex, cpmCPUTotal5minRev");
```

Here cpmCPUTotalIndex, and cpmCPUTotal5minRev are the MIB attributes from CISCO_PROCESS_MIB.

Modifying the ProcessPollResult Section

To modify the ProcessPollResult section:

Step 1 If the required MIB attributes are not polled in the PollDefinition section, see [Modifying Poll Definitions, page 2-21](#).

Step 2 Write the formula and assign it to a variable.

For example, in cpu.xml, cpmCPUTotal5minRev is a polled variable and the formula to be calculated is cpmCPUTotal5minRev / 100.

Step 3 Include the formula in the <ProcessPollResult> section as follows:

```
<ProcessPollResult>
    fiveMinUtil      = cpmCPUTotal5minRev / 100;
</ProcessPollResult>
```

fiveMinUtil is a meaningful name given by the user, which can be used in the other sections of the XML such as the ProcessDBSummary section.

Setting Up Cross Launch of Reports in Cisco Prime Network

If you are using Cisco Prime Performance Manager with Cisco Prime Network (Cisco Active Network Abstraction), you can set up cross-launch of Prime Performance Manager reports from Cisco Prime Network Vision device shortcut menus.

There are two ways to do this:

- Using the Prime Performance Manager GUI
- Using the **ppm crosslaunch** CLI command

Using the Prime Performance Manager GUI

To set up cross-launch using the Prime Performance Manager GUI:

Step 1 From the System menu, choose **Prime Network Integration**.

Step 2 Click the Prime Network tab.

The Prime Network Gateway page appears.

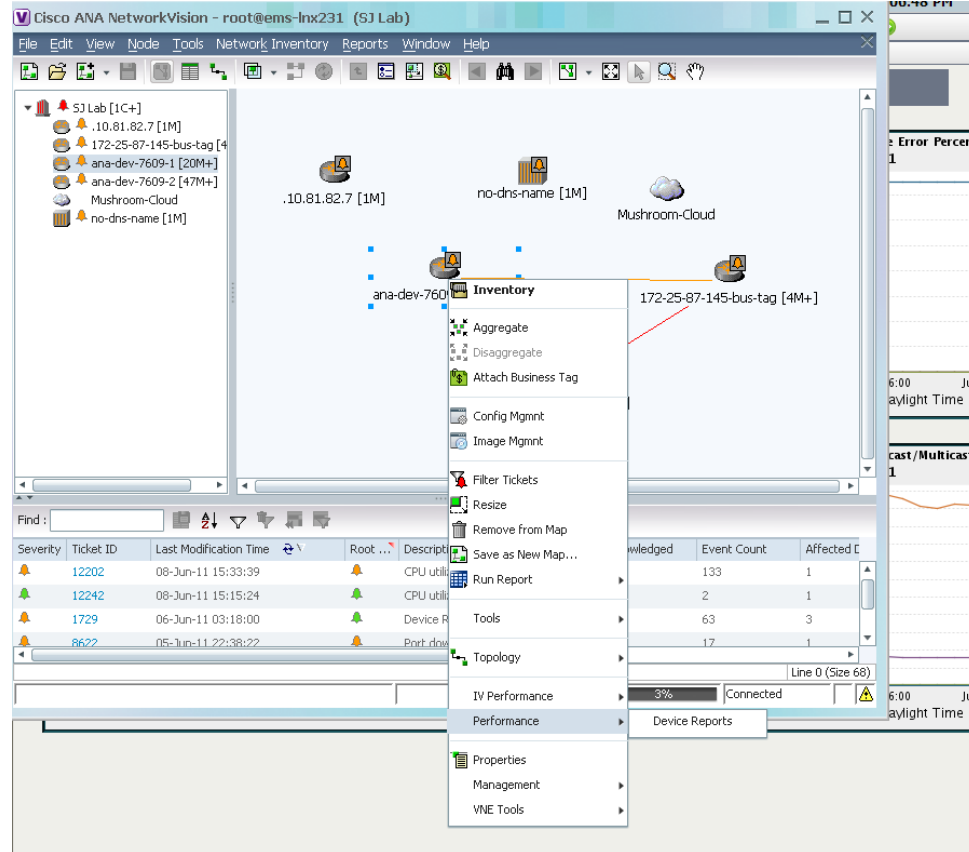
Step 3 On the Prime Network Gateway page, enter the parameters to log into the Prime Network Gateway:

Step 4 Click the Install Cross Launch icon.

The Prime Performance Manager gateway communicates with the Prime Network gateway and automatically installs BQL scripts that add menu selections for Cisco Prime Performance Manager reports to the Device Shortcut Menu.

[Figure 2-2](#) shows an example:

Figure 2-2 Device Shortcut Menu with Cross-Launch Menu Selections



The process adds a menu select for **Performance > Device Reports** to the Prime Network device shortcut menu.

Prime Network users can now launch reports from the node level or interface level from nodes or interfaces that support the installed reports.

Using the Command Line

To set up cross-launch using the Prime Performance Manager CLI, enter the following command on the gateway:

```
ppm crosslaunch
```

Adding Cross Launch for Your Own Reports

The `CSCOpM-gw/etc/bql/xl` directory on the Prime Performance Manage gateway contains several BQL examples for setting and deleting cross-launch points in Prime Network

Table 2-1 BQL Cross Launch Scripts Provided with Cisco Prime Performance Manager

Script Names	Description
bgp.bql, bgp-remove.bql	Adds, removes, cross-launch points for Border Gateway Protocol (BGP) reports.
evc.bql, evc-remove.bql	Adds, removes cross-launch points for Ethernet Virtual Circuit (EVC) reports.
if.bql, if-remove.bql	Adds, removes, cross-launch points for interface reports.
mpls-te-tunnel.bql, mpls-te-tunnel-remove.bql	Adds, removes, cross-launch points for MPLS Traffic Engineering reports.
node.bql, node-remove.bql	Adds, removes, cross-launch points for node level reports.
ospf.bql, ospf-remove.bql	Adds, removes, cross-launch points for OSPF reports.
pwe3.bql, pwe3-remove.bql	Adds, removes, cross-launch points for Pseudo Wire Emulation Edge-to-Edge (PWE3) reports.

Note that every BQL script to set a cross-launch point must have a corresponding BQL file to delete the cross launch.

The following examples show cross-launch BQL to add a cross-launch point at the node level in Prime Network.

[Example 2-10](#) shows how to add a cross-launch point giving users a **Performance > Device Reports** menu selection for launching Prime Performance Manager reports at the node level.

Example 2-10 The node.bql File

```
<command name="Set">
  <param name="imo">
    <value>
      <management.IExternalLaunch>
        <ID
type="Oid">{[ExternalLaunch(ContextImoType=com.sheer.imo.IManagedElement)(Name=deviceReport)]}</ID>
          <MenuCaption type="String">Device Reports</MenuCaption>
          <MenuPath type="String">Performance</MenuPath>
          <LineToExecute
type="String">$ppmProtocol$://$ppmWebAddress$: $ppmWebPort$/ppm/jsp/navMain.jsp?displayType=reportTab&FQDN=Node=$com.sheer.imo.IManagedElement.DeviceName$</LineToExecute>
        </management.IExternalLaunch>
      </value>
    </param>
    <param name="replace">
      <value>true</value>
    </param>
  </command>
```


Example 2-11 shows sample BQL for removing the cross-launch point.

Example 2-11 The node-remove.bql File

```
<command name="Delete">
  <param name="oid">
    <value>
      <management.IExternalLaunch>
        <ID
type="Oid">{ [ExternalLaunch(ContextImoType=com.sheer.imo.IManagedElement) (Name=deviceReport)] }</ID>
      </management.IExternalLaunch>
    </value>
  </param>
</command>
```

After you develop your own reports, you can add cross-launch points in Prime Network by modifying the provided BQL samples and then enabling cross launch.

