vCloud Usage Meter
User Guide

Version 3.0

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vmware®

Contents

1. About the VMware vCloud Usage Meter

1.1 Overview

The VMware® vCloud Usage Meter is a tool that monitors, measures, and reports on VMware product consumption at a Service Provider. The vCloud Usage Meter is provided as a virtual appliance.

The vCloud Usage Meter serves two functions: metering and reporting. The metering part of the tool is used to collect raw usage data on VMware Service Provider Program (VSPP) bundles; the reporting part of the tool is used to generate reports for planning, billing, general account management, dispute resolution, and other purposes.

Information collected on an hourly basis includes:

- Time at which data is collected
- Host DNS name
- Host RAM (physical memory)
- vSphere license type
- Virtual machine vCenter name
- Virtual machine hostname
- vRAM (allocated virtual memory)
- Billing vRAM (calculation based on reserved virtual memory and per-virtual-machine memory cap)
- Virtual machine CPU (count of virtual CPUs)
- Virtual machine Instance UUID (universal unique identifier)
- Virtual machine location in vSphere Inventory

Data collected is stored in the PostgreSQL database of the virtual appliance itself.

1.2 Related Documentation

Table 1. Related Documentation

Subject Area	Found At
vCloud Usage Meter Release Notes *vCloud Usage Meter API Guide*	VMware Community, via title search
VSPP Program Guide *VSPP Product Guide*	http://www.vmware.com/partners/partners.html
Support for Service Providers and Aggregators with vSphere or vCloud entitlements	https://vmware.com/support/contacts/file-sr.html
Customers with no entitlements	http://communities.vmware.com/community/vmtn/vcd/vcloud_usage_meter
VMware vSphere® documentation	http://www.vmware.com/support/pubs

1.3   Requirements

Before you install the vCloud Usage Meter, ensure that the minimum software and hardware requirements are met.

Table 2. Software Requirements

Requirement	Description
VMware vSphere® (if deployed through vSphere Host)	• VMware ESXi 4.0 • VMware ESXi 4.0 Update 1 • VMware ESXi 4.0 Update 2 • VMware ESXi 4.0 Update 3 • VMware ESXi 4.0 Update 4 • VMware ESXi 4.1 • VMware ESXi 4.1 Update 1 • VMware ESXi 4.1 Update 2 • VMware ESXi 5.0 • VMware ESXi 5.0 Update 1 • VMware ESXi 5.1
Supported VMware vCenter Server™ Versions (if deployed through vCenter Server)	• VMware vCenter Server 4.0 • VMware vCenter Server 4.0 Update 1 • VMware vCenter Server 4.0 Update 2 • VMware vCenter Server 4.0 Update 3 • VMware vCenter Server 4.0 Update 4 • VMware vCenter Server 4.1 • VMware vCenter Server 4.1 Update 1 • VMware vCenter Server 4.1 Update 2 • VMware vCenter Server 4.1 Update 3 • VMware vCenter Server 5.0 • VMware vCenter Server 5.0 Update 1 • VMware vCenter Server 5.1
VMware vCenter Operations Manager Enterprise™ (optional)	• VMware vCenter Operations Manager 5.0.3
VMware Site Recovery Manager™ (optional)	VMware Site Recovery Manager 5.0
VMware vCloud Integration Manager (optional)	VMware vCloud Integration Manager 1.0

Requirement	Description
Browser	• Internet Explorer 8 and later • Firefox 7 and later • Google Chrome 12 and later
Hardware Requirements	• 2.0GHz or faster Intel or AMD x86 processor • 3.6 GB or more RAM • 40GB or more disk storage • 10/100 Ethernet adapter (1 Gigabit recommended)

Table 3. System Requirements

Information	Detail
Configuration Maximums	Each vCloud Usage Meter virtual appliance supports metering of: • 10 vCenter Servers • 10,000 virtual machines • 1000 Customers • 2500 vCenter Inventory objects **Note**: When working with large datasets of virtual machines and vCenter Server inventory objects, greater than 10,000 virtual machines and 2,500 vCenter Server inventory objects, VMware recommends having at least 750MB of RAM available on the client for efficient operation.
TCP Ports	vCloud Usage Meter is accessed using predetermined TCP ports. If you manage network components from outside a firewall, you may be required to reconfigure the firewall to allow access on the appropriate ports.

Port	Source	Target	Purpose
80	vCloud Usage Meter	vCenter Server	vSphere API
443	vCloud Usage Meter	vCenter Server	vSphere API
5480	vCenter Update Manager	vCloud Usage Meter	Used for virtual appliance updates
8443	Client Browser	vCloud Usage Meter	Used for the web application

2.   Installation

2.1   Deploying through vCenter Server

1. Download the vCloud Usage Meter OVA installation file and save it to your local machine:
    http://www.vmware.com/download/download.do?downloadGroup=UMSV3

2. From the File menu in the vSphere client, select **Deploy OVF Template**. The installation wizard is displayed.

3. In the Deploy OVF Template screen, specify the location of the saved OVA file and click **Next**.

4. Verify the OVF Template Details and click **Next**.

5. Accept the VMware End User License Agreement and click **Next**.

6. Specify a Name and Inventory Location for the vCloud Usage Meter virtual appliance and click **Next**.

7. Select the resource pool within which you want to deploy the template and click **Next**.

8. Select the Datastore in which you want to store the virtual machine files and click **Next**.

9. Select the Disk Format in which you want to store the virtual disks and click **Next**.

10. Select a network for the deployed template and click **Next**.

11. Select the IP Address Allocation policy to allocate IP addresses and click **Next**.

12. Review the information in the Ready to Complete screen and click **Finish**. The installer starts deploying the template.

13. Power on the virtual machine and perform the steps in Configuring Virtual Appliance Details.

2.2   Deploying Through vSphere Host

1. Download the vCloud Usage Meter OVA installation file and save it to your local machine:
    http://www.vmware.com/download/download.do?downloadGroup=UMSV3

2. Ensure that you have vSphere Client installed.

3. From the File menu in the vSphere client, select **Deploy OVF Template**. The installation wizard is displayed.

4. In the Deploy OVF Template screen, specify the location of the saved OVA file and click **Next**.

5. Verify the OVF Template Details and click **Next**.

6. Accept the VMware End User License Agreement and click **Next**.

7. Specify a Name and Inventory Location for the vCloud Usage Meter virtual appliance and click **Next**.

8. Select the resource pool within which you want to deploy the template and click **Next**.

9. Select the Datastore in which you want to store the virtual machine files and click **Next**.

10. Select the Disk Format in which you want to store the virtual disks and click **Next**.

11. Select a network for the deployed template and click **Next**.

12. Select the IP Address Allocation policy to allocate IP addresses and click **Next**.

13. Review the information in the Ready to Complete screen and click **Finish**. The installer starts deploying the template.

14. Power on the virtual machine and perform the steps in Configuring Virtual Appliance Details.

2.3 Configuring Virtual Appliance Details

Perform these steps to complete the installation of your Usage Meter Virtual Appliance.

To change/create passwords

1. On the virtual machine console, navigate to **Login** and press **Enter**. The command line interface prompts you to enter your credentials.

2. Log in as root with the default password **vmware**, and then press **Enter**.

3. To change your console password, at the #prompt, type **passwd** and press **Enter**.

4. Enter and confirm a new console password. The password is changed.

5. To create your web application password, at the #prompt, type **webpass** and press **Enter**.

6. Enter and confirm a new web application password. The password is created.

7. Type **Exit** to return to the virtual machine console.

To change time zone details

1. On the virtual machine console, navigate to **Set Timezone** and press **Enter**. By default, NTP has not been configured for a virtual appliance.

2. Select your time zone and press **Enter**.

3. Restart the Tomcat service. For more information, see Restarting Tomcat.

To configure the network

The vCloud Usage Meter console displays a web application URL. However, network details are not configured at OVF deployment. You must configure network parameters so that the console displays the correct URL for running the web application.

1. Log in and run the following command:

   ```
   /opt/vmware/share/vami/vami_config_net
   ```

2. Follow instructions on configuring new network settings. On completion of setting up the network, interfaces will reset.

3. Return to the vCloud Usage Meter console and note the new web application URL address in the format http://<IP-Address>:8443/um.

3.   Restarting Tomcat

Tomcat needs to be restarted when:

- Configuring or changing the time zone. See [Configuring Virtual Appliance Details](#).

- Resetting. Under some conditions, Tomcat may not find the hostname. When Tomcat is started/stopped on the appliance multiple times, you may not get a response when you try running the VCloud Usage Meter web application in your browser.

To stop and start Tomcat

Use the command

```
service tomcat restart
```

4.   Upgrading the vCloud Usage Meter

You can upgrade to version 3.0 from version 2.3.2.

4.1   Prerequisites

1. Before upgrading, back up or snapshot your vCloud Usage Meter virtual machine, in case an unexpected error occurs during the upgrade process.

2. Ensure that you are using version 2.3.2. If not, upgrade to version 2.3.2 before proceeding.

3. If you have configured an outgoing email server and it requires a password, remove the password. Failure to do will cause the upgrade to fail, due to the new encryption mechanism. vCloud Usage Meter 3.0 changes the way the password is encrypted in the database and is unable to convert the pre-existing value.

4.2   To upgrade to version 3.0

1. Transfer the patch file `usage-meter-300-update.zip` to `/root` in the virtual appliance.

2. Log in to the virtual appliance as `root`.

3. Use the command `unzip /root/usage-meter-300-update.zip`

4. Use the commands
    ```
    cd usage-meter-300-update
    ./updateum.
    ```

4.3   After the upgrade

1. If you require authentication for the vCloud Usage Meter, re-enter your password for the outgoing email server.

2.   (Optional)You can edit and save a vCenter Server with a blank instance UUID before the first collection in order to set the UUID again. The VMware vCenter Server UUID will be blank until after the first collection, post upgrade, where all the vCenter Server UUIDs are updated.

3. Verify your memory settings. All but the very largest environments should work well with the vCloud Usage Meter's default settings. You can also configure for smaller environments. See Configuring for Environment Size.

5. Using the vCloud Usage Meter User Interface

5.1 Log into the vCloud Usage Meter User Interface

Open a browser and enter the web application URL address.

Log in to the vCloud Usage Meter User Interface with the web application password.

For more information on the web application URL address and password, see Configuring Password, Time Zone, and Network.

5.2 Main Menu of the User Interface

Along the top right menu bar, the user interface displays the following menu choices.

Table 4. vCloud Usage Meter UI Menu

Menu	Description
Manage	Allows you to manage settings and/or credentials for: • Contact (Service Provider) • Email (Outgoing Email Server, Email Alerts) • LDAP (LDAP Authentication) • Products (vCenter Servers, vCenter Operations Manager Servers, Site Recovery Manager Servers, vCloud Integration Manager, Collector) • API (API Access Tokens) Note: This page is only visible to those with administrator privileges. For more information, see the section Managing vCloud Usage Meter.
Licenses	Allows you to: • Create a label for a license set • Add licenses to a set • Assign licenses to a default category For more information, see the section Managing Licenses.
Automatic Reporting	Allows you to set up automatic reporting. For more information, see the section Setting Up Automatic Reporting.
Monitor	Allows you to select a month of a year to monitor. For more information, see the section Monitoring.

Menu	Description
Customers	Allows you to: • View a customer list • Import customers and/or rules • Add customers singly • Edit customers • Delete customers • Export customers and/or rules For more information, see the section Managing Customers.
Rules	Allows you to: • Create rules • View current rules • View mapped and unmapped virtual machines For more information, see the section Managing Customer Rules.
Report	Allows you to: • Select type of report • Set a customer filter • Set a license set filter • Select a month of a year • Set a per-virtual machine memory cap Note: This page is only visible if data is present for reporting. For more information, see the section Generating Reports.
Support	Allows you to: • Select a logging level • View or save the virtual appliance log file • Generate support bundles For more information, see the section Support.
Log Out	Logs you out of the vCloud Usage Meter.

5.3   Notifications Area

The vCloud Usage Meter's user interface displays notifications about user activities and background processes.

• The notifications appear at the top left of each page.

- Notifications persist from session to session, unless manually cleared, or if the web application is restarted (which is infrequent).

- A Clear button allows you to remove the current notifications.

To clear the Notifications list

1. Click the **Clear** button. The clear button operates with one click without asking for a confirmation.

2. To view notifications as part of a log, view the virtual appliance log file. For more information, see the section Support.

6.   Managing the vCloud Usage Meter

The vCloud Usage Meter must be configured after installation to properly meter vCenter Servers and report virtual machine usage.

6.1   Managing Contact Details

Service Provider details are required in order for the vCloud Usage Meter virtual appliance to collect and report on virtual machine and customer usage. Failure to enter details will result in failed vCenter collections and incomplete monthly reports.

To enter Service Provider details

1.   Click **Manage** in the top right menu bar.

2.   Click the **Contact** tab.

3.   Enter a **Company** name.

4.   Enter a **Contact Name**.

5.   Enter a **Phone** number.

6.   Enter an **Email**.

6.2   Managing Email Details

To enter email details

1.   Click **Manage** in the top right menu bar.

2.   Click the **Email** tab.

6.2.1   Outgoing Email Server

Configure the outgoing email server to receive automatic monthly billing reports and alerts of failed and successful collections.

To enter Outgoing Email Server details

1.   Enter the **Host**.

2.   Enter **Port** (the default port is 25).

3.   (Optional) If you require authentication, enter a **User** name and **Password**.

6.2.2   Email Alerts

You can set up an option for an email address to receive email alerts after successful or failed collections.

To set up email alerts

1.   Enter the **From Email**.

2.   Enter the **To Email**. To enter more than one email address, separate email addresses with commas (example: jdoe@vmware.com, ddoe@vmware.com).

3.   Select whether successful or failed collection emails will be sent.

4. In order to test email alerts when saving, select **Send a test email alert after saving** to verify that the outgoing email server is working correctly and that the alerts will be sent. By default this check box is not selected.

5. Click **Save** when completed.

6.3   Managing LDAP Authentication

vCloud Usage Meter can authenticate users against an LDAP service.

To enter LDAP Authentication details

1. Click **Manage** in the top right menu bar and **LDAP**.

2. Type **Host** using one of these options:

   - Hostname (most common, requires the vCloud Usage Meter appliance to have DNS configured—this can be verified in the appliance console)

   - Domain Name (preferred because it supports failover, requires the vCloud Usage Meter appliance to have DNS configured—this can be verified in the appliance console)

   - IP address (least preferred—but does not require DNS configuration)

3. Type **Port**. 389 is the default port for LDAP.

4. Click **checkbox to use SSL**. Import certificates as directed.

5. Type **Password**. This is the password of the Distinguished Name user account (see step 7) that will connect to LDAP for the purposes of locating the account of someone logging into vCloud Usage Meter.

6. Type **Object Class**. For example, `User`. Only Active Directory is supported.

7. Under Distinguished Names, type **Usage Meter** name. This is the Distinguished Name user account (see step 5) that will connect to LDAP for the purposes of locating the account of someone logging into vCloud Usage Meter. This field has a 60 character limit.

8. Type **Base DN**. This is the Base Distinguished Name of the LDAP hierarchy that you will allow to log into vCloud Usage Meter. Use a specific Base DN that only contains your intended user group. This field has a 60 character limit.

9. Click **Save**.

To test an LDAP login

1. Log out of vCloud Usage Meter User Interface.

2. Log in using the Active Directory sAMAccountName and password of a user that is within the scope of your Base DN search path.

6.4   Managing Products

To enter product details

1. Click **Manage** in the top right menu bar.

2. Click the **Products** tab.

6.4.1 vCenter Server

At least one vCenter Server must be added to collect virtual machine usage data.

The vCloud Usage Meter does not support directly metering vSphere hosts.

To enter vCenter Server details

1. Under vCenter Servers, click **Add**. The Add/Edit vCenter Server screen appears.

2. Enter **Host Name or IP**.

3. Enter **User Name**. Read-Only administrator privileges required**.**

4. Enter a **Password**.

5. Click **Save**. If there is an error, a separate message dialog will appear, and the server will not be added to the list.

6.4.2   vCenter Operations Manager Server

If a vCenter Operations Manager Server is associated with a vCenter Server, it is listed and will be reported on in the Product Report. You must supply user credentials.

To enter vCenter Operations Manager Server user credentials

1. Under vCenter Operations Manager Servers, click **Edit**.

2. Enter **User Name** and **Password**.

6.4.3   Site Recovery Manager Server

(Optional) Configure Site Recovery Manager (SRM) Servers and their relationships to vCenter Servers. Only one SRM Server, located at the protected or recovery site, needs to be configured for metering.

Multiple SRM relationships can be set up for one or more customers and each SRM setup needs to be metered. Usage is added up with other SRM servers.

Example: NewCo and YourCo are both running private cloud backups to a Service Provider. Each customer would need a separate encapsulated SRM installation to back up resources. The Service Provider would register each failover SRM server/vCenter relationship for each customer.

To enter Site Recovery details

1. Under Site Recovery Manager Servers, click **Add**. The Add/Edit SRM Server screen appears.

2. Enter **Host Name or IP**.

3. Enter **User Name**. Read-Only administrator privileges required**.**

4. Enter a **Password**.

5. From the dropdown, select the vCenter Server to pair to the SRM Server.

6. In order to test the SRM Server credentials when saving, select the **Test Before Saving** check box. If there is an error, a separate message dialog will appear with error details, and the server will not be added to the list. By default this check box is selected.

7. Click **Save** to commit changes.

6.4.4   vCloud Integration Manager Details

Configure vCloud Integration Manager details in order to collect usage data from vCloud Integration Manager.

To enter vCloud Integration Manager details

1. Under vCloud Integration Manager, click **Add**. The Add/Edit vCloud Integration Manager screen appears.

2. Enter **Host Name or IP**.

3. Enter **Username** as user@companyname**.**

4. Enter a **Password**.

5. In order to test the vCloud Integration Manager credentials when saving, select the **Test Before Saving** check box. If there is an error, a separate message dialog will appear with error details, and vCloud Integration Manager will not be added to the list. By default this check box is selected.

6.4.5 Collector Details

Set the start time for the vCloud Usage Meter to poll vCenter Servers. The default is 5 minutes after the hour. The start time can be set at zero (the start of the hour) or to any other minute of the hour, in order to avoid competition with other scripts working with the vCenter Servers.

1. Select the minute of the hour for the polling to start.

2. Click **Save** to commit changes.

3. (Optional) Click **Test** to verify that the collection process is working correctly. Data will be collected for the purpose of the test, but will not be saved to the database. Email alerts must be set in advance to receive results.

6.5   API Access Tokens

All vCloud Usage Meter APIs require authentication. If you wish to use the vCloud Usage Meter API, generate an authentication token.

For more information, refer to the *vCloud Usage Meter API Guide v3.0.*

7.   Managing Licenses

License sets allow you to associate virtual machine vRAM usage with one or more vSphere license keys. vSphere licenses keys are updated after a successful vCenter query. If a license key is no longer present in a vCenter Server, the license is removed from the licenses that can be managed.

7.1   Managing License Sets

To create a License Set

1.   Click **Licenses** in the top right menu bar.

2.   Under the text **License Sets**, enter a license set name and click **New**.

3.   Under the text **Add Licenses to the current set**, select the name of the License Set you wish to edit. The selected set is also listed as the current set next to the Delete button.

4.   To manage the licenses associated with the license set, select or deselect the checkboxes on the right. License details (name, key, vCenters, and hosts) are displayed to aid in your selections. Licenses can be assigned to more than one license set.

To delete a License Set

1.   Select the license set you wish to delete.

2.   Click **Delete**. A message asking "Are you sure?" appears.

3.   Click **Yes**.

7.2   Managing Billing Categories

vSphere license keys deployed by Service Providers may have different billing characteristics, so you can indicate which vSphere license keys are billable by defining the billing category. You can assign these categories:

- *VSPP*. (Default) License key obtained through VSPP and all virtual machines running on hosts with these keys are considered to be billable.

- *Demo*. License keys that are not billable that can be used for environments such as demo systems and View deployments.

- *Perpetual*. License keys obtained outside of the VSPP program and virtual machines running on hosts with these keys are not considered billable.

To assign a license category

Under the heading **Billing Category**, select a billing category for each license as desired. The list provides license details (name, key, and vCenters) to aid in your category selection.

8. Setting Up Automatic Reporting

You can set up VCloud Usage Meter to automatically generate sets of reports and email them to an Aggregator, or elsewhere. Service Providers who report to multiple Aggregators can set up an automatic report for each one, using a different license set for each (for information about license sets, see Managing Licenses).

Available reports to use with Automatic Reporting Sets are displayed by name. Reports can be included in more than one automatic reporting set.

To create or edit an Automatic Reporting Set

1. Click **Automatic Reporting** in the top right menu bar.

2. Enter an Automatic Reporting Set name in the right hand box next to **Name**. As you type, existing names starting with the same letter will appear. If you select an existing set, the last time the report was sent, if available, appears at the bottom of this area.

3. Select a reporting day of the month.

4. Select a set of reports to include by using Shift + Click or Ctrl + Click. Reports can be assigned to more than one automatic reporting set.

5. Select a license set or sets to include by using Shift + Click or Ctrl + Click. License sets can be assigned to more than one automatic reporting set.

6. Enter an email that the reporting will be from in **From Email**.

7. Enter an email that the reporting will be sent to in **To Email**.

8. Click **Save**.

To delete an Automatic Reporting Set

1. On the left hand side, ensure the automatic reporting set that you wish to delete is selected.

2. Click **Delete**.

9. Monitoring

The Monitor page allows you to view times of successful (OK) or failed (Fail) collections for each vCenter Server as set up in the Manage page (for more information, see vCenter Servers).

The default view is the current month and year, but you can select a view of any month and year of the past four years.

To select and view a month and year

1. Click **Monitor** in the top right menu bar.

2. Select the year and month you wish to view.

3. Click **Submit**.

4. To view collection times, hover your mouse over the OK or Fail count in any column.

10. Managing Customers

The vCloud Usage Meter provides the ability to add, edit, delete, export, and import customers that are using Service Provider resources.

Creating customers and also associating rules with them enables monthly customer usage reporting. It also aids in planning, billing, general account management, dispute resolution, and other purposes. For more information about rules, see Managing Rules.

Table 5. vCloud Usage Meter Customer Options

Option	Description
Sharing customer details among multiple vCloud Usage Meter virtual appliances	Service Providers frequently have multiple vCloud Usage Meter virtual appliances installed in different datacenters. There is no federated database or replication between vCloud Usage Meter virtual appliances at this time. So, customer details stored in one vCloud Usage Meter virtual appliance are not shared among other virtual appliances.
	If a customer's details are changed, in order to share the change among multiple virtual appliances, customer details must be exported or imported into the other installations. VMware recommends that an administrator enter customers into one virtual appliance and update the others independently.
Bulk upload and export of customer details, including associated rules	Basic customer importing and exporting are discussed inImporting/Exporting Customers and Rules.
	For more information about rules, see Managing Rules.
Shielding customers whose details are confidential	If a customer's name or location is considered sensitive, the customer can be designated as *restricted*, and given a code name and/or location. An arrangement is made with VMware VSPP on what code to use for these customers and the location of the restricted customers is maintained at VSPP operations.
	While the customer's code details can be either added through the UI or imported, the restricted status can only be set manually through the UI (see Adding a Customer).

10.1 Adding a Customer Through the User Interface

To add a customer

1. Click **Customers** in the top right menu bar.

2. Click **Add**. Add/Edit Customer screen appears.

3. Enter a unique customer **Name**.

4. If the customer is restricted, select the **Restricted** check box.

5. Select a **Country**.

6. Enter a **Postal Code**.

7. Click **Save** to commit changes. The new customer appears in the customer list.

10.2 Deleting Customers

When deleting a customer from the vCloud Usage Meter, all rules associated with the customers are also removed from the system.

To delete a customer

1. Click **Customers** in the top right menu bar.

2. Select the check box for the customer or customers to be deleted.

3. Click the **Delete Selected** button. A message asking "Delete all selected?" appears.

4. Click **Yes**. A message will appear in the upper left of the browser window confirming that the customer or customers have been deleted.

10.3 Importing/Exporting Customers and Rules

Customer and rules can be imported into the vCloud Usage Meter via a tab separated file. This file can be manually generated or consist of an exported customers and customers rules list from another vCloud Usage Meter virtual appliance.

The vCloud Usage Meter allows:

*   Import of customers

*   Import of customers and rules together

*   Export of customers and rules together

For information about how to construct rules, see Managing Rules. If vCloud Usage Meter cannot import a rule, an error message is displayed and the rule is not created.

About customer imports:

*   Duplicate customer names are not permitted.

*   Customers that are restricted are not allowed to be imported via a tab separated file and must be entered manually.

*   Country code information is available from the ISO Organization, ISO 3166-1-alpha-2 code.

To import customers and/or rules

1. Prepare, or obtain from export, a tab separated file. A sample of the contents of a file that would import both customers and rules is shown below.

Row	Column A	Column B	Column C	Column D	Column E
1	# vCloud Usage Meter Customer Export				
2	# Version: 1				
3	# Customers				
4	# Name	Country	Postal Code		
5	NewCo	AF	44		
6	YourCo	US	94555		
7	TheCo				
8	ThisCo	US	95555		
9	# Rules				
10	# Example rule: Exact string folder match for abc for customer CloudCo				
11	# CloudCo		Folder	Exact String	abc
12	# Customer	vCenter	Object Type	Value Type	Value
13	NewCo	10.255.79.10	VM	Unique ID	vm-100
14	NewCo	10.255.79.10	Host	Unique ID	host-77
15	NewCo		VM DNS name	Exact string	ad
16	NewCo	10.255.79.10	vApp	Unique ID	resgroup-v99
17	NewCo	10.255.79.10	VM	Unique ID	vm-103
18	NewCo	10.255.79.10	vApp	Unique ID	resgroup-v91
19	TheCo	192.168.128.1	Data Center	Unique ID	datacenter-2

2. Click **Customers** in the top right menu bar.

3. Browse to the file to be uploaded and click **Import**:

   a. If import completes without error, a new page is displayed with the message "Importing completed with no errors."

   b. If import of customers fails, an error message indicating the line number, text associated with the line producing the error, and the error message are displayed.

4. Click in the top right menu bar to return to the VCloud Usage Meter UI.

To export customers and rules

1. Click **Customers** in the top right menu bar.

2. Click the **Export All** button. A new dialog window is presented in order to save the customers and customer's rules as a tab separated text file (.tsv).

The export procedure exports *all* customers and rules whether customers are selected or unselected (there is no selection for a subset in this version of the vCloud Usage Meter).

11. Managing Rules

Customer rules allow a Service Provider to associate vCenter Server objects with a customer's cloud infrastructure. This enables monthly customer usage reporting as defined in the *VSPP Program Guide* and the *VSPP Product Guide*. The vCloud Usage Meter provides the Service Provider with granular control of a vCenter Server inventory, where they are able to link objects in the vCenter Server inventory from as high as the vCenter Server down to the individual unique ID for a virtual machine or IP address.

During customer rules creation, if there is a conflict with another customer rule an error message is displayed to the end user with customer and virtual machines affected and the rule is not created.

Table 6 vCloud Usage Meter Rules Options

Option	Via	Description
Create a rule directly, by specific object type	**Rules** page	Create a rule by directly selecting the object and value type, and then entering a value.
Create a rule by locating an object type in the vSphere inventory	**Rules** page	Use the filters and tree view to locate the object type that the rule will map to.
Import of customers and rules together	**Customers** page	Import as tab separated file.

For further information, refer to these topics:

- Managing Customers for more information about customers.

- Importing/Exporting Customers and Rules for more information and a sample of a rule as imported or exported.

- Generating Reports for information about reports.

- Customer Summary Report for information about reviewing customers' monthly usage after creating rules.

11.1 Adding a Rule

The features in the Rules page help you map rules to the inventory structure.

To link a rule to a customer using Create Rules

1. Click **Rules** in the top right menu bar.

2. Enter the **Customer** name. The Customer name has auto complete functionality to assist with finding a customer. As you enter each letter there is a slight delay as the customer list is populated based on values entered. Complete the name manually, or select the customer from the filtered list provided.

3. Select **Object Type** and **Value Type**. As you select Object Type, the options for Value Type will vary accordingly. For certain combinations of object and value type, other selections, such as **vCenter**, are required.

Exact String, Substring, Regular Expression, and CIDR Notation apply to all vCenter Servers registered with the vCloud Usage Meter virtual appliance. Refer to the table below for the input required for combinations of supported object and value types.

Table 7. Supported Object and Value Types for Mapping Customers to Rules

Object Type	Description	Value Types	vCenter Needed
VM	A virtual machine is a software computer that	Unique ID	yes
VM vCenter Server Name	A name for the vCenter Server that represents its purpose	Exact string	no
		Substring	no
		Regular expression	no
VM DNS Name	The DNS name of a virtual machine.	Exact string	no
		Substring	no
		Regular expression	no
IP V4 address	IP network address.	IP V4 CIDR notation	no
Folder	Folders allow you to group objects of the same type so you can easily manage them. For example, you can use folders to set permissions across objects, to set alarms across objects, and to organize objects in a meaningful way.	Unique ID	yes
		Exact string	no
		Substring	no
		Regular expression	no
Resource Pool	A resource pool is a logical abstraction for flexible management of resources. Resource pools can be grouped into hierarchies and used to hierarchically partition available CPU and memory resources in vSphere or organization virtual datacenter in vCloud Director.	Unique ID	yes
		Exact string	no
		Substring	no
		Regular expression	no
vApp	A vSphere vApp is a format for packaging and managing applications. A vApp can contain multiple virtual machines.	Unique ID	yes
		Exact string	no
		Substring	no
		Regular expression	no
Host	Similar to rules that are created against vCenter Servers, only host unique IDs can be associated against a customer.	Unique ID	yes

Cluster	Similar to rules that are created against vCenter Servers, only cluster unique IDs can be associated against a customer.	Unique ID	yes
Datacenter	Similar to rules that are created against vCenter Servers, only datacenter unique IDs can be associated against a customer.	Unique ID	yes
vCenter Server	Rules that are created against vCenter Servers are specific to that vCenter Server unique ID only without the functionality to configure based on string, sub-string, or regular expression.	Unique ID	yes

4. Enter a **Value** to be associated with the customer.

5. Click **Create** to add the new rule to the current rules associated with the customer.

6. Click **Show customer virtual machines** to view all virtual machines associated with all customer rules created.

To link a rule to a customer using the vSphere Inventory Tree

1. Click **Rules** in the top right menu bar.

2. Enter the **Customer** name. The Customer name has auto complete functionality to assist with finding a customer. As you enter each letter there is a slight delay as the customer list is populated, based on values entered. Complete the name manually, or select the customer from the filtered list provided.

3. Review the tree displayed under **vSphere Inventory**. The vCenter Servers, and objects contained within them, can be expanded or collapsed by clicking the arrow pointers, or using the buttons **Collapse All** or **Expand All**.

   The vSphere Inventory filter is linked to those vCenter Servers that the vCloud Usage Meter is collecting usage data for. By default, all objects in the vCenter Server inventory are collected for each vCenter Server.

4. Enter text in the field to the left of Filter that matches a location in the tree that you want to create a rule for, and then click **Filter**. The filter then reduces the tree display to objects related to the text you entered.

5. Select the **vSphere Inventory Object** you wish to associate with the customer. A Unique ID—or mapping between the vCenter Server ID and more—is created to link the customer to the associated vSphere Inventory object and the details of that mapping then appear under the **Create Rules** section.

6. If the mapping is correct, click **Create**, as in step 5 above. Then continue with step 6 above.

7. If the mapping is not correct, click **Reset Filter** to clear the previous search criteria.

11.2 Deleting Customer Rules

Customer's rules can be deleted from the vCloud Usage Meter using the Rules page. When deleting customer's rules from the vCloud Usage Meter, only the relationship between the vSphere Inventory object and the customer is removed. All usage data associated with the virtual machines is still maintained.

To delete customer rules

1. Click **Rules** in the top right menu bar.

2. Enter the **Customer** name. The area **Current Rules** displays the current rules for the customer.

3. Select the checkbox for the rule(s) to be deleted.

4. Click the **Delete Selected** button. A message asking "Are you sure?" appears.

5. Click **Yes**. A message will appear in the upper left of the browser window confirming that the rule or rules have been deleted.

12. Generating Reports

The vCloud Usage Meter allows the end user to generate various reports to monitor and track resource usage for your vCenter Server and virtual machines. There are six different reports that can be generated from the vCloud Usage Meter, as described below.

A report can be generated manually at any time and can be exported as a tab separated file or zip, when a large number of records are returned.

The previous report executed will remain cached in your browser until another report is generated or upon logout from the vCloud Usage Meter virtual appliances.

To generate a report

1. Click **Report** in the top right menu bar.

2. Select the **Report Type**.

3. Select:

   - **All** to return all records.

   - **Customer** to report on a specific customer.

     Enter a **Customer** name in the provided field. This field has auto complete functionality. As you enter each letter the customer list is populated based on values entered. Complete the name manually, or select the customer from the filtered list provided.

   - **Customer Country** to report by country

     Enter a **Customer Country** in the provided field. This field has auto complete functionality. As you enter each letter the country list is populated based on values entered and the countries of existing customers.

   - **Customer Postal Code** to report by postal code

     Enter a **Postal Code** in the provided field. This field has auto complete functionality. As you enter each number or letter the postal code list is populated based on values entered and the codes of existing customers.

4. Select **License Sets** or leave blank to return all records.

5. Select **Options**:

   a. Select **Month** and **Year**.

   b. Specify **Per VM Memory Cap** (this field has a default value of 24 GB)

6. To view the report in the user interface, click the **Browse** button.

7. To save the report to a file, click the **Export** button. (Optional) Select the **Zip** checkbox to export the file as a zip archive.

12.1 Detailed Billing Report

This is a generic report that provides billing information for all types of vSphere licenses and is also used for sending usage details to the Aggregator assigned to the Service Provider. Virtual machine usage reported is based on which vSphere license keys are selected as VSPP keys. Please refer to License Management for more details.

Table 8. Detailed Billing Report Details

Report Column	Description
Time	Day of the reporting month, hour, minute, and milliseconds
Host DNS Name	Host identifier which can be IP address or FQDN depending on how the host was configured with vCenter
Host Memory Size (KB)	Host memory size displayed in KB
vSphere License	vSphere license type associated with vSphere host
VM RAM (MB)	Configured virtual RAM for the virtual machine
Billing RAM (MB)	Billing virtual RAM for the virtual machine calculated from the amount of reserved RAM assigned to the virtual machine
VM CPUs	Number of CPUs assigned to the virtual machine
VM Instance UUID	Unique identifier for virtual machine to assist with identification and audit

12.2 Detailed Usage Report

The Usage Data Report provides all usage-related information including virtual machine name as listed in vCenter Server and virtual machine DNS name.

Table 9. Detailed Usage Report Details

Report Column	Description
Time	Day of the reporting month, hour, minute, and milliseconds
Customer	Customer associated with record
Host DNS Name	Host identifier which can be IP address or FQDN depending on how the host was configured with vCenter
Host RAM (GB)	Host memory size displayed in GB
vSphere License	vSphere license type associated with vSphere host
VM VC Name	Virtual machine name as listed in vCenter Server
VM Hostname	Virtual machine DNS name
VM RAM (MB)	Configured virtual RAM for the virtual machine

Report Column	Description
Billing RAM (MB)	Billing virtual RAM for the virtual machine calculated from the amount of reserved RAM assigned to the virtual machine
VM CPUs	Number of CPUs assigned to the virtual machine
VM Instance UUID	Unique identifier for virtual machine to assist with identification and audit

12.3 Customer Summary Report

This report provides information such as customer, vSphere license type, category, if a license is billable, billed vRAM in GB, and capped billed vRAM in GB. Uncapped and capped memory totals are based on the sum of all hourly collections for each license type.

Table 10. Customer Summary Report Details

Report Column	Description
Customer	Customer associated with usage
Country	Customer's country
Postal	Customer's postal code
License Type	License type being metered
Category	vSphere license category
Billable	If the vSphere license is billable
Billed vRAM (GB-Hour)	Non-Capped Memory (GB-Hour)
Capped Billed vRAM (GB-Hour)	Capped Memory (GB-Hour) – Used in billing calculations

12.4 License Summary Report

This report provides information such as vSphere license type, category, if license is billable, Billed vRAM in GB, and Capped Billed vRAM in GB. Uncapped and capped memory totals are based on the sum of all hourly collections for each license type. This report replaces the Aggregate Billing report for the vCloud Usage Meter releases previous to version 2.3 and is sent to the Aggregator for use in monthly reporting.

Table 11. License Summary Report Details

Report Column	Description
Billable	If the vSphere license is billable
Category	vSphere license category
License Type	License type being metered
Billed vRAM (GB-Hour)	Non-Capped Memory (GB-Hour)
Capped Billed vRAM (GB-Hour)	Capped Memory (GB-Hour)—Used in billing calculation

12.5 Product Report

This report provides information such the product being monitored, the metric being metered on, and the associated monthly usage. This report will be included in monthly reporting if Site Recovery Manager is used to protect the customer's virtual machines.

Table 12. Product Report Details

Report Column	Description
Product	Product metered
Metric Type	Metric being used to meter a product
Value	Monthly usage for product

12.6 Customer Product Report

This report provides lists the customers and virtual machines protected by Site Recovery Manager. Customers will be displayed in the report if the vCenter Server Folder and vCenter Resource Pool associated with a protection group are also mapped to the customer as part of the customers rules definitions.

Virtual machines will be displayed in this report if they are protected for one or more days during the month.

Table 13. Customer Product Report Details

Report Column	Description
Customer	Customer associated with the virtual machine
Product	Product metered
Object	Metric being used to meter a product

13. Support

The vCloud Usage Meter Support page provides information for developer or technical support use.

13.1 Runtime Information

Runtime Information is provided for diagnostic purposes. Technical support may request you to relay information such as heap used and Java arguments in order to diagnose problems.

13.2 Database

This information shows all virtual machines in the Usage Meter database, along with their related hosts and vCenter Servers. This helps diagnose problems such as duplicate hosts.

13.3 Logging Level

Access appliance log information for the vCloud Usage Meter through the console at

`/var/log/usgmtr/*`.

The available logging level settings are:

- **Info** (default, includes Warn, Error, and Fatal levels)
- **Debug** (more detail, will cause the logs to fill faster)
- **Warn** (warnings only, not recommended)
- **Error** (errors only, not recommended)
- **Trace** (not currently used)
- **Fatal** (fatal only, not recommended)

To change logging levels in the user interface

1. Click **Support** in the top right menu bar.
2. Under Logging Level, select the check box **Detailed**.

To change logging levels in the properties file

1. Access the `log4j.properties` file at

   `/usr/local/apache-tomcat-7.0.14/webapps/um/WEB-INF/classes/log4j.properties`

2. Edit this line by replacing `INFO` with your desired logging level:

   `log4j.rootLogger=INFO, roll`

13.4 Log Rolling

By default the Usage Meter allots 100MB for log activity, before deleting log history. VMware recommends that this log rolling capacity not be reduced.

To change log rolling settings in the properties file

1. Access the `log4j.properties` file at

   `/usr/local/apache-tomcat-7.0.14/webapps/um/WEB-INF/classes/log4j.properties`

2. Edit these lines to configure your desired log rolling:

```
log4j.appender.roll.MaxFileSize=10MB

log4j.appender.roll.MaxBackupIndex=10
```

13.5 Support Bundle

Technical support may request support bundles, a collection of log files, to help diagnose problems. Support bundles take disk space and should be deleted when no longer needed.

To generate or delete a support bundle

1. Under Support Bundle, click **Generate**.

2. Under Support Bundle, click **Delete support bundles**.

14. Using the vCloud Usage Meter's JMX Service

Each vCloud Usage Meter server host exposes a number of MBeans through JMX (Java Management Extensions) to provide access to internal data such as database size, customer count, customer rules count, and other information.

You can use any JMX client to access the vCloud Usage Meter JMX service. JConsole is an example of a JMX client.

To use the vCloud Usage Meter's JMX service

1. Use the command

    ```
    /opt/vmware/cloudusagemetering/scripts/tomcat
    ```

2. To enable local access only JMX monitoring, uncomment the lines given (for example):

    ```
    #export CATALINA_OPTS='-
    Dcom.sun.management.jmxremote.password.file=$CATALINA_HOME/conf/jmxr
    emote.password -
    Dcom.sun.management.jmxremote.access.file=$CATALINA_HOME/conf/jmxrem
    ote.access -Dcom.sun.management.jmxremote -
    Dcom.sun.management.jmxremote.port=9003 -
    Dcom.sun.management.jmxremote.ssl=false -
    Dcom.sun.management.jmxremote.authenticate=true'

    #export JAVA_OPTS=$JAVA_OPTS" -Djava.rmi.server.hostname=`ifconfig |
    grep 'inet addr:'| grep -v '127.0.0.1' | cut -d: -f2 | awk '{ print
    $1}'`"
    ```

3. In the directory `/usr/local/apache-tomcat-7.0.14/conf/` create two files:

    ```
    jmxremote.password
    ```

    ```
    jmxremote.access
    ```

4. To create a read-only user for JMX:

    a.   Add the line `monitorRole <password>` to the file `jmxremote.password`, replacing `<password>` with your chosen password

    b.   Add the line `monitorRole readonly` to the file `jmxremote.access`

5. To change the file permissions to `600`, use the command
    ```
    chmod 600 /usr/local/apache-tomcat-7.0.14/conf/jmxremote.*
    ```

6. Restart Tomcat with the command

    ```
    service tomcat restart
    ```

7. Connect with your JMX client by entering:

    *   IP address of the vCloud Usage Meter server

    *   Port number `9003`

    *   User name `monitorRole`

    *   Password for the user you created

15. Advanced Management

These options allow you to configure memory size, collection speed, monitoring, and database backup.

15.1 Configuring Memory for Environment Size

All but the very largest environments should work well with the vCloud Usage Meter's default settings. If you change your JVM heap size setting, VMware recommends that you configure the vCloud Usage Meter Virtual Machine's RAM as well. Setting the JVM maximum heap size larger than the virtual appliance size can cause excessive paging or running out of swap space.

Table 14. Sample Memory Settings

JVM Maximum Heap Size	Virtual Appliance Size	Description
3072	3600	Default vCloud Usage Meter settings
4096	5120	A setting for larger environments
2048	2560	A setting for smaller environments and to conserve memory usage

To change JVM heap size

1. Use the command

   ```
   service tomcat stop
   ```

2. The location to set heap size is:

   ```
   /etc/init.d/tomcat
   export JAVA_OPTS='-Xms512m –Xmx3072m -XX:+CMSClassUnloadingEnabled -
   XX:MaxPermSize=256m'
   ```

3. Change **3072** to a larger or smaller number.

4. Use the command

   ```
   service tomcat restart
   ```

To change the virtual RAM for the Usage Meter virtual appliance

1. In your vSphere client, navigate to **Home > Hosts and Clusters > VMs and Templates**.

2. Locate the vCloud Usage Meter virtual appliance in the inventory tree, right-click and select **Power > Power Off**.

3. Right-click and select **Edit Settings**.

4. Click the **Hardware** tab and **Memory** in the list on the left, if these are not already selected.

5. Under Memory Configuration on the right, type a larger or smaller **Memory Size** value, and click **OK**.

6. Right-click the vCloud Usage Meter virtual appliance and select **Power > Power On**.

15.2   Turning On Parallel Collections

To increase collection speed if you have multiple vCenter Servers, you can turn on parallel collections.

1. Use the command

    ```
    service tomcat stop
    ```

2. Change the **1** to a 5:

    ```
    /usr/local/apache-tomcat-7.0.14/WEB-INF/webapps/um/web.xml

    <context-param>

        <param-name>maxConcurrentCollections</param-name>

        <param-value>1</param-value>

    </context-param>
    ```

3. Use the command

    ```
    service tomcat restart
    ```

15.3 Monitoring the Appliance

This provides a way to monitor the vCloud Usage Meter virtual machine for failures using HP OpenView.

SSH is pre-installed in the appliance, but it is set to `chkconfig off` for sshd.

To enable SSH

As root, use these commands:

```
chkconfig sshd on
service sshd start
```

15.4 Managing the vCloud Usage Meter Database

All usage data collected by the vCloud Usage Meter is maintained in the appliance database. Therefore, to maintain history, VMware recommends that you not delete the vCloud Usage Meter virtual appliance.

Database administrators should have knowledge of PostgreSQL before performing any direct database functions. VMware does not support modifying the database directly.

To back up the database

 Run this command as the PostgreSQL user:

```
pg_dump usage_meter_db | gzip > /tmp/usage_meter_db.pgd.gz
```

This will auto-gzip the database into a single file that can be viewed.