



Using the Chargeback Module

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About Chargeback Features

The chargeback module in Cisco UCS Director offers in-depth visibility into the costs of the virtual infrastructure. It allows the definition of cost models and their assignment to policies within departments and organizations. Virtual machine (VM) metering data is collected at frequent intervals to ensure accurate calculation of resource costs.



Attention

The chargeback module is supported only for physical servers that are within an application container.

Following are the features of the chargeback module:

- **Flexibility**—Provides fixed costs, one-time costs, allocation costs, usage costs, and a combination of these costs, based on the organizational requirements.
- **Reusable Cost Models**—Assigns cost models to VMs using standardized cost models or templates. These templates apply cost models to new environments quickly.
- **Reporting**—Generates various summary and comparison reports of costs and resource usage for the virtual infrastructure. These reports are exported to PDF, CSV, and XLS formats and allow you to view them with a web browser.
- **Top Five Reports**—Monitors the top five reports for organizations or groups with the highest VM cost, CPU, memory, storage, and network costs.

- **Dashboard**—Monitors and analyzes VM metering information and chargeback in real time with the built-in dashboard and an extensive set of graphical widgets.

Budget Policies

Overall resources are accounted for by the chargeback module. In addition to chargeback, individual groups or organizations must be associated with a budget policy where you can enable or disable the budget watch and over budget.

Configuring a Budget Policy

- Step 1** Choose **Administration > Users and Groups**.
- Step 2** On the **Users and Groups** page, click **User Groups**.
- Step 3** Choose a group and click **Budget Policy**.
- Step 4** In the **Budget Policy** screen, complete the required fields, including the following:

Name	Description
Enable Budget Watch check box	If checked, the group's budget usage is monitored. If unchecked, all budget entries for this group are ignored.
Allow Over Budget check box	If checked, the group members are allowed to go over the provisioned budget. If unchecked, once the budget is exhausted, all requests are rejected until a new budget is added.

- Step 5** Click **Save**.

Creating a Tag-Based Cost Model

The tag-based cost model capability is supported on all VMs that have been provisioned through a container.

- Step 1** Choose **Policies > Virtual/Hypervisor Policies > Service Delivery**.
- Step 2** On the **Service Delivery** page, click **Tag Based Cost Model**.
- Step 3** Click **Add** to create a new cost model.
- Step 4** In the **Add Tag Based Cost Model** screen, complete the required fields, including the following:

Field	Description
Cost Model Name field	The name of the cost model.
Cost Model Description	The description of the cost model.

Field	Description
Tag Name drop-down list	Select a VM tag from the drop-down list. The tag costs that you specify are restricted to the VM tag that you select in this drop-down list. The tag-based cost model is restricted to the VM tag that you selected.

Step 5 Click + sign to add tag costs to the cost model.

Step 6 In the **Add Entry to Tag Costs** screen, complete the required fields, including the following:

Field	Description
VM Tag drop-down list	Choose a tag value from the drop-down list. This drop-down list displays the possible values for the tag name that you selected.
Fixed Cost field	The per-hour fixed cost for the tag.
One Time Cost field	The fixed one-time cost for the tag.
Include VM in Regular Chargeback check box	Check the check box to include the tag-based cost model along with the regular cost model for the VM.

Step 7 Click **Submit**.

Step 8 In the **Add Tag Based Cost Model** screen, click **Submit**.

Step 9 Click **OK**.

Cost Models

A cost model is used to define the unit-level costs of virtual resources, and physical resources. These costs are used for chargeback calculations of VMs within the virtual infrastructure as well as physical resources. Cost models offer a definition of costs in a linear model.

The cost of a particular resource is calculated on how many units are assigned to that resource in the VM or physical resource. For example, the cost of 1 GB of RAM is defined within the cost model. This unit cost is used to determine the cost of RAM for a particular VM.

You can define one-time provisioning costs, active or inactive VM costs, and provisioned, reserved, or used costs for resources, such as CPU, and memory. These values are used to calculate VM costs based on usage.

In addition, you can also create a cost model for bare metal servers within the physical infrastructure.



Note You can map a cost model to a VDC or to an application container. For more information on mapping a cost model to an application container, see the *Cisco UCS Director Application Container Guide* available at the following link:

<http://www.cisco.com/c/en/us/support/servers-unified-computing/ucs-director/products-installation-and-configuration-guides-list.html>

Creating a Cost Model

- Step 1** Choose **Policies > Virtual/Hypervisor Policies > Service Delivery**.
- Step 2** On the **Service Delivery** page, click **Cost Model**.
- Step 3** Click **Add**.
- Step 4** In the **Add Cost Model** screen, complete the required fields, including the following:

Name	Description
Cost Model Name field	The name of the cost model.
Cost Model Description field	The description of the cost model.
Cost Model Type drop-down list	Choose the type of cost model. Standard indicates a linear cost model. Advanced indicates a package or script-based cost model. See the Package-Based Cost Models for the Advanced cost model description and usage. You can also choose HyperV , if appropriate.
Charge Duration drop-down list	Choose the interval at which costs for the VM's resources are defined. It can be one of the following options: <ul style="list-style-type: none"> • Hourly—If you want to quantify the costs of resources on an hourly basis. • Daily—If you want to quantify the costs of resources on a daily basis. • Weekly—If you want to quantify the costs of resources on a weekly basis. • Monthly—If you want to quantify the costs of resources on a monthly basis. • Yearly—If you want to quantify the costs of resources on a yearly basis.
Virtual Machine Cost Parameters	
Fixed Costs (Currency: USD)	

Name	Description
One Time Cost field	The fixed one-time cost for provisioning the VM.
VM Costs (Currency: USD)	
Active VM Cost field	The per-hour cost of a VM in the active state.
Inactive VM Cost field	The per-hour cost of a VM in the inactive state.
CPU Charge Unit drop-down list	Choose the charge unit for CPU: GHz or cores.
Provisioned CPU Cost field	<p>The provisioned CPU cost per CPU charge unit per-hour. The system calculates the percentage of CPU that was provisioned for the VM.</p> <p>Note The cost of the CPU charge unit is GHz.</p> <p>If you enter a value for the Used CPU Cost field, you must leave this field blank.</p>
Reserved CPU Cost field	<p>The reserved CPU cost per GHz per hour.</p> <p>The amount of CPU that has been actually reserved to the VM is taken into consideration, including the provisioned CPU cost calculation. Any extra cost for the reserved CPU (apart from the provisioning cost) is entered here. For example, if the provisioning cost is \$1 and the reserved cost is \$1.4, the extra amount to reserve must be mentioned. In this example, it is $\\$1.4 - \\$1 = \\$0.4$.</p> <p>Note The cost if the CPU charge unit is GHz.</p> <p>If you enter a value for the Used CPU Cost field, you must leave this field blank.</p>
Used CPU Cost field	<p>The used CPU cost per GHz per hour. The cost is based on the actual CPU usage.</p> <p>This cost does not take into consideration the provisioned and reserved costs. If you enter a value for the Used CPU Cost field, the provisioned cost and reserved cost fields must be left blank.</p> <p>Note The cost if the CPU charge unit is GHz.</p>
Provisioned Memory Cost field	The provisioned memory cost per GB per hour.
Reserved Memory Cost field	The reserved memory cost per GB per hour.
Used Memory Cost field	The used memory cost per GB per hour.
Received Network Data Cost field	The received data cost per GB per hour.
Transmitted Network Data Cost field	The transmitted data cost per GB per hour.

Name	Description
Committed Storage Cost field	The committed storage cost per GB per hour.
Uncommitted Storage Cost field	The uncommitted storage cost per GB per hour. The unused but provisioned storage is defined as uncommitted storage.
Tag Based Cost Model drop-down list	Select a tag-based cost model. This list displays all the tag-based cost models that you have created.
Physical Server Cost Parameters	
Fixed Costs (Currency: USD)	
One Time Cost field	The fixed one-time cost for provisioning the server.
CPU Charge Unit drop-down list	Choose the charge unit for CPU: GHz or cores.
Provisioned CPU Cost field	The provisioned CPU cost per CPU charge unit per hour. The CPU percentage that was provisioned to the server is taken into consideration. Note The cost if the CPU charge unit is GHz. If you enter a value for the Used CPU Cost field, you must leave this field blank.
Provisioned Memory Cost field	The provisioned memory cost per GB, per-hour.
Used Memory Cost field	The used memory cost per GB, per-hour.
Committed Storage Cost field	The committed storage cost per GB, per-hour.
Full Length Blade Cost field	The cost of full-length blade servers, per-hour. Note This field does not appear when HyperV is selected as the cost model type.
Half Length Blade Cost field	The cost of half-length blade servers, per-hour. Note This field does not appear when HyperV is selected as the cost model type.

Step 5 Click **Add**.

Creating a Bare Metal Cost Model

Step 1 Choose **Policies > Physical Infrastructure Policies > Bare Metal Servers**.

Step 2 On the **Bare Metal Servers** page, click **Bare Metal Cost Model**.

Step 3 Click **Add**.

Step 4 In the **Add Bare Metal Cost Model** screen, complete the required fields, including the following:

Name	Description
Cost Model Name field	The name of the cost model.
Cost Model Description field	The description of the cost model.
Charge Duration drop-down list	Choose the charge duration from the drop-down list. It can be Hourly, Daily, Weekly, Monthly, and Yearly.
One Time Cost field	The fixed one-time cost for provisioning a bare metal server.
CPU Charge Unit drop-down list	Choose the charge unit for the CPU. It can be GHz or Cores.
CPU Cost field	The CPU cost per CPU charge unit per hour.
Memory Cost field	The memory cost per GB per hour.
Used Memory Cost field	The used memory cost per GB per hour.
Storage Cost field	The storage cost per GB per hour.
Full Width Blade Cost field	The cost of the full width blade servers per hour.
Half Width Blade Cost field	The cost of the half width blade servers per hour.

Step 5 Click **Submit**.

What to do next

You can choose this cost model when you create a Bare Metal Server provisioning policy.

Modifying a VDC to Include a Cost Model

You can add or edit an existing VDC to assign a newly created cost model. You can edit an existing VDC, or create a new VDC and assign a cost model to it.

After the cost model is assigned to a VDC, all VMs within the VDC are charged based on the advanced cost model. Any VMs within VDCs that have the standard type of cost model are still charged according to the standard cost model.

Adding a Cost Model to a VDC

Step 1 Choose **Policies > Virtual/Hypervisor Policies > Virtual Data Centers**.

Step 2 On the **Virtual Data Centers** page, click **vDC**.

Step 3 Choose the VDC to which you want to add the cost model.

Step 4 Click **Add**.

Step 5 In the **Add vDC** screen, select the account type, and click **Submit**.

Step 6 In the **Add VDC** screen, complete the required fields, including the following:

Name	Description
VDC Name field	The name of the VDC.
VDC Locked check box	By default, this check box is not checked, which means that the VDC is available for further deployments. Check the check box to deny the use of the VDC for any further deployments. Actions on existing VMs, within this VDC, are disabled. Uncheck the check box to allow the use of the VDC for further deployments.
VDC Description field	The VDC-specific description.
Group drop-down list	Choose the group for which the VDC is being set up.
Cloud Name drop-down list	Choose the cloud on which the VDC is being set up.
Enable Protection check box	Check the check box to enable SRM.
Approvers and Contacts	
First Level Approvers list	The users who must approve the service request at the first-level. Expand the list to check the check boxes of the users. You can select multiple users.
Second Level Approvers list	The users who must approve the service request at the second-level. Expand the list to check the check boxes of the users. You can select multiple users.
Approval Required from all users check box	Check this check box to indicate that approval is required from all users who have been selected as first-level and second-level approvers.
Number of Approval Requests Reminders field	The number of times the reminder email to approve the service request is sent to the approvers. By default, the system sends a reminder email once every 24 hours until the service request is approved or rejected.
Reminder Interval (Hours) field	The time interval between the reminder emails that are sent to the approvers. By default, the system sends a reminder email every 24 hours.
Provider Support Email Address field	The contact or user's email address. The person who is notified about VM provisioning using this VDC.

Name	Description
Copy Notifications to Email Address field	The second contact's email for receiving copies of notifications about this VDC.
Policies	
System Policy drop-down list	Choose the system policy applicable to the VDC.
Computing Policy drop-down list	Choose the computing policy applicable to the VDC.
Network Policy drop-down list	Choose the network policy applicable to the VDC.
Storage Policy drop-down list	Choose the storage policy applicable to the VDC.
Cost Model drop-down list	Choose the cost model applicable to the VDC.
Disable displaying cost in the SR summary and email page check box	Check the check box to disable displaying cost in the SR summary and email page for this VDC.
User Action Policy drop-down list	Choose the policy that is used for execution of orchestration workflows after provisioning of the VMs. The chosen workflow appears as an action button for VMs within the VDC.
End User Self-Service Policies	
VM Power Management check box	Check the box to enable all VM power management actions for VMs that belong to this VDC.

Note End user self-service policies also include VM Resizing, VM Snapshot Mangement, VM deletion, VM Disk Management, and VM Network Management. For more information, see [Adding a Virtual Data Center](#).

Step 7 Click **Add**.

Editing a VDC to Include a Cost Model

- Step 1** Choose **Policies > Virtual/Hypervisor Policies > Virtual Data Centers**.
- Step 2** On the **Virtual Data Centers** page, click **vDC**.
- Step 3** Choose the VDC to add to the cost model.
- Step 4** Click **Manage Categories**.
- Step 5** Choose the category to edit.
- Step 6** Click **Edit**.
- Step 7** In the **Edit App Category** screen, in the drop-down list, choose a **Cost Model** and a **Deploy Policy**.
- Step 8** Click **Save**.

Package-Based Cost Models

A package-based cost model enables you to define the costs for the system resources as packages instead of as individual definitions. There are different packages to choose from based on your requirements. This type of cost model is suitable for nonlinear models.



Note Cisco UCS Director supports definitions of CPU memory (server) packages.

In this type of cost model, the definition is based on the available resource packages. The model is in the following format:

C – M:X.

C is the number of CPU cores.

M is the memory in GB.

X is the combined monthly cost of C and M.

For example, a package with an entry of 2-4:200 implies CPU cores = 2, memory = 4 GB, and the cost of this package is \$200 per month.

You can define multiple packages using the following format: C1-M1:X1,C2-M2:X2,.....,CN-MN:YN.

For example, 1-1:50,1-2:70,1-4:90,2-4:150,2-6:170,2-8:190,4-8:350,4-12:380,4-16:400. The first entry 1-1:50 is a package of 1 core CPU and 1 GB memory that costs \$50 per month.



Note These entries can be edited at any time to suit the cost package requirements.

Creating a Package-Based Cost Model

- Step 1** Choose **Policies > Virtual/Hypervisor Policies > Service Delivery**.
- Step 2** On the **Service Delivery** page, click **Cost Model**.
- Step 3** Click **Add**.
- Step 4** In the Add Cost Model screen, enter a cost model name and description.
- Step 5** For the **Cost Model Type** field, choose **Advanced**.
- Step 6** Paste the script provided in the **Advanced Cost Model** field.

```

/*****/
var CPU_MEMORY_COST =
"1-2:81,1-4:95,1-8:109,2-4:162,2-6:176,2-8:189,2-16:378,4-12:352,4-16:378";
var oneTimeCost = 150;
/*****/
/* define cost packages as shown above.

```

The cost packages can be defined in the following format:

C-M:X.

C is the number of CPU cores.

M is the memory in GB.

X is the combined monthly cost of C and M.

For example, 2-4:162 means CPU cores = 2, memory = 4 GB and the cost of this package is \$162 per month. */

/* When defining multiple packages, define it in the following format: C1-M1:X1,C2-M2:X2,,CN-MN:YN

The standard packages are defined at the top of the script using the variable CPU_MEMORY_COST.

This variable can be edited to suit the cost package requirement. */

/* For reference, the storage cost to use is based on the storage tier cost model definition. */

/* do not edit any script below */

```
computeChargeback(data);
function computeChargeback(data)
{
var map = chargeBackAPI.getCPUMemCostModelMap(CPU_MEMORY_COST);
var cpuCores = data.getVmMeter().getCpuCores();
var memory = data.getVmMeter().getAllocMemGB();
var serverCost = chargeBackAPI.getCostForItem(map,cpuCores, memory);
serverCost = serverCost / (24 * 30);
var storageTierCost = chargeBackAPI.getStorageCostForItem(data.getVmMeter().getVmId());
var storageGB = (data.getVmMeter().getCommittedDiskGB() +
(data.getVmMeter().getUncommittedDiskGB()));
var committedDiskGBCost = (data.getVmMeter().getCommittedDiskGB()) * storageTierCost;
var unCommittedDiskGBCost = (data.getVmMeter().getUncommittedDiskGB()) * storageTierCost;
var storageCost = (storageGB * storageTierCost) / (24 * 30);
var totalVMCost = serverCost + storageCost;
var cb = data.getCbSummary();
cb.setCpuCores(cpuCores);
cb.setMemory(memory);
cb.setServerCost(serverCost);
cb.setCommittedDiskGB(data.getVmMeter().getCommittedDiskGB());
cb.setCommittedDiskGBCost(committedDiskGBCost);
cb.setUncommittedDiskGB(data.getVmMeter().getUncommittedDiskGB());
cb.setUncommittedDiskGBCost(unCommittedDiskGBCost);
cb.setTotalCost(totalVMCost);
}
/*****/
```

Step 7 Click Add.

Note Once the cost model has been defined, assign it to a VDC in order to start the chargeback of VMs based on this cost model.

Storage Tier Cost Models

You can use a storage tier cost model to define multiple costs for storage using the tier format. Current storage types include but not limited to local storage, NFS, SAN, and NAS. Each storage cost could vary. You can incorporate this variation while calculating costs for storage usage.

You can use this model to define different costs for different tiers and then assign existing datastores to these tiers. You can group similar datastore types by cost wise using the tier cost model.

Each tier must be assigned a cost, at a per-GB, per-month value. For example, when assigning \$0.50 to a tier, all datastores within this tier are charged at \$0.50 per GB per month. By default, four tiers are already created, so you must assign the costs to them.

Assigning a Cost to a Tier

- Step 1** Choose **Policies > Virtual/Hypervisor Policies > Service Delivery**.
 - Step 2** On the **Service Delivery** page, click **Storage Tier Cost Model**.
 - Step 3** Choose the tier to edit.
 - Step 4** Click **Edit**.
 - Step 5** Edit the **Disk Cost (GB)/Month** field.
 - Step 6** Click **Submit**.
-

About Assigning a Datastore to Tiers

You can assign a datastore to a tier so that the cost defined in the tier is used to calculate the cost of storage within that particular datastore.

When calculating the chargeback for VMs within a datastore, the cost is determined by which tier the datastore was assigned to. If no tier is assigned to a datastore, the storage cost for that datastore is not considered when using the advanced (script-based) cost model.

With a regular cost model, you define resource costs in a form. Storage tier costs are taken into consideration if tier costs are assigned and datastores are assigned to those tiers. However, if no tier is assigned to a datastore, the storage cost for VMs under that datastore is removed from the storage cost entry of the cost model form.



Note Assigning a datastore to a tier applies only to the regular cost model.

Assigning a Datastore to a Tier

- Step 1** Choose **Virtual > Storage**.
- Step 2** On the **Storage** page, choose the cloud.

- Step 3** On the **Storage** page, click **Datastore Capacity Report**.
- Step 4** Choose the datastore to assign to a tier.
- Step 5** Click **Assign Tier** and the **Storage Tier** screen appears.
- Currently, the tier-based cost is supported only on VMware cloud accounts.
- Step 6** From the drop-down list, choose a tier.
- Step 7** Click **Submit**.
-

Chargeback Reports

Chargeback provides information about how much your organization may be paying for resources, even unused resources. This feature allows you to optimize resource consumption and costs. System resources accounting can be based on monthly usage. Resources, such as CPU and memory usage, are monitored and measured.

Chargeback reports are based on the cost model type. Chargeback is calculated and shown in the user interface in the form of tabular reports, summaries, graphical reports, and widgets.

Chargeback summary data is stored only at a daily and monthly interval. So, you cannot generate daily and hourly trend cost reports using the **Chargeback** menu option. You can generate trend reports only for weekly and monthly duration. You can generate these trend reports, in addition to several other trend reports, using the **Report Builder** menu available under **CloudSense**. For more information on using the **Report Builder** option, see [Report Builder for Custom Report Templates](#).



Important

While generating trend reports for a month, the data is calculated from the first day of the month till the current date. For example, if you are generating a trend report on 5th March, this report includes data from March 1st, to March 5th.



Note

For VMs that are provisioned through a container, you can associate a tag-based cost model and include those costs in the regular chargeback calculations and subsequent reports.

Following are the report types that are available:

- Viewing
 - Current month summary—The current month summary cost report (VM, CPU, storage costs, and so on).
 - Previous month summary—The previous month summary cost report (VM, CPU, storage costs, and so on).
 - Monthly resource accounting details—The resource accounting details (CPU and memory usage statistics) on a monthly basis.
 - VM level resource accounting details—The resource accounting details at the VM level.

- VM level chargeback details—The charges that are applicable for VM usage calculated with the chargeback feature.
- Export
 - Export monthly resource accounting details—These reports can be exported as tables.
 - Export VM level resource Accounting details—These reports can be exported as tables.
 - Export VM level chargeback details—Chargeback reports can be exported as tables.

**Important**

You can generate these reports for a group, or for a specific virtual data center (VDC). These reports include information on virtual resources as well as on physical servers.

Viewing the Current Month Summary

Using the **Current Month Summary** tab, you can view the month's chargeback details for all VMs and physical servers that belong to the group.

-
- Step 1** Choose **Organizations > Chargeback**.
 - Step 2** On the **Chargeback** page, choose the user group.
 - Step 3** On the **Chargeback** page, click **Current Month Summary**.
-

Viewing the Previous Month's Summary

Using the **Previous Month Summary** tab, you can view the previous month's chargeback details for all VMs and physical servers that belong to the group.

-
- Step 1** Choose **Organizations > Chargeback**.
 - Step 2** On the **Chargeback** page, choose the user group.
 - Step 3** On the **Chargeback** page, click **Previous Month Summary**.
-

Viewing Monthly Resource Accounting Information

-
- Step 1** Choose **Organizations > Chargeback**.
 - Step 2** Choose a group or a virtual data center (VDC).
 - Step 3** On the **Chargeback** page, click **Resource Accounting**.
-

Viewing the VM Level Resource Accounting Details

Using the **Resource Accounting Details** tab, you can view the individual VM's resource usage details.

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- Step 1** Choose **Organizations > Chargeback**.
 - Step 2** Choose a group or a virtual data center (VDC).
 - Step 3** On the **Chargeback** page, click **Resource Accounting Details**.
-

Viewing the VM Level Chargeback Details

Using the **Chargeback** tab, you can view the chargeback report for the selected group or VDC.

If you indicated that the tag-based cost model must be included in the regular VM chargeback calculations, then you will see the **Fixed Costs** column in the report. This column retrieves the cost that you indicated in the tag-based cost model.

-
- Step 1** Choose **Organizations > Chargeback**.
 - Step 2** Choose a group or a virtual data center (VDC).
 - Step 3** On the **Chargeback** page, click **Chargeback**.
-

Exporting the Monthly Resource Accounting Details

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- Step 1** Choose **Organizations > Chargeback**.
 - Step 2** On the **Chargeback** page, click **Resource Accounting**.
 - Step 3** Click the **Export Report** icon.
 - Step 4** In the **Export Report** screen, choose a format.
It can be one of the following options:
 - PDF
 - CSV
 - XLS
 - Step 5** Click **Generate Report**.
After the report is generated, the **Download** option appears.
 - Step 6** Click **Download** to open the report in another browser.
After the report opens in another browser, you can save it on your system.
-

Exporting VM Level Resource Accounting Details

- Step 1** Choose **Organizations > Chargeback**.
- Step 2** On the **Chargeback** page, click **Resource Accounting Details**.
- Step 3** Click the **Export Report** icon.
- Step 4** In the **Export Report** screen, choose a format.
It can be one of the following options:
- **PDF**
 - **CSV**
 - **XLS**
- Step 5** Click **Generate Report**.
After the report is generated, the **Download** option appears.
- Step 6** Click **Download** to open the report in another browser.
After the report opens in another browser, you can save it on your system.
-

Exporting VM Level Chargeback Details

- Step 1** Choose **Organizations > Chargeback**.
- Step 2** On the **Chargeback** page, click **Chargeback**.
- Step 3** On the right side of the toolbar, click the **Export Report** icon.
- Step 4** In the **Export Report** screen, choose a format.
It can be one of the following options:
- **PDF**
 - **CSV**
 - **XLS**
- Step 5** Click **Generate Report**.
After the report is generated, the **Download** option appears.
- Step 6** Click **Download** to open the report in another browser.
After the report opens in another browser, you can save it on your system.
-

About Change Records

You can use change records within the Change Management Database (CMDB) to track and manage changes in the system. These records typically display ADD, DELETE, and MODIFY types of events on any resource, such as a VM, service request, or group.

Change records display information about the resource type (VM), including the resource name, change type, change time, and description. When a VM is resized, the change records display information on the resources that were resized. This includes information on the original resource size and the resized values. You can view this information from the **Change Records** tab.

Accessing Change Records

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- Step 1** Choose **Administration > Integration**.
- Step 2** On the **Integration** page, click **Change Records**.
-

Chargeback Calculations

The total cost calculated for a VM includes the following:

Total cost = active VM cost or inactive VM cost + one-time cost + CPU cost + memory cost + disk cost + CPU reserved cost + memory reserved cost + CPU used cost + CPU core cost + memory used cost + network received used cost + network transmitted used cost + application cost.

If a VM is associated with a tag, and has a cost model and a tag-based cost model associated with the vDCs, then the chargeback calculation is derived as follows:

- When the **Include VM in Regular Chargeback** check box is not checked, only the tag-based cost is calculated.

Total Cost - Fixed Cost + One-Time Cost

- When the **Include VM in Regular Chargeback** check box is checked, the total cost is calculated including the tag-based cost and the regular chargeback computation.

Total Cost = active VM cost or inactive VM cost + one-time cost + CPU cost + memory cost + disk cost + CPU reserved cost + memory reserved cost + CPU used cost + CPU core cost + memory used cost + network received used cost + network transmitted used cost + application cost + Fixed Cost



Note The one-time cost for the VM is determined from the cost specified in the tag-based cost model. If you have not specified a one time cost in the tag-based cost model, then this cost is derived from the regular cost model.

The total cost calculated for a physical server includes the following:

Total cost = one time cost + CPU cost + memory cost + memory used cost + committed disk cost + CPU core cost + full blade cost + half blade cost.

The VM cost calculation is done only on an hourly basis. There is no other option available to calculate the VM cost. The cost for each resource is calculated based on the values that are defined in the cost model. The cost calculations are based as follows:

Cost	Cost Description
Active VM Cost	The value defined in the cost model for the active VM cost.
Inactive VM Cost	The value defined in the cost model for the inactive VM cost.
One Time Cost	The value defined in the cost model for the one-time cost.
CPU Cost	CPU usage (provisioned) × cost that is defined in the cost model for the provisioned CPU cost. The CPU charge unit is GHz.
Memory Cost	Memory usage (provisioned) × cost that is defined in the cost model for the provisioned memory cost. The memory charge unit is GB.
Disk Cost	The committed storage × committed storage cost that is defined in the cost model + uncommitted storage × uncommitted storage cost that is defined in the cost model. The storage charge unit is GB.
CPU Reserved Cost	The reserved CPU × cost that is defined in the cost model for the reserved CPU cost.1.
Memory Reserved Cost	The reserved memory × cost that is defined in the cost model for the reserved memory cost.2.
CPU Used Cost	The used CPU × cost that is defined in the cost model for the used CPU cost.1.
CPU Core Cost	The used CPU core × cost that is defined in the cost model for the CPU core cost. The CPU charge unit is per core.
Memory Used Cost	The used memory × cost that is defined in the cost model for the used memory cost.2.
Network Received Used Cost	The network received usage in KB / (1024.0 × 1024.0) × cost that is defined in the cost model for the received network data cost. The network charge unit is GB.
Network Transferred Used Cost	The network transmitted usage in KB / (1024.0 × 1024.0) × cost that is defined in the cost model for the transmitted network data cost.5.

Cost	Cost Description
Application Cost	The active VM hours × cost that is defined in a catalog for active VM application cost + inactive VM hours × cost that is defined in a catalog for the inactive VM application cost.
Full-length Blade Cost	The cost of full-length blade servers per-hour. This cost is applicable only for physical servers. This is applicable only for physical servers that are part of an application container.
Half-Length Blade Cost	The cost of half-length blade servers per-hour. This cost is applicable only for physical servers. This is applicable only for physical servers that are part of an application container.
Fixed Cost USD	The fixed cost, per-hour, determined for the VM. This is applicable only if you have indicated that the tag-based cost model should be included with the regular cost model for the VM.

