



## Managing Multi-Tenant Services

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Multi-tenancy is a principle of software architecture where a single instance of the software runs on a server serving multiple client organizations, or tenants. Tenants are logically isolated, but physically integrated.

In Prime Performance Manager you can create tenants directly or import tenants by integrating with OpenStack servers. You can then filter reports, alarms, and thresholds by one or more tenants. Procedures for managing tenants in Prime Performance Manager data are provided in the following topics:

- [Overview to Multi-Tenancy in Prime Performance Manager, page 15-1](#)
- [Creating Tenants in Prime Performance Manager, page 15-2](#)
- [Adding Tenants Through OpenStack Integration, page 15-4](#)
- [Displaying Tenant Reports, page 15-6](#)
- [Displaying Alarms and Events by Tenant, page 15-6](#)
- [Adding Tenants to Thresholds, page 15-6](#)
- [Tenant Views, page 15-7](#)

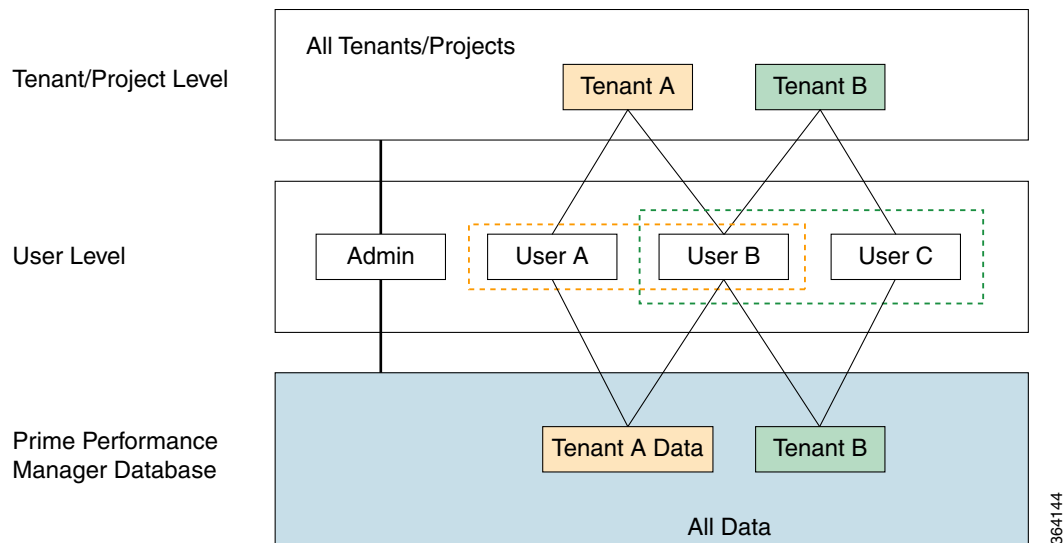
### Overview to Multi-Tenancy in Prime Performance Manager

Multi-tenant actions you can perform in Prime Performance Manager include:

- Adding tenants directly.
- Creating tenant groups.
- Importing and synchronizing tenants through integration with an OpenStack server.
- Filtering reports, thresholds, and alarms by tenant scope.
- Displaying alarms filtered by tenant scope.
- Associating Prime Performance Manager users to tenants.

**Figure 15-1** provides an overview to the Prime Performance Manager tenant and user data access:

- User A is a member of Tenant A, User A can only access data defined for Tenant A.
- User B is a member of both Tenant A and Tenant B, User B can access data defined for both Tenant A and Tenant B.
- User C is a member of Tenant B, User C can only access data defined for Tenant B.
- The Admin user is the administrator, and can access all Prime Performance Manager data.

**Figure 15-1 Multi-Tenancy Support in Prime Performance Manager**

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## Creating Tenants in Prime Performance Manager

You can create tenants in Prime Performance Manager using one of the following methods:

- Create tenants through the Tenant window, then create the report filtering for the tenant.
- Create a tenant group then assign the data source and algorithms to filter the data objects and reports for the tenant group.

In general, creating tenants through the Tenants window is quicker and simpler, but does not provide the filtering capabilities tenant groups provide.

Following tenant creation, you must modify the definition file.

Instructions are provided in the following topics:

- [Adding Tenants to Prime Performance Manager From the Tenants Window, page 15-2](#)
- [Adding Tenants to Prime Performance Manager Through Tenant Groups, page 15-3](#)
- [Adding Tenants Through OpenStack Integration, page 15-4](#)

## Adding Tenants to Prime Performance Manager From the Tenants Window

To add tenants Prime Performance Manager through the Tenants window:

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- Step 1** Log into Prime Performance Manager GUI as a System Administrator user.
  - Step 2** If user access is not enabled, enable it following the [“Enabling Secure User Access” procedure on page 6-9](#).
  - Step 3** From the Administration menu, choose **Users/Tenants/Security**.
  - Step 4** On the Users window, click the **Tenants** tab.
  - Step 5** On the Tenants window, click **Add**.

- Step 6** In the Add Tenant dialog box, enter:
- Tenant Name—The tenant name.
  - Display Name—The tenant display name.
  - Tenant Status—Choose Enabled to enable the tenant (default), or Disabled to not enable it.
- Step 7** Click **Save**.
- Step 8** On the Tenants window, choose the tenant you created and on the toolbar click **Filter Reports**.
- Step 9** On the Tenant Reports window, check or uncheck the reports you want available to the tenant.
- Step 10** To display or hide report data columns:
- a. Navigate to the report and click the **Tenant Report Condition** icon next to the report title.  
The Tenant Filter Condition: [*report category:report title*] dialog box is displayed.
  - b. In the Column Name field choose the report column for which you want to set conditions.  
The column display name and data type are displayed in the Display Name and Column Type fields.
  - c. In the Filter Value field, enter the value that you want the report data column to equal before it is displayed to tenant members. (Equal is the only available operator.)
  - d. Click **Add**.
  - e. If you want to add or append additional conditions, repeat Step c and click **Add** to add a new condition, or click **Append** to append the condition to the existing one.
  - f. When finished, click **OK**.
- Step 11** On the Tenant Reports window, click **Save** to save the tenant filter.
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## Adding Tenants to Prime Performance Manager Through Tenant Groups

To add tenants to Prime Performance Manager by creating tenant groups:

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- Step 1** Log into Prime Performance Manager GUI as a System Administrator user.
- Step 2** If user access is not enabled, enable it following the [“Enabling Secure User Access” procedure on page 6-9](#).
- Step 3** From the Administration menu, choose **Group Editor**.
- Step 4** Click the **Create New Group** tool.
- Step 5** In the Create Group dialog box, enter the group name.
- Step 6** Click **OK**.
- The new group is added to the System Groups table.
- Step 7** Click the new group link.
- Step 8** In the Group Details tab Type/Tag field, enter **ppm\_tenant**.  
This tag identifies the group as a tenant and will cause it to appear on the Tenants window.
- Step 9** In the Data Source area, click **Change**.
- Step 10** In the Edit Group Data Source dialog box, choose the data sources you want for the tenant and click Add to move them to the Assigned Data Sources group.

- Step 11** When finished, click **Save**.
  - Step 12** To create an algorithm to run against the selected data source(s), click **Launch Algorithm Editor (Beta)**.
  - Step 13** Create the algorithm by dragging blank operator equations to the area on the right, then dragging the variables on the top to fill in the blank elements of the operator equation.
  - Step 14** When finished, click **Save and Quit**.
  - Step 15** On the Group Details tab, click **Validate** to validate the data source and algorithm.
  - Step 16** Click **Save**.
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## Adding Tenants Through OpenStack Integration

OpenStack is an open-source cloud computing platform generally deployed in infrastructure as a service (IaaS) solutions. OpenStack controls data center processing pools, storage, networking resources, and many other IaaS functions.

Tenants are primary organizational elements within the OpenStack Compute service. (The OpenStack Compute service provides virtual servers upon demand.) OpenStack tenants include a separate VLAN, volumes, instances, images, keys, and users.

You can import OpenStack tenants into Prime Performance Manager by connecting to the OpenStack server and running the tenant integration function. After the OpenStack tenants are added, you can set up report filtering to restrict report data to that which is appropriate for the tenant.

To integrate Prime Performance Manager with OpenStack tenants:

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- Step 1** Log into the Prime Performance Manager GUI as the administrator user.
  - Step 2** From the Administration menu, choose **Tenant Integration**.  
The Administration Tenant Integration window displays.
  - Step 3** Click **OpenStack** tab.  
Enter the following:
    - Ongoing Tenant Synchronization—Indicates whether the OpenStack tenants are regularly synchronized. Initially this displays No. After you complete the integration, it changes to Yes.
    - Host Name or IP Address—Enter the OpenStack server host name or IP address. For multi-node OpenStack deployments, this is the server where the OpenStack Keystone API service is installed.
    - Protocol—Choose the protocol used to access the server, either HTTP or HTTPS.
    - Port—Enter the OpenStack server port number.
    - User Name (Admin User Level)—Enter the OpenStack project name and user in the format: `[ProjectName]\[UserName]`. For example, if the username is admin and the project name to which the admin user belongs is openstack, you would enter openstack\admin.
    - Password—Enter the user password.
    - Version—The Keystone Web API version. Currently only Version 2.0 is supported.
    - Sync Interval—Choose the synchronization interval: 30 minutes, 1 hour, or 6 hours.



**Note** The synchronization interval must be longer than the life of the OpenStack authenticate token.

**Step 4** On the Administration Tenant Integration toolbar, click **Import Tenants**.

After successful integration:

- The Ongoing Tenant Synchronization field changes to Yes.
- At the bottom you will see

```
Tenant Import success
Last import of tenant: [date and time of last import]
```

**Step 5** At any later time, you can perform the following actions from the Tenant Integration toolbar:

- **Import Tenants**—Synchronizes the tenant immediately and updates the last import date and time.
- **Disable Import Tenants**—Stops the ongoing tenant synchronization.
- **Clear Import Tenants**—Removes the current tenant import configuration and all associated tenant data.

## Adding Users to Tenants

After you create or add tenants to Prime Performance Manager, you can add users to them. User creation and editing procedures are provided in the following topics:

- [Adding New Users, page 6-14](#)
- [Editing User Information, page 6-16](#)

When you create or edit a user, in the Tenant Name field check the tenants to which you add the user. After you save the user or user information updates, you can display the tenants to which the user belongs by clicking the **Tenants** box.

## Setting Up OpenStack Ceilometer Reports

OpenStack ceilometers provide a point of contact for billing systems to acquire measurements for customer billing across all current OpenStack core components. Ceilometer reports are located in the Compute > OpenStack report category.

By default, ceilometer collects metrics every 10 minutes. Prime Performance Manager allows you to configure other intervals. If the interval is lower than the ceilometer interval, Prime Performance Manager fills the data automatically by using most recent data. Therefore, the polling interval must always be larger than the ceilometer interval.

When configuring Prime Performance Manager to monitor OpenStack, review the default OpenStack Ceilometer poll interval. By default this is 10 minutes. Disable OpenStack reports that are less than the Ceilometer poll interval, otherwise Prime Performance Manager will poll OpenStack more frequently than OpenStack is updated. For example, if the OpenStack Ceilometer poll interval is the 10-minute default, disable OpenStack 1 and 5 minute reports. See [Customizing Individual Report Settings, page 7-25](#).

# Displaying Tenant Reports

If OpenStack tenant integration is enabled, hypervisor and OpenStack Ceilometer report data are filtered automatically.


**Note**

For OpenStack tenant integration, Prime Performance Manager must import Ceilometer as the monitored device for data filtering. Hypervisors are optional.

For tenants added to Prime Performance Manager directly, filtering is set up at the time you create the tenant. See the following topics:

- [Adding Tenants to Prime Performance Manager From the Tenants Window, page 15-2](#),
- [Adding Tenants to Prime Performance Manager Through Tenant Groups, page 15-3](#)

To display report data by tenant:

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- Step 1** Log into the Prime Performance Manager GUI as the administrator user.
- Step 2** On the Prime Performance Manager toolbar, click **User Preferences**.
- Step 3** In the User Preferences window, click **General Display Settings**.
- Step 4** In the right column, modify the following tenant report properties:
- Tenant Scope—Sets the report tenant scope:
    - All—Displays all reports, not just tenant reports.
    - All Tenants—Displays all tenant reports.
    - SELECTED—Allows you to select and display reports for individual tenants.
  - Tenant Display—Sets the tenant identifier when displayed in reports, either Name (internal tenant name), or Display Name.

For example, if you set Tenant Scope to All Tenants and Tenant Display to Display Name, then navigate to Reports > Compute > OpenStack > [Ceilometer], you will notice a new Tenant column is displayed with the data for all Tenants.

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## Displaying Alarms and Events by Tenant

Alarms and events have a Tenant attribute that you can use to sort alarms and events by tenant. The Tenant attribute is not displayed by default. To display it, see [Adding and Removing Properties from Property Views, page 3-19](#).

## Adding Tenants to Thresholds

Prime Performance Manager thresholds allow you define performance criteria for displaying threshold crossing alert alarms and events. For complete information about Prime Performance Manager thresholds, see [Chapter 11, “Creating and Managing Thresholds.”](#) When you create thresholds, you can apply one, multiple, or all tenants to it.

To add tenants to threshold crossing alerts:

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**Step 1** Complete the “[Creating Thresholds](#)” procedure on page 11-1.

**Step 2** Complete the following tenancy fields:

- Tenancy—Indicates the tenants that should be included in the threshold:
    - ALL—(default) Choose this option if you do not want to assign tenants to the threshold.
    - ALL\_TENANTS—Includes all tenants in the threshold.
    - SELECTED—Allows you to choose the tenants added to the threshold
  - Selected Tenants—If you chose SELECTED in the Tenancy field, displays the tenants that added. To add tenants, click **Change** then chose the tenants you want in the Select Tenants dialog box using the **Add**, **Add All**, **Remove**, **Remove All** buttons.
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## Tenant Views

After you integrate Prime Performance Manager with OpenStack tenants, you view information about them in the Data Center > Tenants view. Each tenant view includes the following subviews retrieved from the OpenStack server:

- Network—Displays information about the tenant VLAN.
- Compute—Displays the tenant virtual machines. In OpenStack Horizon, these are called instances.
- Storage—Displays information about tenant storage volumes.

To display tenant details, click the tenant in the View tree. The following tenant details are displayed:

- Name—The tenant name.
- Status—The tenant status, either enabled or disabled.
- Description—A description of the tenant, if added.
- Tenant Source—The source of the tenant. Currently, this will be OpenStack.
- Regular Tenant Sync—Indicates whether regular synchronization occurs between Prime Performance Manager and the OpenStack server, either Yes or No.
- Last import of tenant—Indicates the data and time of the last tenant information synchronization.

## Pushing Prime Performance Manager Data to OpenStack

Prime Performance Manager can monitor OpenStack virtual machines (VMs) through different paths and therefore retrieve some VM data not available in OpenStack Ceilometers. For example, Prime Performance Manager can get the availability percentage of each OpenStack VM. By pushing this data to the OpenStack Ceilometers, OpenStack users will see the new meter created and supported by Prime Performance Manager in the Ceilometer.

To push data to OpenStack Ceilometers, you must modify `pushToCeilometer.xml` for each push processor. `pushToCeilometer.xml` is located in the `/opt/CSCOppm-gw/etc/nbapps/` directory.

Open `pushToCeilometer.xml` with a text editor and enter the following:

- `listen`—Enter the data source.
- `interval`—Enter the interval of report data to be pushed. The interval must be enabled for the data source and be a valid interval value defined in `EventPoller.xsd`. By default it includes all user-configurable intervals.
- `queueSize`—Defines the queue size. The default is 10000.
- `reconnectInterval`—If Prime Performance Manager loses connection to the Ceilometer while it is pushing data, it will put the message in a queue and keep trying to reconnect. `reconnectInterval` defines the interval between reconnect attempts. The default value is 60000 ms, which means Prime Performance Manager will try to reconnect every 60 seconds until the connection is reestablished.
- Usage of macro—`PushToCeilometer(tableName, KPIName, Unit, [queueSize], [reconnectInterval])`

In the following expressions, default values for `queueSize` and `reconnectInterval` are used:

- `PushToCeilometer("ppmKVMDomainCPU", "CPUTime", "%");`
- `PushToCeilometer("ppmKVMDomainCPU", "CPUTime", "%", "default", "default");`

In the following expressions, both custom and default values for `queueSize` and `reconnectInterval` are used:

- `PushToCeilometer("ppmKVMDomainCPU", "CPUTime", "%", "5000", "30000");`
- `PushToCeilometer("ppmKVMDomainCPU", "CPUTime", "%", "5000", "default");`
- `PushToCeilometer("ppmKVMDomainCPU", "CPUTime", "%", "default", "30000");`

All pushing processors share one queue and one connection. If you define different `queueSize` and `reconnectIntervals` in the expressions, the largest `queueSize` and the smallest `reconnectInterval` are used. For example, in the following expression set, `queueSize=5000` and `reconnectInterval=30000` will be used:

```
<Push name="kvmDomainAvailability" listen="kvmDomainAvailability" location="gateway"
interval="Min1" enabled="true">
  <Collection>
    PushToCeilometer("ppmKVMDomainAvailability", "Availability", "%", "3000",
"30000");
  </Collection>
</Push>

<Push name="kvmDomainTotalCPU" listen="kvmDomainTotalCPU" location="gateway"
interval="Min1" enabled="true">
  <Processing>
    CPUTime = CPUTime / IntervalDuration() / 1000000000 / VCPUs;
  </Processing>
  <Collection>
    PushToCeilometer("ppmKVMDomainCPU", "CPUTime", "%", "5000", "50000");
  </Collection>
</Push>
```

After modifying and saving the `pushToCeilometer.xml`, Prime Performance Manager pushes the defined VM reports to the integrated OpenStack Ceilometer.