

Welcome To Class

The lab files you will be working from this week were originally written for a slightly different environment. However, they have been tested for this delivery, and this document should help you to map some of the lab notes to the actual environment.

Our Lab environment has several servers included in it. The key server will be 0Workstation, which we will set up so that you can access it via ssh in a moment. Here's the mapping of servers to the names commonly used in the lab instructions:

Ravello Server Name	Lab Server Name
0Workstation	workstation.example.com, workstation-GUID.rhpds.opentlc.com
OldM	idm.example.com
1CloudForms	cf.example.com, https://cf-GUID.rhpds.opentlc.com
1CloudForms-UI	https://cfui-GUID.rhpds.opentlc.com
1CloudForms-Worker1	<not accessed externally>
1CloudForms-Worker2	<not accessed externally>
2RHEV-M	rhevm.example.com, https://rhevm-<GUID>.rhpds.opentlc.com
3RHEL+KVM	<not accessed externally>
5OpenShift	ose.example.com
6OpenStack	osp.example.com, https://ops-<GUID>.rhpds.opentlc.com
7Satellite	sat.example.com

All systems can be accessed via the console in the browser. The root password is r3dh4t1! for all systems.

SSH Access for Workstation

It is generally handy, and required for one lab, to have access to Workstation via ssh from your local system. In order to do this, you will need to make some alterations to the server, and add a user.

1. In the VM environment, log in to 0Workstation as root, password r3dh4t1!
2. Edit the /etc/ssh/sshd_config file, to change "PasswordAuthentication no" to "PasswordAuthentication yes".
3. Restart the sshd service with: systemctl restart sshd
4. Create a user, any name you like, but here's an example: useradd remote
5. Set a password for the user: passwd remote
6. In the Ravello tool bar, there is an entry labeled DNS that will look something like: 0workstation-role202546e93b5a43-v3ruuxob.srv.ravcloud.com
7. Copy the above entry, and using a local ssh client, ssh to workstation as your new user: ssh remote@0workstation-role202546e93b5a43-v3ruuxob.srv.ravcloud.com
8. Log in with your password, and then become root with: su -
9. If you've completed these steps, you now have direct ssh access to your Workstation, and further lab steps can be completed as written.

Connecting Your Browser

In the table above, we listed some https:// URLs. When the lab instructions refer to one of these URLs, please use the DNS entry from the associated VM in Ravello. For instance, if a lab refers to https://cf-GUID.rhpds.opentlc.com, you will need to open the console for 1CloudForms, and locate the DNS: field, which will look something like: 1cloudforms-role202546e93b5a43-5mbddn63.srv.ravcloud.com. You will then be able to connect to: https://1cloudforms-role202546e93b5a43-5mbddn63.srv.ravcloud.com. Similar steps will be required for all labs that ask you to connect to the system via browser.

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Architecture Lab

1. Initial Configuration of the CloudForms Appliance

1.1. Connect to CloudForms Appliance With SSH

- From the **workstation** host use SSH to remotely connect with to the appliance:

```
# ssh root@cf.example.com
```

- When you see the following command, enter the **root** password, which for this lab is **r3dh4t1!**:

```
root@cf.example.com's password:
```

- Verify that your output is similar to the following, indicating that you are now logged in to the CloudForms appliance:

```
Last login: Fri Dec 18 14:38:39 2015 from workstation-GUID.rhpds.opentlc.com
Welcome to the Appliance Console

For a menu, type: appliance_console.
```

1.2. Configure CloudForms Database

- Start the console by entering the **appliance_console** command:

```
# appliance_console
```

- Verify that your console information page is similar to this example:

```
Welcome to the CFME Virtual Appliance.

To modify the configuration, use a web browser to access the management page.

Hostname: cf-GUID.rhpds.opentlc.com
IP Address: 192.168.0.100
Netmask: 255.255.0.0
Gateway: 192.168.0.2
Primary DNS: 192.168.0.1
Secondary DNS:
Search Order: localdomain.rhpds.opentlc.com
MAC Address: 2c:c2:60:3d:70:15
Timezone: America/New_York
```

```
Local Database:           not running
CFME Database:           not configured
Database/Region:         not configured
External Auth:           not configured
CFME Version:            5.5.0.13
CFME Console:            not configured
```

Press any key to continue.

3. Press any key to get to the console menu:

```
Advanced Setting

1) Set DHCP Network Configuration
2) Set Static Network Configuration
3) Test Network Configuration
4) Set Hostname
5) Set Timezone, Date, and Time
6) Restore Database From Backup
7) Setup Database Region
8) Configure Database
...OUTPUT OMITTED...
```

Choose the advanced setting:

4. Choose the following advanced settings:

- Select option **8** to configure the database and verify that your output is similar to the following:

```
Configure Database

No encryption key found.
For migrations, copy encryption key from a hardened appliance.
For worker and multi-region setups, copy key from another appliance.
If this is your first appliance, just generate one now.
```

Encryption Key

- Create key
- Fetch key from remote machine

Choose the encryption key: |1|

- Select option **1** to create a key, and confirm that your key is created:

```
Encryption key now configured
```

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- c. From the **Database Location** menu, select option **1** to set the database location as internal:

```
Database Location  
1) Internal  
2) External
```

- d. Select option **1** to select the **/dev/vdb** database disk location:

```
database disk  
1) /dev/vdb: 20480 MB  
2) Don't partition the disk  
  
Choose the database disk: |1|
```

- e. When prompted, enter **0** for **database region number**:

```
Setup Database Region  
Each database region number must be unique.  
Enter the database region number:
```

- f. When prompted for the database password and password confirmation, enter **r3dh4t1!** twice:

```
Enter the database password on 127.0.0.1: *****  
Enter the database password again: *****
```

- g. Wait for the database to configure, and then verify that the database configuration is complete:

```
Activating the configuration using the following settings...  
Host: 127.0.0.1  
Username: root  
Database: vmdb_production  
Region: 0  
  
Initialize postgresql disk starting  
Initialize postgresql disk complete  
Initialize postgresql starting  
Initialize postgresql complete  
Create region starting  
Create region complete  
  
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Configuration activated successfully.
```

| Press any key to continue.

5. Press any key to continue.
6. Verify that you see the CloudForms appliance information menu:

Welcome to the CFME Virtual Appliance.

To modify the configuration, use a web browser to access the management page.

Hostname:	cf-261c.rhpds.opentlc.com
IP Address:	192.168.0.100
Netmask:	255.255.0.0
Gateway:	192.168.0.2
Primary DNS:	192.168.0.1
Secondary DNS:	
Search Order:	localdomain rhpds.opentlc.com
MAC Address:	2c:c2:60:3d:70:15
Timezone:	America/New_York
Local Database:	running
CFME Database:	postgresql @ localhost
Database/Region:	vmdb_production / 0
External Auth:	not configured
CFME Version:	5.5.0.13
CFME Console:	https://192.168.0.100

Press any key to continue.

7. Press any key to continue.

1.3. Configure IdM Authentication (CLI Portion)

1. Verify that you see the CloudForms appliance menu:

Advanced Setting

...OUTPUT OMITTED...
10) Configure External Authentication (httpd)
...OUTPUT OMITTED...

Choose the advanced setting:

2. From the CloudForms appliance console, select option **10** to configure external authentication for httpd:

Configure External Authentication (httpd)

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IPA Server Parameters:

```
Enter the IPA Server Hostname: idm.example.com
Enter the IPA Server Domain: |rhpds.opentlc.com| example.com
Enter the IPA Server Realm: |EXAMPLE.COM| EXAMPLE.COM
Enter the IPA Server Principal: |admin| admin
Enter the IPA Server Principal Password: r3dh4t1!
```

3. Use the example output, as shown above, to perform the following steps:

- a. Enter the IdM/IPA server hostname **idm.example.com**.
- b. Enter **example.com** as the server domain.
- c. Enter **EXAMPLE.COM** in all caps for the server realm.
- d. Enter **admin** for the server principal.
- e. Enter **r3dh4t1!** for the server principal password.

4. Verify that your output for IPA server details is similar:

```
IPA Server Details:
Hostname:      idm.example.com
Domain:        example.com
Realm:         EXAMPLE.COM
Naming Context: dc=example,dc=com
Principal:     admin
```

```
Proceed? (Y/N):
```

5. At the **Proceed?** prompt, enter **y** to proceed, and then verify that your IPA configuration looks similar to that below:

```
Checking connectivity to idm.example.com ... Succeeded.

Configuring IPA (may take a minute) ...
Configuring the IPA Client ...
Configuring pam ...
Configuring sssd ...
Configuring IPA HTTP Service and Keytab ...
Configuring httpd ...
Configuring SELinux ...
Restarting sssd and httpd ...
Configuring sssd to start upon reboots ...

External Authentication configured successfully.

Press any key to continue.
```

6. As prompted, press any key to continue.



This only configures the operating system to be a client of the IdM domain. In a later exercise in the GUI, you complete this configuration.

1.4. Lock Down the Appliance

1. When you return to the CloudForms appliance information screen, press any key to get to the menu.
2. From the CloudForms menu, select option **12** to access the Harden Appliance Using SCAP Configuration screen:

```
Harden Appliance Using SCAP Configuration
```

```
Locking down the appliance for SCAP...
Complete
```

```
Press any key to continue.
```

3. Press any key to continue.
4. Select option **18** to close the appliance TUI menu.



Part of the lockdown procedure causes idle SSH sessions to time out to the CloudForms appliance. While this can be a problem when running `tail -f` on logs, it is an important security measure.

1.5. Install VMware VDDK on CloudForms appliance

Any appliance serving the SmartProxy role and that fleeces vSphere must have the VMware Virtual Disk Development Kit (VDDK) installed.



The lab provides a copy of the VDDK tarball on the workstation server for you. In practice, you download this from the VMware website directly by navigating to **Downloads** → **All Downloads, Drivers & Tools** → **VMware vSphere** → **Drivers & Tools**. Expand **Automation Tools and SDKs**, and selecting **vSphere Virtual Disk Development Kit 5.5**. Alternatively, find the file by searching for it on the VMware site using that site's search menu.

1. Copy the VDDK tarball from the **workstation** host to the CloudForms appliance:

```
[you@workstation-GUID ~]$ sudo -i
[you@workstation-GUID ~]# scp /root/VMware-vix-disklib-5.5.0-1284542.x86_64.tar.gz
\_
root@cf.example.com:/root
<enter password>
```

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Password is **r3dh4t1!**

2. Log into the CloudForms appliance as **root** from the **workstation** host:

```
# ssh root@cf.example.com  
<enter password>  
#
```



Password is **r3dh4t1!**.

3. Untar the tarball:

```
# cd /root  
# tar -xvf VMware-vix-disklib-5.5.0-1284542.x86_64.tar.gz
```

4. Change into the install directory and run the installer:

```
# cd vmware-vix-disklib-distrib  
# ./vmware-install.pl
```

5. Accept the defaults during installation. The following is an example of VDDK install output:

```
Creating a new VMware VIX DiskLib API installer database using the tar4 format.
```

```
Installing VMware VIX DiskLib API.
```

```
You must read and accept the VMware VIX DiskLib API End User License Agreement to continue.
```

```
Press enter to display it.
```

```
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```

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Do you accept? (yes/no) **yes**

Thank you.

What prefix do you want to use to install VMware VIX DiskLib API?

The prefix is the root directory where the other folders such as man, bin, doc, lib, etc. will be placed.
[/usr]

The installation of VMware VIX DiskLib API 5.5.0 build-1284542 for Linux completed successfully. You can remove this software from your system at any time by invoking the following command:
"/usr/bin/vmware-uninstall-vix-disklib.pl".

Enjoy,

--the VMware team

6. Run **ldconfig** in order for CloudForms to find the newly installed VDDK library:

```
# ldconfig
```

7. Use the following command to verify the VDDK files are listed and accessible to the appliance:

```
# ldconfig -p | grep vix
```

8. Verify your **ldconfig** output is similar to the following:

```
libvixDiskLib.so.5 (libc6,x86-64) => /lib/libvixDiskLib.so.5
libvixDiskLib.so (libc6,x86-64) => /lib/libvixDiskLib.so
```

1.6. Set Admin User Password

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Before continuing, change the default **admin** password by logging into the CloudForms

web GUI.

1. Go to <http://cf-GUID.rhpds.opentlc.com>.



Remember to replace GUID with your lab's GUID as noted in the email sent to you from OPENTLC when you ordered the lab environment.

2. Accept the untrusted SSL certificate.
3. Click the **Update password** link.

RED HAT® CLOUDFORMS MANAGEMENT ENGINE

Username Password

Region
Zone:
Application

Update password

4. Enter **Username** **admin** and **Password** **smartvm**, but do not press **ENTER** or click **Login**.
5. For **New Password** and **Verify Password** enter **r3dh4t1!**.

RED HAT® CLOUDFORMS MANAGEMENT ENGINE

Username Password

New Password Verify Password

Back



Make sure you use this password so that if you have problems you can get assistance.

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6. Press **ENTER** or click **Login**.



You have now changed the default password of **smartvm** to
r3dh4t1!

2. Zones

In this section you learn how to:

- Create a CloudForms Management Engine Zone.
- Assign your CloudForms Management Engine Servers to a CloudForms Management Engine Zone.
- Assign your Management Systems to their appropriate zones.

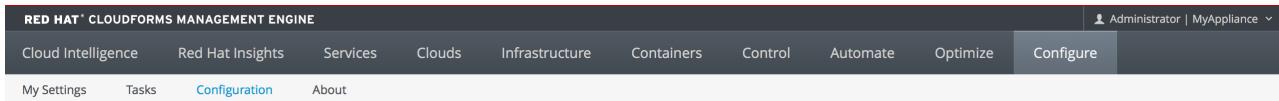
2.1. Create CloudForms Management Engine Zone:

1. Log into the CloudForms GUI as user **admin** at <http://cf-GUID.rhpds.opentlc.com>.



Replace GUID with your lab's GUID as noted in the email sent to you from OPENTLC when you ordered the lab environment.

2. Click **Configure** → **Configuration**:



3. Click the **Settings** accordion and navigate to **CFME Region: Region 0 [0]** → **Zones**:

The screenshot shows the Red Hat CloudForms Management Engine interface. In the top navigation bar, 'Configuration' is selected. Under the 'Settings' accordion, the 'CFME Region: Region 0 [0]' section is expanded. Within this section, the 'Analysis Profiles' subsection is visible, containing three entries: 'host default', 'host sample', and 'sample'. Below this, the 'Zones' subsection is expanded, showing a single entry: 'Zone: Default Zone'.

4. Click **Configuration** → **Add a new Zone** to create a zone:

The screenshot shows the Red Hat CloudForms Management Engine interface. At the top, there's a navigation bar with links like Cloud Intelligence, Red Hat Insights, Services, Clouds, Infrastructure, Containers, Control, Automate, Optimize, and Configure. The 'Configure' tab is selected. Below the navigation is a sub-menu for 'Configuration' with options like 'Settings' (selected), 'CFME Region: Region 0 [0]', and 'Ansible Profile'. A tooltip 'Configuration' is shown above the sub-menu. The main content area is titled 'Adding a new Zone' and contains a 'Zone Information' form with fields for Name, Description, and SmartProxy Server IP.

- Verify that you see a **Zone Information** form similar to the following:

Adding a new Zone

Zone Information

Name	<input type="text"/>
Description	<input type="text"/>
SmartProxy Server IP	<input type="text"/>

- For **Name** enter **My Zone**, and for **Description** enter **My Zone**.



For each zone optionally specify a different set of NTP servers and a Windows AD domain. Additionally, limit the number of active VM scans.

- On the bottom right, click **Add**.

2.2. Configure Zones

In this series of steps, you assign a CloudForms Management Engine Server to a CloudForms Management Engine Zone.

- Click **Configure** → **Configuration**.
- Click the **Settings** accordion and navigate to **CFME Region: Region 0 [0]** → **Zones** → **Zone: Default Zone (current)** → **Server:EVM[1] (current)**.
- In the **Basic Information** section do the following:
 - In the **Company Name** field, customize the interface with a company name (eg. Red Hat). You see this name when you are on a resource looking at tags.
 - In the **Appliance Name** field, found in the upper-right corner of the interface next to the name of the user who is logged in to the CloudForms Management Engine Console, change the name of the appliance to **MyAppliance**.
 - Change **Zone** to the zone you created in the last exercise (**My Zone**).
 - Change **Appliance Time Zone** to your time zone.
- Click **Save**.
- Click reload on your browser and look at the upper-right corner to verify that your changes were applied.

3. Infrastructure Providers

3.1. Add Red Hat Enterprise Virtualization Manager (RHEVM) Provider

1. Go to **Infrastructure** → **Providers** → **Configuration** → **Add a New Infrastructure Provider**.
2. For **Name** enter **RHEVM**.
3. For **Type** choose **Red Hat Enterprise Virtualization Manager**.
4. For **Hostname or IP address** enter **rhevm.example.com**.
5. Leave **API Port** blank.
6. Ensure that **Zone** is set to **My Zone**.



If you do not do this, the appliance is not be able to schedule jobs to this provider and CloudForms appears to hang when provisioning systems later.

7. Under the **Credentials/Default** section:
 - a. For **Username** enter **admin@internal**
 - b. For **Password** and **Confirm Password** enter **r3dh4t1!**
8. Click **Validate** to confirm that CloudForms connects to the provider. A green message appears at the top of the form if successful, otherwise you see an error message.
9. Click **Add**.
10. Verify that your provider configuration looks similar to this example:

The screenshot shows the 'Add New Infrastructure Provider' dialog in the Red Hat CloudForms Management Engine. The 'Basic Information' tab is active, displaying fields for Name (RHEVM), Type (Red Hat Enterprise Virtualization), Hostname or IP address (rhevm.example.com), API Port (blank), and Zone (default). The 'Credentials' tab is also visible, showing fields for Username (admin@internal), Password (r3dh4t1!), and Confirm Password (r3dh4t1!). A green success message at the top indicates 'Credential validation was successful'. At the bottom, a note states 'Required. Should have privileged access, such as root or administrator.' and there are 'Add' and 'Cancel' buttons.

3.1.1. Enable Red Hat Enterprise Virtualization Manager Capacity and Utilization Collection

In this exercise, you enable history data viewing for Red Hat Enterprise Virtualization Manager.

1. Click **Infrastructure** → **Providers**.
2. Click the **RHEVM** provider you added earlier.
3. Click **Configuration** → **Edit this Infrastructure Provider**.
4. Under the **Credentials** section click the **C & U Database** tab.
5. Use the following credentials:
 - a. **User ID:** **ovirt_engine_history**
 - b. **Password:** **NrkUE9SiJcmZPZQGhcJYH1**
6. Click **Validate** and scroll up to verify that the validation was successful.
7. Click **Save**.

3.2. Add vSphere Provider

1. Go to **Infrastructure** → **Providers** → **Configuration** → **Add a New Infrastructure Provider**.
2. For **Name** enter **vCenter**.
3. For **Type** choose **VMware vCenter**.
4. For **Hostname or IP address** enter **vcenter.example.com**.
5. Ensure that **Zone** is set to **My Zone**.
6. Under the **Credentials/Default** section:
 - a. For **Username** enter **root**
 - b. For **Password** and **Confirm Password** enter **r3dh4t1!**
7. Click **Validate** to confirm that CloudForms connects to the provider. A green message appears at the top of the form if it worked, otherwise you see an error message.
8. Verify your vCenter provider configuration looks similar to this example:

The screenshot shows the Red Hat CloudForms Management Engine interface. The top navigation bar includes links for Cloud Intelligence, Red Hat Insights, Services, Clouds, Infrastructure, Containers, Control, Automate, Optimize, and Configure. The Infrastructure tab is selected. Below the navigation is a breadcrumb trail: Infrastructure Providers > Add New Infrastructure Provider. The main content area has a green header bar indicating "Credential validation was successful". The "Basic Information" section contains fields for Name (vSphere), Type (VMware vCenter), Hostname or IP address (vcenter.example.com), and Zone (default). The "Credentials" section contains fields for Username (root), Password (redacted), and Confirm Password (redacted). At the bottom right of the form is a "Validate" button. A note at the bottom states: "Required. Should have privileged access, such as root or administrator." At the very bottom right of the page are "Add" and "Cancel" buttons.

3.3. Add Microsoft SCVMM Provider

1. Go to **Clouds** → **Providers** → **Configuration** → **Add a New Cloud Provider**.
2. For **Name** enter **SCVMM**.
3. For **Type** choose **Microsoft System Center VMM**.
4. For **Hostname or IP address** enter **scvmm.winexample.com**.
5. Set **Protocol** to **Basic (SSL)**.
6. Ensure that **Zone** is set to **My Zone**.
7. Under the **Credentials** section:
 - a. For **Username** enter **WINEXAMPLE\Administrator**
 - b. For **Password** enter **r3dh4t1!**
8. Click **Validate** to confirm that CloudForms connects to the provider. A green message appears at the top of the form if it worked, otherwise you see an error message.
9. Click **Add**.
10. Confirm that your SCVMM provider configuration is similar to this example:

The screenshot shows the 'Infrastructure Providers' configuration page for a provider named 'scvmm.winexample.com'. The 'Basic Information' section includes fields for Name (scvmm.winexample.com), Type (Microsoft System Center VMM), Hostname or IP address (scvmm.winexample.com), Security Protocol (Basic (SSL)), and Zone (default). The 'Credentials' section includes fields for Username (WINEXAMPLE\Administrator) and Password (*****). A 'Validate' button is present. At the bottom, there is a note: 'Required. Should have privileged access, such as root or administrator.' and a footer with 'Save', 'Reset', and 'Cancel' buttons.

3.4. Configure Infrastructure Hosts

3.4.1. Configure Red Hat Enterprise Virtualization Provider Host

1. Go to **Infrastructure** → **Hosts**.
2. Click on the **rhelkvm** host.
3. Click **Configuration** → **Edit this item**.
4. In the **Credentials/Default** section:
 - a. For **Username** enter **root**

- b. For **Password** and **Confirm Password** enter **r3dh4t1!**
5. Click **Validate** to confirm that CloudForms connects to the provider. A green message appears at the top of the form if it worked, otherwise you see an error message.
 6. Click **Save**.
 7. Verify that your KVM host configuration looks similar to this example:

Services Clouds Infrastructure Containers Control Automate Optimize Configure

Machines Resource Pools Datastores Repositories PXE Requests Configuration Management

Hosts > rhelkvm (Summary) > Info/Settings

Info/Settings

Credential validation was successful

Name	rhelkvm
Hostname (or IPv4 or IPv6 address)	192.168.0.40
Custom Identifier	
IPMI IP Address	
MAC Address	

Credentials

Default Remote Login Web Services IPMI

Username	root
Password	*****
Confirm Password	*****

Validate

Required. Should have privileged access, such as root or administrator.

Save **Reset** **Cancel**

3.4.2. Configure vSphere Provider Host

1. Go to **Infrastructure** → **Hosts**.
2. Click **vsphere1.localdomain**.
3. Click **Configuration** → **Edit this item**.
4. Change the **Name** and **Hostname** to **esx1.example.com**.
5. In the **Credentials/Default** section:
 - a. For **Username** enter **root**
 - b. For **Password** and **Confirm Password** enter **r3dh4t1!**
6. Choose either host next to **Select Host to validate against**.
7. Click **Validate** to confirm that CloudForms connects to the provider. A green message appears at the top of the form if it worked, otherwise you see an error message.
8. Click **Save**.
9. Repeat this procedure for **vsphere2.localdomain** but change the **Name** and **Hostname** to **esx2.example.com**.
10. Confirm that your ESX host configuration looks similar to the example here:

Hosts > vsphere1.localdomain (Summary) > Info/Settings

Info/Settings

Credential validation was successful

Name	esx1.example.com
Hostname (or IPv4 or IPv6 address)	esx1.example.com
Custom Identifier	
IPMI IP Address	
MAC Address	

Credentials

- Default** Remote Login Web Services IPMI

Username	root
Password	*****
Confirm Password	*****

Validate

Required. Should have privileged access, such as root or administrator.

Save **Reset** **Cancel**

4. Configure Cloud Providers



Outside of the lab environment you can add Amazon EC2 and Microsoft Azure cloud providers by creating an API token and specifying it in the CloudForms configuration. See CloudForms documentation for more information.

4.1. Add Red Hat OpenStack Platform Provider

1. Go to **Clouds** → **Providers** → **Configuration** → **Add a New Cloud Provider**.
2. For **Name** enter **OpenStack**.
3. For **Type** choose **OpenStack**.
4. For **Hostname or IP address** enter **osp.example.com**.
5. Leave **API Port** and **API Version** set to defaults.
6. Ensure that **Zone** is set to **My Zone**.
7. Under the **Credentials/Default** section:
 - a. For **Username** enter **admin**
 - b. For **Password** and **Confirm Password** enter **r3dh4t1!**
8. Click **Validate** to confirm that CloudForms connects to the provider. A green message appears at the top of the form if it worked, otherwise you see an error message.
9. Click **Add**.
10. Confirm that your Red Hat OpenStack Platform provider configuration is similar to this example:

Cloud Providers > Add New Cloud Provider

Credential validation was successful

Name	OpenStack
Type	OpenStack
Hostname (or IPv4 or IPv6 address)	osp.example.com
API Port	5000
API Version	Keystone v2
Zone	default

Credentials

Default	AMQP
Username	admin
Password	*****
Confirm Password	*****

Validate

Required. Should have privileged access, such as root or administrator.

Add Cancel

5. Configure Configuration Management Providers

5.1. Add A Red Hat Satellite Provider

1. Go to **Infrastructure** → **Configuration Management** → **Configuration** → **Add a new Provider**.
2. For **Name** enter **sat.example.com**.
3. For **Url** enter **https://sat.example.com**.
4. Leave **Verify Peer Certificate** unchecked.
5. For **Username** enter **admin**.
6. For **Password** and **Confirm Password** enter **r3dh4t1!**.
7. Click **Validate** to confirm that CloudForms connects to the provider. A green message appears at the top of the form if it worked, otherwise you see an error message.
8. Click **Add**.
9. Verify that your Red Hat Satellite provider configuration is similar to this example:

The screenshot shows a configuration management interface with a navigation bar at the top. The 'Configuration Management' tab is selected. Below it, a green success message box displays the text 'Credential validation was successful'. The main form contains fields for a provider: 'Name' (sat.example.com), 'Url' (https://sat.example.com), and a checked 'Verify Peer Certificate' checkbox. Under 'Credentials', there are fields for 'Username' (admin), 'Password' (redacted), and 'Confirm Password' (redacted). A 'Validate' button is present. A note below the form states 'Required. Should have privileged access, such as root or administrator.' At the bottom right are 'Add' and 'Cancel' buttons.

6. Configure Container Providers

6.1. Add Red Hat OpenShift Enterprise Container Provider

1. Go to **Containers** → **Providers** → **Configuration** → **Add a New Containers Provider**.
2. For **Name** enter **OpenShift**.
3. For **Type** choose **OpenShift Enterprise**.
4. For **Hostname or IP address** enter **ose.example.com**.
5. Leave **Port** set to default.
6. Ensure that **Zone** is set to **My Zone**.
7. Through your workstation system, open an SSH session to **ose.example.com** as root:

```
# ssh root@ose.example.com
```

8. Open a terminal and run the following commands:

```
# oadm new-project management-infra --description="Management Infrastructure"
```

```
# oc create -n management-infra -f - <<EOF
apiVersion: v1
kind: ServiceAccount
metadata:
  name: management-admin
EOF
```

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```
# oc create -f - <<EOF
```

```
apiVersion: v1
kind: ClusterRole
metadata:
  name: management-infra-admin
rules:
- resources:
  - pods/proxy
  verbs:
  - '*'
EOF
```

```
# oadm policy add-role-to-user -n management-infra admin \
-z management-admin
```

```
# oadm policy add-role-to-user -n management-infra \
management-infra-admin -z management-admin
```

```
# oadm policy add-cluster-role-to-user cluster-reader \
system:serviceaccount:management-infra:management-admin
```

```
# oadm policy add-scc-to-user privileged \
system:serviceaccount:management-infra:management-admin
```



At the moment, the **management-infra-admin** role is needed to address OpenShift issue #5973. See <https://github.com/openshift/origin/issues/5973>

9. To obtain the **management** service account token name, run:

```
# oc get -n management-infra sa/management-admin \
--template='{{range .secrets}}{{printf "%s\n" .name}}{{end}}'
management-admin-token-32f97
management-admin-dockercfg-fvkso
```



Replace **management-admin-token-32f97** with the name of your token.

10. To retrieve the token, run:

```
# oc get -n management-infra secrets management-admin-token-32f97 \
--template='{{.data.token}}' | base64 -d;echo
eyJhbGciOiJSUzI1NiIsInR5cC...
```



Replace **management-admin-token-32f97** with the name of your token.

11. In the above example **eyJhbGciOiJSUzI1NiIsInR5cC...** is the token. Copy your token into your buffer.
12. Under the **Credentials** section in CloudForms for **Token** paste the copied token.
13. Click **Validate** to confirm that CloudForms connects to the provider. A green message appears at the top of the form if it worked, otherwise you see an error message.
14. Click **Add**.



To successfully add an OpenShift Enterprise or Atomic Enterprise Platform provider, you must first configure a service account in a provider's cluster. For details on this process, see:

https://access.redhat.com/documentation/en/red-hat-cloudforms/version-4.0/managing-providers/#configuring_service_accounts

7. CloudForms Appliance Administrative Functions

7.1. Configure an Email Server

1. Click **Configure** → **Configuration**.
2. Click the **Settings** accordion.
3. Navigate to **CFME Region: Region 0 [0]** → **Zones** → **Zone: My Zone (current)** → **Server: MyAppliance[1](current)**.
4. Click the **Server** tab (on the right).
5. In **Outgoing SMTP E-mail Server**, enter the following information:
 - a. **Host:** **workstation.example.com**
 - b. **Port:** **25**
 - c. **Domain:** **workstation.example.com**
 - d. Uncheck **Start TLS Automatically**
 - e. **SSL Verify Mode:** **None**
 - f. **Authentication:** **None**
 - g. **From E-mail Address:** **cfadmin@workstation.example.com**
 - h. **Test E-mail Address:** **cfadmin@workstation.example.com**
6. Click **Verify** to test the settings.

7. Scroll up and confirm that you see a message indicating that your mail is being delivered.
8. Click **Save**.

7.2. Check Admin Email

1. Check your email inbox for the test message.
2. Use SSH and your **OPENTLC SSO** credentials to connect to workstation-GUID.rhpds.opentlc.com
3. Use the following commands to check the mail for **cfadmin**:

```
$ sudo -i  
# yum -y install mailx  
# su - cfadmin  
$ mail
```

4. Enter **1** to view the message.
5. Enter **d** to delete it.
6. Enter **q** to exit.

7.3. Assign CloudForms Management Engine Server Roles

1. Click **Configure** → **Configuration**.
2. Click the **Settings** accordion.
3. Navigate to **CFME Region: Region 0 [0]** → **Zones** → **Zone: My Zone (current)** → **Server: MyAppliance[1](current)**.
4. Click the **Server** tab (on the right).
5. In the **Server Control** section, add the following roles:
 - Capacity & Utilization Coordinator
 - Capacity & Utilization Data Collector
 - Capacity & Utilization Data Processor
 - Notifier
 - SmartProxy



Do not disable any previously enabled roles.

6. Click **Save**.

7.4. Configure SmartProxy

The CloudForms appliance needs to be configured to handle SmartProxy requests.

1. Click **Configure** → **Configuration**.
2. Click the **Settings** accordion and under **CFME Region: Region 0, Zones**, click **Zone: My Zone**.
3. Click the **SmartProxy Affinity** tab (on the right) and insert a check in the top box next to **Server: <Your Server Name>**
4. Click **Save**.
5. Click the **Zone** tab next to **SmartProxy Affinity**
6. Click **Configuration** → **Edit this Zone** and set **SmartProxy Server IP** to **192.168.0.100**.
7. Click **Save**.

7.5. View Status of Monitor CloudForms Management Engine Server Roles

1. Click **Configure** → **Configuration**.
2. On the left side, select the **Diagnostics** accordion.
3. Navigate to **My Zone** by selecting **CFME Region: Region 0 [0]** → **Zones** → **Zone: My Zone (current)**.
4. Explore the two different server views **Roles by Servers** and **Servers by Roles**.
5. Ensure that the status of the CloudForms Management Engine Servers and their server roles is displayed. Stay on this screen for the next step.

7.6. Manage CloudForms Management Engine Server Roles

In this exercise, you change the status of CloudForms Management Engine Server Roles.

1. Click the **Servers by Roles** tab.
2. Under **Status of Roles for Servers In Zone My Zone**, select green **Power** under any role *without* the word *secondary* or *primary* in the parenthesis () such as **Role: Capacity & Utilization Data Processor**.
3. Click **Configuration** → **Suspend Role** to pause the CloudForms Management Engine Server Role.
4. Click **OK**.
5. Click **Configuration** → **Start Role** to restart it.
6. Click **OK**, and then stay on this screen for the next step.

7.7. Set CloudForms Management Engine Server Role Priorities

In this exercise, you set the priority of a failover role.

1. Under **Status of Roles for Servers In Zone My Zone**, select green **Power** under any role *with* the word *secondary* or *primary* in the parenthesis () such as **Role: Capacity & Utilization Coordinator**.
2. Observe that the role is marked as **secondary**.



The default role is secondary.

3. Click **Configuration** → **Promote Server** to make this the primary CloudForms Management Engine Server for this role.
4. Click **OK**.
5. Observe that the role is now marked as **primary**.

8. Capacity and Utilization

8.1. Enable a Cluster, Host, or Datastore for Capacity and Utilization Collection

1. Click **Configure** → **Configuration**.
2. Click the **Settings** accordion and select **CFME Region: Region 0[0]**.
3. On the right, click the **C & U Collection** tab.
4. In the **Clusters** section, check **Collect for All Clusters**.
5. In the **Datastores** section, check **Collect for All Datastores**.
6. Click **Save**.

8.2. Create Time Profile

Following these steps, you create a time profile, which is useful when generating graphs and reports.

1. Click **Configure** → **My Settings** → **Time Profiles** tab.
2. Click **Configuration** → **Add a new Time Profile**.
3. In the **Description**, enter a meaningful name such as *Weekdays* or *Weekends*.
4. Change **Scope** to **All Users**.
5. Uncheck **Days using (All)** and select the appropriate days to match the description.
6. Select your local time zone.
7. Ensure that **Roll Up Daily Performance** is checked.
8. Click **Add**.

9. User Management

9.1. Create a Non-administrative End User in CloudForms Database

9.1.1. Copy an Existing Role

1. Go to **Configure** → **Configuration**.
2. In the **Access Control** accordion, navigate to **CFME Region: Region 0 [0]** → **Roles**.
3. Click **EvmRole-user** and click **Configuration** → **Copy this Role to a new Role**.
4. Set **Name** to **my_role**.
5. Click **Add**.

9.1.2. Create a New Local Group

Outside the lab environment, if you are running a directory service such as Active Directory or IPA, you normally do not add local groups. However, when not running a directory service, as is the case here in the lab environment, follow these steps to add a new local group.

1. On the left, click **Groups**.
2. Click **Configuration** → **Add a new Group**.
3. Set **Description** to **local_group**.
4. Scroll down and set **Role** to **my_role**.
5. Set **Project/Tenant** to the company name you entered earlier.
6. Click **Add**.

9.1.3. Add a Local User

Outside the lab environment, if you are running a directory service such as Active Directory or IPA, you normally do not add local users. However, when not running a directory service, as is the case here in the lab environment, follow these steps to add a new local user.

1. On the left, click **Users**.
2. Click **Configuration** → **Add a new User**.
3. For **Full Name** and **Username** enter **local_user**.
4. Set the password to **r3dh4t1!**.
5. Set the email address to **cfuser@workstation.example.com**.
6. Set **Group** to **local_group** (scroll down).
7. Click **Add**.

9.2. Configure IdM Authentication (GUI Portion)

During the initial CLI setup, you configured the CLI portion of the IdM configuration. In this exercise, you complete the GUI portion of the configuration so that the appliance authenticates against IdM.

1. Go to **Configure** → **Configuration** → **Settings** accordion.
2. Navigate to **CFME Region: Region 0 [0]** → **Zones** → **Zone: My Zone (current)** → **Server: MyAppliance[1](current)**.
3. Click the **Authentication** tab.
4. Set **Mode** to **External (httpd)**.
5. Check **Get User Groups from External Authentication (httpd)**.
6. Click **Save**.

Build Version: 2.5 : Last updated 2016-06-01 17:11:11 EDT

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Template Provisioning Lab

1. From **Infrastructure** → **Virtual Machines**, click **(Lifecycle)**, and then **(Provision VMs)**.
2. Select the **windowsXP** template from the list and click **Continue**.
3. Click the **Request** tab, and set the following:
 - a. For **E-Mail**, enter **cfadmin@workstation.example.com**.

 This address is used to send the requester status emails during the provisioning process for items such as auto-approval, quota, provision complete, retirement, request pending approval, and request denied.
 - b. Enter your **First** and **Last** names.
4. Click the **Catalog** tab, and on the catalog template, do the following:
 - a. Set **Provision Type** to **Native Clone**.
 - b. Under **Naming**, set **VM Name** to **winxp**.
5. Click the **Environment** tab and perform the following:
 - a. Make sure that **Choose Automatically** is **not** checked.
 - b. Set **Datacenter** to **Default**.
 - c. Set **Cluster** to **Default**.
 - d. Set **Host** to **rhelkvm**.
 - e. Set **Datastore** to **vmstore00**.
6. Click the **Hardware** tab and observe the settings, but do not change anything.
7. Click the **Network** tab, and set **vLan** to **rhevm**.
8. Click the **Customize** tab.
 - a. Leave the **Credentials** section blank.
 - b. In the **IP Address Information** section, set **Address Mode** to **DHCP** and leave all other settings blank.
 - c. Leave the **DNS** section blank.
 - d. Leave the **Customize Template** section unchanged.
9. Click the **Schedule** tab and observe the settings, but do not change anything.
10. Click **Submit** (in the bottom-right corner) to send your provisioning request.
11. Follow the progress of your request when redirected to **Services** → **Requests**.

1. Monitor the text in the **Last Message** column by clicking  (Refresh) in the CloudForms UI (not the web browser) as needed to get updates.
2. In another browser window or tab, go to <https://rhevm-<GUID>.rhpdsoptlc.com>.
3. Confirm any security exceptions.
4. Click **Administration Portal**.
5. Log in as **admin** with **profile** set to **internal**. The password is **r3dh4t1!**
6. Monitor the progress in Red Hat Enterprise Virtualization Manager.
7. At the same time, use SSH to connect to **cf.example.com** as **root** from your **workstation** host and monitor **/var/www/miq/vmdb/log/automation.log**:

```
$ ssh root@cf.example.com  
<enter password>  
# tail -f /var/www/miq/vmdb/log/automation.log
```



The **automation.log** shows information discovered in CloudForms Customization and Automation that is useful for debugging issues with provisioning. Two other log in the same directory — **evm.log** and **rhevm.log** — may also prove useful.

8. In the CloudForms GUI, move to **Services** → **Requests**, refresh the page every few minutes, and monitor the **Last Message** column.



When the message *Vm Provisioned Successfully* appears, CloudForms starts the VM automatically. The build process can take a long time and may seem to hang.

3. PXE Provisioning

3.1. Add ISO Datastore

1. Click **Infrastructure** → **PXE**.
2. Click the **ISO Datastores** accordion on the left.
3. Click **Configuration** → **Add a New ISO Datastore**.
4. In the **Basic Information** section in the **Cloud/Infrastructure Provider** list, select your RHEVM system.
5. Click **Add**.

3.2. Add PXE Server to CloudForms Management Engine

1. Click **Infrastructure** → **PXE**.
2. Click the **PXE Servers** accordion.
3. Click **Configuration** → **Add a New PXE Server**.
4. Enter the following values in the **Basic Information** section:

- **Name:** **PXE-Server**
- **Depot Type:** **Network File System**
- **URI:** **192.168.0.254/var/lib/tftpboot/ipxe**
- **Access URL:** **http://192.168.0.254/tftpboot/ipxe**
- **PXE Directory:** **pxe**
- **Windows Images Directory:** Leave blank
- **Customization Directory:** **custom**

5. In the **PXE Image Menus** section, for **Filename** enter: **menu.php**.
6. On the bottom right, click **Add**.



A notification line on the upper part of the screen shows that your PXE server configuration is added.

7. Click the PXE server you just added (**PXE-Server**).
8. Click **Configuration** → **Refresh Relationships**.
9. Click **OK**, and then wait a few seconds.
10. Click **(Refresh)**—next to **Configuration** in the CloudForms UI, **not** the web browser's refresh—until you see a **PXE Images** section appear with the entry **Training-VM** as shown.



If the PXE server was configured correctly, you have a value for **Last Refreshed On** and see the information in the **Basic Information** section.

PXE Server "PXE-Server"

Basic Information	
URI Prefix	nfs
URI	nfs://192.168.0.254/var/lib/tftpboot/pxe
Access URL	http://192.168.0.254/tftpboot/pxe
PXE Directory	ipxe
Windows Images Directory	
Customization Directory	menu.php
Last Refreshed On	2015-12-22 14:55:46 -0500

PXE Image Menus	
Filename	menu.php

PXE Images			
Name	Description	Kernel	Windows Boot Env
Training-VM	Training-VM	http://\${next-server}/dvd/rhel-x86_64-server-6/images/pxeboot/vmlinuz	

3.3. Create System Image Types

1. Click **Infrastructure** → **PXE**, and then click the **System Image Types** accordion.
2. Click **Configuration** → **Add a new System Image Type**.
3. Under **Basic Information**, set the following as shown:
 - **Name:** **RHEL - Server**
 - **Type:** **Vm**

Adding a new System Image Type

Basic Information

Name	RHEL-Server
Type	Vm

4. Click **Add**.

3.4. Set Image Type for PXE Image

1. Click **Infrastructure** → **PXE**, and then click the **PXE Servers** accordion.
2. Select your server and then click **Configuration** → **Refresh Relationships**.
3. Click **OK**.
4. Expand the **PXE Images** section that appears.



If you do not see the **PXE Images** section, refresh the view by navigating away from this page and then returning to it.

5. Under **PXE Images**, select **Training-VM** and click **Configuration** → **Edit This PXE Image**.
6. Under **Basic Information**, set **Type** to **RHEL - Server**.

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PXE Image "Training-VM"

Basic Information

Type	RHEL-Server
Windows Boot Environment	<input type="checkbox"/> * Checking this box will remove this setting from all other PXE Images on this PXE Server

7. Click **Save**.

3.5. Add Customization Template

1. In your browser, navigate to this URL:

https://www.opentlc.com/download/cf_implementation_4.0/materials/ks.cfg.

2. Select everything displayed in your browser and copy it to your clipboard.

3. Click **Infrastructure** → **PXE**, and then click the **Customization Templates** accordion.

4. Click **Configuration** → **Add a New Customization Template**.

5. Enter the following values, as shown:

- Name: **RHEL - Custom**
- Description: **RHEL Custom**
- Image Type: **RHEL - Server**
- Type: **Kickstart**
- Script: Paste the content you just copied into the script box.

6. Click **Add**.

Customization Templates for System Image Type "RHEL-Server"

 Customization Template "RHEL-Custom" was saved

	Name	Description
	RHEL-Custom	RHEL Custom

3.6. Provision Using PXE

1. From **Infrastructure** → **Virtual Machines**, click **(Lifecycle)**, and then **(Provision VMs)**.

2. Select the **rhel** template from the list and click **Continue**.

3. Make sure the **Request** tab is selected, and then set the following:

- a. For **E-Mail**, enter **cfadmin@workstation.example.com**.



This address is used to send the requester status emails during the provisioning process for items such as auto-approval, quota, provision complete, retirement, request pending approval, and request denied.

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- b. Enter your **First** and **Last** names.

4. Click the **Catalog** tab and set the following in the customization template you selected:
 - a. Set **Provision Type** to **PXE**.
 - b. In the **PXE** section, set **Image** to **Training-VM**.
 - c. Under **Naming**, set **VM Name** to **training-vm**.
5. Click the **Environment** tab and set the following:
 - a. Make sure that **Choose Automatically** is **not** checked.
 - b. Set **Datacenter** to **Default**.
 - c. Set **Cluster** to **Default**.
 - d. Set **Host** to **rhelkvm**.
 - e. Set **Datastore** to **vmstore00**.
6. Click the **Hardware** tab and observe the settings, but do not change anything.
7. Click the **Network** tab, and set **vLan** to **rhevm**.
8. Click the **Customize** tab.
 - a. In the **Credentials** section, set **Password** to **r3dh4t1!**.
 - b. In the **IP Address Information** section, set **Address Mode** to **DHCP** and leave all other settings blank.
 - c. Leave the **DNS** section blank.
 - d. In the **Customize Template** section, set **Script Name** to **RHEL - Custom**.
9. Click the **Schedule** tab and observe the settings, but do not change anything.
10. Click **Submit** to send your provisioning request.



You are automatically redirected to **Services** → **Requests** to follow the progress of your request.

11. Verify that provisioning is successful:

- a. Open a web browser to: <https://rhevm-<GUID>.rhpds.opentlc.com> to monitor the progress in Red Hat Enterprise Virtualization Manager.
- b. Confirm any security exceptions.



The VM automatically boots and starts building. It may take some time for this to occur.

- c. Monitor the log files mentioned in the *Template Provisioning* section of this lab.
- d. To watch the iPXE files build, use SSH to connect to **rhevm.example.com** as **root** and run the following command:

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```
$ ssh root@rhevm.example.com
<enter password>
# cd /var/lib/tftpboot/ipxe
# watch find .
```

- e. When your files are provisioned, two files that match the MAC address of the VM appear:

```
Every 2.0s: find .
12:24:47 2016

.

./custom
./custom/00-1a-4a-85-25-01.ks.cfg
./boot.php
./menu.php
./undionly.kpxe
./pxe
./pxe/00-1a-4a-85-25-01
```

- f. While you wait for the VM to build, review the contents of these files to see what CloudForms automatically configured.

4. VM Management

4.1. Clone a VM

1. From **Infrastructure** → **Virtual Machines**, select the checkbox for or click the VM named **rhe16**.
2. Click **(Lifecycle)**, and then **(Clone selected item)**.
3. Click each tab and enter the settings as you did in the *Provision From a Template* section.
4. Fill out the **Request** tab, as before.
5. In the **Catalog** tab, set **Provision Type** to **VMware** and **VM Name** to **training-clone**.
6. Click the **Environment** tab and set the following:
 - a. Make sure that **Choose Automatically** is **not** checked.
 - b. Set **Datacenter** to **DC01**.
 - c. Set **Cluster** to **Cluster01**.
 - d. Set **Resource Pool** to **Default for Cluster / Deployment**.

- e. Set **Folder** to **DC01 / Discovered virtual machines**.
 - f. Set **Host** to any host in the list (not None).
 - g. Set **Datastore** to **Datastore**.
7. Click the **Hardware** tab and observe the settings, but do not change anything.
8. Click the **Network** tab, set **vLan** to **VM Network**, and click **Submit**.
9. Verify that cloning is successful:
- a. Open a web browser to **vcenter-<GUID>.rhpds.opentlc.com** and confirm any security exceptions.
 - b. Click **Log in to vSphere Web Client** and confirm any security exceptions.
 - c. Enter **root** and **r3dh4t1!** to log in to the web client.
-  You may need to enable pop-ups and Flash for this to work.
- d. Click **VMs and Templates**.
 - e. Expand **DC01** → **Discovered virtual machines**.
 - f. Click **training-clone**.
 - g. Click **Launch Console**.
 - h. Verify that the VM boots and that it is an exact replica of the other VM (**rhe16**).

4.2. Power on a VM

1. From **Infrastructure** → **Virtual Machines**, select the checkbox for or click the VM named **rhe16**.
2. Click  **Power** ▾ | **(Power)**, and then  **Power On** | **(Power On)**.
3. Click **OK**.
4. Monitor the VM's status in vCenter.
5. Click  **(Refresh)** in the CloudForms UI periodically until the power state shows it is on.

4.3. Migrate a VM

1. From **Infrastructure** → **Virtual Machines**, click the VM named **rhe16**.
2. Make sure the VM is powered on. (For more information, see the previous section, *Power on a Virtual Machine*).
3. In the **Relationships** section, note on which hypervisor host the **rhe16** VM is currently running.

4. Click  **(Lifecycle)**, and then  **(Migrate this VM)**.
5. Fill out the **Request** tab as before.
6. In the **Environment** tab, use the following settings:
 - **Datacenter/Name:** **DC01**
 - **Cluster/Name:** **Cluster01**
 - **Resource Pool/Name:** Default for Cluster / Deployment.
 - **Host/Filter:** <ALL>
 - **Host/Name:** Select the new hypervisor host name
 - **Datastore/Filter:** <ALL>
 - **Datastore/Name:** **Datastore**
7. Click **Submit**.
8. Verify that migration is successful:
 - a. In the resulting requests status page, continue to click  **(Refresh)** in the CloudForms UI until the process is complete.
 - b. At the same time, monitor vCenter using the UI refresh in vCenter.
 - c. Wait until you see **Last Message** *Finished VM Migrate* in CloudForms indicating the process is complete.
 - d. In vCenter, check that you see **Relocate virtual machine** completed as well, indicating the VM is running on the new hypervisor host.

4.4. Create a Template

1. From **Infrastructure** → **Virtual Machines**, click the VM named **rhe16**.
2. Click  **(Lifecycle)**, and then  **(Publish this VM to a Template)**.
3. Fill out the **Request** tab as before.
4. Skip the **Purpose** tab.
5. In the **Catalog** tab use the following settings:
 - **Select/Name:** **rhe16**
 - **Select/Provision Type:** **VMware**
 - **Linked Clone:** Do not check
 - **Number of VMs/Count:** **1**
 - **Naming/VM Name:** **mytemplate**
6. In the **Environment** tab use the following settings:

- Datacenter/Name: **DC01**
- Cluster/Name: **Cluster01**
- Resource Pool/Name: Default for Cluster / Deployment
- Folder/Name: **DC01 / Discovered virtual machines**
- Host/Filter: <ALL>
- Host/Name: Select either host, not <None>
- Datastore/Filter: <ALL>
- Datastore/Name: **Datastore**

7. Click **Submit**.
8. Verify that template creation is successful:
 - In the resulting requests status page, click  (**Refresh**) (not the browser's refresh), as needed, until the process is complete.
 - Use the UI refresh as needed to monitor vCenter.



When you see **Last Message VM Provisioned Successfully** in CloudForms, the process is complete. In vCenter you also see the template **mytemplate** show up under **vcenter → DC01 → Discovered virtual machines**.

5. Cloud Provisioning

5.1. Provision From an Image: OpenStack

1. From **Clouds** → **Instances**, click **(Lifecycle)**, and then **(Provision Instances)**.
2. Select the **rhel7.2** image from the list and then click **Continue**.
3. Fill out the **Request** tab as before.
4. In the **Catalog** tab, set the **VM Name** to **training-ospvm**.
5. Click the **Environment** tab.
 - a. Set **Cloud Network** to **private**.
 - b. Set the **Public IP Address** to **192.168.1.2**.
6. Click the **Properties** tab:
 - a. Set the **Instance Type** to **m1.small**.
 - b. Set the **Guest Access Key Pair** to **root-on-osp**.
7. Leave everything else as default.

8. Click **Submit**.
9. Verify that provisioning is successful:
 - a. Log in to the Red Hat Enterprise Linux OpenStack Platform dashboard at <https://osp-<GUID>.rhpds.opentlc.com> with username **admin** and password **r3dh4t1!**.

 Make sure you use **https** in the above URL.
 - b. Click **Project** → **Compute** → **Instances** to watch the new instance spawn.
 - c. Once the instance is in the **Running** state, click the **training-ospvm** link for the instance under **Instance Name**.
 - d. Click the **Console** tab.
 - e. Click **Click here to show only console**.
 - f. Confirm any security exceptions.
 - g. Verify that you see the VM booting.

5.2. Provision Cloud Instance From an AMI in EC2 (Reference Only)



Run this lab in your environment with your own EC2 account, because the lab does not provide an EC2 account.

1. From **Clouds** → **Instances**, click **(Lifecycle)**, and then **(Provision Instances)**.
2. Select one of the AMIs from your EC2 account from the list and click **Continue**.
3. With the following exceptions the remaining steps are nearly identical to the deployment of an Infrastructure VM:
 - a. On the **Environment** tab, set the EC2 availability zone.
 - b. On the **Properties** tab, specify the following:
 - Instance Type
 - Guest Access Key Pair
 - Security Groups
 - CloudWatch settings
 - Public IP Address
4. Set the appropriate settings in these two tabs and click **Submit**.
5. Log in to the **Amazon EC2 dashboard/Instances** and click **refresh** to watch for the new instance.

6. Auto Approval

6.1. Configure Auto Approval

This exercise deals with Automation, which is not part of this training. To learn more about Automation, register for the *CloudForms Customization and Automation* training course. In the steps that follow, you set the thresholds for automatic approval. The next time a provision request is created, the thresholds are checked. If the requirements are met, the provisioning request is approved without user intervention.

1. Go to **Automate** → **Explorer**.
2. Click **Datastore**.
3. On the right side, click **Configuration** → **Add a New Domain**.
4. Set the following, as shown in the image below:
 - **Name:** **TrainingDomain**
 - **Description:** **Training Domain**
 - **Enabled:** Check this box

Adding a new Automate Domain

Info

Name	TrainingDomain
Description	Training Domain
Enabled	<input checked="" type="checkbox"/>

5. Click **Add**.
6. In the **Datastore** accordion, navigate to **ManageIQ** → **Infrastructure** → **VM** → **Provisioning** → **StateMachines** → **ProvisionRequestApproval** and click **Default**.
7. On the right side, click **Configuration** → **Copy this Instance**.
8. In the **Copy Automate Instance** screen, make sure **Copy to same path** is checked and click **Copy**.
9. In the **Datastore** accordion, navigate to **TrainingDomain** → **Infrastructure** → **VM** → **Provisioning** → **StateMachines** → **ProvisionRequestApproval** and click **Default**.
10. On the right, click **Configuration** → **Edit this Instance**.
11. Set **max_memory** to **1024**. Verizon-CL220VT-06202016
12. Click **Save**.

6.2. Test Approval

1. From **Infrastructure** → **Virtual Machines**, click **(Lifecycle)**, and then **(Provision VMs)**.
2. Select the **ds1** template from the list and click **Continue**.
3. Make sure the **Request** tab is selected and set the following:
 - a. Set **E-Mail** to **cfadmin@workstation.example.com**.
 - b. Enter your **First** and **Last** names.
4. Click **Catalog** to edit the customization template you selected.
 - a. Set the **Provision Type** to **Native Clone**.
 - b. Under **Naming**, set **VM Name** to **training-ds1**.
5. Click the **Environment** tab and set the following:
 - a. Ensure that **Choose Automatically** is **not** checked.
 - b. Set **Datacenter** to **Default**.
 - c. Set **Cluster** to **Default**.
 - d. Set **Host** to **rhelkvm**.
 - e. Set **Datastore** to **vmstore00**.
6. Click the **Hardware** tab and set **Memory (MB)** to **2048**.
7. Click the **Network** tab and set **vLan** to **rhevm**.
8. Click the **Customize** tab.
 - a. In the **Credentials** section, set **Password** to **r3dh4t1!**
 - b. In the **IP Address Information** section, set **Address Mode** to **DHCP** and leave all other settings blank.
 - c. Leave the **DNS** section blank.
9. Click **Submit**.
10. On the resulting screen, click  **(Refresh)** (in the CloudForms UI, not the browser) until the **Last Message** reads: *Request was not auto-approved for the following reasons: (Requested Memory 2048MB limit is 1024MB)*.

6.3. Approve a Provisioning Request

1. Go to **Services** → **Requests**.
2. For **Approval State**, uncheck **Approved** and **Denied**.
3. Click **Apply**.
4. Click the request requiring approval.

5. Click **(Approve this request)**.
6. In **Reason**, enter **because I am all powerful** for the approval.
7. In the lab environment, click **Cancel**; outside the lab environment, click **Submit** to continue with the process.

6.4. Deny a Provisioning Request

1. Verify that you are at the request screen.
2. Click **(Deny this request)**.
3. In **Reason**, enter a reason for the denial.
4. Click **Submit**.

6.5. Copy a Provisioning Request

1. Navigate to **Services** → **Requests**.
2. If you do not see any requests, click **Default**.
3. Click the request you denied in the previous lab.
4. Click **(Copy original provision request)**.
5. In the **Hardware** tab, change **Memory (MB)** to **1024**.
6. Click the **Schedule** tab and uncheck **Power on virtual machines after creation**.
7. Click **Submit**.
 - The provision request is sent through the approval process and is auto-approved because it meets the auto-approval criteria of memory less than 2048 MB per request.



If the logged in user is not same as the requester or a Super Administrator, or the request was already approved or denied, you cannot edit or delete the request.

6.6. Un-Configure Auto-Approval

In the next steps you remove the auto-approval threshold so that it cannot impede future exercises.

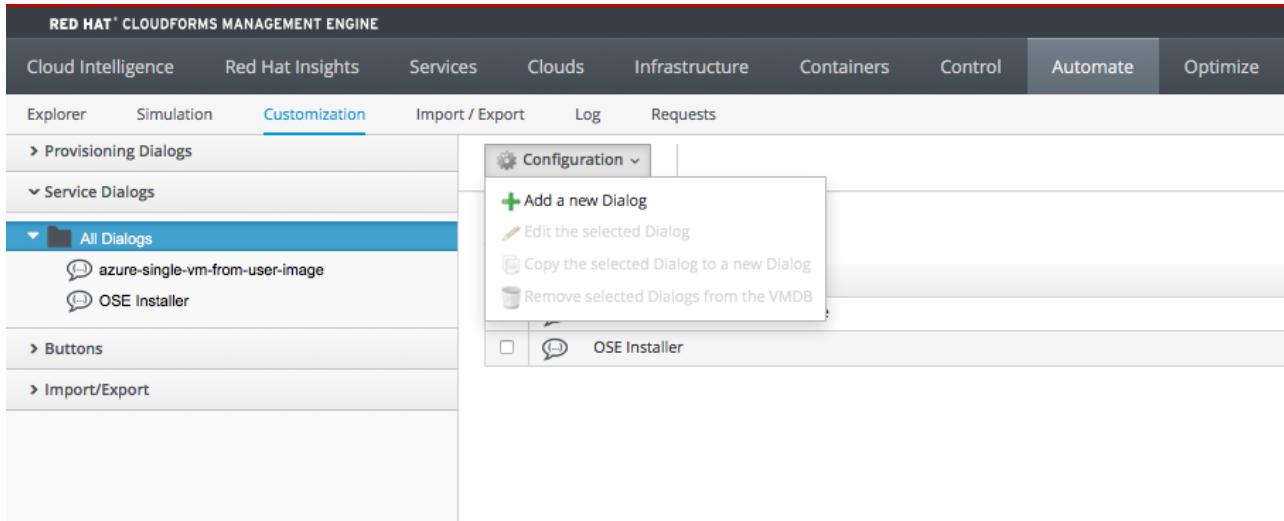
1. Go to **Automate** → **Explorer**.
2. Click **Datastore**.
3. In the **Datastore** accordion, navigate to **TrainingDomain** → **Infrastructure** → **VM** → **Provisioning** → **StateMachines** → **ProvisionRequestApproval** and click **Default**.
4. On the right, click **Configuration** → **Remove this Instance**.
5. Click **OK**.

7. Services

7.1. Create Service Dialog

Services require a dialog that is applied later to the Catalog Item. In these steps you create this service dialog.

1. Go to **Automate** → **Customization** and click the **Service Dialogs** accordion.
2. Click **Configuration** → **Add a new Dialog**:



- a. For **Label** enter **MyDialog**.
- b. Check both **Submit** and **Cancel**.
3. Click , then **Add a new Tab to this Dialog**.
 - a. For **Label** enter **Tab1**.
4. Click , then **Add a new Box to this Tab**.
 - a. For **Label** enter **Box1**.
5. Click , then **Add a new Element to this Box**.
 - a. For **Label** enter **VM Name**.
 - b. For **Name** enter **vm_name**.
 - c. For **Type** choose **Text Box**.
 - d. Check **Required**.
6. Click , then **Add a new Element to this Box**.
 - a. For **Label** enter **Service Name**.
 - b. For **Name** enter **service_name**.
 - c. For **Type** choose **Text Box**.
 - d. Check **Required**.
7. Click , then **Add a new Element to this Box**.

- a. For **Label** enter **Number of CPUs**.
 - b. For **Name** enter **option_0_cores_per_socket**.
 - c. For **Type** choose **Drop Down List**.
8. Scroll down to **Entries** and click **.**
- a. For **Value** enter **1**.
 - b. For **Description** enter **1**.
 - c. Press **Enter**.
9. Click **.**
- a. For **Value** enter **2**.
 - b. For **Description** enter **2**.
 - c. Press **Enter**.
10. Change **Default Value** to **2**.
11. Click **,**, then **Add a new Element to this Box**.
- a. For **Label** enter **VM Memory**.
 - b. For **Name** enter **option_0_vm_memory**.
 - c. For **Type** choose **Drop Down List**.
12. Scroll down to **Entries** and click **.**
- a. For **Value** enter **1024**.
 - b. For **Description** enter **1024**.
 - c. Press **Enter**.
13. Click **.**
- a. For **Value** enter **2048**.
 - b. For **Description** enter **2048**.
 - c. Press **Enter**.
14. Change **Default Value** to **2048** and click **Add**.

7.2. Create Catalog

Catalog items must exist in a catalog for them to be visible to users.

1. Go to **Services** → **Catalogs**.
2. Click the **Catalogs** accordion.
3. Click **Configuration** → **Add a New Catalog**:

The screenshot shows the Red Hat CloudForms Management Engine interface. The top navigation bar includes links for Cloud Intelligence, Red Hat Insights, Services, Clouds, Infrastructure, Containers, and Control. Below this, a secondary navigation bar has tabs for My Services, Catalogs (which is selected and underlined), Workloads, and Requests. On the left, a sidebar contains sections for Service Catalogs, Catalog Items, Orchestration Templates, and Catalogs, with 'All Catalogs' currently selected. The main content area is titled 'All Catalogs' and displays a message: 'No Records Found.' There are buttons for Configuration (with a dropdown menu), Add a New Catalog, Edit Selected Item, and Remove Items from the VMDB.

4. For Name enter **My Catalog**:

Adding a new Catalog

Basic Info

Name	<input type="text" value="My Catalog"/>
Description	<input type="text"/>

Assign Catalog Items

Unassigned:

Selected:

5. Click **Add**

7.3. Create Catalog Item

In the next exercise, you create a catalog item that deploys a VMWare template.

1. Go to **Services** → **Catalogs**.
2. Click the **Catalog Items** accordion.
3. Click **Configuration** → **Add a New Catalog Item**:

The screenshot shows the Red Hat CloudForms Management Engine interface. The top navigation bar includes tabs for Cloud Intelligence, Red Hat Insights, Services (which is selected), Clouds, Infrastructure, and Containers. Below the navigation bar, there are links for My Services, Catalogs (which is selected and highlighted in blue), Workloads, and Requests. The left sidebar has a tree view with nodes like Service Catalogs, Catalog Items, All Catalog Items (which is expanded to show Unassigned and My Catalog), Orchestration Templates, and Catalogs. The main content area is titled 'All Service Catalog Items' and displays a message 'No Records'. A context menu is open on the right side with options: Configuration, Policy, Add a New Catalog Item, Add a New Catalog Bundle, Edit Selected Item, and Remove Items from the VMDB.

- a. For **Catalog Item Type** choose **RHEV**.
- b. For **Name** enter **RHEL**.
- c. For **Description** enter **Example RHEL Service in RHEV**.
4. Check **Display in Catalog**.
 - a. For **Catalog** choose **My Catalog**.
 - b. For **Dialog** choose **MyDialog**.
5. Click the box next to **Provisioning Entry Point State Machine (NS/CIs/Inst)**.
 - a. In the pop-up window that appears, navigate to **Datastore** → **ManageIQ (Locked)** → **Service** → **Provisioning** → **StateMachines** → **ServiceProvision_Template** → **CatalogItemInitialization**, as shown here:

The screenshot shows a 'Select Entry Point Instance' dialog box. The tree view shows the following structure: Datastore → RedHat (Locked) → ManageIQ (Locked) → Cloud, Infrastructure, Service → Provisioning → StateMachines → ServiceProvision_Template → CatalogItemInitialization. The 'CatalogItemInitialization' node is selected. At the bottom of the dialog, there is a checkbox 'Include Domain prefix in the path' and two buttons: 'Apply' and 'Cancel'.



Make sure you click **CatalogItemInitialization** and not **CatalogBundleInitialization**.

- b. Click **Apply**, and the pop-up window disappears.
6. Click the **Details** tab and enter some useful text about your RHEL service in the box.
7. Click the **Request Info** tab.
8. In the **Catalog** subtab, set the following:
 - a. For **Selected VM** choose **rhel1**.
 - b. For **Naming/VM Name** enter **placeholder**.
9. In the **Environment** subtab, set the following:
 - a. For **Cluster** choose **Default**.
 - b. For **Host** choose **rhelkvm**.
 - c. For **Datastore** choose **vmstore00**.
10. In the **Customize** subtab, set **IP Address Information/Address Mode** to **DHCP**.
11. Click **Add**.

7.4. Order a Catalog Item

1. Go to **Services** → **Catalogs**.
2. Click the **Service Catalogs** accordion.
3. On the right click **Order** for the **RHEL** item you created.
4. Notice the order form that comes from the service dialog you created earlier and defined in the catalog item.
5. Do not order a service at this time.

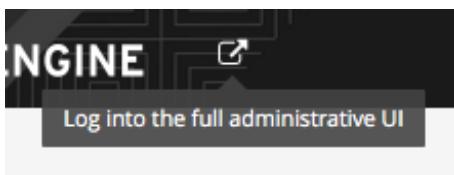
7.5. Self-Service Portal



Do not open the Self-Service portal in another tab or window in the same browser as a regular CloudForms GUI login. If you do this, the pages show errors or unexpected logouts.

1. Do one of the following:
 - Close all instances of the browser in which you are using the CloudForms GUI, and then open a new instance of that browser without an active CloudForms session.
 - Open a totally different browser. For example open Chrome versus Firefox.
2. In a new web browser tab, navigate to https://cf-GUID.rhpd.openlc.com/self_service.
3. Log in as **admin** with password **r3dh4t1!**.

4. Click the **Service Catalog** accordion.
5. Hover over the **RHEL/My Catalog** item.
6. Hover over the text **More** and click the **RHEL/My Catalog** item.
 - a. For **VM Name** enter **service-vm1**.
 - b. For **Service Name** enter **my first service**.
 - c. For **Number of CPUs** choose **1**.
 - d. For **VM Memory** choose **2048**.
7. At the top right, click **Submit Request**.
8. On the resulting screen, click the new service and notice the information provided.
9. Click the **My Services** accordion.
 - a. Click your service.
 - b. Explore your service.
 - c. Click **Retire** to retire the service now or schedule retirement for later.
10. Go back to the full CloudForms administrative GUI by clicking (**Go Back**) as shown here:



11. Close the tab with the Self-Service portal.
12. Go to **Infrastructure** → **Virtual Machines** → **service-vm1**.
13. Determine the status of the VM build.

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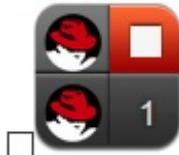
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VM and Host Information Lab

1. Use VM Virtual Thumbnail

1. Launch the **CloudForms Management Engine** GUI and log in as the **admin** user.
2. Click **Infrastructure > Virtual Machines**.
3. View (do not click) the **Virtual Thumbnail** for your **training-vm**.



4. Note that the virtual thumbnail image shows the following:
 - Operating system of the virtual machine
 - Virtual machine host's software
 - Power state of virtual machine
 - Number of snapshots

2. Use VM Summary

Click the **training-vm** Virtual Thumbnail to determine the following details:

- IP address
- Date/time discovered
- Datastores
- Average CPU usage
- Disk space used by the VM
- Unused (free) memory available on the VM

3. Analyze Multiple VMs

In completing this exercise you analyze multiple VMs using SmartState Analysis.

1. From **Infrastructure → Virtual Machines**, go to the **VMs** accordion and click **All VMs**.
2. At the bottom click **Check All**.

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If you do not see the Windows VM, check the status of the VM build in



Red Hat Enterprise Virtualization Manager. Verify that the Windows VM build is complete before continuing.

3. Click **Configuration** → **Perform SmartState Analysis**.
4. Click **OK** to confirm that you want to analyze these virtual machines.
5. Go to **Configure** → **Tasks**.
6. Click (**Refresh**) in the UI (not the browser) until all the tasks are complete. The **SmartProxy** works to return the current data.
7. Optionally, monitor (with **tail -f**) the following logs on the CloudForms appliance:
 - **/var/www/miq/vmdb/log/vim.log**
 - **/var/www/miq/vmdb/log/rhevvm.log**



If you are scanning a brand new VM and you get a *No such file or directory* error, wait a few minutes and try again. Red Hat Enterprise Virtualization may need time to write the necessary files in its queuing process.

4. Schedule SmartState Analysis

From the **Schedules** area in the **Settings** accordion on the left, you schedule the analysis of virtual machines, hosts, clusters, and datastores to keep the information current and filter which items are analyzed.

1. Click the **Configure** tab on the top menu, and then click **Configuration** on the submenu.
2. Under the **Settings** accordion on the left, click **Region** and then click **Schedules**.
3. On the top menu, click **Configuration** and then click **Add a new Schedule**.
4. In the **Basic Info** box, set the following:
 - a. Enter a **Name** and **Description** for the schedule.
 - b. Check the **Active** box to activate this schedule item as soon as you add it.
 - c. Set **Action** to **VM Analysis**.

Adding a new Schedule

Basic Information

Name	<input type="text"/>
Description	<input type="text"/>
Active	<input checked="" type="checkbox"/>
Action	VM Analysis ▾

5. In VM Selection, you have the options to analyze all VMs, all VMs for a specific management system, cluster or host, or a single VM. For this exercise, choose **All VMs**:

6. In the **Timer** area, click the **Run** list to specify how often you want the analysis to run. Your remaining options depend on which Run option you choose:

Timer

Run	Once ▾
Time Zone	(GMT+00:00) UTC
Starting Date	11/18/2014
Starting Time (UTC)	0 h 0 m

* Changing the Time Zone will reset the Starting Date and Time fields below

- Select **Once** to run the analysis only one time.
- Select **Daily** to run the analysis on a daily basis. When prompted, select how many days you want between each analysis.
- Select **Hourly** to run the analysis hourly. When prompted, select how many hours you want between each analysis.

7. In **Starting Date**, type or select a date to begin the schedule.
8. Set the **Starting Time (UTC)** based on a 24-hour clock (Coordinated Universal Time).
9. Click **Add** to accept the analysis schedule.

5. Find VM by Name

In this exercise you filter the VMs based on the specified criteria.

1. Navigate to **Infrastructure** → **Virtual Machines**.
2. Do one of the following:
 - Select the **VMs & Templates** accordion and then **All VMs & Templates**.
Verizon-CL220VT-06202016
 - Select the **VMs** accordion and then **All VMs**.

3. In the **Name Filter** bar (in the upper-right corner of the window), type your criteria:



4. Click **Search by Name within results** or press **Enter**.
5. Enter other criteria to filter based on what is currently displayed.
6. Click **Search by Name within results** or press **Enter**.

6. Create Advanced Filter

1. Before continuing, make sure **SmartState Analysis** is complete for all VMs.
2. Create a filter:
 - a. Click **Infrastructure** → **Virtual Machines**, and then from the **VMs** accordion click **All VMs**.
 - b. Click the down arrow (**Advanced Search**) found at the right of the search text box, as shown here, to open the expression editor in the **Advanced Search** window:



- c. Click **<Choose>** and select **Field** to create criteria based on field values.



- d. Choose **Virtual Machine : Parent Host**.
- e. In the text field, enter **rhelkvm**; use lower-case letters as the entry is case sensitive.
- f. Click **(Check)** to commit the query.
- g. Click **Save** to save your filter. Verizon-CL220VT-06202016
- h. For **Save this ManageIQ::Providers::InfraManager::Vm** search as: enter

VMs on **KVM** and click **Save** again.

- i. Click **Apply**.



Find your saved filter in the **My Filters** area of the **Filter** accordion.

3. Create another filter:

- a. From **Infrastructure** → **Virtual Machines**, click the **VMs** accordion and select **All VMs**.
- b. Click the down arrow (**Advanced Search**) to open the expression editor.
- c. Where you see <Choose>, select **Find**.
- d. In the field below, choose **Virtual Machine.Guest Applications : Name**.
 - i. Where you see **=**, change it to **REGULAR EXPRESSION MATCHES**.
 - ii. In the text box, enter **/.*rhev.*agent.*/i**.
 - iii. In the field that reads **Check All**, change it to **Check Count**.
 - iv. In the field that reads **=**, change it to **>=**.
 - v. In the text box, enter **1**.
- e. Click **(Check)** above.
- f. Click **Save** to save your filter.
- g. For **Save this ManageIQ::Providers::InfraManager::Vm search as:** enter **VMs with agent** and click **Save** again.
- h. Click **Apply** and then click the **x** at the top right to close the advanced search bar.

You now see the two VMs named **training-vm** and **winxp** in the results.

7. Change View

In the following steps, you display the virtual machines in the view you select.

1. Go to **Infrastructure** → **Virtual Machines**.
2. Select the **VMs & Templates** accordion and then **All VMs & Templates**.
3. To change the view, click the appropriate image for the view you want to see:
 - o Click for **Grid** view.
 - o Click for **Tile** view.
 - o Click for **List** view.

8. Sort VMs

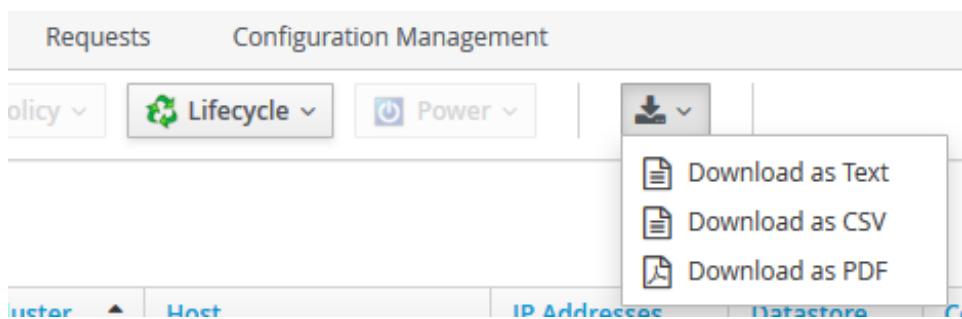
In this exercise, you sort virtual machines by attribute, such as **Name**, **Last Sync Time**, **Total Snapshots**, and **Datastore Path**.

1. Go to **Infrastructure** → **Virtual Machines**.
2. Select the **VMs & Templates** accordion and then **All VMs & Templates**.
3. At the bottom of the window, change the **Sorted by** list to choose the attribute by which you want to sort, and the display refreshes to reflect the new sort.

9. Download List Items

In this series of steps, you create a quick report. For most lists of items, you can create a quick report in CSV, Text, or PDF format.

1. Go to **Infrastructure** → **Virtual Machines**.
2. Select the **VMs & Templates** accordion and then **All VMs & Templates**.
3. Click  **(Download)**.
4. Click the output name for the type of report you want:
 - Text
 - CSV
 - PDF



10. View Timelines for VM

1. From **Infrastructure** → **Virtual Machines**, click the **training-vm** VM you provisioned earlier.
2. On the Virtual Machine taskbar, click **Monitoring** and then **Timelines** to view timeline output:

Timelines for Virtual Machine "training-vm"

Options

Show: Management Events

Interval: Daily

Date: 1/5/2016

Show: 7 days back

Level: Summary

Event Groups: Power Activity

<NONE>

<NONE>

* Dates/Times on this page are based on time zone: Eastern Time (US & Canada).

training-vm

Event Type: USER_STARTED_VM

Event Source: RHEVM

Provider: RHEVM

Message: VM training-vm was started

Jan 1 Jan 2 Jan 3 Jan 4 Jan 5 Jan 6 Jan 7 Jan 8

3. To view details for an item in the timeline, click it. A balloon appears with a clickable link to the resource.

11. Make a Change to a VM

In order to show drift, first make a change to one of your existing VMs.

1. Open a web browser to <https://rhevm-<GUID>.rhpd.openlc.com> and accept any security exceptions.
2. Click **Administration Portal**.
3. Log in as the **admin** user with the **r3dh4t1!** password.
4. Set **Profile** to either **example.com** or **internal**.
5. Click the **training-vm** VM.
6. Click (**Red Hat Enterprise Virtualization Console**).



The Red Hat Enterprise Virtualization console works with Firefox, on Windows or Red Hat Enterprise Linux only. The console does not work with Firefox on Mac OS X. If you are using Mac OS X, try the solution at <https://access.redhat.com/site/solutions/93613>.

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7. Click the console and log in using **root** with the password **r3dh4t1!**.

8. Enter the following command to add a user:

```
# useradd newguy
```

9. Press **Shift+F12** to exit the console.
10. Run a new SmartState analysis for this VM in CloudForms.
11. Make sure the analysis completes before continuing.

12. View Drift on Virtual Machine

1. Go to **Infrastructure → Virtual Machines**.
2. Click the **All VMs & Templates** accordion and select **training-vm**.
3. In the **Relationships** section of the virtual machine details, click **Drift History**:

The screenshot shows the CloudForms interface. On the left, there is a tree view of infrastructure resources under 'vSphere'. Under 'DC01', it lists 'Discovered virtual machine', 'rhel6-template', 'rhel', and 'training-clone'. On the right, there is a 'Relationships' table. At the bottom of the table, there is a row for 'Drift History' which has a red circle around it.

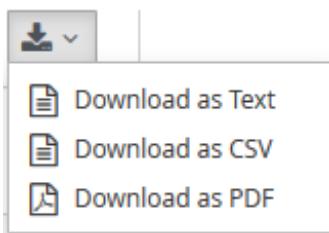
Relationships	
Infrastructure Provider	RHEVM
Cluster	Default
Host	rhelkvm
Resource Pool	Default for Cluster Default
Datastores	vmstore00
Service	None
Parent VM	rhel
Genealogy	<input checked="" type="checkbox"/> Show parent and child VMs
Drift History	1

4. Check both **Timestamps**.
5. At the top of the screen, click **(Drift)** to display the results.
6. Click **(Attributes with different values)**.
7. On the left, uncheck **Properties**. (Click twice, if necessary.)
8. Check **Security** and click **Apply**.
9. At the right, expand **Users**.
10. Verify that **newguy** appears only in the later timestamp. **Root** may also change.
11. On the right, expand **root** to view the difference.
12. Click **(Exists Mode)**.
13. Notice the difference.

13. Download Drift Report

1. Click **(Download)**.
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2. Click **Output** for the type of report you want to download:

- Text
- CSV
- PDF



The output is created using the date as a suffix.

14. Compare VMs

1. From **Infrastructure** → **Virtual Machines**, select the **VMs & Templates** accordion, and then click **All VMs & Templates**.
2. Check the Red Hat Enterprise Linux template (**rhel**) and the Red Hat Enterprise Linux VM (**training-vm**).
3. Click **Configuration**, and then click **Compare Selected Items**.
 - The comparison displays in the default view, which shows a limited set of properties.
4. In the **Resource** area, limit the mode of the view:
 - a. Click  (**Exists Mode**) to limit the view depending on whether or not an attribute exists compared with the base. This applies only to attributes that can have a Boolean property. For example, a user account or a piece of hardware either exists or does not exist.
 - b. Click  (**Details Mode**) to see all details for an attribute.
5. Change the base VM with which all the others are compared by clicking its label at the top of its column.
6. To go to the summary screen for a VM, click its Virtual Thumbnail or icon.

15. Use VM Comparisons

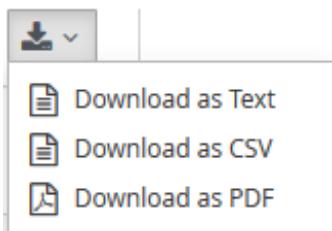
1. On the left of a comparison screen, select the categories of properties you want to display.
2. Click **Apply**.
3. Click the plus sign next to the section's name to expand it.
4. Observe the display colors for each of the properties, and notice the display color for

properties that are different than the base property.

5. Switch to the compressed view.
 6. Hover over properties that are marked with a check and those marked with an X.
 7. Click the minus sign next to the section's name to collapse it.
-

16. Download Comparison Report

1. Create the comparison you want to analyze.
2. Click  (Download).
3. Click **Output** for the type of report you want to download:
 - Text
 - CSV
 - PDF



The output is created using the date as a suffix.

17. Use Host Thumbnail

1. Click **Infrastructure** → **Hosts**.
2. View (do not click) the **Host Thumbnail**, as shown here, for your **rhelkvm**.



3. Verify that you see the following in the **Host Thumbnail**:
 - Number of VMs on this host
 - Virtual machine software
 - Power state of the host
 - Authentication state of the host

18. Perform SmartState Analysis on Host

1. Go to **Infrastructure** → **Hosts**.
2. Click **Check All** at the bottom.
3. Select **Configuration** → **Perform SmartState Analysis**.
4. Click **OK**.
5. Monitor the progress in **Configure** → **Tasks** under **My Other UI Tasks**.
6. Wait for the process to complete.
7. From the **workstation** host, SSH to the **kvm** host then install the **xauth** package.

```
$ ssh root@kvm.example.com  
# yum -y install xauth
```

8. Run the SmartState Analysis for this host again and wait for it to complete before continuing.



The **kvm** host is the same host as **rhelkvm**

19. Use Host Summary

1. Go to **Infrastructure** → **Hosts**.
2. Click the **rhelkvm** host.
3. Note all the information gathered from this host using SmartState Analysis:
 - Operating system
 - Number of CPUs
 - Datastores
 - Number of installed packages

20. View Host Drift

1. From **Infrastructure** → **Hosts**, click **rhelkvm**.
2. Click the **Relationships** accordion on the left.
3. In the expanded accordion, click **Drift History**.



This is an alternate method of entering **Drift History**. Use (Drift) when looking at VM drift.

4. Check both timestamps.
5. Click (Drift) at the top of the screen to display the results.
6. On the left, double-click the checkbox for **Properties** to disable it.
7. Check **Configuration**.
8. Click **Apply**.
 - To expand a section, click the plus sign next to the section's name.
 - To track changes to items, look at the image next to each item:
 - indicates a change after the last analysis.
 - indicates no change after the last analysis.
9. On the left side, add or remove a specific analysis from the report. The drift then recalculates and the new results display.
 - To see the expanded view, click (**Expanded View**).
 - To compress the information, click (**Compressed View**).
 - To collapse the section's name, click the minus sign next to the name.
10. To limit the type of views, use the taskbar:
 - To see all attributes of the sections you selected, click (**All attributes**).
 - To see only the attributes that are different across the drifts, click (**Attributes with different values**).
 - To see only the attributes that are the same across drifts, click (**Attributes with the same values**).



You can download the VM drift report data and then analyze the data using external tools.

21. Compare Hosts

1. Go to **Infrastructure** → **Hosts** and check the two vSphere hosts.
2. Click **Configuration**, and then click **Compare selected items**.
 - The comparison displays in the default view, which shows a limited set of properties.
3. To remove a host from the comparison, click **Remove this Host from the comparison** at the bottom of the column.

4. To go to a compressed view, click  (**Compressed View**).
5. To return to an expanded view, click  (**Expanded View**).
6. To limit the mode of the view, choose the taskbar:
 - Click  (**Details Mode**) to see all details for an attribute.
 - Click  (**Exists Mode**) to limit the view depending on whether or not an attribute exists compared with the base.
 - This applies only to attributes that can have a Boolean property.
 - For example, a user account or a piece of hardware either exists or does not exist.
7. To change the base host with which all the others are compared, click its label at the top of its column.
8. To go to the summary screen for a host, click its Virtual Thumbnail or icon.

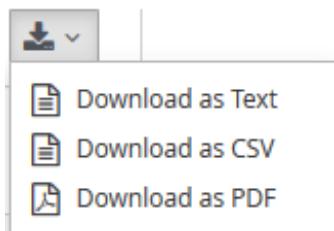
22. Use Host Comparisons

1. On the left side of a comparison screen under **Comparison Sections**, select the property categories you want to display.
2. Click **Apply**
3. Click  (**Compressed View**).
4. Click the plus sign next to the section's name where you see differences to expand it.
5. Use the following descriptions to understand the Expanded View. Whether you see the value of a property, or an icon representing the property, depends on the property's type.
 - A property displayed in the same color as the base means that the compared host matches the base for that property.
 - A property displayed in a different color from the base means that the compared host does not match the base for that property.
6. Click the minus sign next to the section's name to collapse it. In **Compressed View**, the values of the properties are not displayed.
7. Use the descriptions below to understand the items in **Compressed View**:
 - A checkmark indicates that the compared host matches the base for that property. If you hover over it, the value of the property displays.
 - An X indicates that the compared host does not match the base for that property. If you hover over it, the value of the property displays.

23. Download Comparison Report

You can view your comparison in multiple ways. You can export the data or create a report from your comparison for analysis using external tools. You can also download the data for analysis using external tools.

1. Create the comparison you want to analyze.
2. Click the output for the type of report you want to view, as shown:

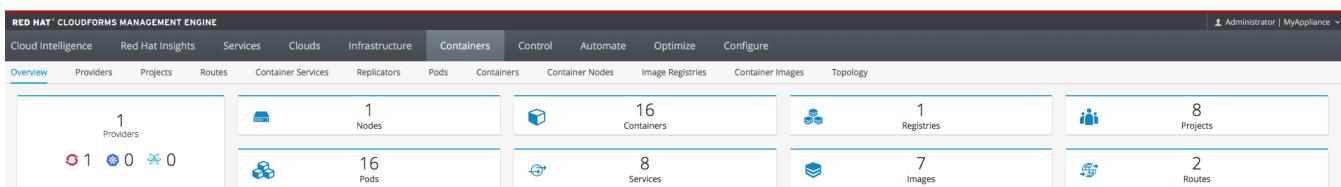


3. Choose the format in which you want to download the report.

24. Container Information

24.1. View Container Overview

1. Click **Containers** → **Overview**.
2. Note the item counts and information provided:



24.2. View Container Project Information

1. Click **Containers** → **Projects**.
2. Examine the information gathered from projects:

A screenshot of the Container Projects page. It shows a table of projects:

Name	Display Name	Provider	Container Routes	Container Services	Container Replicators	Pods	Containers
default		OpenShift	0	3	2	2	2
explore-example	Explore Example	OpenShift	1	2	2	3	3
instant-app	Instant app example project	OpenShift	0	0	0	0	0
myproject	My Project	OpenShift	0	0	0	4	4
my-ruby-project		OpenShift	0	2	2	3	3
openshift		OpenShift	0	0	0	0	0
openshift-infra		OpenShift	0	0	0	0	0
svslab	Services Lab	OpenShift	1	1	0	4	4

24.3. View Container Routes

1. Click **Containers** → **Routes**.

2. Note the routes and information provided:

The screenshot shows the GINE interface with the 'Containers' tab selected. Under the 'Routes' sub-tab, there is a table listing two routes: 'hello-openshift' and 'hello-service'. The table columns are 'Name', 'Provider', and 'Project Name'. Both routes are associated with 'OpenShift' as the provider and have 'explore-example' as the project name.

Name	Provider	Project Name
hello-openshift	OpenShift	explore-example
hello-service	OpenShift	svcslab

24.4. View Container Services

1. Click Containers → Container Services.

2. Examine the container services and information provided:

The screenshot shows the GINE interface with the 'Containers' tab selected. Under the 'Container Services' sub-tab, there is a table listing various services. The table columns are 'Name', 'Provider', 'Project Name', 'Type', 'Portal IP', and 'Session Affinity'. Most services are of type 'ClusterIP' and have a portal IP starting with 172.30. The services listed include database, docker-registry, hello-openshift, hello-service, kubernetes, router, ruby-hello-world, and sinatra-example.

Name	Provider	Project Name	Type	Portal IP	Session Affinity
database	OpenShift	my-ruby-project	ClusterIP	172.30.15.132	None
docker-registry	OpenShift	default	ClusterIP	172.30.221.144	None
hello-openshift	OpenShift	explore-example	ClusterIP	172.30.58.235	None
hello-service	OpenShift	svclab	ClusterIP	172.30.69.92	None
kubernetes	OpenShift	default	ClusterIP	172.30.0.1	None
router	OpenShift	default	ClusterIP	172.30.4.89	None
ruby-hello-world	OpenShift	my-ruby-project	ClusterIP	172.30.189.229	None
sinatra-example	OpenShift	explore-example	ClusterIP	172.30.111.57	None

24.5. View Container Replicators

1. Click Containers → Replicators.

2. Note the replicators and information provided:

The screenshot shows the GINE interface with the 'Containers' tab selected. Under the 'Replicators' sub-tab, there is a table listing replicators. The table columns are 'Name', 'Provider', 'Project Name', 'Replicas', and 'Current Replicas'. All replicators are currently at 1 replica. The replicators listed are database-1, docker-registry-1, hello-openshift-1, router-1, ruby-hello-world-1, and sinatra-example-1.

Name	Provider	Project Name	Replicas	Current Replicas
database-1	OpenShift	my-ruby-project	1	1
docker-registry-1	OpenShift	default	1	1
hello-openshift-1	OpenShift	explore-example	1	1
router-1	OpenShift	default	1	1
ruby-hello-world-1	OpenShift	my-ruby-project	1	1
sinatra-example-1	OpenShift	explore-example	0	0

24.6. View Pods

1. Click Containers → Pods.

2. Examine the pods and information provided:

	Name	Provider	Project Name	Ready	Phase	Restart Policy	DNS Policy
□	database-1-ikb1y	OpenShift	my-ruby-project	True	Running	Always	ClusterFirst
□	docker-registry-1-g7e0k	OpenShift	default	True	Running	Always	ClusterFirst
□	hello-openshift-1	OpenShift	svclab	True	Running	Always	ClusterFirst
□	hello-openshift-1	OpenShift	mynetwork	True	Running	Always	ClusterFirst
□	hello-openshift-1-zvls2	OpenShift	explore-example	True	Running	Always	ClusterFirst
□	hello-openshift-2	OpenShift	svclab	True	Running	Always	ClusterFirst
□	hello-openshift-2	OpenShift	mynetwork	True	Running	Always	ClusterFirst
□	hello-openshift-3	OpenShift	mynetwork	True	Running	Always	ClusterFirst
□	hello-openshift-3	OpenShift	svclab	True	Running	Always	ClusterFirst
□	hello-openshift-4	OpenShift	mynetwork	True	Running	Always	ClusterFirst
□	hello-openshift-4	OpenShift	svclab	True	Running	Always	ClusterFirst
□	router-1-igpb	OpenShift	default	True	Running	Always	ClusterFirst
□	ruby-hello-world-1-build	OpenShift	my-ruby-project	False	Succeeded	Never	ClusterFirst
□	ruby-hello-world-1-u4u8s	OpenShift	my-ruby-project	True	Running	Always	ClusterFirst
□	sinatra-example-1-build	OpenShift	explore-example	False	Succeeded	Never	ClusterFirst
□	sinatra-example-1-deploy	OpenShift	explore-example	False	Failed	Never	ClusterFirst

24.7. View Containers

1. Click **Containers** → **Containers**.
2. Note the containers and information provided:

	Name	Pod Name	State	Image
□	deployment	sinatra-example-1-deploy	openshift3/ose-deployer	Terminated
□	hello-openshift	hello-openshift-4	openshift/hello-openshift	Running
□	hello-openshift	hello-openshift-3	openshift/hello-openshift	Running
□	hello-openshift	hello-openshift-2	openshift/hello-openshift	Running
□	hello-openshift	hello-openshift-1	openshift/hello-openshift	Running
□	hello-openshift	hello-openshift-4	openshift/hello-openshift	Running
□	hello-openshift	hello-openshift-3	openshift/hello-openshift	Running
□	hello-openshift	hello-openshift-2	openshift/hello-openshift	Running
□	hello-openshift	hello-openshift-1	openshift/hello-openshift	Running
□	hello-openshift	hello-openshift-1-zvls2	openshift/hello-openshift	Running
□	mysql	database-1-ikb1y	registry.access.redhat.com/openshift3/mysql-55-rhel7	Running
□	registry	docker-registry-1-g7e0k	openshift3/ose-docker-registry	Running
□	router	router-1-igpb	registry.access.redhat.com/openshift3/ose-haproxy-router	Running
□	ruby-hello-world	ruby-hello-world-1-u4u8s	my-ruby-project/ruby-hello-world	Running
□	sti-build	sinatra-example-1-build	openshift3/ose-sti-builder	Terminated
□	sti-build	ruby-hello-world-1-build	openshift3/ose-sti-builder	Terminated

24.8. View Container Nodes

1. Click **Containers** → **Container Nodes**.
2. Examine the nodes and information provided:

	Name	Provider	Ready	Operating System	Kernel Version	Runtime Version
□	ose.example.com	OpenShift	True	Red Hat Enterprise Linux Server 7.2 (Maipo)	3.10.0-327.el7.x86_64	docker://1.8.2

24.9. View Image Registries

1. Click **Containers** → **Image Registries**.

2. Note the image registries and information provided:

	Host	Port	Provider
	172.30.221.144	5000	OpenShift

24.10. View Container Images

1. Click Containers → Container Images.

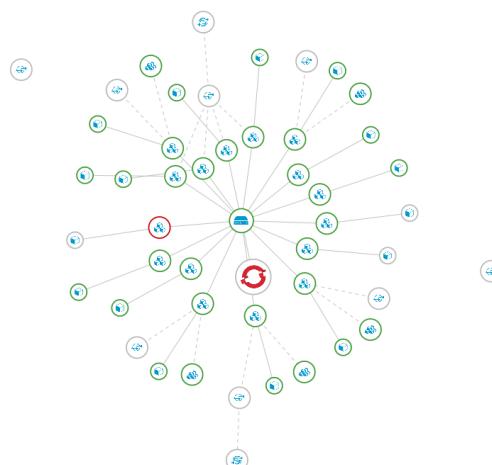
2. Examine the routes and information provided:

	Name	Provider	Tag	Id	Image Registry
my-ruby-project/ruby-hello-world	OpenShift			docker://ddc70acfcfd55833cfb042f63bcfd4374d233342580667e96a54ee56de0035b9	172.30.221.144:5000
openshift/ose-deployer	OpenShift	v3.1.0.4		docker://9580a28b3e18c64cff56f95e3f777464431accde6c98b3765d9bfc5a7e619ea2	Unknown image source
openshift3/ose-docker-registry	OpenShift	v3.1.0.4		docker://eb7a879607c92ad5e51fc39ca73a8d556a7bf983627fa70019dc0055e4c	Unknown image source
openshift3/ose-sti-builder	OpenShift	v3.1.0.4		docker://8b1293f81020974d0eaaf222cdcc5a16ca3b3d9ec614256e6e31ff5f22ec36ff	Unknown image source
openshift/hello-openshift	OpenShift			docker://bba2117915baaafdf05932dc916306bae2c51d15848592c30187fa308dee519	Unknown image source
registry.access.redhat.com/openshift/mysql-55-rhel7	OpenShift	latest		docker://61e9287c406e06a29eae03fe0c0806576b9b2adb1fc3da00b45f32622abc1f	Unknown image source
registry.access.redhat.com/openshift/ose-haproxy-router	OpenShift			docker://6a3fe65c07f1e12825d61ef9fe7d6937f87bf394f736ead8927b339245ccb66	Unknown image source

24.11. View Container Topology

1. Click Containers → Topology.

2. Note the topology and information provided:



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Capacity and Utilization Lab



Most of the exercises in this lab require that the CloudForms appliance gather 24 hours of data. Without this data, most charts and graphs appear empty. This lab runs in 48-hour increments before powering itself off automatically to save resources. See <http://www.opentlc.com/lifecycle> for more information.

1. View Capacity and Utilization Charts for VM

1. From **Infrastructure** → **Virtual Machines**, click the **winxp** VM.
2. Click **(Monitoring)** and then **(Utilization)**.
3. Select **Compare To** for a side-by-side comparison with the virtual machine's parent host or parent cluster:

Capacity & Utilization data for Virtual Machine "winxp"

Options

Interval ▼

Date

Show ▼ back

Time Profile UTC

Compare To ▼

* Daily charts only include days for which all 24 hours of data has been collected.



For the charts to populate, you need 24 hours of data.

2. View Capacity and Utilization Charts for Host

In this exercise, you specify how capacity and utilization charts are displayed for CPU, Memory, Disk, Network, and Running Virtual Machines.

1. From **Infrastructure** → **Hosts**, click the host for which you want to view Capacity and Utilization data.
2. Click **(Monitoring)** and then **(Utilization)**.
3. From **Interval**, select to view data points either hourly or daily.
4. Select the dates for which you want to view data.
5. Use **Group by** to group the lines by **SmartTags**.
6. Use **Time Profiles** to select a time range for the data.

3. View Capacity and Utilization Charts for Cluster

1. From **Infrastructure** → **Clusters**, click the cluster for which you want to view Capacity and Utilization data.
2. Do one of the following:
 - Click **(Monitoring)** and then **(Utilization)**.
 - From the **Cluster** accordion, click **Properties** and then **Capacity & Utilization**.
3. From **Interval**, select to view data points hourly or daily.
4. Select the dates for which you want to view data.
5. Use **Group by** to group the lines by **SmartTags**.

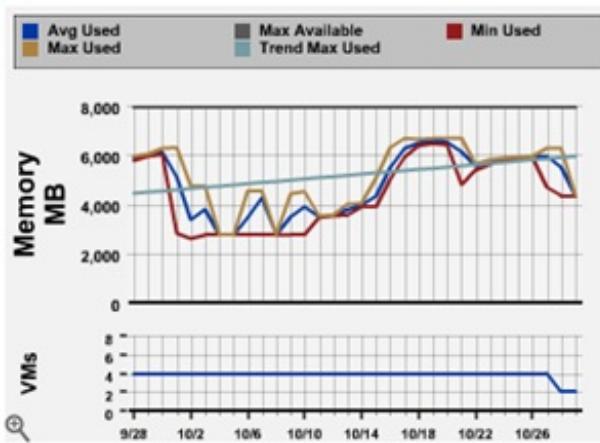
6. Use **Time Profiles** to select a time range for the data.
-

4. View Capacity and Utilization Charts for Datastore

1. From **Infrastructure** → **Datastores**, click the datastore for which you want to view capacity and utilization data.
 2. Click **(Monitoring)** and then **(Utilization)**.
 3. From **Interval**, select to view data points hourly or daily.
 4. Select the dates for which you want to view data.
 5. Use **Show VM Types** to include only registered, unregistered, or unmanaged virtual machines.
 6. Use **Time Profiles** to select a time range for the data.
-

5. Explore Chart Features: Zoom

1. Navigate to the chart you want to zoom.
 - The example below shows a memory usage chart for a host.
2. Hover anywhere on the chart. When two dashed lines appear, use these lines to target a coordinate of the chart.
 - To zoom in to your selected target, in the lower left corner of the chart, click  **(Click to zoom in)**.
 - To go back to the regular view, on the enlarged chart, click  **(Click to zoom out)**.

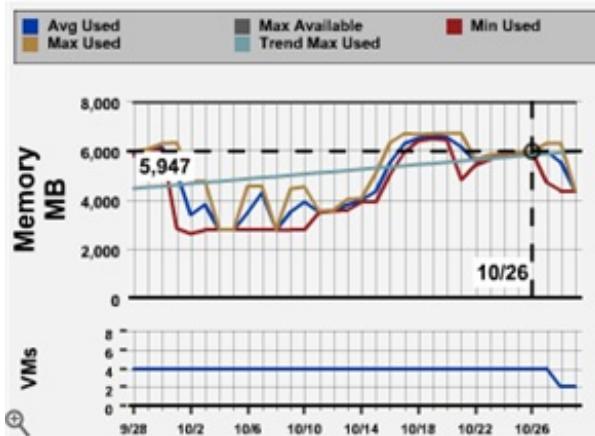


6. Explore Chart Features: Drill

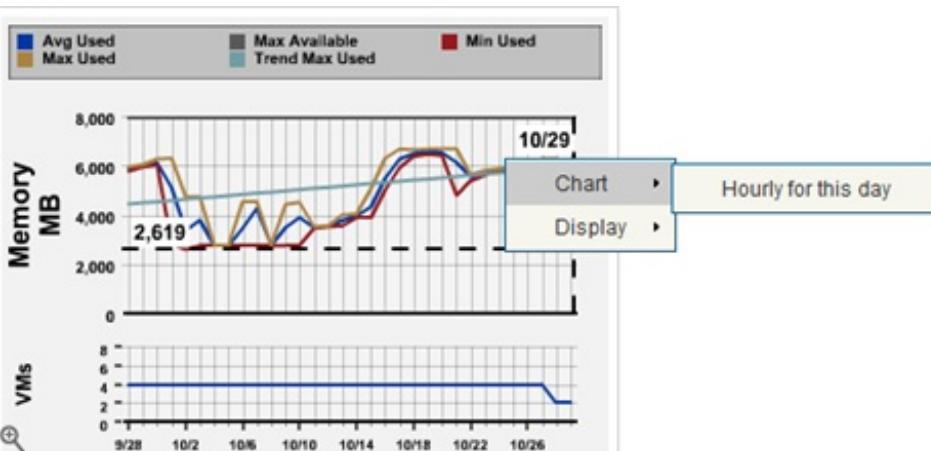
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1. Navigate to the chart for which you want to view more detail.

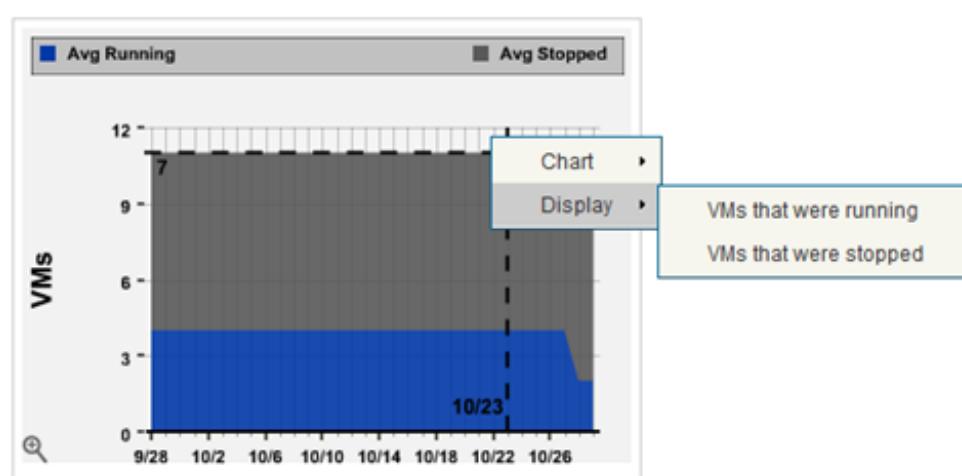
- The figure below shows a memory usage chart for a host.
2. Hover over a data point to see the coordinates:



3. Click a data point to open a shortcut menu for the chart.
- The figure below shows the shortcut menu, which displays the hourly chart or the VMs that were running when the data was captured:



4. While viewing the CPU, Disk, Memory, or Network charts, you can do the following:
- Select **Chart** to change all of the charts on the page to the new interval selected.
 - Select **Display** to drill in to the virtual machines or hosts that were running at the time.
5. Click a VM to go to its details:



7. View Utilization Trend Summary

1. From **Optimize** → **Utilization**, click the **Summary** tab.
 2. On the left, expand **Cloud/Infrastructure Providers** → **RHEVM** → **Cluster / Deployment Role**.
 3. Select **Default**.
 4. Wait for the collected data to process and a chart/summary to appear.
 5. Explore the data.
 6. On the left, expand the **Datastores** tree and select a datastore.
 7. Wait for the collected data to process and a chart/summary to appear.
 8. Explore the data.
-

8. View Details of Utilization Trend

1. From **Optimize** → **Utilization**, click the **Details** tab.
 2. On the left, expand **Cloud/Infrastructure Providers** → **RHEVM** → **Cluster / Deployment Role**.
 3. Select **Default**.
 4. Wait for the collected data to process and a detailed chart to appear.
 5. Explore the data.
 6. On the left, expand the **Datastores** tree and select a datastore.
 7. Wait for the collected data to process and a detailed chart to appear.
 8. Explore the data.
-

9. View Report of Utilization Trend

1. From **Optimize** → **Utilization**, click the **Report** tab.
2. On the left, expand **Cloud/Infrastructure Providers** → **RHEVM** → **Cluster / Deployment Role**.
3. Select **Default**.
4. Wait for the collected data to process and a detailed report to appear.
5. Explore the data.
6. On the left, expand the **Datastores** tree and select a datastore.
7. Wait for the collected data to process and a detailed report to appear.

-
8. Explore the data.

10. Project Placement of New VM

1. Click **Optimize** → **Planning**.
2. On the left, set **Reference VM Selection** to **All VMs**.
3. Select the **training-vm** as your model.
4. In **VM Options**, set **Source** to **Reservation**.
5. In **Target Options**, set **Show** to **Hosts**.



You can select a limit for how high the projection can go for vCPUs, Memory, and Disk (Datastore).

6. In **Trend Options**, use one week for trend data.
7. Click **Submit**.
8. Click the **Report** tab to see the best fit and statistics on the reference VM in a tabular format.
9. In **Target Options**, set **Show** to **Clusters**.
10. Click **Submit**.

11. Right-Size VM

1. From **Infrastructure** → **Virtual Machines**, click the **training-vm** VM.
2. Click **(Configuration)** and then **(Right-Size Recommendations)**.
3. In the new page that appears next to the **Normal Operating Range**, explore three different memory and CPU recommendations.

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Access Control Lab

1. Built-in Named Groups and Roles in Identity Management (IdM)
 2. Custom Roles, Users, and Groups
-

Access Control Lab

1. Built-in Named Groups and Roles in Identity Management (IdM)

If your directory server has the predefined group names as shown in the table below, you can add users to those groups without creating any custom groups in CloudForms.

The Identity Management (IdM) server in this lab environment is preconfigured with the following users and groups:

LDAP Group Name	CloudForms Management Engine Account Role	LDAP Username
EvmGroup-administrator	Administrator	cfadmin
EvmGroup-approver	Approver	approver
EvmGroup-auditor	Auditor	auditor
EvmGroup-operator	Operator	operator
EvmGroup-security	Security	security
EvmGroup-super_administrator	Super Administrator	super_administrator
EvmGroup-support	Support	support
EvmGroup-user	User	user



1. Log out of the **admin** account and log in using some of the users on the preceding table.
 - o The user login is in the **LDAP Username** column.
 - o All passwords are set to **r3dh@t1!**.
2. Check whether the GUI for CloudForms Management Engine looks different for each user.

2. Custom Roles, Users, and Groups



In order for the lab instructions to work properly, use the names as shown in the chart.

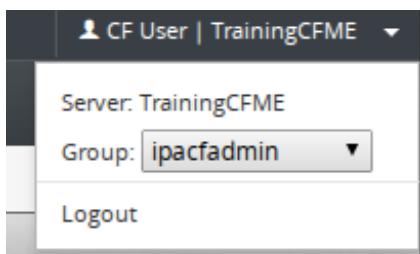
1. From **Configure** → **Configuration**, select the **Access Control** accordion.
2. On the left side, under **Region**, click **Roles**.
3. On the right side, click **Configuration** and then click **Add a new Role**.
4. Create a role:
 - a. Set **Name** to **limited-role**.
 - b. Set **VM & Template Access Restriction** to **None**.
 - c. In **Product Features (Editing)**, uncheck **Everything**, and check **Services** and **Infrastructure**.
 - d. Click **Add**.
5. Create another role:
 - a. Set **Name** to **admin-role**.
 - b. In **Product Features (Editing)**, make sure **Everything** is checked.
 - c. Click **Add**.
6. From **Configure** → **Configuration**, select the **Access Control** accordion.
7. On the left side, under **Region**, click **Groups**.
8. On the right side, click **Configuration** and then click **Add a new Group**.
9. Create a group:
 - a. Set **Description** to **ipacflimited**.
 - b. Set the role for this group to **limited-role**.
 - c. Select the existing tenant.
 - d. Click **Add**.

10. Create another group:

- a. Set **Description** to **ipacfadmin**.
- b. Set the role for this group to **admin-role**.
- c. Select the existing tenant.
- d. Click **Add**.

11. Test the configuration:

- a. Log out from the CloudForms Management Engine.
- b. Log in again using **Username: user** and **Password: r3dh@t1!**.
- c. At the upper-right side of your screen, click the user information section to see the changes to the UI according to the logged-in user:



- d. Change the **Group** selection and watch the GUI change.
- e. Repeat the previous step multiple times to see how the GUI changes each time you change the group membership.

12. When finished, log out and log in again as **admin**.

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Access Control Lab

1. Built-in Named Groups and Roles in Identity Management (IdM)
 2. Custom Roles, Users, and Groups
-

Access Control Lab

1. Built-in Named Groups and Roles in Identity Management (IdM)

If your directory server has the predefined group names as shown in the table below, you can add users to those groups without creating any custom groups in CloudForms.

The Identity Management (IdM) server in this lab environment is preconfigured with the following users and groups:

LDAP Group Name	CloudForms Management Engine Account Role	LDAP Username
EvmGroup-administrator	Administrator	cfadmin
EvmGroup-approver	Approver	approver
EvmGroup-auditor	Auditor	auditor
EvmGroup-operator	Operator	operator
EvmGroup-security	Security	security
EvmGroup-super_administrator	Super Administrator	super_administrator
EvmGroup-support	Support	support
EvmGroup-user	User	user



1. Log out of the **admin** account and log in using some of the users on the preceding table.
 - o The user login is in the **LDAP Username** column.
 - o All passwords are set to **r3dh@t1!**.
2. Check whether the GUI for CloudForms Management Engine looks different for each user.

2. Custom Roles, Users, and Groups



In order for the lab instructions to work properly, use the names as shown in the chart.

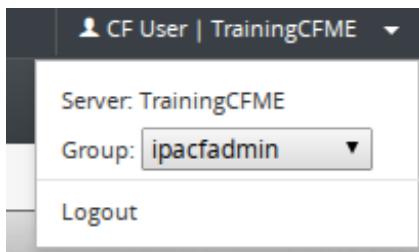
1. From **Configure** → **Configuration**, select the **Access Control** accordion.
2. On the left side, under **Region**, click **Roles**.
3. On the right side, click **Configuration** and then click **Add a new Role**.
4. Create a role:
 - a. Set **Name** to **limited-role**.
 - b. Set **VM & Template Access Restriction** to **None**.
 - c. In **Product Features (Editing)**, uncheck **Everything**, and check **Services** and **Infrastructure**.
 - d. Click **Add**.
5. Create another role:
 - a. Set **Name** to **admin-role**.
 - b. In **Product Features (Editing)**, make sure **Everything** is checked.
 - c. Click **Add**.
6. From **Configure** → **Configuration**, select the **Access Control** accordion.
7. On the left side, under **Region**, click **Groups**.
8. On the right side, click **Configuration** and then click **Add a new Group**.
9. Create a group:
 - a. Set **Description** to **ipacflimited**.
 - b. Set the role for this group to **limited-role**.
 - c. Select the existing tenant.
 - d. Click **Add**.

10. Create another group:

- a. Set **Description** to **ipacfadmin**.
- b. Set the role for this group to **admin-role**.
- c. Select the existing tenant.
- d. Click **Add**.

11. Test the configuration:

- a. Log out from the CloudForms Management Engine.
- b. Log in again using **Username: user** and **Password: r3dh@t1!**.
- c. At the upper-right side of your screen, click the user information section to see the changes to the UI according to the logged-in user:



- d. Change the **Group** selection and watch the GUI change.
- e. Repeat the previous step multiple times to see how the GUI changes each time you change the group membership.

12. When finished, log out and log in again as **admin**.

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Tags Lab

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 2. Create Company Tag Value
 3. Delete Company Tag Value
 4. Tag Configuration Items
 5. Apply Tag to User or Group
 6. Assign Provisioning Scope Tags
 7. Create Provisioning Scope Using Tags
 8. Filter Report by Tag
 9. Create Tag for Future Labs
-

Tags Lab

1. Create Tag Category

1. From **Configure** → **Configuration**, select the **Settings** accordion.
2. On the left, click **CFME Region: Region 0 [0]**.
3. From the tabs on the right, click the **<your company> Categories** tab.
4. Click **<Click on this row to create a new category>**, as shown in the example here:

Settings Region "Region 1 [1]"

Details	C & U Collection	TrainingCompany Categories	TrainingCompany Tags	Import Tags	Import	Red Hat Updates
		Name	Display Name		Show in	
		<Click on this row to create a new category>				
	cc		Cost Center		true	
	customer		Customer		true	
	department		Department		true	
	environment		Environment		true	

5. Use the following settings for the new category:

- a. Set **Name** to **my_category**.

- The Name field can contain only lowercase letters, integers, and underscores.
- You cannot change the Name and Single Value fields after you add the category.

- b. Set **Description** and **Long Description** to **My Category**.

- The **Description** specifies how you want to see the name of the category in the CloudForms Management Engine Console.

- The **Long Description** provides a brief explanation of how the category should be used, which helps when you add a value to the category.
- c. Check **Show in Console**.
- This option enables you to populate values for the category before exposing it to users.
- d. Check **Single Value**.
- Use this option for categories that can have only a single value assigned to a resource.
 - For example, a VM can be assigned to only one Location, but it could belong to more than one Department.
- e. Do not check **Capture C & U Data by tag**.
- This option enables you to group capacity and utilization data by this tag category.
 - This feature increases the amount of space required by the virtual management database, or VMDB, and requires additional computing resources.
 - When using this option, assign this tag to all the resources by which you want to group data.

6. Click **Add**.

7. Once you create a category, add values to it. This process is covered in the next exercise.



If you do not create values for a category, you cannot assign a value from that category or filter by that category.

2. Create Company Tag Value

Once you create your values, use them to tag the items in your infrastructure. To create a company tag value:

1. From **Configure** → **Configuration**, select the **Settings** accordion.
2. On the left side, click **Region**.
3. On the right, click the **<your company> Tags** tab.
4. Set **Category** to **My Category**, which you just created:

Choose a Category

Category	My Category
Description	My Category Description
Show In Console	true

My Category Entries

	Name	Display N
+	<New Entry>	<Click on this row to create a new entry>



Some categories allow only one value to be assigned to a resource.

5. Click <New Entry>, and do the following:
 - a. Set **Name** to **my_tag_1**.
 - b. Set **Description** to **My 1st Tag**.
 - c. Click **(Add this entry)**, or press **Enter**, to confirm the entry.

3. Delete Company Tag Value

1. From **Configure** → **Configuration**, select the **Settings** accordion.
2. On the left side, click **Region**.
3. Click the <**your company**> **Tags** tab.
4. Look for the **my_category** category that you created earlier.
5. In the category entries section, click **(Click to delete this entry)** next to the tag you want to delete.
6. For this lab, you do not want to delete the tag now, so do not click **OK**. Instead, click **Cancel**.



When you delete a tag, the tag is also deleted from any resource to which it is assigned.

4. Tag Configuration Items

1. Navigate to **Infrastructure** → **Hosts**.
2. Check the **rhelkvm** host.
3. Click **(Policy)**, and then click **(Edit Tags)**.

4. Select the customer tag you created earlier from the first list, and then select a value for the tag, as shown:

Hosts

Tag Assignment

Select a customer tag to assign:	Cost Center *	<Select a value to assign>
Category		
No TrainingCompany Tags are assigned		

* Only a single value can be assigned from these categories

5. Click **Save** to immediately apply the tag to the selected items.
6. Navigate to **Infrastructure → Hosts**.
7. Click the **rhelkvm** host.
8. Look at the **Smart Management** section. Verify that you see the tag attached to the host, as shown in this example:

Smart Management	
TrainingCompany Tags	My Category: My 1st Tag

5. Apply Tag to User or Group

1. From **Configure → Configuration**.
2. On the left side, select the **Access Control** accordion.
3. On the left side, under **Region**, navigate to the **user** user you created.
4. At the top, click **(Policy)**, and then click **(Edit <Company> Tags for this user)**.
5. In **Select a customer tag to assign**, select any tag to assign, and then set the value.
6. Click **Save** to assign the tag.
7. Click the user and look under **Smart Management** to see the assigned tag.
8. Repeat the process, this time with one of the groups.

6. Assign Provisioning Scope Tags

You can use tags to limit which hosts, clusters, datastores, and templates a group can select. In this lab you tag a template to limit which users are allowed to see it.

1. From **Infrastructure → Virtual Machines**, select the **VMs & Templates** accordion.
2. Click **All VMs & Templates**.

3. Check the box next to the **dsl** template.
 4. Click **(Policy)**, and then click **(Edit Tags)**.
 5. From **Select a customer tag to assign**, choose **Provisioning Scope** with a value of **All**.
 6. Click **Save** to immediately apply the tags to the selected items.
-

7. Create Provisioning Scope Using Tags

In this exercise, you modify a user group with a tag filter. If you are using VM Access Restrictions, the filters are applied during provisioning only for selecting templates.

1. From **Configure** → **Configuration**, select the **Access Control** accordion.
 2. On the left side, under **Region**, click **Groups**.
 3. Select the **ipacflimited** group you created earlier.
 4. Click **Configuration**, and then click **Edit this Group**.
 5. In the **Assign Filters** section, on the right under the **<company> Tags** tab, select **Provisioning Scope** with the value **All**.
 6. Click **Save** to limit this group to the items tagged with the selected tag values.
 7. Review the outcome:
 - a. Log out as **admin**.
 - b. Log in as **user**.
 - c. At the top right, toggle the group to **ipacflimited**.
 - d. Navigate to **Infrastructure** → **Virtual Machines**.
 - You see only the **dsl** template.
 - The sections under **Providers**, **Clusters**, and **Hosts** are empty.
 - If tagged with the **Provisioning Scope: All**, they would be visible.
 8. Log out as **user**.
 9. Log back in as **admin**.
-

8. Filter Report by Tag

In the steps that follow, you filter a report by tag. You repeat these steps in the module that covers reporting.

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1. Assign the custom tag you created earlier to a random VM in the environment. Use steps

similar to those you used to assign a tag to a host, in the *Tag Configuration Items* section.

2. Modify the custom report you created earlier.
 3. From the **Filter** tab, select **Tag**, the tag category, and the value you created in the earlier lab to filter by.
 4. Click .
 5. Click the **Preview** tab.
 6. Click **Load** to load a sample report.
 - Only the VM marked with your custom tag should show up in the report.
 7. Click **Save**.
-

9. Create Tag for Future Labs

In this exercise, you create a tag to use in one of the Policy exercises later in this course.

1. Navigate to <My Company Tags>.
2. Select the **Owner** category.
3. Create a tag with a **Name** of **windows_team** and **Display Name** of **Windows Team**.
4. Save your work.

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Reporting Lab



Some exercises in this lab require at least 24 hours of data before running.

Verizon-CL220VT-06202016

1. Generate Single Report

1. From **Cloud Intelligence** → **Reports**, select the **Reports** accordion.
2. Navigate to **All Reports** → **Configuration Management** → **Virtual Machines** → **Vendor and Guest OS**.
3. Click **(Queue this report to be generated)**.
4. Observe that the report generation is placed in the queue and its status appears in the report's page.



The report's page is located at **Cloud Intelligence** → **Reports Accordion** → **All Reports** → **Configuration Management** → **Virtual Machines** → **Vendor and Guest OS**.

5. Click **(Reload current display)** to update the status.
6. When a report finishes generating, a green check mark appears, as shown in the example; click its row to view the report:



2. Change Report View

In this exercise, you display a report in a selected view.

1. From **Cloud Intelligence** → **Reports**, select the **Saved Reports** accordion.
2. Navigate to the report you generated in the previous exercise.
3. Click the appropriate image for the view you want:
 - Click **Graph View**.
 - Click **Hybrid View**.
 - Click **Tabular View**.

3. Download Reports

The report is automatically named with its type and date. You download it for further analysis or printing by following these steps:

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1. From **Cloud Intelligence** → **Reports**, select the **Saved Reports** accordion.

2. Navigate to the report you generated earlier.
 3. Click  (**Report Download**) and select the type of export you want to download:
 - Click **TXT** to download the report as a text file.
 - Click **CSV** to download the report as a comma-separated file.
 - Click **PDF** to download the report as a PDF.
-

4. Show Report in Full Screen

1. From **Cloud Intelligence** → **Reports**, select the **Saved Reports** accordion.
 2. Navigate to the report you generated earlier.
 3. On the right side, click **Configuration** and then click **Show full screen report**.
 4. Click **OK**.
 - The report opens in its own window or tab without displaying any menus, buttons, or other controls.
 - You can print the page by using your browser's print function.
 5. Close the new window or tab.
-

5. View Saved Report

1. From **Cloud Intelligence** → **Reports**, select the **Saved Reports** accordion.
 2. Navigate to the report you generated earlier.
 3. Click the instance of the report you want to view.
-

6. Schedule Datastore Summary Report

1. From **Cloud Intelligence** → **Reports**, select the **Reports** accordion.
2. Navigate to **All Reports** → **Configuration Management** → **Storage** → **Datastore Summary for VMs**.
3. On the right side, click **Configuration** and then click **Add a new Schedule**.
 - For this exercise, the **Basic Information** and **Report Selection** areas are pre-populated when you add the Schedule directly from the Report.
4. Optionally, from the Schedule accordion, use the **Filter** lists to select the report that you want to schedule:

Basic Information

Name	Datastore Summary for VMs
Description	Datastore Summary for VMs
Active	<input checked="" type="checkbox"/>

Report Selection

Filter	Configuration Management ▾
	Storage ▾
	Datastore Summary for VMs ▾

5. In the **Timer** area, click the **Run** list to review the options available for how often you want the analysis to run. Your options after that depend on which run option you choose:
 - Choose **Once** to run the analysis just one time.
 - Choose **Daily** to run the analysis on a daily basis. You are prompted to select how many days you want between each analysis.
 - Choose **Hourly** to run the analysis hourly. You are prompted to select how many hours you want between each analysis.
6. For this lab, choose **Once**.
7. Click the **Starting Date** field to open a calendar tool and select a date to begin the schedule.
8. Set the starting time to be after the next hour.
9. Click **Add** when you are finished.

7. Modify Report Schedule

1. From **Cloud Intelligence** → **Reports**, select the **Schedules** accordion.
2. Click the schedule you want to edit. For this exercise, select the one you just created.
3. On the right, click **Configuration** and then click **Edit this Schedule**.
4. Change the report to run in the next minute.
5. Click **Save**.

8. View Scheduled or Saved Reports

1. From **Cloud Intelligence** → **Reports**, select the **Saved Reports** accordion.
 2. On the right side, click **(Reload current display)** to reload until the scheduled report becomes available on the right.
 3. Click **Report** to view it.
-

9. Delete Saved Report

1. From **Cloud Intelligence** → **Reports**, select the **Saved Reports** accordion.
 2. On the left, select **All Saved Reports**.
 3. Select any report to delete.
 4. On the top, click **Configuration**, and then click **(Delete this Saved Report from the Database)**.
-

10. Create Report with Summary Values

Follow these steps to create a new report accessible from the **<my company>/Custom** folder in the **Reports** accordion:

1. From **Cloud Intelligence** → **Reports**, select the **Reports** accordion.
2. On the left side, select **All Reports**.
3. On the right side, click **Configuration** and then click **Add a new Report**.
4. In the **Columns** tab, set the following:
 - a. Under **Basic Report Info**, enter a unique name in **Menu Name** and add a related title in **Title**.
 - b. Under **Configure Report Columns**, set **Base the report on** to **VMs and Instances**.
 - c. In **Available Fields**, select the following fields by clicking them and clicking **Add** under the list, as shown in the image below:
 - Host Names
 - Name
 - Number of CPUs
 - Memory

Adding a new Report

Columns Consolidation Formatting Styling Filter Summary Charts Timeline Preview

Basic Report Info

Menu Name	Test01
Title	Test Report01

Configure Report Columns

* Base the report on: VMs and Instances

Available Fields:

- Active
- Allocated Disk Storage
- Annotation
- Archived
- Autostart
- Boot Time
- Busy
- CPU - % Overallocated
- CPU - Aggregate Usage Rate for Child VMs for Collected Intervals 30 Day Max (MHz)
- CPU - Aggressive Recommendation Savings (%)

Selected Fields:

- Host Names
- Name
- Number of CPUs
- Memory

* Caution: Changing these fields will clear all selected values below them!

Report Creation Timeout

Cancel after: <System Default>

5. Near the top, click the **Summary** tab and do the following:
 - a. In the **Sort Criteria** section, set **Sort the Report By** to **Host Names**.
 - b. In the new fields that appear, set **Within Above Field, Sort By** to **Name**.
6. Click the **Consolidation** tab and set the following:
 - a. Set **Column 1** to **Number of CPUs**.
 - b. In the **Specify Calculations** section, click the **Check Options** list and check the boxes next to **Maximum** and **Minimum**.
7. Click the **Preview** tab and do the following:
 - a. In the **Generate Report Preview** area, click **Load** to see a sample of your report, as shown below.
 - b. When you have the report you want, click **Add** to create the new report.

The screenshot shows the CloudForms Management Engine interface. On the left, there's a sidebar titled 'Saved Reports' and 'Reports'. Under 'Reports', there's a tree view with categories like 'All Reports', 'Configuration Management', 'Migration Readiness', etc., and a 'Custom' section where 'Test01' is selected. The main panel on the right displays 'Report "Test01"'. It has tabs for 'Report Info' (which is selected) and 'Saved Reports'. Below the tabs, the report title is 'Test01'. A table provides detailed information about the report:

Title	Test Report01
Sort By	Host Names, Name
Based On	VM and Instance
User	admin
EVM Group	EvmGroup-super_administrator
Updated On	11/24/14 10:04:02 EST

Below the table, there are sections for 'Schedules' (with a note: 'Report is not Scheduled.') and 'Widgets' (with a note: 'Report doesn't belong to Widgets.').

11. Export Report

In this section, you export a report as a **yml** file that can be imported into another VMDB.

1. From **Cloud Intelligence** → **Reports**, select the **Import/Export** accordion.
2. In the **Export** section on the right, select the report that you created in the previous exercise.
3. Click **Export** at the bottom right.

12. Import Report

In this series of steps, you import a report into the **<my company>/Custom** folder under the **Reports** accordion.

1. From **Cloud Intelligence** → **Reports**, select the **Import/Export** accordion.
2. In the **Import** area, click **Choose File** to find the file to import.
3. Browse to the **yml** file exported from another CloudForms Management Engine and select it.
4. If you want to overwrite an existing report with the same name, check the **Overwrite existing reports** box.
5. Click **Upload**.

13. Copy Report

Follow these steps to create a new report that is accessible from the **<my company>/Custom** folder in the **Reports** accordion.

1. From **Cloud Intelligence** → **Reports**, select the **Reports** accordion.
2. On the left side, navigate to **Configuration Management** → **Virtual Machines** → **VM Location and Size**.
3. At the top, click **Configuration**, then click **(Copy to a new Report)**.
4. In the **Columns** tab, set the following:
 - a. Under **Basic Report Info**, change to a new **Menu Name** and set **Title** to **VM Location and Size with Cluster**.

 Each menu name must be unique.
 - b. Under **Available Fields**, click **Cluster** and then click **(Move selected fields down)** to add the field to the report.
 - c. From **Selected Fields**, click **Date Created** and then click **(Move selected fields up)** to remove that field from the report.
 - d. Remove the **Datastore Path** and **Date Updated** fields.
 - e. With the **Cluster** field in the **Selected Fields** area, select it and move it up to just under **Datastore: Name** by using **(Move selected fields up)** on the right of the **Selected Fields** area.
5. Click the **Formatting** tab, and at the bottom of the **Specify Column Headers and Formats** section, change the header for **Last Sync Time** to **Last Analysis**.
6. Click the **Preview** tab, and then click **Load** to see a sample of your report.
7. Click **Add** to create the new report.

14. Edit and Sort Report

1. From **Cloud Intelligence** → **Reports**, select the **Reports** accordion.
2. Under **<my company>/Custom**, select the report you want to edit. In this case, select **VM Location and Size with Cluster**.
3. On the right side, click **Configuration** and then click **(Edit this Report)**.
4. Click the **Summary** tab.

5. In the **Sort Criteria** area, set **Sort the Report By** to **Cluster**.
 6. Set **Within Above Field, Sort By**, to **Host: Name**.
 7. Click the **Preview** tab.
 8. Click **Load** and confirm that these are the changes you want to make.
 9. Click **Save** to commit the changes.
-

15. Filter Report by Tag

1. Assign the tag you created earlier to a random VM in the environment.
 - You created this tag in the *Create Tag for Future Labs* section of the *Tags* module.
 2. Make the following changes to the custom report you created earlier in the *Create Report with Summary Values* section:
 - a. From the **Filter** tab, select **Tag**, the tag category, and the value you created in the earlier lab to filter by.
 - b. Click **Save** to commit your changes.
 3. Click the **Preview** tab.
 4. Click **Load** to load a sample report.
 5. Confirm that only the VM marked with your custom tag appears in the report.
 6. Click **Save**.
-

16. Add Performance Report

In this section, you create a performance report and make it accessible from the **<my company>/Custom** folder in the **Reports** accordion.

1. From **Cloud Intelligence** → **Reports**, select the **Reports** accordion.
2. On the left side, click **All Reports**.
3. On the right side, click **Configuration** and then click **Add a new Report**.
4. In the **Columns** tab, set the following:
 - a. Under **Basic Report**, enter a unique name in **Menu Name** and add a related title in **Title**.
 - b. Under **Configure Report Columns**, set **Base the report on** to **Performance - Clusters**.
 - c. Set **Performance Interval** to **Daily**.
 - d. In **Available Fields**, select:

- Cluster
 - Activity Sample -- Day (MM DD YY)
 - CPU -- Aggregate Time Child VMs Spent in Ready State (ms)
- e. Change the order of the fields in the report by clicking the field and using the buttons on the right.
5. Click the **Formatting** tab to specify the column titles you want displayed for each field. For this report, you can use the defaults.
 6. Click the **Preview** tab, and then click **Load** to see a sample of your report.
 7. When you have the report that you want, click **Add** to create the new report.
-

17. Add Trend Report for Datastore Disk Usage

1. From **Cloud Intelligence** → **Reports**, select the **Reports** accordion.
 2. On the left side, click **All Reports**.
 3. On the right side, click **Configuration** and then click **Add a new Report**.
 4. In the **Columns** tab, set the following:
 - a. Under **Basic Report**, enter a unique name in **Menu Name** and add a related title in **Title**.
 - b. Under **Configure Report Columns**, set **Base the report on** to **Performance Trends**.
 - c. Set **Trending for** to **Performance - Datastore: Disk Space Max Used**.
 - d. Set **Trend Target limit** to **Disk Space Max Total**.
 - e. From **Trend Target Percents**, select **70, 80, and 100**.
 5. Click the **Filter** tab to specify how far back in the data you want to go to create the trend:
 - a. Set **Show Daily data from** to **Yesterday**.
 - b. Set **going back to 1 month**.
 6. Click the **Preview** tab, and then click **Load** to see a sample of your report.
 7. When you have the report that you want, click **Add** to create the new report
-

18. Create Report Grouped by Date/Time

You create a new report accessible from the **<my company>/Custom** folder by following this series of steps.

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1. From **Cloud Intelligence** → **Reports**, select the **Reports** accordion.

2. On the left side, click **All Reports**.
3. On the right side, click **Configuration** and then click **Add a new Report**.
4. In the **Columns** tab, set the following:
 - a. Under **Basic Report**, enter a unique name in **Menu Name** and add a related title in **Title**.
 - b. Under **Configure Report Columns**, set **Base the report on** to **VMs and Instances**.
 - c. From **Available Fields**, select **Name** and **Boot Time**.
5. Select the **Summary** tab and set the following:
 - a. Under **Sort Criteria**, set **Sort the Report By** to **Boot Time**.
 - b. From the list that appears to the right, select **Week**.
 - c. Set **Sort Order** to **Descending** to see the most recent boot time first.
 - d. Set **Show Sort Breaks** to **Yes**.
 - e. Set **Format on Summary Row** to **Date (M/D/YY)** to see the date range for the week that you are grouping on.
6. Select the **Preview** tab, and then click **Load** to see a sample of your report.
7. When you have the report that you want, click **Add** to create the new report.

19. Add Report

1. From **Cloud Intelligence** → **Reports**, select the **Reports** accordion.
2. On the left side, click **All Reports**.
3. On the right side, click **Configuration** and then click **Add a new Report**.
4. In the **Columns** tab, set the following values:
 - a. Under **Basic Report**, enter a unique name in **Menu Name** and add a related title in **Title**.
 - b. Under **Configure Report Columns**, set **Base the report on** to anything you want.

 If you change the report basis or interval, all of the selections below them are reset.
 - c. Select fields that you want in the report from **Available Fields**, and then click **(Move selected fields down)**.
 - d. Optionally, select any tags that you have created and assigned.
 - e. Change the order of the fields in the report by clicking **(Move selected fields up)** or **(Move selected fields down)**.

5. Select the **Consolidation** tab to consolidate and aggregate data points into maximum, minimum, average, and total:



This is useful for analyzing performance data over a specific period of time. If you do this, individual records are not visible, but rather the aggregate is calculated and displayed in the report.

- a. Select the columns to group by.
- b. For each numeric field selected in the report, click the list under **Calculations** and check the calculations you want to use.

6. Select the **Formatting** tab and set the following:

- a. Under **Specify Column Headers and Format**, set the header you want displayed for each field.
- b. For each numeric field, use the list to the right of the header to set the display format.

Adding a new Report

Columns Consolidation **Formatting** Styling Filter Summary Charts Timeline Preview

Basic Report Info

Menu Name	Test-2
Title	Test Report 2

PDF Output

Page Size: US Letter - 8.5in x 11.0in

Specify Column Headers and Formats

Column Name	Header	Format
Boot Time	Boot Time	Date/Time (M/D/Y H:M:S Z)
Name	Name	<None>

7. Select the **Filter** tab to set filters for the data displayed in the report. There are two types of filters to explore:

- o **Record Filter:** This is the primary filter of the main table's records.
- o **Display Filter** This is a secondary filter of rows based on the fields of the child table.
 - a. In the first list, select **Field** to create criteria based on field values.
 - b. In the second list that appears, select criteria based on the count of something, such as the number of snapshots for a virtual machine, or the number of virtual machines on a host.
 - c. Click **Tag** to create criteria based on tags assigned to your resources. For example, you may want to check the power state of a VM or see if it is tagged as production.
 - d. Click **Registry** to create criteria based on registry values. For example, you may want to check if DCOM is enabled on a Windows system. Note that this applies only to Windows operating systems.
 - e. Change the first list to **Find** to search for a particular value, and then check a

property. For example, finding the Admin account and checking that it is enabled.

- f. Click **(Commit Expression Element Changes)** to add the expression.

- The filters that you apply show at the bottom of the report.

8. Select the **Summary** tab to select sort order, sort type, groupings, and group calculations for the report:

- **Summary** groups rows of data based on the sort breaks.
- You can only sort by fields that display in the report.
 - a. Set the primary sort in **Sort the report by**.
 - b. Set the secondary sort in **Within the above field, sort By**.
 - c. In **Sort Order**, select **Ascending** or **Descending**.
 - d. In **Show Sort Breaks**, select **Yes** to show the sort breaks, **Counts** to show sort breaks with the count, or **No** to omit sort breaks.
 - e. For any numeric field, select to show minimum, average, maximum, and total in the sort break.

9. Click the **Charts** tab to create a chart for the report:

- a. Use **Choose a chart type** to select a type of chart.



Some charts may not produce the result you are looking for based on the types of fields in the report and its sort order.

- b. If you want to see only the top values, select the number of top values from **Top values to show**.
- c. If you want to see the total number of values that are not **categorize and evaluate to “other”**, check **Sum ‘Other’ values**.

10. Click the **Timeline** tab and set the following:

- a. Use **Base Timeline on** to select a column (in date or time format) for the report.
- b. Select a unit of time for the first band in **First band unit**.
- c. Select a unit of time for the second band in **Second band unit**.
- d. Select a unit of time for the third band in **Third band unit**.
- e. In **Event to position at**, select an event.
- f. Select the range for the event to position from **Show events from last**.



If you select a timeline for a report, that timeline also shows on the **Timelines** page of **Virtual Intelligence**. The filters that you apply show on a timeline report so that you know which filters are applied.

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11. Click the **Preview** tab, and then click **Load** to see a sample of your report.

12. When you have the report that you want, click **Add** to create the new report.
-

20. Create Accordion and Folder

In these steps, you add reports to the report menu for a specified account role. You add a new accordion and its folders. Repeat this procedure for any role for which you want these accordions and folders.

1. From **Cloud Intelligence** → **Reports**, select the **Edit Report Menus** accordion.
2. Click the group that you created in an earlier lab, whose menus you want to customize.
3. In the **Reports** section, click **Top Level**.
4. Under **Manage Accordions**, do the following:

- a. Click **(Add folder to selected Accordion)** to add an Accordion.



When creating a new accordion, you must first select **Top Level** under **Reports**, as you did here.

- b. To name the accordion, double-click **New Folder**.
- c. Type **ACME** (or any other name you want) for the name of the new accordion.
- d. When you are finished adding accordions, click **(Commit folder management changes)**.



To revert, click **(Discard folder management changes)**.

5. Click the new accordion you created in the **Reports** section.
6. Add a folder as follows:
 - a. Click **(Add subfolder to selected folder)**.
 - b. To name the folder, double-click **New Folder** in the **Manage Accordions** area.
 - c. Repeat until all folders have been added to the accordion.

Editing EVM Group "my_group"

Reports

- ▼ Top Level
 - ▶ Configuration Management
 - ▶ Migration Readiness
 - ▶ Operations
 - ▶ VM Sprawl
 - ▶ Relationships
 - ▶ Events
 - ▶ Performance by Asset Type
 - ▶ Running Processes
 - ▶ Trending
 - ▶ Provisioning
- ▼ ACME
 - ▶ 2nd Folder

Manage Accordions & Folders

Please select a node at left to edit.

7. Click **Save**.



You can add a folder to an existing folder by selecting the existing folder at the beginning of the process.

21. Add Reports to Report Menu Folders

In this section, you add reports to report menus' folders.

1. From **Cloud Intelligence** → **Reports**, select the **Edit Report Menus** accordion.
2. Click the group whose menus you want to customize.
3. Expand the **Report** accordions and menus, using the triangles to the left of the item name, until you are able to select the subfolder in which you want to put reports.
4. Under **Available Reports**, select a report on the right and click the **(Move selected reports left)**.
5. When you are finished making changes, click **(Commit report management changes)**.
6. Click **Save**.

22. Create Report Widget

Follow these steps to add a widget to the Dashboard:

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1. From **Cloud Intelligence** → **Reports**, select the **Dashboard Widgets** accordion.

2. On the left side, navigate to the **All Widgets** → **Reports** folder.
3. On the right side, click **Configuration**, and then click **Add a new Widget**.
4. Under **Basic Information**, do the following:
 - a. Enter a **Title** and **Description**.
 - b. By default the widget is active when you create it. To make it inactive, uncheck the **Active** box.
5. Under **Report Options**, do the following:
 - a. Set **Filter** to **<my company>** and select **Custom** in the list that appears.
 - b. Select the report in the next list.
 - c. Select up to four columns from that report.
 - d. For **Row Count**, select the number of rows that you want displayed.
6. In the **Timer** area, do the following:
 - a. Click the **Run** list to specify how often you want to update the widget data: **Hourly**, **Daily**, **Weekly**, or **Monthly**. The options displayed depend on which run option you choose.
 - b. Select a **Time Zone**.

 If you change the **Time Zone**, you need to reset the starting date and time.

 - c. Type or select a date to begin the schedule in **Starting Date**.
 - d. Select a **Starting Time** based on a 24-hour clock in the selected **Time Zone**.
7. In the **Visibility area**, choose one of the following:
 - Select **Show To All**, so that all users can use this widget regardless of the user role they are assigned.
 - Select **By Role** to assign this widget to specific user roles.
8. Click **Add**.

23. Create Chart Widget

1. From **Cloud Intelligence** → **Reports**, select the **Dashboard Widgets** accordion.
2. Navigate to the **All Widgets** → **Charts** folder.
3. On the right side, click **Configuration** and then click **Add a new Widget**.
4. Under **Basic Information**, do the following:
 - a. Enter a **Title** and **Description**.

- b. By default the widget is active when you create it. To make it inactive, uncheck the **Active** box.
5. From the **Chart Report** section, choose a chart.
6. In the **Timer** area, do the following:
 - a. Click the **Run** list to specify how often you want to update the widget data: **Hourly**, **Daily**, **Weekly**, or **Monthly**. The options displayed depend on which run option you choose.
 - b. Select a **Time Zone**.
-  If you change the **Time Zone**, you need to reset the starting date and time.
- c. Type or select a date to begin the schedule in **Starting Date**.
- d. Select a **Starting Time** based on a 24-hour clock in the selected **Time Zone**.
7. In the **Visibility area**, choose one of the following:
 - o Select **Show To All**, so that all users can use this widget regardless of the user role they are assigned.
 - o Select **By Role** to assign this widget to specific user roles.
8. Click **Add**.

24. Create RSS Feed Widget

1. Based on your experience in this and previous labs, create an RSS feed widget.

25. Add Widget to the Dashboard

1. From **Cloud Intelligence** → **Dashboard**, click the plus sign next to **Add a new Widget** (at the top left).
-  If you have not already created a widget, the plus sign is grayed out.
2. Select the widget you want to add from the list.
 - o Only widgets that are not currently showing on the dashboard appear in the list.

26. Filter Report by Tag



You used these steps in the previous lab, *Tags*.

1. Assign the custom tag you created earlier to a random VM in the environment.
2. Modify the custom report you created earlier.
3. From the **Filter** tab, select **Tag**, the tag category, and the value you created in the earlier lab to filter by.
4. Click **...**.
5. Click the **Preview** tab, and then click **Load** to see a sample of your report.



Only the VM marked with your custom tag should show up in the report.

6. Click **Save**.

27. Chargeback

27.1. Setting Compute and Storage Costs

The CloudForms Management Engine allows you to create your own set of computing and storage costs.



You can use Compute to set chargeback rates for CPU, disk I/O, memory, network I/O, and fixed items. You can use Storage to set chargeback rates for fixed and storage items.

1. Navigate to **Cloud Intelligence** → **Chargeback**.
2. Click the **Rates** accordion and select **Compute**.
3. Click **Configuration**, then **Add a new Chargeback Rate** to create a new chargeback rate.
4. For **Description** enter **MyComputeRates**.
5. For each item that you want to set, you can type in a rate and select a time option as described in the next section.
6. For **Used CPU in MHz** enter a rate of **0 . 04** and set the time to **Daily**.
7. For **Used Disk I/O in KBps** enter a rate of **0 . 006** and set the time to **Hourly**.
8. For **Used Memory in MB** enter **0 . 04** and set the time to **Daily**.
9. For **Used Network I/O in Kbps** enter **0 . 010** and set the time to **Hourly**.
10. Click **Add**.

27.2. Assigning Chargeback Rates

1. Navigate to **Cloud Intelligence** → **Chargeback**.
2. Click the **Assignments** accordion, and then click **Compute**.



You can use Compute to assign a compute chargeback rate. You can assign chargeback rates to The Enterprise, Selected Clusters, Selected Infrastructure Providers, or Tagged VMs and Instances. Similarly, you can use Storage to assign a storage chargeback rate. You can assign chargeback rates to The Enterprise, Selected Datastores, or Tagged Datastores.

3. From the **Basic Info** area, use the **Assign To** list to select **Selected Cloud/Infrastructure Providers**.
 - a. Under **Selections** there should only be one option, **rhevm**, in the list.
 - b. Select **MyComputeRates**.
 - c. Click **Save**.
4. Navigate to **Cloud Intelligence** → **Reports**.
 - a. Click the **Reports** accordion.
 - b. Click **Configuration**, then **Add a new Report**.
 - c. On the **Columns** tab, fill out the **Basic Report Info** area.
 - d. Type **MyChargebackReport** for **Menu Name**. ...Type **My Chargeback Report** for **Title**.
 - e. In the **Configure Report Columns** area, from the **Base the report on** list, select **Chargebacks**.
 - f. From **Available Fields** select **CPU Used**, **CPU Used Cost**, **Disk I/O Used**, **Disk I/O Used Cost**, **Memory Used**, **Memory Used Cost**, **Network I/O Used**, and **Network I/O Used Cost**.



To select multiple items, use **Ctrl+Click** in Windows or **Cmd+Click** in OS X.

5. Click **(Move selected fields down)**.



In addition to fields, you can also select any tags that you have created and assigned.



Do NOT click Add yet!

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6. Optionally, can change the order of the fields in the report by clicking **(Move selected fields up)** or **(Move selected fields down)**.
7. Click the **Formatting** tab and take note of the options to set the size of paper for a PDF and column header format.
8. Click the **Filter** tab and take note of the options available to set filters for the data displayed in the report.
 - a. For **Show Costs** by select **Owner**.
 - b. For **Owner** select any user that owns VMs.
9. Click the **Preview** tab, and then **Load** to see the report.
10. Click **Add** to create the new report.

28. Red Hat Insights

For Red Hat Insights to work, the CloudForms appliance must be subscribed via **subscription-manager** to a Red Hat Satellite server. Use these commands to subscribe the CloudForms appliance to the lab environment's Red Hat Satellite server.

1. From the **workstation** host, establish an SSH session to **cf.example.com** as **root**:

```
$ ssh root@cf.example.com  
#
```

2. Disable the OPENTLC repos on the CloudForms appliance:

```
# mv /etc/yum.repos.d/open.repo /etc/yum.repos.d/open.disabled
```

3. Bootstrap the CloudForms appliance with the necessary Red Hat Satellite certificates:

```
# rpm -Uvh http://sat.example.com/pub/katello-ca-consumer-latest.noarch.rpm
```

4. Subscribe the CloudForms appliance to the Red Hat Satellite server:

```
# subscription-manager register --org="Default_Organization" --activationkey=rhel7
```

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Control and Basic Automation Lab

1. Create Simple Policy Based on VM Reconfiguration

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In this exercise, you create a policy. After these steps you can make this part of a policy

profile. If you want a SmartState Analysis to occur for all of your VMs, assign the policy profile to all of your management systems.

1. From **Control** → **Explorer**, select the **Policies** accordion.
2. Navigate to **All Policies** → **Control Policies** → **VM Control Policies**.
3. Create a new policy as follows:
 - a. On the right side, click **Configuration** and then click **Add a New Control Vm Policy**.
 - b. In the **Basic Information** section, set **Description** to **my policy**, as shown:

Basic Information

Description	my policy
Active	<input checked="" type="checkbox"/>

- c. In the **Notes** section, optionally, enter additional details.
- d. Click **Add**.
4. Edit the policy as follows:
 - a. On the left, click the policy you just created.
 - b. On the right side, click **Configuration** and then click **(Edit This Policy's Event assignments)**.
 - All possible events display.
 - c. From the **VM Configuration** section, check **VM Settings Change**.
 - d. Click **Save**. You are returned to the main screen for the policy.
5. Configure an action as follows:
 - a. On the left side, under the new policy, click **VM Settings Change**.
 - b. Click **Configuration** and then click **(Edit Actions for this Policy Event)**.
 - c. In **Order of Actions if ALL Conditions are True**, select **Initiate SmartState Analysis for VM from Available Actions**.
 - d. Click **▶ (Move selected Actions into this Event)**.
 - e. Click **Save** when you are finished.

Event "VM Settings Change"

 Actions for Policy Event "VM Settings Change" were saved

Basic Information

Event Group	VM Configuration
Attached to Policy	my policy

Order of Actions if ALL Conditions are True

	Description
	Initiate SmartState Analysis for VM

Order of Actions if ANY Conditions are False

 This Event has no false Actions.

2. Create Policy Profile

1. From **Control** → **Explorer**, select the **Policy Profiles** accordion.
2. On the right side, click **Configuration** and then click **Add a new Policy Profile**.
3. For **Description**, enter **My Policy Profile**.
4. Select the policy you created in the last exercise and click ► (**Move selected Actions into this Event**) to add the policy.
5. Verify your screen looks similar to the image below:

Adding a new Policy Profile

Basic Information

Description	My Policy Profile
-------------	-------------------

Policy Selection

Available Policies:	Profile Policies:
<input type="checkbox"/>	<input checked="" type="checkbox"/> VM and Instance Control: my policy

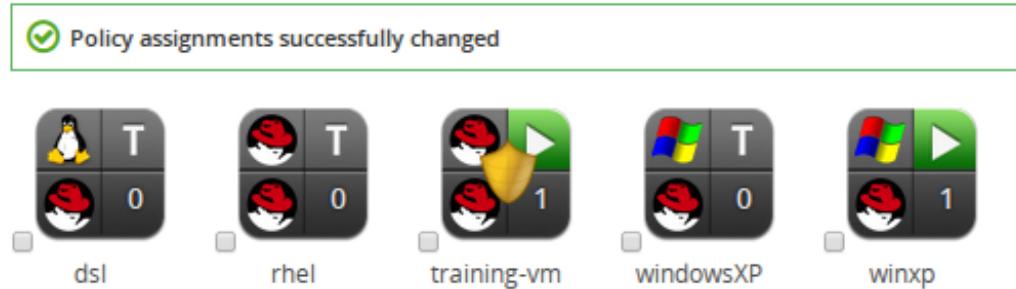
6. Click **Add**.

3. Assign Policy Profiles to Virtual Machine

1. From **Infrastructure** → **Virtual Machines**, select the **VMs & Templates** accordion.

2. Click **All VMs & Templates**.
3. On the right, check the Red Hat Enterprise Linux VM that you built.
4. At the top, click **(Policy)** and then click **(Manage Policies)**.
5. From the **Select Policy Profiles** section, check the policy profile you created in the *Template Provisioning* lab.
 - Any changes from the previous setting appear in blue.
6. Click the triangle next to a policy profile to expand it to see its member policies.
7. Click **Save**.
 - Now, the policy profiles are assigned to the selected VMs.
8. Observe that the VM's icon now has a  on it.

All VMs & Templates



9. Use the procedure presented here and what you learned in this course to assign the same profile to the following resources:
 - Provider
 - Cluster
 - Host
 - Resource Pool
 - Repository

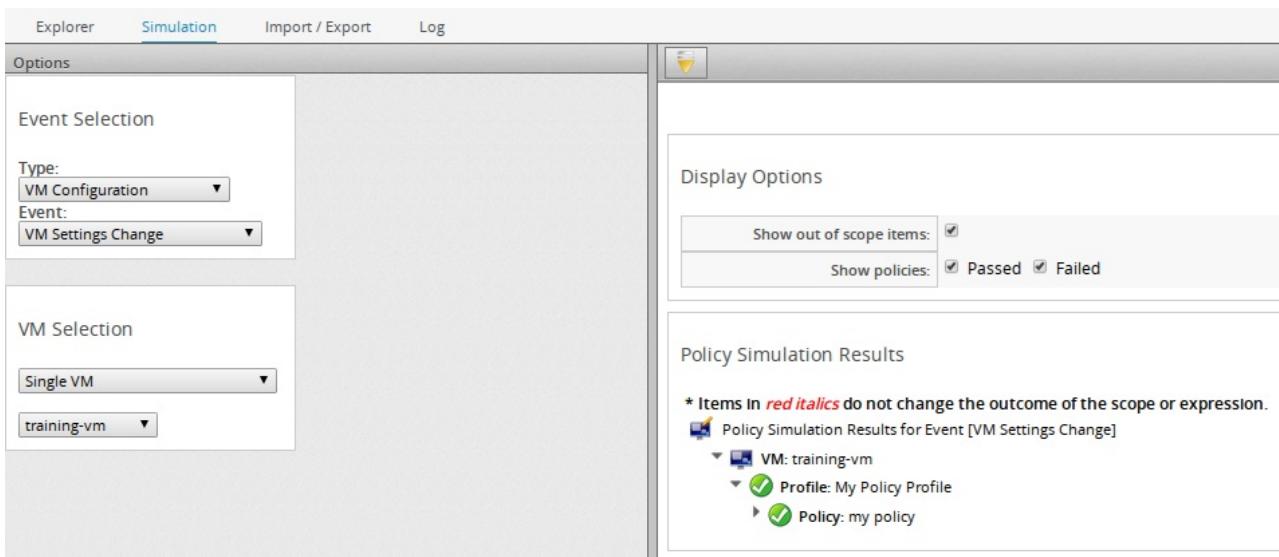
4. Simulate Policy Profiles

1. From **Infrastructure → Virtual Machines**, select the virtual machines to which you added the policy profile.
2. Click **(Policy)** and then click **(Policy Simulation)**.
3. From the **Select a Policy Profile to add** list, click the policy you want to apply to the selected virtual machines.
 - The virtual machines appear below in the **Resolving Policies** area.

- A checkmark in the lower right quadrant of the Virtual Thumbnail shows that the virtual machine passes policy.
 - An X in the lower right quadrant of the Virtual Thumbnail shows that the virtual machine fails policy.
4. Click a virtual machine in the **Policy Simulation** area to see its details.
 5. Expand the policy profile by clicking the triangle to its left to see its member policies and the status of the conditions.
 6. Check **Show out of scope items** to show all conditions, whether or not the virtual machine passes the scope part of the condition. Or uncheck it to hide the conditions where the scope part fails.
 7. Toggle showing successful and failed policies by checking **Successful** or **Failed** next to **Show Policies**.
 - Items in green passed the condition.
 - Items in red failed the condition.
 - Items in *red italics* failed the condition, but do not change the outcome of the scope.

5. View Policy Simulation in CloudForms Management Engine Console

1. From **Control** → **Simulation**, set the following under **Event Selection**:
 - a. Set **Type** to **VM Configuration**.
 - b. Set **Event** to **VM Settings Change**.
2. Under **VM Selection**, select **Single VM**.
3. In the resulting pull-down, select **training-vm** (your Red Hat Enterprise Linux VM running on Red Hat Enterprise Virtualization).
4. Click **Submit** to display the simulation:



6. Create Condition Based on Account Properties

1. From **Control** → **Explorer**, select the **Conditions** accordion.
2. Navigate to **All Conditions** → **All VM and Instance Conditions**.
3. On the right side, click **Configuration** and then click **Add a New VM Condition**.
4. For **Description**, enter **Find VMs with Admin users**.
5. In the expression editor area, do the following:
 - a. Choose **Find** from the first visible list.
 - b. When the second list appears, select **VM and Instance.Users: Name**.
 - c. In the next list, select **STARTS WITH**.
 - d. In the text box to the right, enter **"Admin"** to find all user accounts that begin with the word **Admin**.
 - e. In the next list, select **Check Any**.
 - f. In the list to the right, select **Active**, so that the **Active** field is queried in the **VM and Instance.Users** table.
 - g. In the next list to the right, select **=**.
 - h. In the last list to the right, select **true** to find where the account is enabled.
6. On the gray bar above the lists, click **(Commit Expression Element Changes)** to add the expression.
7. In **Notes**, optionally, enter a detailed explanation of the condition.
8. Click **Add** when you are finished.
9. Now that this condition is created, add it to a policy or edit it:

VM and Instance Condition "Find VMs with Admin users"

 Condition "Find VMs with Admin users" was added

Scope

 No scope defined, the scope of this condition includes all elements.

Expression

FIND VM and Instance.Users : Name = "Admin" CHECK ANY Active = 'true'

7. Create Snapshot Action

1. From **Control** → **Explorer**, select the **Actions** accordion.
2. Click **All Actions**.
3. On the right side, click **Configuration** and then click **Add a new Action**.
4. For **Description**, enter **Create a Snapshot**.
5. Set **Action Type** to **Create a Snapshot**.
6. For **Snapshot Name**, enter **AutoSnapshot**.
7. Click **Add** when you are finished.

8. Create Policy Based on VM Start From Provider

1. From **Control** → **Explorer**, select the **Policies** accordion.
2. Select **Control Policies** and then **VM Control Policies**.
3. Create a policy as follows:
 - a. On the right side, click **Configuration** and then click **Add a New Control Vm Policy**.
 - b. For **Description**, enter **VM Power On Policy**.
 - c. Click **Add**.
4. Edit the policy as follows:
 - a. On the left, click the policy you just created.
 - b. Click **Configuration** and then click **(Edit this Policy's Event assignments)**.
 - All possible events display.
 - c. From the **VM Operation** area, check **VM Power On**.
 - d. Click **Save**.

- You are returned to the main screen for this policy.
5. Configure an action as follows:
- a. On the left, under the new policy, click **VM Power On**.
 - b. Click **Configuration** and then click **(Edit Actions for this Policy Event)**.
 - c. In the **Order of Actions if ALL Conditions are True** section, select the **Create a Snapshot** action created in the previous exercise *Create a Snapshot Action* from **Available Actions**.
 - d. Click ► **(Move selected Actions into this Event)**.
 - e. Select **Initiate SmartState Analysis for VM** from **Available Actions**.
 - f. Click ► **(Move selected Actions into this Event)**.
 - g. Click **Save** when you are finished.



You can now make this part of a policy profile. If you want a snapshot and analysis to occur for all of your VMs, assign the policy profile to the provider.

9. Create Memory Reconfigure Action

1. From **Control** → **Explorer**, select the **Actions** accordion.
2. On the left side, click **All Actions**.
3. On the right side, click **Configuration** and then click **Add a new Action**.
4. For **Description**, enter **Set VM RAM**.
5. Set **Action Type** to **Reconfigure Memory**.
6. Set **Memory Size** to **2048**.
7. Click **Add**.

10. Create Condition Based on RAM

In the following steps, you create a condition based on the amount of memory available in your VM. In the exercise after this one, you add this condition to a policy.

1. From **Control** → **Explorer**, select the **Conditions** accordion.
2. Navigate to **All Conditions** → **All VM and Instance Conditions**.
3. On the right side, click **Configuration** and then click **Add a New Vm Condition**.
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4. In **Description**, enter **Power Down**.

5. In the expression editor area, set the following:
 - a. Select **Field** from the list to create criteria based on field values.
 - b. Select **VM and Instance.Hardware : RAM** from the next list.
 - c. Select **<=** from the operator list.
 - d. In the last box, enter **1024** as the amount of RAM to check for.
 - e. In the gray bar above, click **(Commit Expression Element Changes)** to add the expression.
 6. Click **Add**.
-

11. Create Policy Based on Power Down Event

1. From **Control** → **Explorer**, select the **Policies** accordion.
2. Navigate to **Control Policies** → **VM Control Policies**.
3. Add a new control policy:
 - a. On the left side, click **Configuration** and then click **Add a New Vm Policy**.
 - b. In **Description**, enter **Power Down**.
 - c. Click **Add**.
4. Edit the policy's events:
 - a. On the left, click the **Power Down** policy.
 - b. Click **Configuration** and then click **(Edit this Policy's Event assignments)**.
 - All possible events display.
 - c. In the **VM Operation** area, check **VM Power Off**.
 - d. Click **Save**.
 - You are returned to this policy's main screen.
5. From **Configuration**, click **(Edit this Policy's Condition assignments)**.
6. Edit the policy's conditions:
 - a. In the **Available VM Conditions** box, select the **Power Down** condition you created earlier.
 - b. Click **► (Move selected Actions into this Event)**.
 - c. Click **Save**.
7. Navigate to **Policies** → **All Policies** → **Vm Control Policies** → **Power Down** → **VM Power Off**.
8. Edit the policy's actions:

- a. Click **Configuration** and then click **(Edit Actions for this Policy Event)**.
- b. In the **Order of Actions if ALL Conditions are True** section, select **Set VM RAM** from **Available Actions**.
- c. Click **► (Move selected Actions into this Event)**.
- d. Click **Save**.



You can now make this policy part of a policy profile.

12. Create a Count Condition

1. From **Control** → **Explorer**, select the **Conditions** accordion.
2. Navigate to **All Conditions** → **All VM and Instance Conditions**.
3. On the right side, click **Configuration** and then click **Add a New Vm Condition**.
4. In **Description**, set **Condition** to **Snapshot Count**.
5. In the expression editor area, set the following:
 - a. In the first visible list, select **Count of** to create a count condition.
 - b. In the next list, select **VM and Instance.Snapshots**.
 - c. In the operator list select **>=**.
 - d. Enter **3** to limit the VM to three snapshots.
6. Click **(Commit Expression Element Changes)** to add the expression.
7. Click **Add**.

13. Create a Policy for Snapshot Request

1. From **Control** → **Explorer**, select the **Policies** accordion.
2. Navigate to **Policies** → **Control Policies** → **Vm Control Policies**.
3. Add a new control policy:
 - a. On the right side, click **Configuration** and then click **Add a new Vm Control Policy**.
 - b. In **Description**, enter **VM Snapshot Request**.
 - c. Click **Add**.
4. Edit the policy's events:
 - a. Select the new policy on the left.
 - b. From **Configuration**, click **(Edit this Policy's Event assignments)**.

- All possible events display.
- c. In the **VM Operation** area, check **VM Snapshot Create Request**.
 - d. Click **Save**.
 - You are returned to this policy's main screen.
5. From **Control** → **Explorer**, select the **Policies** accordion.
 6. Navigate to **All Policies** → **Control Policies** → **VM Snapshot Request**.
 7. Edit the policy's conditions:
 - a. On the right side, click **Configuration** and then click **(Edit this Policy's Condition Assignments)**.
 - b. In the **Available Conditions** box, select **Snapshot Count**.
 - c. Click **▶ (Move selected Actions into this Event)**.
 - d. Click **Save**.
 8. From **Control** → **Explorer**, select the **Policies** accordion.
 9. Navigate to **All Policies** → **Control Policies** → **VM Snapshot Request** → **VM Snapshot Create Request**.
 10. Edit the policy's actions:
 - a. Click **Configuration** and then click **(Edit Actions for this Policy Event)**.
 - b. In the **Order of Actions, if ALL Conditions are True** section, select **Prevent Current Event from Proceeding**.
 - c. Click **▶ (Move selected Actions into this Event)**.
 - d. Click **Save**.
 11. Try making this policy for a snapshot request part of a policy profile.

14. Create Inherit Tag Action

1. From **Control** → **Explorer**, select the **Actions** accordion.
2. On the left side, click **All Actions**.
3. On the right side, click **Configuration** and click **Add a new Action**.
4. For **Description**, enter **Inherit Tag from Cluster**.
5. Set **Action Type** to **Inherit Parent Tags**.
6. Select **Cluster** as the parent type.
7. Check **Environment, Owner, and Location**.
8. Click **Add**.

-
9. Try adding the action you created to a policy.

15. Remove Tag Using an Action

1. From **Control** → **Explorer**, select the **Actions** accordion.
 2. On the left side, click **All Actions**.
 3. On the right side, click **Configuration** and then click **Add a new Action**.
 4. In **Description**, enter **Remove Tags**.
 5. Set **Action Type** to **Remove Tags**.
 6. Check **Environment**, **Location**, and **Owner**.
 7. Click **Add**.
-

16. Create Tag Action

1. From **Control** → **Explorer**, select the **Actions** accordion.
2. On the left side, click **All Actions**.
3. On the right side, click **Configuration** and then click **Add a new Action**.
4. In **Description**, enter **Tag Windows Team**.
5. Set **Action Type** to **Tags**.
6. In **Select a Tag to Apply**, expand <My Company Tags>/Owner and then click **Windows Team**.
7. Verify your user interface looks similar to the following image:

Action "Tag Windows Team"

 Action "Tag Windows Team" was added

Basic Information

Action Type Tag

Applied Tag

Tag Owner: Windows Team

Assigned to Policies

 This Action is not assigned to any Policies.

8. Click **Add**.

17. Create Tag Policy With User Condition

1. From **Control** → **Explorer**, select the **Policies** accordion.
2. Navigate to **All Policies** → **Control Policies** → **VM Control Policies**.
3. Add a new control policy:
 - a. On the right side, click **Configuration** and then click **Add a New Control Vm Policy**.
 - b. Enter a **Description** such as **Autotag Windows VM with Admin**.
 - c. Click **Add**.
4. Create the policy's conditions:
 - a. Click the new policy on the left.
 - b. From **Configuration**, click **(Create a new Condition assigned to this Policy)**.
 - c. For **Description**, enter **Admin User Exists**.
 - d. In the expression editor area, click **Find** to create a condition based search results.
 - e. From the list, select **VM and Instance.Users : Name**.
 - f. Next, select **STARTS WITH** and enter **Admin** for the username.
 - g. Select **Check All, Active = true**.
 - h. Click **(Commit Expression Element Changes)** to add the expression.
 - i. Click **Add** when you are finished with the condition.
5. From **Control** → **Explorer**, select the **Policies** accordion.

6. Navigate to **All Policies** → **Control Policies** → **Autotag Windows VM with Admin User** policy.
7. Edit the policy's events:
 - a. Click **Configuration** then click **(Edit this Policy's Event Assignments)**.
 - b. From the **VM Operations** area, check **VM Analysis Complete**.
 - c. Click **Save**.
8. Navigate to **Policies** → **All Policies** → **Control Policies** → **VM Control Policies** → **Autotag Windows VM with Admin** → **VM Analysis Complete**.
9. Edit the policy's actions:
 - a. Click **Configuration** and then click **(Edit Actions for this Policy Event)**.
 - b. In the **Order of Actions if ALL Conditions are True** section, select the **Tag Windows Team** you created earlier from **Available Actions**.
 - c. Click **▶ (Move selected Actions into this Event)**.
 - d. Click **Save**.

18. Create Condition With a Scope

1. From **Control** → **Explorer**, select the **Conditions** accordion.
2. Navigate to **All Conditions** → **All VM and Instance Conditions**.
3. On the right side, click **Configuration** and then click **Add a new Condition**.
4. In **Description**, enter **Look for Windows**.
5. Under **Scope**, do the following to create a general condition based on a simple attribute:
 - a. Click **(Edit this Scope)**.

 Based on what you choose, different options appear.
 - b. In the first list, choose **Field** to create criteria based on field values.
 - c. From the second list, select **VM and Instance.OS : Product Name**.
 - d. From the third list, select **STARTS WITH**.
 - e. In the entry box, enter **Microsoft Windows**.
 - f. Click **(Commit Expression Element Changes)** to add the expression.
6. Create an **and** condition for this scope:
 - a. Click the new expression, highlighted in yellow.
 - b. In the gray bar above, click **AND**.

- c. In the first list, select **Find**.
 - d. In the second list, select **VM and Instance.Hardware.Networks : IP Address**.
 - e. In the third list, select **STARTS WITH**.
 - f. In the entry box, enter **192 . 168** and select **Check All, DHCP Enabled**, and **=**.
 - g. Enter **true**.
 - h. Click **(Commit Expression Element Changes)**.
7. In the expression editor area, do the following:
- a. Click **(Edit this Expression)**.
 - b. Click **???**.
 - c. From the list, choose **Tag**.
 - d. From the next list choose **VM and Instance.User.<My Company> Tags : Owner** for the tag type.
 - e. From the **CONTAINS** list, choose **Windows Test Team**.
 - f. Click **(Commit Expression Element Changes)**.
 - g. Click **Add**.
8. Run the policy through simulation.
9. Attach the policy to your Windows XP-based VM.
10. Make a change to your Windows XP VM to make the policy do nothing.

19. Put New Settings into Use

After performing the exercises above, your **Policies** accordion looks similar to this example:

The screenshot shows the 'Policy Profiles' interface with the 'Explorer' tab selected. On the left, under 'Policies', the 'All Policies' section is expanded, displaying a hierarchical list of policies and actions. The list includes:

- Compliance Policies
- Control Policies
 - Host Control Policies
 - Vm Control Policies
 - Autotag Windows VM with Admin
 - Admin User Exists
 - my policy
 - VM Settings Change
 - Initiate SmartState Analysis for VM
 - Power Down
 - Power Down
 - VM Power Off
 - Set VM RAM
 - VM Power On Policy
 - VM Power On
 - Create a Snapshot
 - Initiate SmartState Analysis for VM

In this next section, you experiment with putting your policies into use. This section has an open format, allowing you to work through the exercises' steps and review what you have covered up to this point. Perform the following exercises:

- Create a new policy profile.
- Put your newly created policies in the profile.
- Run it through simulation.
- Attach it to the appropriate objects as you see fit.
- If you like, do this for several more new policies.

The following is one example of how to use your settings:

1. From **Control** → **Explorer**, select the **Policy Profiles** accordion.
2. On the left side, click **All Policy Profiles**.
3. On the right side, click **Configuration** and then click **Add a new Policy Profile**.
4. In **Description**, enter **Low Memory**.
5. Select the **Power Down** policy.
6. Click **▶ (Move selected Actions into this Event)** to add the policy.
7. Click **Add**.
8. From **Infrastructure** → **Virtual Machines**, select and check the Red Hat Enterprise Linux VM in your environment.
9. Click **(Policy)** and then click **(Policy Simulation)**.
10. Set **Select a Policy Profile to add to the** **Low Memory** policy profile.

- The VMs appear below in the **Resolving Policies** area.
 - A checkmark in the lower right quadrant of the Virtual Thumbnail shows that the VM **passes** policy.
 - An X in the lower right quadrant of the Virtual Thumbnail shows that the VM **fails** policy.
11. Practice by creating additional policy profiles using the policies you just created and simulating them against VMs in your environment.

20. Create Alert

In this exercise you create an alert that is ready to assign to an Alert Profile.

1. From **Control** → **Explorer**, select the **Alerts** accordion.
 2. On the left side, click **All Alerts**.
 3. On the right side, click **Configuration** and then click **Add a New Alert**.
 4. In **Description**, enter **Send E-mail**.
 5. Check **Active**.
 6. From **Based On**, select **VM and Instance**.
-
- The parameters available are based on your **What to Evaluate** selection.
7. In **What to Evaluate**, select **Event Threshold**.
 8. In **Notification Frequency**, keep the default for how often you want to be notified if the event log threshold is reached.
 9. In **Event to Check**, select **Power Activity: PowerOnVM_Task_Complete**.
 10. In **How Far Back to Check**, select **1 Day**.
 11. In **Event count Threshold**, enter **1**.
 12. Check **Send an E-mail**.
 - When selected, parameters required for sending an e-mail are displayed.
 - a. Leave **From** blank.
 - b. In **Add a User**, select Administrator **cfadmin@lab.opentlc.com**.
 13. To show the alert as an event on the CloudForms Management Engine timeline, check **Show on Timeline**.
 14. To invoke automation, you would check **Send a Management Event**, but do not do this for the exercise.

- If selected, you would enter the name of the event.
 - This item should exist in the **Process/Event Class**.
15. Click **Add**.
-

21. Create SNMP Alert

This lab environment does not have SNMP available, so these steps are strictly for reference only. Do not do these steps now, but review them so you are familiar with setting an SNMP trap.

1. In **SNMP Parameters**, check **Send**.
 - When selected, parameters required for sending an SNMP trap are displayed.
 2. Enter the IP for the host to send the trap.
 3. Select the version of SNMP that you are using.
 4. Enter the trap **Object ID**.
 5. Enter the variables that you want to use in your message.
-

22. Create Alert Profile

1. From **Control** → **Explorer**, select the **Alert Profiles** accordion.
 2. Navigate to **All Alert Profiles** → **VM and Instance Alert Profiles**.
 3. On the right side, click **Configuration** and then click **Add a New VM and Instance Alert Profile**.
 4. In **Description**, enter **E-mail On Power On**.
 5. In the **Alert Section** area, from **Available VM and Instance Alerts**, select **Send E-mail** (the alert you created earlier).
 6. Click **▶ (Move selected Actions into this Event)** to add the alert.
 7. Enter any additional comments in the **Notes** area.
 8. Click **Add**.
-

23. Assign Alert Profile

1. From **Control** → **Explorer**, select the **Alert Profiles** accordion.
2. Navigate to **All Alert Profiles** → **VM and Instance Alert Profiles** and click the alert profile you created earlier.

3. On the right side, click **Configuration** and then click **(Edit Assignments for this Alert Profile)**.



The options available are based on whether the alert is for a cluster, datastore, CloudForms Management Engine Server, host, or virtual machine.

4. Assign the profile to the **Enterprise**.



You can also assign an alert profile to specific hosts, clusters, resource pools, and management system, or based on assigned tags. For a CloudForms Management Engine alert profile, you can only assign the profile to CloudForms Management Engine servers in the current region.

5. Assign the profile to one of your existing VMs.
6. Click **Save**.
7. Test your work by powering on the resource and looking for an email from the system.
8. Try to create more alerts, and test other scenarios.

24. Create Compliance Policy

1. From **Control** → **Explorer**, select the **Policies** accordion.
2. Navigate to **Compliance Policies** → **VM Compliance Policies**.
3. Add a new compliance policy:
 - a. On the right side, click **Configuration** and then click **Add a New Compliance Vm Policy**.
 - b. In **Description**, enter **Windows Check**.
 - c. Click **Add**.
4. Navigate to **Policies** → **All Policies** → **Compliance Policies** → **Vm Compliance Policies** → **Windows Check**.
5. Edit the policy's conditions:
 - a. Click **Configuration** and then click **(Edit this Policy's Condition assignments)**.
 - b. Select the **Look for Windows** condition you created earlier from the **Available Conditions** box.
 - c. Click **▶ (Move selected Actions into this Event)**.
 - d. Click **Save**.



By default, if any conditions are false, the VM is marked as non-compliant.

6. From **Control** → **Explorer**, select the **Policies** accordion.
7. Navigate to **All Policies** → **Compliance Policies** → **VM Compliance Policies** → **Windows Check** → **VM Compliance Check**.
8. Edit the policy's actions:
 - a. On the right side, click **Configuration** and then click **(Edit Actions from this Policy Event)**.
 - b. In **Order of Actions If ANY Conditions Are False**, select **Generate Log Message** from **Available Actions**.
 - c. Click **▶ (Move selected Actions into this Event)**.
 - d. Click **Save**.

25. Assign Compliance Policy

Now that you have nearly completed the lab, try assigning a compliance policy.

1. Make this compliance policy part of a new policy profile.
2. Assign the policy profile to the Windows virtual machine you have running in your environment.
3. After completing the above steps, continue to the next exercise to check the VM's compliance status.
4. If compliance fails, fix the VM's settings to pass compliance.



26. Check VM for Compliance

The results of this exercise display the compliance status on the virtual machine's **Summary** screen.

1. From **Infrastructure** → **Virtual Machines**, select and check the **Windows Virtual Machine** to check it for compliance.
 2. Click **(Policy)** and then click **(Check Compliance of Last Known Configuration)**.
-

27. More Policies

1. Using what you learned from previous exercises, create more policies and test them.

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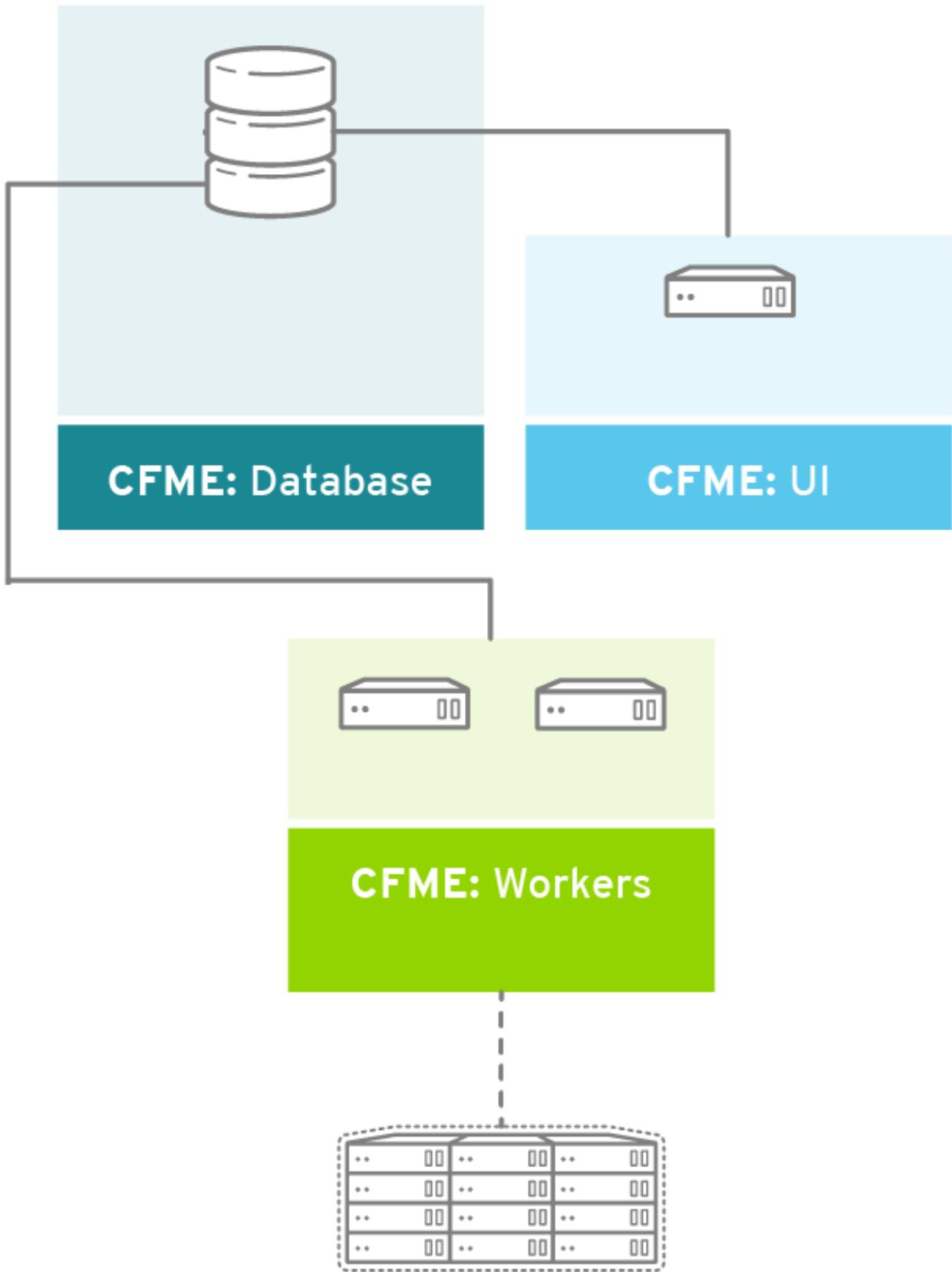
Advanced Architecture Lab

1. Create New Zones
 2. Update Existing Appliance Name and Zone
 3. Add UI Appliance
 4. Configure IdM Authentication on UI Appliance (CLI Portion)
 5. View Identity, Policy, and Audit (IPA) Server Details
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 9. Associate Providers to Zones
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-

Advanced Architecture Lab

In this lab, you explore and implement an advanced CloudForms appliance with multi-tier architecture. The lab steps through the process of breaking up appliance roles into multi-tier appliances.

After you complete the lab, your environment's architecture is similar to that shown in this diagram:



The image above depicts an architecture where:

- Your original CloudForms appliance becomes the Database appliance.
- One UI appliance and two worker appliances are added.
- All roles except **database** are disabled on the database server.
- End users connect only to the UI appliance.

- Only worker appliances communicate with VMware and Red Hat Enterprise Virtualization, or RHEV.
-

1. Create New Zones

1. Log in to <https://cf-GUID.rhpds.opentlc.com> as **admin**.
 2. Go to **Configure** → **Configuration**.
 3. Go to the **Settings** accordion.
 4. Using what you learned in the previous labs, create three new zones:
 - UI Zone
 - DB Zone
 - Worker Zone
-

2. Update Existing Appliance Name and Zone

1. Log in to <https://cf-GUID.rhpds.opentlc.com> as **admin**.
2. Go to **Configure** → **Configuration**.
3. Go to the **Settings** accordion.
4. Click **Server: MyAppliance**.
5. Change **Appliance Name** to **DB Appliance**.
6. Change **Zone** to **DB Zone**.
7. Disable the following **Server Roles**:
 - Automation Engine
 - Capacity & Utilization Coordinator
 - Capacity & Utilization Data Collector
 - Capacity & Utilization Data Processor
 - Event Monitor
 - Provider Inventory
 - Provider Operations
 - Reporting
 - Scheduler
 - Notifier
 - SmartProxy

- SmartState Analysis
- Web Services



Leave **User Interface** enabled for now.

8. Click **Save**.

3. Add UI Appliance

In this section, you add a new appliance that is designated as the *UI Appliance*. It serves as the main interface for users and administrators. It has no other function, such as database or SmartProxy.

1. From the **workstation** host, connect remotely using SSH to the **cfui.example.com** host as user **root** with password **r3dh4t1!**:

```
# ssh root@cfui.example.com
```

2. Run the **appliance_console**:

```
# appliance_console
```

3. Press any key to continue.

4. Select option **8** to **Configure Database**.

5. When prompted, select option **2** to **Fetch key from remote machine**.

6. When prompted for the host name of the **appliance with the encryption key**, enter **cf.example.com**.
 - a. Enter **root** for the **appliance SSH login**.
 - b. Enter **r3dh4t1!** for the **SSH password**.

7. When asked to **Enter the path of remote encryption key**, press **ENTER** to accept the default path.

8. When prompted for the **database location**, enter **2** for **External**.

9. When prompted for **database region**, enter **2** to **Join existing region**, for **database hostname or IP address** enter **cf.example.com**.

10. Press **ENTER** to accept the default when prompted for **name of the database**.

Verizon-CL220VT-06202016

11. Press **ENTER** to accept the default when prompted for **username**.

12. Enter **r3dh4t1!** for the two **database password** prompts.

13. Press any key when prompted.

4. Configure IdM Authentication on UI Appliance (CLI Portion)

1. Make sure you are on the **cfui.example.com** CLI.

2. Press any key to get to the CloudForms appliance menu:

```
Advanced Setting  
...OUTPUT OMITTED...  
10) Configure External Authentication (httpd)  
...OUTPUT OMITTED...
```

```
Choose the advanced setting:
```

3. From the CloudForms appliance console, enter option **10** to configure external authentication (httpd).

5. View Identity, Policy, and Audit (IPA) Server Details

1. Enter the IdM/IPA server hostname: **idm.example.com**.

2. Enter **example.com** as the server domain.

3. Enter **EXAMPLE.COM** in all caps for the server realm.

4. Enter **admin** for the server principal.

5. Enter **r3dh4t1!** for the server principal password.

6. Verify that your display looks similar to the following:

```
Configure External Authentication (httpd)  
  
IPA Server Parameters:  
  
Enter the IPA Server Hostname: idm.example.com  
Enter the IPA Server Domain: |rhpds.opentlc.com| example.com  
Enter the IPA Server Realm: |EXAMPLE.COM| EXAMPLE.COM  
Enter the IPA Server Principal: |admin| admin Verizon-GL220VT-06202016  
Enter the IPA Server Principal Password: r3dh4t1!
```

7. View the sample IPA server details, as shown here:

```
IPA Server Details:  
Hostname:      idm.example.com  
Domain:        example.com  
Realm:         EXAMPLE.COM  
Naming Context: dc=example,dc=com  
Principal:     admin
```

```
Proceed? (Y/N):
```

8. At the **Proceed? (Y/N)** prompt, as shown above, enter **y**.

9. Review the IPA configuration output:

```
Checking connectivity to idm.example.com ... Succeeded.  
  
Configuring IPA (may take a minute) ...  
Configuring the IPA Client ...  
Configuring pam ...  
Configuring sssd ...  
Configuring IPA HTTP Service and Keytab ...  
Configuring httpd ...  
Configuring SELinux ...  
Restarting sssd and httpd ...  
Configuring sssd to start upon reboots ...  
  
External Authentication configured successfully.
```

```
Press any key to continue.
```

10. Press any key to continue.

6. Update UI Appliance Name and Zones

1. Log in to <https://cf-GUID.rhpd.openlc.com> as **admin**.
2. Go to **Configure** → **Configuration**.
3. Go to the **Settings** accordion.
4. Click **Server: EVM [2]**.
5. Change **Appliance Name** to **UI Appliance**.
6. Change **Zone** to **UI Zone**.
7. Disable the following **Server Roles**:
 - Automation Engine
 - Database Operations

- Event Monitor
 - Provider Inventory
 - Provider Operations
 - Reporting
 - Scheduler
 - SmartState Analysis
8. Click **Save**.
9. Make sure Server: **UI Appliance [2]** is still selected.
10. On the right, click the **Authentication** tab.
11. For **Mode**, select **External (httpd)**.
12. Check **Get User Groups from External Authentication (httpd)**.
13. Click **Save**.

7. Add Worker Appliances

This exercise adds two appliances designated as *Worker Appliances*. They serve as worker appliances for all CloudForms functions that do not provide user interface or database.

1. From the **workstation** host, SSH to the **cfwork1.example.com** host as user **root** with password **r3dh4t1!**.

```
# ssh root@cfwork1.example.com
```

2. Run the **appliance_console**:

```
# appliance_console
```

3. Press any key to continue.
4. Select option **8** to **Configure Database**.
5. When prompted, select option **2** to **Fetch key from remote machine**.
6. When prompted for the host name of the **appliance with the encryption key** enter **cf.example.com**.
 - a. Enter **root** for the **appliance SSH login**.
 - b. Enter **r3dh4t1!** for the **SSH password**.
7. When asked to **Enter the path of remote encryption key**, press **ENTER** to accept the

- default path.
8. When prompted for **database location**, enter **2** for **External**.
 9. When prompted for **database region**, enter **2** to **Join existing region**.
 10. For **database hostname or IP address**, enter **cf.example.com**.
 11. Press **ENTER** to accept the default when prompted for **name of the database**.
 12. Press **ENTER** to accept the default when prompted for **username**.
 13. Enter **r3dh4t1!** for both **database password** prompts.
 14. Press any key when prompted.
 15. Repeat this entire procedure for **cfwork2.example.com**.
-

8. Update Worker Appliance Names and Zones

1. Log in to <https://cf-GUID.rhpd.openlc.com> as **admin**.
2. Go to **Configure** → **Configuration**.
3. Go to the **Settings** accordion.
4. Click **Server: EVM [3]**.
5. Change **Appliance Name** to **Worker Appliance 1**.
6. Change **Zone** to **Worker Zone**.
7. Disable the following **Server Roles**:
 - Database Operations
 - Web Services
8. Enable the following **Server Roles**:
 - Capacity & Utilization Coordinator
 - Capacity & Utilization Data Collector
 - Capacity & Utilization Data Processor
 - Notifier
 - SmartProxy
9. Click **Save**.
10. Repeat this entire procedure for **Server : EVM [4]** using the appliance name **Worker Appliance 2**.

9. Associate Providers to Zones

All of the providers are currently in the old **My Zone** zone which now goes nowhere. Move them to the **Worker Zone** in order for the providers to have any operations run on them.

1. Set the infrastructure providers:
 - a. Go to **Infrastructure** → **Providers**.
 - b. Select the RHEV provider.
 - c. Click **Configuration** → **Edit this Infrastructure Provider**, for **Zone** choose **Worker Zone**.
 - d. Click **Save**.
 - e. Repeat this for the vSphere provider.
2. Set the cloud provider:
 - a. Go to **Clouds** → **Providers**.
 - b. Select the OSP provider.
 - c. Click **Configuration** → **Edit this Cloud Provider**, for **Zone** choose **Worker Zone**.
 - d. Click **Save**.
3. Set the container provider:
 - a. Go to **Containers** → **Providers**.
 - b. Select the OSE provider.
 - c. Click **Configuration** → **Edit this Containers Provider**, for **Zone** choose **Worker Zone**.
 - d. Click **Save**.

10. Test New Configuration

1. Log in to the UI Appliance at <https://cfui-GUID.rhpds.opentlc.com> with user **admin** and password **r3dh4t1!**.
2. Deploy a service and also provision a VM to see if it still works with the new **Worker Zone** configuration.

11. Clean Up User Interface Roles

1. From the **UI Appliance**, go to **Configure** → **Configuration**.
2. Disable the **User Interface Server Role** for the **DB Appliance** and **Worker Appliances**.

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