



VMware vCenter Chargeback API

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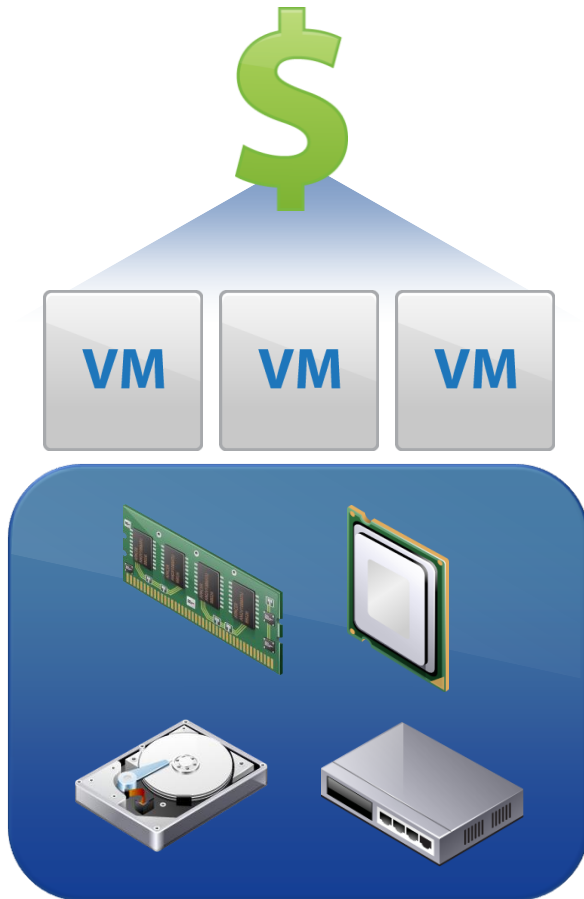
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Agenda

- > What's New in vCenter Chargeback 1.0.1
- > Introduction to Chargeback APIs
- > What is REST?
- > Examples of API Usage
- > Simple Integration Examples
- > Sample JAVA Code Using APIs
- > Q & A

vCenter Chargeback



Account, monitor, and report on costs associated with your virtual infrastructure

Benefits

- > **Improve Resource Utilization:** By associating costs to VMs many of the “free” VMs will go away, freeing up resources for higher priorities
- > **Optimization of Budgets:** Business units can understand how much they are paying for resources and how much goes to unused, allowing them to optimize resource consumption & costs

Key Features

- > Fixed, allocation, and utilization based costing
- > Charge different amounts for tiers of infrastructure
- > Schedule reports & email results

What's New in vCenter Chargeback 1.0.1

Feature Highlights

- > Support for Windows Authentication for SQL databases
- > New computing resource and billing policies added: Enables cost calculation based on number of VCPUs and amount of memory allocated to virtual machines
- > Resource Summary section lists rolled-up usage data
- > Global fixed cost history is retained
- > Ability to undo to the most recent operation on the chargeback hierarchy
- > Ability to use the vCenter Chargeback APIs (Tech Preview)

vCenter Chargeback 1.0.1 Release Notes:

http://www.vmware.com/support/vcbm10/doc/vcbm_1_0_1_release_notes.html

Introduction to Chargeback APIs

Motivation

- > To help integration with 3rd party applications or billing systems

Features

- > RESTlike APIs
- > Platform independent
- > Easy to use
- > End to end functionality
- > Resource based XSDs
- > vCenter Chargeback UI already uses these APIs

What Is REST?

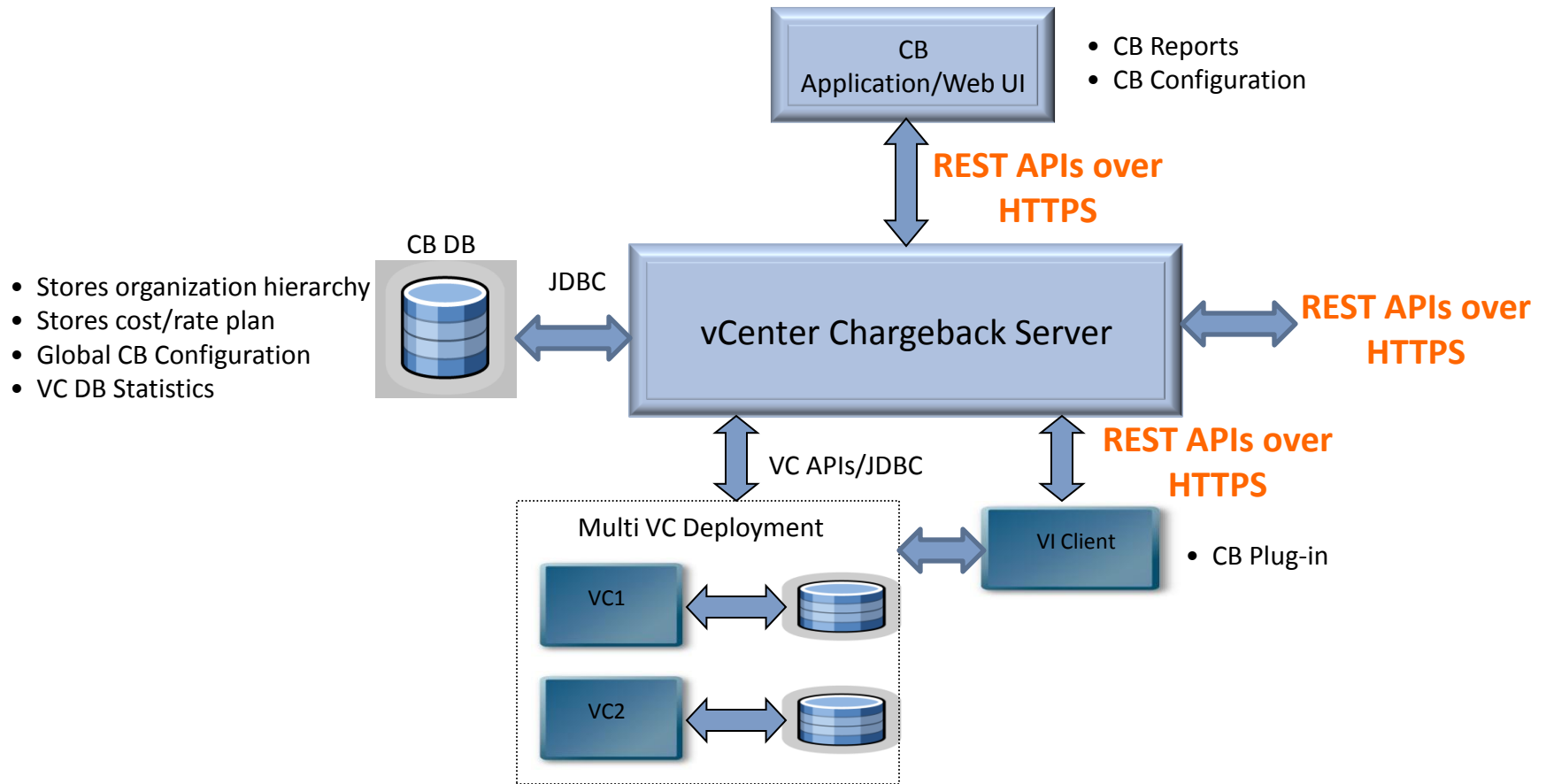
- > REpresentational State Transfer (REST): A Resource-Oriented Architecture to publish web services
- > Uses HTTP Methods mapped to Create, Read, Update and Delete (CRUD)
 - ▣ POST => CREATE a resource
 - ▣ GET => READ a resource
 - ▣ PUT => UPDATE a resource
 - ▣ DELETE => DELETE a resource
- > Publish directory structure-like URIs

Ex: GET

`https://<Chargeback server IP>/vCenter-CB/api/hierarchy/{hierarchyId}`

The URL gives the details of a specific hierarchy resource denoted by hierarchy Id.

vCenter Chargeback Architecture



Chargeback APIs

- > Chargeback API's are grouped under
 - ▣ Administration
 - ▣ Hierarchy Management
 - ▣ Cost Configuration
 - ▣ Reporting
 - ▣ Access Management
 - ▣ Event Management

Chargeback API Syntax

> <HTTP_Request_Method>
<Base_Url>/<API_Signature>?[version=1.0.1]

Syntax Component	Description
HTTP_request_method	Can be one of the following HTTP request types: PUT, POST, GET, or DELETE
Base_Url	Is the URL of the Chargeback server. The Base Url for vCenter Chargeback APIs is: https://<Chargeback server IP>/vCenter-CB/api For example, https://123.123.123.123/vCenter-CB/api
API_signature	The URL path for a Chargeback API. For example, /hierarchies retrieves the hierarchies added to the Chargeback server running on 123.123.123.123
version	Optional API version. For Chargeback server 1.0.1, it needs to be passed as 1.0.1. If not passed, it defaults to latest API version.

> Many APIs take request query and body parameters.

Common XML Elements

Element Name	Description
Request	Every API request starts with this element.
Response	Every API response starts with this element.
Status	Denotes whether API is successfully executed or not. Applicable values are <u>success</u> for successful execution, <u>failure</u> for failed execution.
isValidLicense	Boolean flag indicating license status of the Chargeback server.

XML Namespace

- > vCenter Chargeback version 1.0.1 enforces standard namespace for all XMLs (Request and Response), which is
 - <http://www.vmware.com/vcenter/chargeback/1.0.1>

Chargeback API Versioning

- > URI Versioning

- ▣ `<HTTP_Request_Method>`
`<Base_Url>/<API_Signature>?[version=1.0.1]`

- > XML versioning

`<?xml version="1.0" encoding="UTF-8"?>`

`<Request xmlns="`

`http://www.vmware.com/vcenter/chargeback/1.0.1">`

`...`

`...`

`</Request>`

- > Many APIs take request query and body parameters.

Chargeback APIs

Administration

Functionality	Supported APIs	Example API Syntax
Manage vCenter Server	Add/Delete/Get/Modify vCenter Server settings	POST /vCenterServer <xml request data>
Manage LDAP Server	Add/Delete/Get/Modify LDAP Server settings	GET /ldapServer/{ldapServerId}
Manage Log Levels	Get/Set log levels for log output	PUT /logLevel

Chargeback APIs

Hierarchy Management

Functionality	Supported APIs	Example API Syntax
Manage Hierarchy	Add/Delete/Get/Modify hierarchies	POST /hierarchy <xml add hierarchy data>
Populate Hierarchy	Import hierarchy from CSV	POST /hierarchy/{hierarchyId}/populate <xml import Ex.csv data>
Manage Entities	Add/Delete/Get/Modify/Move entities in the hierarchy	PUT /hierarchy/{hierarchyId}/entity/{entityId} <xml modify data>
Manage Attributes	Add/Delete/Get/Modify custom attributes	DELETE /attribute/{attributeId}
Manage Entity Attributes	Get/Set entity attribute values	GET /hierarchy/{hierarchyId}/entity/{entityId}/attribute

Chargeback APIs

Cost Configuration – Manage cost models

Supported APIs	Example API Syntax
Add/Delete/Get/Modify cost model	POST /costModel <xml add cost model data>
Get/Modify billing policies in the cost model	GET /costModel/{costModelId}/billingPolicies
Get/Modify base rates	PUT /costModel/{costModelId}/baseRates <xml modify base rate data>
Get/Modify rate factors on an entity	GET /hierarchy/{hierarchyId}/entity/{entityId}/costModel/{costModelId}/rateFactors
Add/Delete/Get/Modify fixed costs	GET /fixedCosts
Get/Modify fixed costs on an entity	PUT /hierarchy/{hierarchyId}/entity/{entityId}/costModel/{costModelId}/fixedCosts <xml modify fixed costs data>
Add/Delete/Get/Modify/Apply cost template	POST /costTemplate <xml request - add cost template data>

Chargeback APIs

Reporting/Event/Access Management

Supported APIs	Example API Syntax
Generate Report	POST /rawReport <xml report request data>
Get Events	GET /events?eventFetchSize=<value>&filterType=<value> &filterValue=<value>
Add/Delete/Get/Modify Role	GET /roles
Add/Delete/Get/Modify User	POST /user <xml add user request data>
Login/Logout User	POST /login <xml login request data>
Add/Delete/Get/Modify Role for a user on a hierarchy	PUT /user/{userId}/hierarchy/{hierarchyId}/role/{roleId}

Example – Login Request

POST

https://<Chargeback server IP>/vCenter-CB/api/login?version=1.0.1

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<Request xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1">
```

```
  <Users>
```

```
    <User>
```

```
      <Type>local</Type>
```

```
      <Name>TestUser</Name>
```

```
      <Password>SomePassword</Password>
```

```
    </User>
```

```
  </Users>
```

```
</Request>
```

Example – Login Response

```
<?xml version="1.0" encoding="UTF-8"?>
<Response status="success" isValidLicense="true"
xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Users>
    <User id="1">
      <Name>TestUser</Name>
      <Type>local</Type>
      <IsSuperUser>true</IsSuperUser>
      <IsAuthenticated>true</IsAuthenticated>
    </User>
  </Users>
</Response>
```

Example – Logout

Request

PUT

https://<Chargeback server IP>/vCenter-CB/api/logout?version=1.0.1

Response

```
<?xml version="1.0" encoding="UTF-8"?>  
<Response status="success" isValidLicense="true"  
xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1"  
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" />
```

Example – Add VC Server Request

POST https://<Chargeback server IP>/vCenter-CB/api/vCenterServer?version=1.0.1

```
<?xml version="1.0" encoding="UTF-8"?>
<Request xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1">
  <VCenterServers>
    <VCenterServer>
      <Url>10.112.107.21:443</Url>
      <Name>vc1</Name>
      <Description>vc1</Description>
      <UserName>administrator</UserName>
      <Password>xxxx</Password>
      <PluginRegistered>true</PluginRegistered>
      <StatsSync>true</StatsSync>
      <DataSourceUrl>
        10.112.107.21\sqlxp_vim
      </DataSourceUrl>
      <DataSourceName>vim_vcdb</DataSourceName>
      <DataSourceUserName>sa</DataSourceUserName>
      <DataSourcePassword>xxxx</DataSourcePassword>
      <DataSourceType id="1" />
      <DataSourceAuthType id="1" />
      <VCenterServerView id="1" />
      <ForceUpdate>false</ForceUpdate>
    </VCenterServer>
  </VCenterServers>
</Request>
```

Example – Add VC Server Response

```
<?xml version="1.0" encoding="UTF-8"?>
<Response status="success" isValidLicense="true"
xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <VCenterServers>
    <VCenterServer id="19">
      <Url>https://10.112.107.21:443/sdk</Url>
      <LastSynchronizationTime>
        1000
      </LastSynchronizationTime>
      <Name>vc1</Name>
      <Description>vc1</Description>
      <UserName>administrator</UserName>
      <PluginRegistered>true</PluginRegistered>
      <StatsSync>true</StatsSync>
      <DataSourceUrl>
        10.112.107.21\sqlxp_vim
      </DataSourceUrl>
      <DataSourceName>vim_vcdb</DataSourceName>
      <DataSourceUserName>sa</DataSourceUserName>
      <DataSourceAuthType id="1" />
      <DataSourceType id="1" />
      <VCenterServerView id="1" />
    </VCenterServer>
  </VCenterServers>
</Response>
```

Example – Add Hierarchy Request

POST

https://<Chargeback server IP>/vCenter-CB/api/hierarchy?version=1.0.1

```
<?xml version="1.0" encoding="UTF-8"?>
<Request xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1">
  <Hierarchies>
    <Hierarchy>
      <Name>Test_Hierarchy</Name>
      <Description>Test Hierarchy</Description>
    </Hierarchy>
  </Hierarchies>
</Request>
```

Example – Add Hierarchy Response

```
<?xml version="1.0" encoding="UTF-8"?>
<Response status="success" isValidLicense="true"
xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Hierarchies>
    <Hierarchy id="5">
      <Name>Test_Hierarchy</Name>
      <Description>Test Hierarchy</Description>
      <InSync>true</InSync>
      <LastUpdatedTime>1251892244029</LastUpdatedTime>
      <LastUpdatedUser>local\admin</LastUpdatedUser>
      <Entities>
        <Entity id="119">
          <Name>Test_Hierarchy</Name>
          <Description>Root</Description>
          <Type>100</Type>
          <Shares>
            <Share>
              <Percentage>100</Percentage>
              <Parent id="-1" />
            </Share>
          </Shares>
        </Entity>
      </Entities>
    </Hierarchy>
  </Hierarchies>
</Response>
```

Example – Add vCenter Entity to Hierarchy Request

POST

https://<Chargeback server IP>/vCenter-CB/api/hierarchy/1/entity/1?version=1.0.1

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<Request xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1">
```

```
  <Hierarchies>
```

```
    <Hierarchy id="1">
```

```
      <Entities>
```

```
        <Entity id="1">
```

```
          <VCenterServers>
```

```
            <VCenterServer id="145">
```

```
              <Entities>
```

```
                <Entity id="630"/>
```

```
              </Entities>
```

```
            </VCenterServer>
```

```
          </VCenterServers>
```

```
        </Entity>
```

```
      </Entities>
```

```
    </Hierarchy>
```

```
  </Hierarchies>
```

```
</Request>
```

re

Example – Add vCenter Entity to Hierarchy Response

```
<?xml version="1.0" encoding="UTF-8"?>
<Response status="success" isValidLicense="true" xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Hierarchies>
    <Hierarchy id="1">
      <Name>test1</Name>
      <Description>test</Description>
      <InSync>true</InSync>
      <LastUpdatedTime>1251917231847</LastUpdatedTime>
      <LastUpdatedUser>local\superuser</LastUpdatedUser>
      <Entities>
        <Entity id="419">
          <Name>Do Not Touch- Used for testin1</Name>
          <Description />
          <Type>8</Type>
          <Shares>
            <Share>
              <Percentage>100</Percentage>
              <Parent id="1" />
            </Share>
          </Shares>
        </Entity>
        <Entity id="420">
          <Name>TestCluster</Name>
          <Description />
          <Type>3</Type>
          <Shares>
            <Share>
              <Percentage>100</Percentage>
              <Parent id="419" />
            </Share>
          </Shares>
        </Entity>
      </Entities>
    </Hierarchy>
  </Hierarchies>
</Response>
```

Example – Add Cost Model Request

POST

https://<Chargeback server IP>/vCenter-CB/api/costModel?version=1.0.1

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<Request xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1">
```

```
  <CostModels>
```

```
    <CostModel>
```

```
      <Name>New Cost Model</Name>
```

```
      <Description>New Cost Model Description</Description>
```

```
    </CostModel>
```

```
  </CostModels>
```

```
</Request>
```

Example – Add Cost Model Response

```
<?xml version="1.0" encoding="UTF-8"?>
<Response status="success" isValidLicense="true"
xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <CostModels>
    <CostModel id="1">
      <Name>New Cost Model</Name>
      <Description>New Cost Model Description</Description>
    </CostModel>
  </CostModels>
</Response>
```

Example – Generate Report Request

POST https://<Chargeback server IP>/vCenter-CB/api/rawReport?version=1.0.1

```
<?xml version="1.0" encoding="UTF-8"?>
<Request xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1">
  <ReportTemplates>
    <ReportTemplate>
      <Name>Name</Name>
      <Description>Description</Description>
      <ReportType>COST_REPORT</ReportType>
      <Hierarchies>
        <Hierarchy id="1">
          <Entities>
            <Entity id="2" />
          </Entities>
        </Hierarchy>
      </Hierarchies>
      <CostModels>
        <CostModel id="2" />
      </CostModels>
      <ComputingResources>
        <ComputingResource id="2" />
      </ComputingResources>
      <BillingScheduleType>NOW</BillingScheduleType>
      <BillingPeriod>
        <Now>
          <StartDate>1211871400000</StartDate>
          <EndDate>1232399800000</EndDate>
        </Now>
      </BillingPeriod>
      <DataFilter>
        <DataDepth>1</DataDepth>
        <ExcludeFilters>
          <Filter id="CategorizedCosts" />
          <Filter id="CategorizedUsage" />
          <Filter id="InformationMessages" />
          <Filter id="CostDetails" />
        </ExcludeFilters>
      </DataFilter>
    </ReportTemplate>
  </ReportTemplates>
</Request>
```

Example – Generate Report Response

```
<?xml version="1.0" encoding="UTF-8"?>
<Response status="success" isValidLicense="true" xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <ReportTemplates>
    <ReportTemplate>
      <Name>Sample Report</Name>
      <Description>Description</Description>
      <ReportType>COST_REPORT</ReportType>
      <CreatedOn>Mon Oct 26 12:03:29 GMT+05:30 2009</CreatedOn>
      <CreatedByUser>1</CreatedByUser>
      <Reports><Report>
        <DataDetails>
          <Duration>
            <From>Tue May 27 12:26:40 IST 2008</From>
            <To>Mon Oct 26 02:46:40 IST 2009</To>
          </Duration>
          <DataDetail>
            <CostModel id="2">
              <Name>My Cost Model</Name>
              <Description>Description</Description>
            </CostModel>
            <EntityCostDetails entityId="3559">
              <Name>Name</Name>
              <Type>VM</Type>
              <EntityCost>17156.25</EntityCost>
              <CategorizedCosts>
                ...
              </CategorizedCosts>
              <CategorizedUsage>
                ...
              </CategorizedUsage>
              <CostDetails>
                ...
              </CostDetails>
            </EntityCostDetails>
          </DataDetail>
        </DataDetails>
      </Report>
    </Reports>
  </ReportTemplate>
</ReportTemplates>
</Response>
```

Error Response

```
<?xml version="1.0" encoding="UTF-8"?>  
<Response status="failure" isValidLicense="true"  
  xmlns="http://www.vmware.com/vcenter/chargeback/1.0.1"  
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">  
  <Error majorErrorCode="500" minorErrorCode="2014"  
    message="Hierarchy with id '1' does not exist." />  
</Response>
```

Simple Integration Example: Adding Overhead Costs

- > APIs allow you to create and apply custom fixed costs
- > Integration Example: Accounting Overhead Costs
 - Account for non-compute resources (Ex: Power, Cooling, Labor, Facility, Software Licensing, etc.) for incorporation into overall cost of a VM
- > Integration Steps
 - Login to Chargeback Server: *POST /login*
 - Create cost template: *POST /costTemplate*
<addCostTemplateReq.xml>
 - Apply cost template to VM/entity: *PUT*
/hierarchy/{hierarchyId}/entity/{entityId}/costModel/{costModelId}/costTemplate/{costTemplateId}?startTime=1294828000

Simple Integration Example: Billing/Financial Systems

- > APIs allow you to create hierarchies and generate reports with VM cost summary and utilization data
- > Integration Example: Generate cost report as raw XML data and export directly into your billing/financial system
- > Integration Steps
 - Login as Superuser
 - Create Chargeback hierarchy.
 - Populate chargeback hierarchy from billing/financial system (CSV file)
 - Get chargeback hierarchy
 - Configure costs.
 - Generate raw report on hierarchy and save XML data
 - Import XML report data into your billing/financial system

Simple Integration Example: Custom Applications

- > API allows you to generate reports with VM cost summary and utilization data
- > Integration Example: Leverage chargeback APIs to build custom applications
 - Self-service portal for cloud-based services to provide billing for end users
 - IT dashboard/application for providing usage cost reports for your internal customers (Ex: Various departments in your organization)
 - Develop applications for financial strategy and analysis
- > Integration Steps
 - Appropriate vCenter Chargeback APIs as per application requirements

Sample JAVA Code using APIs

POST https://<Chargeback server IP>/vCenter-CB/api/login?version=1.0.1

```
public void initializeLocalUserSession(String userName, String password)
throws HttpException, IOException {
    RestLoginAPI loginAPI = new RestLoginAPI(
                                this, userName, password, null
                                );
    RestResponse<?> responseObj = loginAPI.execute();
    if (responseObj.isFailed()) {
        throw new LoginFailedException("Login for username: " + userName +
" failed");
    }
}
```

Sample JAVA Code using APIs

PUT https://<Chargeback server IP>/vCenter-
CB/api/logout?version=1.0.1

```
public void logout () throws HttpException, IOException {  
    RestLogoutAPI logoutAPI = new RestLogoutAPI(this);  
    RestResponse<?> responseObj = logoutAPI.execute();  
}
```

Resources & Next Steps

Learn

- vCenter Chargeback Product Website:
<http://www.vmware.com/products/vcenter-chargeback>
- API Programming Guide & API Reference:
http://www.vmware.com/support/pubs/vcbm_pubs.html

Explore

- Download and install vCenter Chargeback:
<http://www.vmware.com/go/try-vcenter-chargeback>

Engage

- VMware VMTN Community Forum:
<http://communities.vmware.com/community/vmtn/mgmt/chargeback>



Questions?