



Using the Chargeback Module

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Note

You must be logged in to the appliance before you can run any of the following procedures.

Chargeback Features

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

Features of the Chargeback module are as follows:

- **Flexibility**—Provide fixed costs, onetime costs, allocation costs, usage costs, and a combination of all, based on the organizational requirements.
- **Re-usable Cost Models**—Assign cost models to VMs using standardized cost models or templates. These templates are used to apply cost models to new environments quickly.
- **Reporting**—Generate various summary and comparison reports of costs and resource usage for the virtual infrastructure. Export reports to (PDF, CSV, and XLS) formats and view within a web browser.
- **Top 5 Reports**—Monitor the top five reports for organizations or groups with highest VM cost, CPU, memory, storage and network costs.

- Dashboard—Monitor and analyze VM metering information and chargeback in real time with the built-in dashboard and extensive set of graphical widgets.

Budget Policy

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** Click **Administration > Users and Groups**.
- Step 2** Choose the **User Groups** tab.
- Step 3** Choose a group and click **Budget Policy**.
- Step 4** Check or uncheck the check boxes in the **Budget Policy** dialog box:

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**.
-

About Cost Models

A cost model is used to define unit level costs of virtual resources such as CPU, RAM, and storage. These costs are used for chargeback calculations of VMs within the virtual infrastructure. Cost models offer a definition of costs in a linear model, Costs can be defined at the unit level.

The cost of a particular resource for a VM is calculated based on how many units are assigned to that VM. For example, the cost of 1 GB of RAM is defined within the cost model and 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, memory and so on. These costs are used to calculate the VM costs based on usage.

Creating a Cost Model

-
- Step 1** Click **Policies > Service Delivery**.
- Step 2** Choose the **Cost Model** tab.

Step 3 Click **Add (+)**.

Step 4 In the **Add Cost Model** dialog box, choose the **Standard** option under **Cost Model Type** drop-down list.

Step 5 Complete the following fields:

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 “ About Package Based Cost Models ” section for the Advanced cost model description and usage. You can also choose HyperV , if appropriate.
Charge Frequency drop-down list	Choose the frequency at which the VM’s resources costs are defined. If you want to specify the costs of resources on an hourly basis, choose Hourly . If you want to specify the costs of resources on a monthly basis, then choose Monthly .
Fixed Costs	
One Time Cost field	The fixed one-time cost for provisioning the VM.
VM Costs	
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 Costs	
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. ¹ The amount of CPU that was provisioned to the VM is taken into consideration. Note If you enter a value for the Used CPU Cost , then this field must be left blank.
Reserved CPU Cost field	The reserved CPU cost per GHz per hour. ¹ 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 provisioning cost) is entered here. For example, if the provisioning cost is \$1 and reserved cost is \$1.4, the extra amount to reserve must be mentioned. In this example, it is \$1.4 – \$1 = \$0.4. Note If you enter a value for the Used CPU Cost , this field must be left blank.
Used CPU Cost field	The used CPU cost per GHz per hour. ¹ The cost is based on the actual CPU usage. This cost does not take into consideration the provisioned and reserved costs. If you enter a value for the Used CPU Cost , the provisioned cost and reserved cost fields must be left blank.
Memory Costs	
Provisioned Memory Cost field	The provisioned memory cost per GB per hour. ²
Reserved Memory Cost field	The reserved memory cost per GB per hour. ²
Used Memory Cost field	The used memory cost per GB per hour. ²
Network Costs	

Name	Description
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.
Storage Costs	
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.

1. The cost if the CPU charge unit is GHz.
2. The memory cost calculation is done in a similar manner to the CPU cost calculation.

Step 6 Click **Add**.

About Modifying a vDC to Include a Cost Model

You can add or edit an existing vDC to assign it the newly created cost model. You can edit an existing vDC or a new vDC can be created and have a cost model assigned 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 vDC to a Cost Model

- Step 1** Click **Policies > Virtual Data Centers**.
- Step 2** Choose the **vDC** tab.
- Step 3** Choose the vDC to add to the cost model.
- Step 4** Click **Add (+)**.
- Step 5** In the **Add vDC** dialog box, complete the following fields:

Name	Description
vDC Name field	The name of the vDC.
vDC Locked check box	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.

Approvers and Contacts

Name	Description
First Approver User Name field	The user who must approve the service request.
Second Approver User Name field	The second user who must approve the service request.
Provider Support Email Address field	The contact or user's email address. The person who is notified about VM provisioning using this vDC.
Copy Notifications to Email Address field	The second contact's email for copying notifications about 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 workflow post-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 check box to enable all VM power management actions for VMs belonging to this vDC.

Step 6 Click **Add**.

Editing a vDC to Include a Cost Model

- Step 1** Click **Policies > Virtual Data Centers**.
- Step 2** Choose the **vDC** tab.
- Step 3** Choose the **vDC** to add 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** dialog box, in the drop-down list, choose a **Cost Model** and a **Deploy Policy**.

Step 8 Click **Save**.

About Package Based Cost Models

A package based cost model allows you to define 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 non-linear 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 entry: 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** Click **Policies > Service Delivery**.
- Step 2** Choose the **Cost Model** tab.
- Step 3** Click **Add (+)** to create a new cost model.
- Step 4** Under the **Cost Model Type** field, choose the **Advanced** option.
- Step 5** 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;
```

```
/*
*****
*/
```

```
/* 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 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 6 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.

About Storage Tier Cost Models

You can use storage tier cost model to define multiple costs for storage using the tier format. Current storage types include local, NFS, SAN, and NAS, andy others. Each storage type cost could vary and 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. This cost is per GB per month. For example, when assigning \$ 0.5 to a tier, all datastores within this tier are charged at \$ 0.5 per GB per month. By default, four tiers are already created, you must assign the costs to them.

Assigning a Cost to a Tier

-
- Step 1** Click **Policies > Service Delivery**.
 - Step 2** Choose the **Storage Tier Cost Model** tab.
 - 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.

When using a regular cost model, where you define the 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 taken 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** Click **Virtual > Storage**.
 - Step 2** From the left panel, choose the cloud account.
 - Step 3** Choose the **Datastore Capacity Report** tab.

Note Currently the tier based cost is supported only on VMware cloud accounts.

- Step 4** Choose the datastore to assign a tier.
- Step 5** Click **Assign Tier** and the **Storage Tier** dialog box appears.
- Step 6** From the drop-down list, choose a tier.
- Step 7** Click **Submit**.
-

Chargeback Reports

Chargeback provides information about how much organizations are paying for resources, both used and unused. This feature allows you to optimize resource consumption and costs. The 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 type of the cost model. Chargeback is calculated and shown in the form of tabular reports, summaries, graphical reports, and widgets.

The report types are as follows:

- Viewing
 - Current month summary—The current month summary cost report (VM, CPU, storage costs, and so on.) by groups.
 - Previous month summary—The previous month summary cost report (VM, CPU, storage costs, and so on) by groups.
 - Monthly resource accounting details—The resource accounting details (CPU and Memory usage statistics) for each group 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 using the Chargeback feature.
- Export
 - Export monthly resource accounting details—Reports of resource accounting details can be exported as tables.
 - Export VM level resource Accounting details—Reports of VM level resource accounting details can be exported as tables.
 - Export VM level chargeback details—Chargeback reports can be exported as tables.

Viewing a Current Month Summary

- Step 1** Click **Organizations > Chargeback**.
- Step 2** From the left panel, choose the group to view.
- Step 3** Choose the **Current Month Summary** tab to view the month's chargeback details for all VMs that belong to the group.
-

Viewing the Previous Months Summary

- Step 1** Click **Organizations > Chargeback**.
 - Step 2** From the left panel, choose the group to view.
 - Step 3** Choose the **Previous Month Summary** tab to view the previous month's chargeback details for all VMs that belong to the group.
-

Viewing the Monthly Resource Accounting

- Step 1** Click **Organizations > Chargeback**.
 - Step 2** Choose the group to view from the left hand column.
 - Step 3** Choose the **Resource Accounting** tab.
-

Viewing the VM Level Resource Accounting Details

- Step 1** Click **Organizations > Chargeback**.
 - Step 2** From the left panel, choose the group to view.
 - Step 3** Choose the **Resource Accounting Details** tab to view the individual VMs resource usage details.
-

Viewing the VM Level Chargeback Details

- Step 1** Click **Organizations > Chargeback**.
 - Step 2** From the left panel, choose the group to view.
 - Step 3** Choose the **Chargeback** tab.
-

Exporting the Monthly Resource Accounting Details

- Step 1** Click **Organizations > Chargeback**.
- Step 2** Choose the **Resource Accounting** tab.
- Step 3** Click the **Export Report** icon on the right side of the toolbar and the **Export Report** dialog box appears.
- Step 4** From the drop-down list, choose a format: **PDF**, **CSV**, or **XLS**.

Step 5 Click **Generate Report**.

Exporting the VM Level Resource Accounting Details

Step 1 Click **Organizations > Chargeback**.

Step 2 Choose the **Resource Accounting Details** tab.

Step 3 Click the **Export Report** icon on the right side of the toolbar and the **Export Report** dialog box appears.

Step 4 From the drop-down list, choose a format: **PDF**, **CSV**, or **XLS**.

Step 5 Click **Generate Report**.

Exporting the VM Level Chargeback Details

Step 1 Click **Organizations > Chargeback**.

Step 2 Choose the **Chargeback** tab.

Step 3 Click the **Export Report** icon on the right side of the toolbar and the **Export Report** dialog box appears.

Step 4 From the drop-down list, choose a format: **PDF**, **CSV**, or **XLS**.

Step 5 Click **Generate Report**.



Note

When using the advanced (script) based cost model, CPU and memory costs are combined as one server cost and displayed in the chargeback report. Storage costs are calculated based on the VM's datastore tier cost.

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 type of events on any resource, such as a VM, service request, groups, and so on.

Change records display information about the resource type (VM) including the resource name, change type, change time, and description.

In the case of VM resizes, information is provided about resources of the VMs that were resized and also about previous and resized resource values.

When a VM has been resized, such changes are recorded and displayed under the **Change Records** tab.

Accessing Change Records

Step 1 Click **Administration > Integration**.

Step 2 Choose the **Change Records** tab.

About the Chargeback Calculation

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

The VM cost calculation is done only on an hourly basis. The cost for each resource is calculated based on the values defined in the cost model. The cost calculations are based as follows:

- **Active VM Cost** = Cost value that is defined in the cost model for the active VM cost.
- **Inactive VM Cost** = Cost value that is defined in the cost model for the inactive VM cost.
- **One Time Cost** = Cost value that is 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.¹
- **Memory Cost** = Memory usage (provisioned) × cost that is defined in the cost model for the provisioned memory cost.²
- **Disk Cost** = (committed storage × committed storage cost that is defined in the cost model) + (uncommitted storage × uncommitted storage cost that is defined in the cost model).³
- **CPU Reserved Cost** = Reserved CPU × cost that is defined in the cost model for the reserved CPU cost.¹
- **Memory Reserved Cost** = Reserved memory × cost that is defined in the cost model for the reserved memory cost.²
- **CPU Used Cost** = Used CPU × cost that is defined in the cost model for the used CPU cost.¹
- **CPU Core Cost** = Used CPU core × cost that is defined in the cost model for the CPU core cost.⁴
- **Memory Used Cost** = Used memory × cost that is defined in the cost model for the used memory cost.²
- **Network Received Used Cost** = (Network received usage in KB / (1024.0 × 1024.0)) × cost that is defined in the cost model for the received network data cost.⁵
- **Network Transferred Used Cost** = (Network transmitted usage in KB / (1024.0 × 1024.0)) × cost that is defined in the cost model for the transmitted network data cost.⁵
- **Application Cost** = (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).

1. The CPU charge unit is GHz.
2. The memory charge unit is GB.
3. The storage charge unit is GB.
4. The CPU charge unit is per core.
5. The network charge unit is GB.