



Red Hat CloudForms 4.0 Provisioning Virtual Machines and Hosts

Provisioning, workload management, and orchestration for CloudForms
Management Engine

CloudForms Team

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Abstract

This guide provides instructions for provisioning, service creation, and automation in CloudForms Management Engine. Information and procedures in this book are relevant to CloudForms Management Engine administrators.

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CHAPTER 1. CLOUDFORMS MANAGEMENT ENGINE LIFECYCLE

This guide discusses lifecycle activities such as provisioning and retirement that are part of the CloudForms Management Engine Automate component. CloudForms Management Engine Automate enables real-time, bidirectional process integration and adaptive automation for management events and administrative or operational activities.

- ✧ Operations Management with service level resource enforcement.
- ✧ Resource Management including datastore cleanup, snapshot aging and enforcement, and virtual machine or instance aging and retirement.
- ✧ Configuration and Change Management including enforced closed loop change management.
- ✧ Lifecycle Management such as provisioning, customization, reconfiguration, approval, CMDB updates, and retirement.

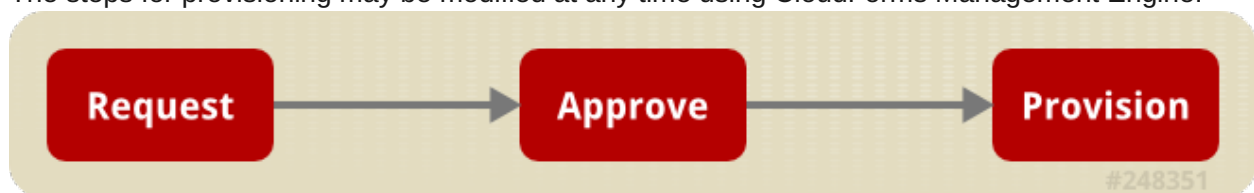


Important

Provisioning requires the **Automation Engine** server role enabled. Check your server role settings in **Configure** → **Configuration** → **Server** → **Server Control**.

1.1. PROVISIONING

When a virtual machine or cloud instance is provisioned, it goes through multiple phases. First, the request must be made. The request includes ownership information, tags, virtual hardware requirements, the operating system, and any customization of the request. Second, the request must go through an approval phase, either automatic or manual. Finally, the request is executed. This part of provisioning consists of pre-processing and post-processing. Pre-processing acquires IP addresses for the user, creates CMDB instances, and creates the virtual machine or instance based on information in the request. Post-processing activates the CMDB instance and emails the user. The steps for provisioning may be modified at any time using CloudForms Management Engine.



CHAPTER 2. PROVISIONING REQUESTS

The following options are available when making provisioning requests:

- ✧ Set an owner (User can do this using LDAP lookup)
- ✧ Assign a purpose (tag)
- ✧ Select a template or image from which to create a new virtual machine or instance respectively
- ✧ Choose placement
- ✧ Set hardware requirements
- ✧ Specify the vLan
- ✧ Customize the guest operating system
- ✧ Schedule the provisioning



2.1. REQUIREMENTS FOR PROVISIONING VIRTUAL MACHINES AND INSTANCES

CloudForms Management Engine supports the provisioning of VMware ESX hosts/hypervisors. To provision a virtual machine from VMware providers, you must have an appliance with the Automation Engine role enabled.

If you are using a Windows template, the following configuration is required:

- ✧ To customize settings that are inside the operating system, Sysprep must be copied to the appropriate directory on your vCenter computer. Usually this location is:
class="directory">C:\Documents and Settings\All Users\Application Data\VMware\VMware VirtualCenter\sysprep. Copy the Sysprep tools to the relevant operating system subdirectory. If you are running a standard Win2008 operating system, this step is unnecessary as Sysprep is included as standard.
- ✧ The Windows template must have the latest version of VMware tools for its ESX Server. Check the VMware Site for more information. If you are creating a new password for the Administrator account, the Administrator's password must be blank on the template. This is a limitation of Microsoft Sysprep.

See the VMware documentation for a complete list of customization requirements.

2.2. REQUIREMENTS FOR PROVISIONING VIRTUAL MACHINES FROM RED HAT ENTERPRISE VIRTUALIZATION MANAGER

Item	Requirements
Red Hat Enterprise Virtualization Manager version 3.0 or higher	Red Hat Enterprise Virtualization Manager properly installed with API in default location https://server:8443/api
Red Hat Enterprise Virtualization Manager History Database	<p>Red Hat Enterprise Virtualization Manager Data Warehouse (DWH) properly installed with access to the PostgreSQL database on the Red Hat Enterprise Virtualization Manager server. Port 5432 open in iptables.</p> <p>md5 authentication allowed to CloudForms Management Engine Appliances in pg_hba.conf.</p> <p>PostgreSQL set to listen for connections on *:5432 in postgresql.conf.</p> <p>Credentials provided during database setup to be used in CloudForms Management Engine UI.</p>
Storage Supported for CloudForms Management Engine Virtual Machine Analysis	<p>NFS - CloudForms Management Engine server must be able to mount NFS storage domain.</p> <p>iSCSI / FCP - Cluster must use full Red Hat Enterprise Linux (not Red Hat Enterprise Virtualization Hypervisor) Hosts.</p> <p>DirectLUN Hook installed on each host and registered to Red Hat Enterprise Virtualization Managers.</p> <p>Must have CloudForms Management Engine Appliance in each Cluster with this storage type.</p> <p>CloudForms Management Engine appliance virtual machine container must have DirectLUN attribute set.</p> <p>Local storage - Not yet supported (Red Hat does not recommend due to single point of failure).</p>

2.3. PXE PROVISIONING

PXE is a boot method that allows you to load files from across a network link. CloudForms Management Engine uses it for files required for provisioning virtual machines. PXE can be used for provisioning for either Red Hat Enterprise Virtualization Manager or VMware.

Procedure Overview

1. Connect to the **PXE Server**.

2. Create a **System Image Type**.
3. Associate each **PXE** image with an image type.
4. Create a customization template.

Requirements for PXE Provisioning

- ✧ DHCP server configured with required PXE implementation
- ✧ PXE implementation for Linux virtual machine provisioning
- ✧ NFS or SAMBA read and write access to create and modify files on the PXE server
- ✧ CloudForms Management Engine Server uses NFS mount to read and write the response files
- ✧ HTTP read access to the NFS share location as virtual machines use this URL to access PXE images and Kickstart or Cloud-Init configuration files
- ✧ Operating system installation media available to be streamed from PXE server
- ✧ Images configured for desired operating systems
- ✧ Kickstart or Cloud-Init templates to configure operating systems with desired packages

Additional Requirements for Provisioning Linux Virtual Machines



- ✧ Linux distribution kernel and ramdisk available over HTTP
- ✧ Linux sources available over HTTP
- ✧ Sample PXE menu item that boots this kernel

Additional Requirements for Provisioning Windows Virtual Machines

- ✧ WinPE ISO built with rhev-agent-tools (for RHEV-M environments) and configured to mount shares for Windows source files and Sysprep files and configured to run customization script
- ✧ Windows based WIM file with operating system installed and configured with Sysprep
- ✧ Sample Sysprep unattend file to be used with the operating system
- ✧ Sample PXE menu item that downloads WinPE ISO, mount in memdisk and boot into WinPE environment

2.4. CONNECTING TO A PXE SERVER



The following procedure connects to a PXE server and adds its details to CloudForms Management Engine.

1. Navigate to **Infrastructure** → **PXE**.
2. Click  (**Configuration**), then  (**Add a New PXE Server**).

3. In **Basic Information**, type a **Name** that will be meaningful in your environment.

Basic Information	
Name	Mahwah
Depot Type	Network File System
URI	nfs:// 192.168.252.60/srv/httpboot/pxe
Access URL	http://192.168.252.60/ipxe
PXE Directory	mac
Windows Images Directory	sources/microsoft
Customization Directory	customization

PXE Image Menus	
Filename	menu.php

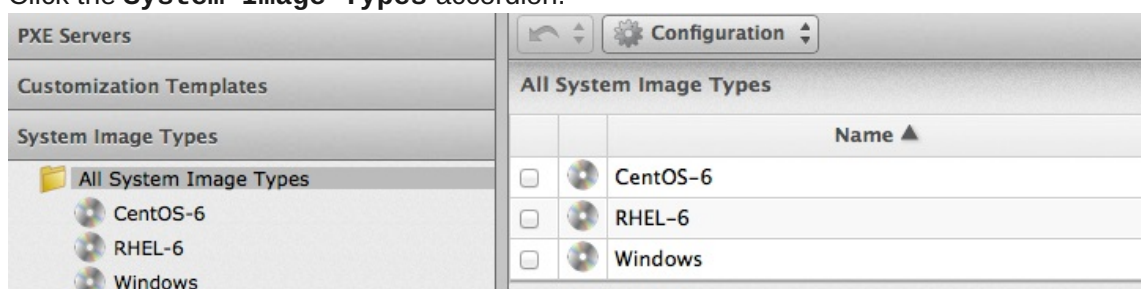
4. For **Depot Type**, select either **Network File System** (NFS) or **Samba**. The fields to enter in the dialog depend on the **Depot Type**.
- ✦ For NFS, type in the **URI**, **Access URL**, **PXE Directory**, **Windows Images Directory** and **Customization Directory**. When you provision, CloudForms Management Engine writes a text file to the **PXE Directory**. The file is named after the MAC address of the NIC that is assigned to the virtual machine. It contains where to get the kernel and initrd image. This file is removed after a successful provision. The **Windows Images Directory** is where the files are located on your NFS for the provisioning of Windows operating systems. The **Customization Directory** is where your Kickstart and Sysprep files are located.
 - ✦ If using a **Depot Type** of **Samba**, you will not need **Access URL**, but you will need a **User ID**, and **Password**, in addition to the items required for NFS.
5. For **PXE Image Menus**, type the **filename** for the PXE Boot menu.
6. Click **Add**.
7. Select the new PXE server from the tree on the left, and click  (**Configuration**), then  (**Refresh**) to see your existing images.



Next, create PXE Image types to associate with the customization templates and to specify if the image type is for a virtual machine, a host, or both.

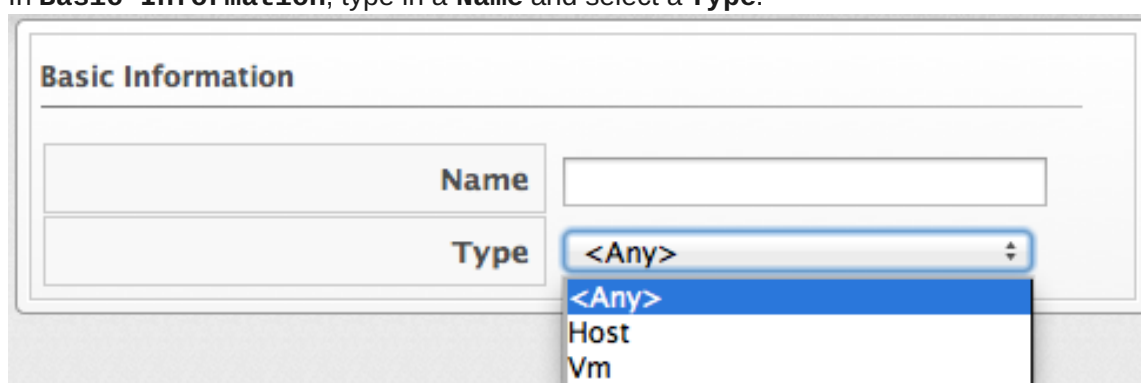
2.5. CREATING SYSTEM IMAGE TYPES FOR PXE

The following procedure creates a system image type for PXE servers.

1. Navigate to **Infrastructure** → **PXE**.
2. Click the **System Image Types** accordion.



3. Click  (**Configuration**), then  (**Add a new System Image Type**).
4. In **Basic Information**, type in a **Name** and select a **Type**.





- » Use **Host** if you want this image type to only apply to hosts.
- » Use **Vm** if you want this image type to only apply to virtual machines.
- » Use **Any** if this image type can be used for either hosts or virtual machines.

5. Click **Add**.

After creating the System Image Types, assign the types to each image on your PXE servers. To do this, you will select each image on the PXE server and identify its type.

2.6. SETTING THE PXE IMAGE TYPE FOR A PXE IMAGE

The following procedure sets the image type for a chosen PXE image.

1. Navigate to **Infrastructure** → **PXE**.
2. Click the **PXE Servers** accordion and select the image that you want to set a type for.
3. Click  (**Configuration**), then  (**Edit this PXE Image**).
4. From the **Basic Information** area, select the correct type. If this PXE image will be used as the **Windows Boot Environment**, check **Windows Boot Environment**. At the time of this writing, only one PXE Image can be identified as the **Windows Boot Environment**. Therefore, checking one as the **Windows Boot Environment**, will

remove that from any other PXE image with that check.

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

Click **Save**.

PXE Servers													
<ul style="list-style-type: none"> All PXE Servers <ul style="list-style-type: none"> PXE Server <ul style="list-style-type: none"> PXE Images <ul style="list-style-type: none"> centos63 rhel63server winpex64 Windows Images <ul style="list-style-type: none"> win2008r2 	<div> <div>Configuration</div> <div> <div>PXE Image "winpex64"</div> <div> <div>✓ PXE Image "winpex64" was saved</div> </div> </div> </div> <table border="1"> <thead> <tr> <th colspan="2">Basic Information</th> </tr> </thead> <tbody> <tr> <td>Name</td> <td>winpex64</td> </tr> <tr> <td>Description</td> <td>WindowsPE_amd64</td> </tr> <tr> <td>Type</td> <td>Windows</td> </tr> <tr> <td>Kernel</td> <td>http://\${next-server}/ipxe/sources/misc/memdisk</td> </tr> <tr> <td>Windows Boot Environment</td> <td>Yes</td> </tr> </tbody> </table>	Basic Information		Name	winpex64	Description	WindowsPE_amd64	Type	Windows	Kernel	http://\${next-server}/ipxe/sources/misc/memdisk	Windows Boot Environment	Yes
Basic Information													
Name	winpex64												
Description	WindowsPE_amd64												
Type	Windows												
Kernel	http://\${next-server}/ipxe/sources/misc/memdisk												
Windows Boot Environment	Yes												



2.7. ISO PROVISIONING

CloudForms Management Engine also allows ISO provisioning from Red Hat Enterprise Virtualization Manager datastores. To use this feature, you will need to do the following before creating a provision request.

1. Add the **ISO Datastore**. The Red Hat Enterprise Virtualization Manager system must have already been discovered or added into the VMDB. For more information, see [Managing Providers](#).
2. Refresh the **ISO Datastore**.
3. Create a **System Image Type**.
4. Set the **ISO Image Type**.
5. **Create** a customization template.

2.8. ADDING AN ISO DATASTORE



The following procedure adds an ISO Datastore from your Red Hat Enterprise Virtualization environment.

1. Navigate to **Infrastructure** → **PXE**.
2. Click the **ISO Datastores** accordion.
3. Click  (**Configuration**),  (**Add a new ISO Datastore**).
4. Select the Cloud or Infrastructure provider hosting the ISO Datastore.
5. Click **Add**.

The ISO datastore is added to CloudForms Management Engine.



2.9. REFRESHING AN ISO DATASTORE

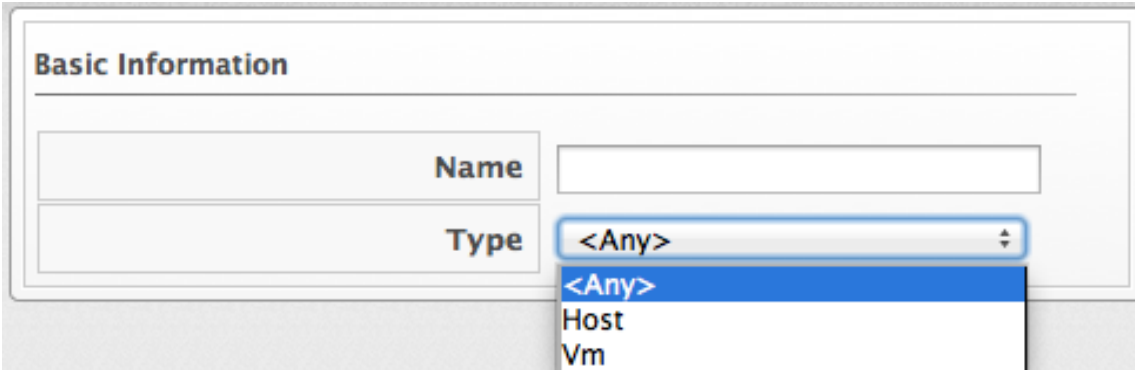
The following procedure refreshes the chosen ISO datastore and updates CloudForms Management Engine with available ISOs.

1. Navigate to **Infrastructure** → **PXE**.
2. Click the **ISO Datastores** accordion, and select an ISO datastore.
3. Click  (**Configuration**), then click  (**Refresh Relationships**).

2.10. CREATING SYSTEM IMAGE TYPES FOR ISO

The following procedure creates a system image type for ISO Servers.

1. Navigate to **Infrastructure** → **PXE**.
2. Click the **System Image Types** accordion.
3. Click  (**Configuration**), then  (**Add a new System Image Type**).
4. In **Basic Information**, type in a **Name** and select a **Type**.

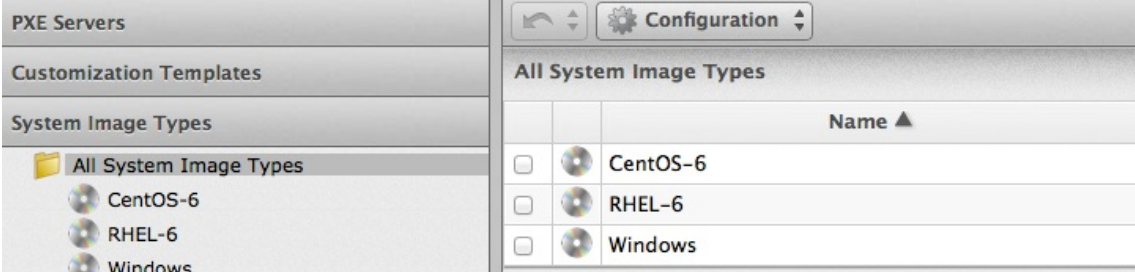





Basic Information

Name	<input type="text"/>
Type	<div><Any></div> <div><Any></div> <div>Host</div> <div>Vm</div>

- ✳ Use **Host** if you want this image type to only apply to hosts.
- ✳ Use **Vm** if you want this image type to only apply to virtual machines.
- ✳ Use **Any** if this image type can be used for either hosts or virtual machines.

5. Click **Add**.





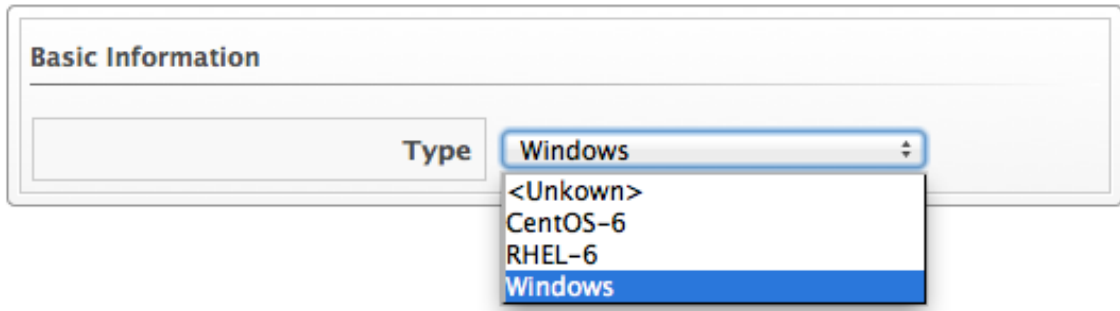
All System Image Types		Name ▲
<input type="checkbox"/>		CentOS-6
<input type="checkbox"/>		RHEL-6
<input type="checkbox"/>		Windows

After creating the system image types, assign the types to each image on your ISO servers. To do this, you will select each image on the ISO server and identify its type.

2.11. SETTING THE IMAGE TYPE FOR AN ISO IMAGE

The following procedure sets the image type for an ISO image.

1. Navigate to **Infrastructure** → **PXE**.
2. Click the **ISO Datastores** accordion, and select the image that you want to set a type for.
3. Click  (**Configuration**), then  (**Edit this ISO Image**).
4. From the **Basic Information** area, select the correct **Type**.



5. Click **Save**.

2.12. CUSTOMIZATION TEMPLATES FOR VIRTUAL MACHINE AND INSTANCE PROVISIONING

Add a customization template to provide **Kickstart**, **Cloud-Init**, or **Sysprep** files for the initial loading of the operating system.

Cloud-Init Requirements

- ✳ When creating a template using Red Hat Virtualization, install the **cloud-init** package on the source virtual machine. This enables Cloud-Init to source configuration scripts when a virtual machine built on that template boots.
- ✳ See the [Red Hat Enterprise Virtualization Administration Guide](#) for more information on using Cloud-Init in a Red Hat Enterprise Virtualization environment.
- ✳ See the [Cloud-Init Documentation](#) web site for example scripts.

Kickstart Requirements for ISO Provisioning

- ✳ Name the **Kickstart** file **ks.cfg**.
- ✳ Set the new virtual machine to power down after provisioning is complete.
- ✳ CFME must use the virtual machine payload feature of RHEV to create a floppy disk containing the data from the selected customization template.
- ✳ Customize the installer to include the data written to the floppy disk payload.

Example 2.1. RHEL ISO with the following modifications:

- ✳ **isolinux.cfg** – modify default menu item **append** line to include **ks=cdrom**
- ✳ **ks.cfg** – which must minimally include:

```

#### Pre Install Scripts


```

Mount the floppy drive
modprobe floppy
mkdir /tmp/floppy
mount /dev/floppy /tmp/floppy
%end

Include ks.cfg file from the floppy (written by CFME based on
selected customization template)
%include /tmp/floppy/ks.cfg

```




```

2.13. CUSTOMIZATION SCRIPT ADDITIONS FOR VIRTUAL MACHINE AND INSTANCE PROVISIONING

Customization Type	Reason to Include	Script entries
Kickstart	Takes the values from the Customize tab in Provisioning Dialog and substitutes them into the script.	Configure Networking based on values from provisioning dialog <% if evm[:addr_mode].first == 'static' %> <% network_string = "network --onboot yes --device=eth0 --bootproto=static --noipv6" %> <% ["ip", :ip_addr, "netmask", :subnet_mask, "gateway", :gateway, "hostname", :hostname, "nameserver", :dns_servers].each_slice(2) do ks_key, evm_key %> <% network_string << " - {ks_key} #{evm[evm_key]}" unless evm[evm_key].blank? %> <% end %> <%= network_string %> <% else %> network --device=eth0 --bootproto=dhcp <% end %>
Kickstart	Encrypts the root password from the Customize tab in the Provisioning Dialog .	rootpw --iscrypted <%= MiqPassword.md5crypt(evm[:root_password]) %>
Kickstart	Sends status of the provision back to CloudForms Management Engine Server for display in the CloudForms Management Engine Console.	

Customization Type	Reason to Include	Script entries
Sysprep	Encrypts the root password from the Customize tab in the Provisioning Dialog . The value for the AdministratorPassword line must be inserted to use the password from the Provision Dialog and encrypt it.	<pre><UserAccounts> <AdministratorPassword> <Value><%= MiqPassword.sysprep_crypt(evm[:root_ password]) %></Value> <PlainText>false</PlainText> </AdministratorPassword> </UserAccounts></pre>

2.14. ADDING A CUSTOMIZATION TEMPLATE

1. Navigate to **Infrastructure** → **PXE**.
2. Click the **Customization Templates** accordion.
3. Click  **(Configuration)**,
 
 (Add a new Customization Template).
4. In **Basic Information**, type in a **Name** and **Description**.

Basic Information

Name	<input type="text" value="RHEL 6.2 Desktop"/>
Description	<input type="text" value="Basic Desktop"/>
Image Type	<input type="text" value="RHEL-6"/>
Type	<input type="text" value="Kickstart"/>
Script	<pre> 1 ##### <%= os_ver %> Kickstart file ##### 2 3 4 ### Install info 5 install 6 text 7 lang en_US.UTF-8 8 keyboard us 9 firewall --service=ssh 10 authconfig --enableshadow --passalgo=sha512 11 selinux --enforcing 12 timezone --utc America/New_York 13 zerombr 14 poweroff 15 16 # Configure Networking based on values from provisioning dialog 17 <%= network_string %> 18 19 rootpw --iscrypted <%= MiqPassword.md5crypt(evm[:root_password]) %> 20 21 # Source Files Location 22 url --url=<%= repo_source_url %> 23 repo --name="<%= os_ver %>" --baseurl=<%= repo_source_url %> --cost=10 24 25 26 ### Post Install Scripts </pre>

5. Select the **Image Type**. This list should include the PXE image types you created.
6. In **Type**, select **Kickstart** or **CloudInit** for Linux based systems, and **Sysprep** for Windows based system.

7. In the **Script** area, either paste the script from another source or type the script directly into the CloudForms Management Engine interface.
8. Click **Add**.

The default dialogs show all possible parameters for provisioning. To limit the options shown, see [Customizing Provisioning Dialogs](#).

2.15. PROVISIONING VIRTUAL MACHINES

There are three types of provisioning requests available in CloudForms Management Engine:

1. Provision a new virtual machine from a template
2. Clone a virtual machine
3. Publish a virtual machine to a template

2.16. PROVISIONING A VIRTUAL MACHINE FROM A TEMPLATE



You can provision virtual machines through various methods. One method is to provision a virtual machine directly from a template stored on a provider.



Important

To provision a virtual machine, you must have the "Automation Engine" role enabled.

To Provision a Virtual Machine from a Template:

1. Navigate to **Infrastructure** → **Virtual Machines**.
2. Click  (**Lifecycle**), and then  (**Provision VMs**).
3. Select a template from the list presented.
4. Click **Continue**.
5. On the **Request** tab, enter information about this provisioning request.

Request Information	
E-Mail *	<input type="text"/>
First Name *	<input type="text"/>
Last Name *	<input type="text"/>
Notes	<input type="text"/>

Manager	
Name	<input type="text"/>

In **Request Information**, type in at least a **First Name** and **Last Name** and an email address. This email 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. The other information is optional. If the CloudForms Management Engine server is configured to use LDAP, you can use the **Look Up** button to populate the other fields based on the email address.



Note

Parameters with a * next to the label are required to submit the provisioning request. To change the required parameters, see Customizing Provisioning Dialogs.

- Click the **Purpose** tab to select the appropriate tags for the provisioned virtual machines.
- Click the **Catalog** tab to select the template to provision from. This tab is context sensitive based on provider.

8. For templates on VMware providers:

Name	Operating System	Platform	CPUs	Memory	Disk Size	Provider	Snapshots
XD-Win7 Template	Microsoft Windows 7 (64-bit)	windows	1	2 GB	30 GB	Virtual Center (10.17.70.14)	0

a. For **Provision Type**, select **VMware** or **PXE**.

i. If **VMware** is selected, select **Linked Clone** to create a linked clone to the virtual machine instead of a full clone. Since a snapshot is required to create a linked clone, this box is only enabled if a snapshot is present. Select the snapshot you want to use for the linked clone.

ii. If **PXE** is selected, select a PXE **Server** and **Image** to use for provisioning

b. Under **Count**, select the number of virtual machines to create in this request.

c. Use **Naming** to specify a virtual machine name and virtual machine description. When provisioning multiple virtual machines, a number will be appended to the virtual machine name.

9. For templates on Red Hat providers:

a. Select the **Name** of a template to use.

b. For **Provision Type**, select either **ISO**, **PXE**, or **Native Clone**. You must select **Native Clone** in order to use a Cloud-Init template.

i. If **Native Clone** is selected, select **Linked Clone** to create a linked clone to the virtual machine instead of a full clone. This is equivalent to *Thin Template Provisioning in Red Hat Enterprise Virtualization. Since a snapshot is required to create a linked clone, this box is only enabled if a snapshot is present. Select the snapshot to use for the linked clone.

ii. If **ISO** is selected, select an ISO **Image** to use for provisioning

iii. If **PXE** is selected, select a PXE **Server** and **Image** to use for provisioning

c. Under **Count**, select the number of virtual machines you want to create in this request.

- d. Use **Naming** to specify a **VM Name** and **VM Description**. When provisioning multiple virtual machines, a number will be appended to the **VM Name**.
10. Click the **Environment** tab to decide where you want the new virtual machines to reside.
 - a. If provisioning from a template on VMware, you can either let CloudForms Management Engine decide for you by checking **Choose Automatically**, or select a specific cluster, resource pool, folder, host, and datastore.
 - b. If provisioning from a template on Red Hat, you can either let CloudForms Management Engine decide for you by checking **Choose Automatically**, or select a datacenter, cluster, host and datastore.
 11. Click the **Hardware** tab to set hardware options.

VM Hardware

Number of Sockets	1
Cores per Socket	1
Memory (MB)	1024
Disk Format	<input type="radio"/> Thick <input type="radio"/> Thin <input checked="" type="radio"/> Default

VM Limits

CPU (MHz)	-1	(-1 = Unlimited)
Memory (MB)	-1	(-1 = Unlimited)

VM Reservations

CPU (MHz)	0
Memory (MB)	0

- a. In **VM Hardware**, set the number of CPUs, amount of memory, and disk format: thin, pre-allocated/thick or same as the provisioning template (default).
- b. For VMware provisioning, set the **VM Limits** of CPU and memory the virtual machine can use.
- c. For VMware provisioning, set the **VM Reservation** amount of CPU and memory.

12. Click **Network** to set the vLan adapter. Additional networking settings that are internal to the operating system appear on the **Customize** tab.

Network Adapter Information

vLan * VM Network

- a. In **Network Adapter Information**, select the **vLan**.
13. Click **Customize** to customize the operating system of the new virtual machine. These options vary based on the operating system of the template.

Basic Options

Customize <None>

- <None>
- Specification
- Sysprep Answer File

14. For Windows provisioning:
 - a. To use a customer specification from the Provider, click **Specification**. To select an appropriate template, choose from the list in the custom specification area. The values that are honored by CloudForms Management Engine display.

Note

Any values in the specification that do not show in the CloudForms Management Engine console's request dialogs are not used by CloudForms Management Engine. For example, for Windows operating systems, if you have any run once values in the specification, they are not used in creating the new virtual machines. Currently, for a Windows operating system, CloudForms Management Engine honors the unattended GUI, identification, workgroup information, user data, windows options, and server license. If more than one network card is specified, only the first is used.

Basic Options

Customize Specification

Custom Specification

Name	Description	Last Updated
<None>		
GM Win2k3 - 0 nics		2012-04-13 15:47:13 UTC
GM Win2k3 - 1 nics		2012-04-13 13:15:43 UTC
GM Win2k3 - 2 nics		2012-04-12 15:12:35 UTC
Win2k8Template		2011-05-17 15:54:37 UTC

Override Specification Values ☐

To modify the specification, select **Override Specification Values**.

- b. Select **Sysprep Answer File**, to upload a Sysprep file or use one that exists for a custom specification on the Provider where the template resides. To upload a file, click **Browse** to find the file, and then upload. To use an answer file in **Customization Specification**, click on the item. The answer file will automatically upload for viewing. You cannot make modifications to it.

15. For Linux provisioning:

- a. Under **Credentials**, enter a **Root Password** for the **root** user to access the instance.
- b. Enter a **IP Address Information** for the instance. Leave as **DHCP** for automatic IP assignment from the provider.
- c. Enter any **DNS** information for the instance if necessary.
- d. Select **Customize Template** for additional instance configuration. Select from the Kickstart or Cloud-Init customization templates stored on your appliance.

16. Click the **Schedule** tab to select when provisioning begins.

- a. In **Schedule Info**, select when to start provisioning. If you select **Schedule**, you will be prompted to enter a date and time. Select **Stateless** if you do not want the files deleted after the provision completes. A stateless provision does not write to the disk so it requires the PXE files on the next boot.
- b. In **Lifespan**, select to power on the virtual machines after they are created, and to set a retirement date. If you select a retirement period, you will be prompted for when you want a retirement warning.

Provision Virtual Machines

Request	Purpose	Catalog	Environment	Hardware	Network	Schedule
<div>Schedule Info</div> <div> <div>When to Provision</div> <div> <input type="radio"/> Schedule <input checked="" type="radio"/> Immediately on Approval </div> </div> <div> <div>Stateless</div> <div><input type="checkbox"/></div> </div>						
<div>Lifespan</div> <div> <div>Power on virtual machines after creation</div> <div><input checked="" type="checkbox"/></div> </div> <div> <div>Time until Retirement</div> <div>Indefinite</div> </div>						

17. Click **Submit**.

The provisioning request is sent for approval. For the provisioning to begin, a user with the administrator, approver, or super administrator account role must approve the request. The administrator and super administrator roles can also edit, delete, and deny the requests. You will be able to see all provisioning requests where you are either the requester or the approver.



After submission, the appliance assigns each provision request a **Request ID**. If an error occurs during the approval or provisioning process, use this ID to locate the request in the appliance logs. The Request ID consists of the region associated with the request followed by the request number. As regions define a range of one trillion database IDs, this number can be several digits long.

Request ID Format



Request 99 in region 123 results in Request ID 1230000000000099.

2.17. CLONING A VIRTUAL MACHINE

Virtual Machines can be cloned in other providers as well.

1. Navigate to **Infrastructure** → **Virtual Machines**, and check the virtual machine you want to clone.
2. Click  (**Lifecycle**), and then  (**Clone selected item**).
3. Fill in the options as shown in **To Provision** from a template using the provided dialogs. Be sure to check the **Catalog Tab**.
4. Schedule the request on the **Schedule** tab.
5. Click **Submit**.



2.18. PUBLISHING A VIRTUAL MACHINE TO A TEMPLATE (VMWARE VIRTUAL MACHINES ONLY)

1. Navigate to **Infrastructure** → **Virtual Machines**, and check the virtual machine you want to publish as a template.
2. Click  (**Lifecycle**), and then  (**Publish selected VM to a Template**).
3. Fill in the options as shown in **To Provision** from a template using the provided dialogs. Be sure to check the **Catalog** tab.
4. Schedule the request on the **Schedule** tab.
5. Click **Submit**.

2.19. PROVISIONING INSTANCES

Cloud instances follow the same process (Request, Approval, Deployment) as a standard virtual machine from virtualization infrastructure. First, a user makes a request for instances and specifies the image, tags, availability zone and hardware profile flavor. Second, the request goes through the approval phase. Finally, CloudForms Management Engine executes the request.

2.19.1. Provisioning an EC2 Instance from an Image

1. Navigate to **Clouds** → **Instances**.
2. Click  (**Lifecycle**), then click  (**Provision Instances**).
3. Select an image from the list presented.
4. Click **Continue**.
5. On the **Request** tab, enter information about this provisioning request. In **Request Information**, type in at least a first and last name and an email address. This email 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. The other information is optional. If the CloudForms Management Engine Server is configured to use LDAP, you can use the **Look Up** button to populate the other fields based on the email address.



Note

Parameters with a * next to the label are required to submit the provisioning request. To change the required parameters, see Customizing Provisioning Dialogs.

6. Click the **Purpose** tab to select the appropriate tags for the provisioned instance.
7. Click the **Catalog** tab for basic instance options.
 - a. To change the image to use as a basis for the instance, select it from the list of images.
 - b. Select the **Number of VMs** to provision.
 - c. Type a **VM Name** and **VM Description**.
8. Click the **Environment** tab to select the instance's **Availability Zone**, **Availability Zone**, **Virtual Private Cloud**, **Cloud Subnet**, **Security Groups**, and **Elastic IP Address**. If no specific availability zone is required, select the **Choose Automatically** checkbox.
9. Click the **Properties** tab to set provider options such as hardware flavor and security settings.
 - a. Select a flavor from the **Instance Type** list.
 - b. Select a **Guest Access Key Pair** for access to the instance.
 - c. Select the **CloudWatch** monitoring level. Leave as **Basic** for the default EC2 monitoring.
10. Click the **Customize** tab to set additional instance options.
 - a. Under **Credentials**, enter a **Root Password** for the **root** user access to the instance.

- b. Enter a **IP Address Information** for the instance. Leave as **DHCP** for automatic IP assignment from the provider.
 - c. Enter any **DNS** information for the instance if necessary.
 - d. Select a **Customize Template** for additional instance configuration. Select from the Cloud-Init scripts stored on your appliance.
11. Click the **Schedule** tab to set the provisioning and retirement date and time.
 - a. In **Schedule Info**, choose whether the provisioning begins upon approval, or at a specific time. If you select **Schedule**, you will be prompted to enter a date and time.
 - b. In **Lifespan**, select whether to power on the instances after they are created, and whether to set a retirement date. If you select a retirement period, you will be prompted for when to receive a retirement warning.
12. Click **Submit**.



The provisioning request is sent for approval. For the provisioning to begin, a user with the admin, approver, or super admin account role must approve the request. The admin and super admin roles can also edit, delete, and deny the requests. You will be able to see all provisioning requests where you are either the requester or the approver.

After submission, the appliance assigns each provision request a **Request ID**. If an error occurs during the approval or provisioning process, use this ID to locate the request in the appliance logs. The Request ID consists of the region associated with the request followed by the request number. As regions define a range of one trillion database IDs, this number can be several digits long.

Request ID Format

Request 99 in region 123 results in Request ID 1230000000000099.

2.19.2. Provisioning an OpenStack Instance from an Image

1. Navigate to **Clouds** → **Instances**.
2. Click  (**Lifecycle**), then click  (**Provision Instances**).
3. Select an OpenStack image from the list presented. These images must be available on your OpenStack provider.
4. Click **Continue**.
5. On the **Request** tab, enter information about this provisioning request. In **Request Information**, type in at least a first and last name and an email address. This email 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. The other information is optional. If the CloudForms Management Engine Server is configured to use LDAP, you can use the **Look Up** button to populate the other fields based on the email address.



Note

Parameters with a * next to the label are required to submit the provisioning request. To change the required parameters, see section [Customizing_Provisioning_Dialogs](#).

6. Click the **Purpose** tab to select the appropriate tags for the provisioned instance.
7. Click the **Catalog** tab for basic instance options.
 - a. To change the image to use as a basis for the instance, select it from the list of images.
 - b. Select the **Number of Instances** to provision.
 - c. Type a **Instance Name** and **Instance Description**.
8. Click the **Environment** tab to select the instance's **Tenant**, **Availability Zones**, **Cloud Network**, **Security Groups**, and **Public IP Address**. If no specific Tenant is required, select the **Choose Automatically** checkbox.
9. Click the **Properties** tab to set provider options such as flavors and security settings.
 - a. Select a flavor from the **Instance Type** list.
 - b. Select a **Guest Access Key Pair** for access to the instance.
10. Click the **Customize** tab to set additional instance options.
 - a. Under **Credentials**, enter a **Root Password** for the **root** user access to the instance.
 - b. Enter a **IP Address Information** for the instance. Leave as **DHCP** for automatic IP assignment from the provider.
 - c. Enter any **DNS** information for the instance if necessary.
 - d. Select a **Customize Template** for additional instance configuration. Select from the Cloud-Init scripts stored on your appliance.
11. Click the **Schedule** tab to set the provisioning and retirement date and time.
 - a. In **Schedule Info**, choose whether the provisioning begins upon approval, or at a specific time. If you select **Schedule**, you will be prompted to enter a date and time.
 - b. In **Lifespan**, select whether to power on the instances after they are created, and whether to set a retirement date. If you select a retirement period, you will be prompted for when to receive a retirement warning.
12. Click **Submit**.

The provisioning request is sent for approval. For the provisioning to begin, a user with the admin, approver, or super admin account role must approve the request. The admin and super admin roles can also edit, delete, and deny the requests. You will be able to see all provisioning requests where you are either the requester or the approver.

After submission, the appliance assigns each provision request a **Request ID**. If an error occurs during the approval or provisioning process, use this ID to locate the request in the appliance logs. The Request ID consists of the region associated with the request followed by the request number. As regions define a range of one trillion database IDs, this number can be several digits long.

Request ID Format

Request 99 in region 123 results in Request ID 1230000000000099.

2.19.3. Requirements for Provisioning a Host



CloudForms Management Engine can provision hosts using PXE and Intelligent Platform Management Interface (IPMI) technologies. Before you provision your first host, configure the following prerequisites:

- ✎ Provisioning requires the **Automation Engine** server role be enabled. Confirm your server role settings in **Configure** → **Configuration** → **Server** → **Server Control**.
- ✎ Make a PXE server accessible to the CloudForms Management Engine server.
- ✎ Create a customization template for hosts. This customization template must contain host-specific additions, documented in the Customization Templates for Host Provisioning section.
- ✎ Create system image types for the host.
- ✎ Associate images with the image types.
- ✎ Enable IPMI on provisioning hosts and add them to the CloudForms Management Engine Infrastructure.

2.19.3.1. IPMI Hosts

There are two ways to get the Intelligent Platform Management Interface (IPMI) Host into the VMDB. You can either use the CloudForms Management Engine's discovery process or add the host using its IP address and credentials.

2.19.3.1.1. Discovering the Management Interface for an IPMI Host

1. Navigate to **Infrastructure** → **Hosts**.
2. Click  (**Configuration**), then  (**Discover Items**).
3. In **Discover**, check **IPMI**.
4. Optionally, in **IPMI Credentials**, type in a **User ID** and **Password**.

**Note**

You can also add IPMI credentials after the host has been discovered. See section To Add IPMI Credentials



5. In **Subnet Range**, type in a range of IP addresses. For quickest results, use the actual IP address in both fields.
6. Click **Discover**.

**Note**



After the host is discovered, you can add credentials for IPMI.

2.19.3.1.2. Adding IPMI Credentials to a Discovered Host

After discovering an IPMI host, add the credentials using the following procedure.

1. Navigate to **Infrastructure** → **Hosts**.
2. Click on the host you want to edit.
3. Click  (**Configuration**), and then  (**Edit this Host**).
4. In the **Credentials** area, **IPMI** tab, type in the IPMI credentials
 - a. Use **User ID** to specify a login ID.
 - b. Use **Password** to specify the password for the user ID.
 - c. Use **Verify Password** to confirm the password.
5. Click **Validate** to test the credentials.
6. Click **Save**.

2.19.3.1.3. Adding the Management Interface for an IPMI Host

1. Navigate to **Infrastructure** → **Hosts**.
2. Click  (**Configuration**), then  (**Add a New Item**).
3. In **Basic Information**, type in a **Name** and the **IPMI IP address**.
4. In the **Credentials** area, under **IPMI** tab, type in the IPMI credentials
 - a. Use **User ID** to specify a login ID.
 - b. Use **Password** to specify the password for the User ID.
 - c. Use **Verify Password** to confirm the password.

5. Click **Validate** to test the credentials.

6. Click **Add**.

The IPMI host is added to the CloudForms Management Engine environment; an operating system can now be provisioned onto it.

2.19.3.2. Customization Templates for Host Provisioning



Add a customization template to provide Kickstart files for the initial loading of the operating system. There are certain sections to use to allow for interactions with the provisioning dialogs provided by CloudForms Management Engine.

2.19.3.3. Customization Script Additions

Customization Type	Reason to Include	Script entries
Kickstart	Takes the values from the Customize tab in Provisioning Dialog and substitutes them into the script.	<pre>#Configure Networking based on values from provisioning dialog <% if evm[:addr_mode].first == 'static' %> <% network_string = "network --onboot yes --device=eth0 --bootproto=static -- noipv6" %> <% ["ip", :ip_addr, "netmask", :subnet_mask, "gateway", :gateway, "hostname", :hostname, "nameserver", :dns_servers].each_slice(2) do ks_key, evm_key %> <% network_string << " --#{ks_key} #{evm[evm_key]}" unless evm[evm_key].blank? %> <% end %> <%= network_string %> <% else %> network --device=eth0 --bootproto=dhcp <% end %></pre>
Kickstart	Encrypts the root password from the Customize tab in the Provisioning Dialog .	<pre>rootpw --iscrypted <%= MiqPassword.md5crypt(evm[:root_password]) %></pre>

Customization Type	Reason to Include	Script entries
Kickstart	Sends status of the provision back to CloudForms Management Engine Server for display in the CloudForms Management Engine Console.	<pre># Callback to CFME during post-install wget --no-check-certificate <%= evm[:post_install_callback_url] %></pre>
Sysprep	Encrypts the root password from the Customize tab in the Provisioning Dialog . The value for the AdministratorPassword line must be inserted to use the password from the Provision Dialog and encrypt it.	<pre><UserAccounts> <AdministratorPassword> <Value><%= MiqPassword.sysprep_crypt(evm[:root_password]) %></Value> <PlainText>>false</PlainText> </AdministratorPassword> </UserAccounts></pre>

2.19.3.3.1. Adding a Customization Template

1. Navigate to **Infrastructure** → **PXE**.
2. Click the **Customization Templates** accordion.
3. Click  (**Configuration**), then  (**Add a New Customization Template**).
4. In **Basic Information**, type in a **Name** and **Description**. image:2325.png
5. Select the **Image Type** list. This list includes the PXE image types you created.
6. In **Type**, select **Kickstart** or **CloudInit** for Linux based systems, and **Sysprep** for Windows based system.
7. In the **Script** area, either paste the script from another source or type the script directly into the CloudForms Management Engine interface.
8. Click **Add**.

The default dialogs show all possible parameters for provisioning. To limit the options shown, Customizing Provisioning Dialogs.



2.19.4. Provisioning a Host

After setting up the IPMI and PXE environments, you are ready to provision a host. Currently, you can only provision in the cluster where the template is located or you can create a template in each cluster and let a CloudForms Management Engine Automate method automatically switch the selected template in the provision object.



Important

A customization template with host-specific script additions is required. Ensure especially that the customization template contains the post-installation callback to enable discovery in CloudForms Management Engine.

1. Navigate to **Infrastructure** → **Hosts**.
2. Select a host with IPMI enabled.
3. Click  (**Lifecycle**), then  (**Provision Hosts**).
4. In **Request Information**, type in at least a **First Name** and **Last Name** and an email address. This email is used to send the requester status emails during the provisioning. The other information is optional. If the CloudForms Management Engine server is configured to use LDAP, you can use the **Look Up** button to populate the other fields based on the email

address.

Request Information

E-Mail *	<input type="text"/>
First Name *	<input type="text"/>
Last Name *	<input type="text"/>
Notes	<input type="text"/>

Manager

Name	<input type="text"/>
------	----------------------

5. On the **Purpose** tab, select the desired tags for the provisioned host.

Select Tags to apply

Tags

- ▶ Auto Approve - Max CPU *
- ▶ Auto Approve - Max Memory *
- ▶ Auto Approve - Max Retirement Days *
- ▶ Auto Approve - Max VM *
- ▶ Cost Center *
- ▶ Department
- ▶ EVM Operations *
- ▶ Environment *
- ▶ Exclusions
- ▶ Location *
- ▶ Network Location *
- ▶ Owner *
- ▶ Provisioning Scope
- ▶ Quota - Max Memory *
- ▶ Quota - Max Storage *
- ▶ Quota - Max CPUs *
- ▶ Service Level *
- ▶ Workload

* Only a single value can be assigned from these Tag Categories

6. On the **Catalog** tab, select the hosts to provision.

- ✧ In the **Host** area, select the hosts to provision.
- ✧ In the **PXE** area, select the PXE server and image.

7. On the **Customize** tab, you can select customizations for the operating system of the new host. These options vary based on the operating system to be provisioned.

- ✧ Use **Credentials** to type in a root password
- ✧ In the **IP Address** area, select either **Static** or **DHCP** and enter any other address information you need. If needed, type in DNS specifications.
- ✧ Under **Customize Template**, select a script.

8. On the **Schedule** tab, select when to start the provisioning process.

When to Provision

☒ Schedule ☐ Immediately on Approval

Provision on

10/23/2014

Starting Time (UTC)

0 0

Stateless

☐

9. In **Schedule Info**, select when to start the provisioning process. If you select **Schedule**, enter a date and time.
10. Select **Stateless** to retain files after the provision completes. A stateless provision does not write to the disk so it requires the PXE files on the next boot.
11. Click **Submit**.

The provisioning request is sent for approval. For the provisioning to begin, a user with the admin, approver, or super admin account role must approve the request. The admin and super admin roles can also edit, delete, and deny the requests. You will be able to see all provisioning requests where you are either the requester or the approver.

After submission, the appliance assigns each provision request a **Request ID**. If an error occurs during the approval or provisioning process, use this ID to locate the request in the appliance logs. The Request ID consists of the region associated with the request followed by the request number. As regions define a range of one trillion database IDs, this number can be several digits long.

Request ID Format

Request 99 in region 123 results in Request ID 123000000000099.

2.19.5. Customizing Provisioning Dialogs

The default set of provisioning dialogs shows all possible options. However, CloudForms Management Engine also provides the ability to customize which tabs and fields are shown. You can decide what fields are required to submit the provisioning request or set default values.



For each type of provisioning, there is a dialog that can be created to adjust what options are presented. While samples are provided containing all possible fields for provisioning, you can remove what fields are shown. However, you cannot add fields or tabs.

Edit the dialogs to:

1. Hide or show provisioning tabs.
2. Hide or show fields. If you hide an attribute, the default will be used, unless you specify otherwise.
3. Set default values for a field.
4. Specify if a field is required to submit the request.
5. Create custom dialogs for specific users.



2.19.5.1. Adding a Provision Dialog for All Users

1. Login to the CloudForms Management Engine console for the CloudForms Management Engine server where you want to change the dialog.
2. Navigate to **Automate** → **Customization**.
3. Click the **Provisioning Dialogs** accordion.
4. Click the type of dialog you want to create: **Host Provision**, **VM Provision** or **VM Migrate**.

5. Select one of the default dialogs.
6. Click  (**Configuration**), and then  (**Copy this Dialog**).
7. Type a new **Name** and **Description** for the dialog.
8. In the **Content** field,
 - ✳ To remove a tab from display, change its display value to **ignore**. By choosing **ignore**, you not only hide the tab, but also skip any fields on that tab that were required. To show the tab, change the display value to **show**.
 - ✳ To hide a field, change its display value from **edit** to **hide**. To display fields of most data types, use **edit**. To display a button, use **show**. To set a default value for a field, use **:default => defaultvalue** to the list of parameters for the field. Set the required parameter to either **true** or **false** based on your needs. Note that if you set required parameter to **true**, the field must have a value for the provision request to be submitted.
9. Click **Add**.

If you are using **Provisioning Profiles**, you can specify a specific file that holds the customizations. To do this, you must create an instance mapping to this file in the CloudForms Management Engine Applications/provisioning/profile/VM provisioning by group class. By default, if you are using provisioning profiles and the group does not have a defined instance, the appropriate default dialog file will be used based on the type of provisioning selected.

2.19.5.2. Creating a Custom Provision Dialog

1. Navigate to **Automate** → **Customization**.
2. Click on the **Provisioning Dialogs** accordion.
3. Click on the type of dialog you want to create, **Host Provision**, **VM Provision** or **VM Migrate**.
4. Select one of the default dialogs.
5. Click  (**Configuration**), and then  (**Copy this Dialog**).
6. Rename the dialog as shown in the examples below.

Type of Provision	Dialog Name
Provision Virtual Machine from a template	miq_provision_dialogs_groupname_template Example: miq_provision_dialogs_EvmGroup-user_self_service _template

Clone a Virtual Machine	miq_provision_dialogs_groupname_clone_to_vm Example: miq_provision_dialogs_ EvmGroup-user_self_service _clone_to_vm
Publish a Virtual Machine to a template	miq_provision_dialogs_groupname_clone_to_template Example: miq_provision_dialogs_ EvmGroup-user_self_service _clone_to_template

1. Make any changes you need.
2. In the **Content** field,
 - ✳ To remove a tab from display, change its display value to ignore. By choosing ignore, you not only hide the tab, but also skip any fields on that tab that were required. To show the tab, change the display value to show.
 - ✳ To hide a field, change its display value from **edit** to **hide**. To ensure the field does not get turned back on by a workflow model, use **:display_override => :hide**. To display fields of most data types, use **edit**. To display a button, use **show**. To set a default value for a field, use **:default => defaultvalue** to the list of parameters for the field. Set the required parameter to either **true** or **false** based on your needs. Note that if you set required to true, the field must have a value for the provision request to be submitted.
3. Click **Add**.

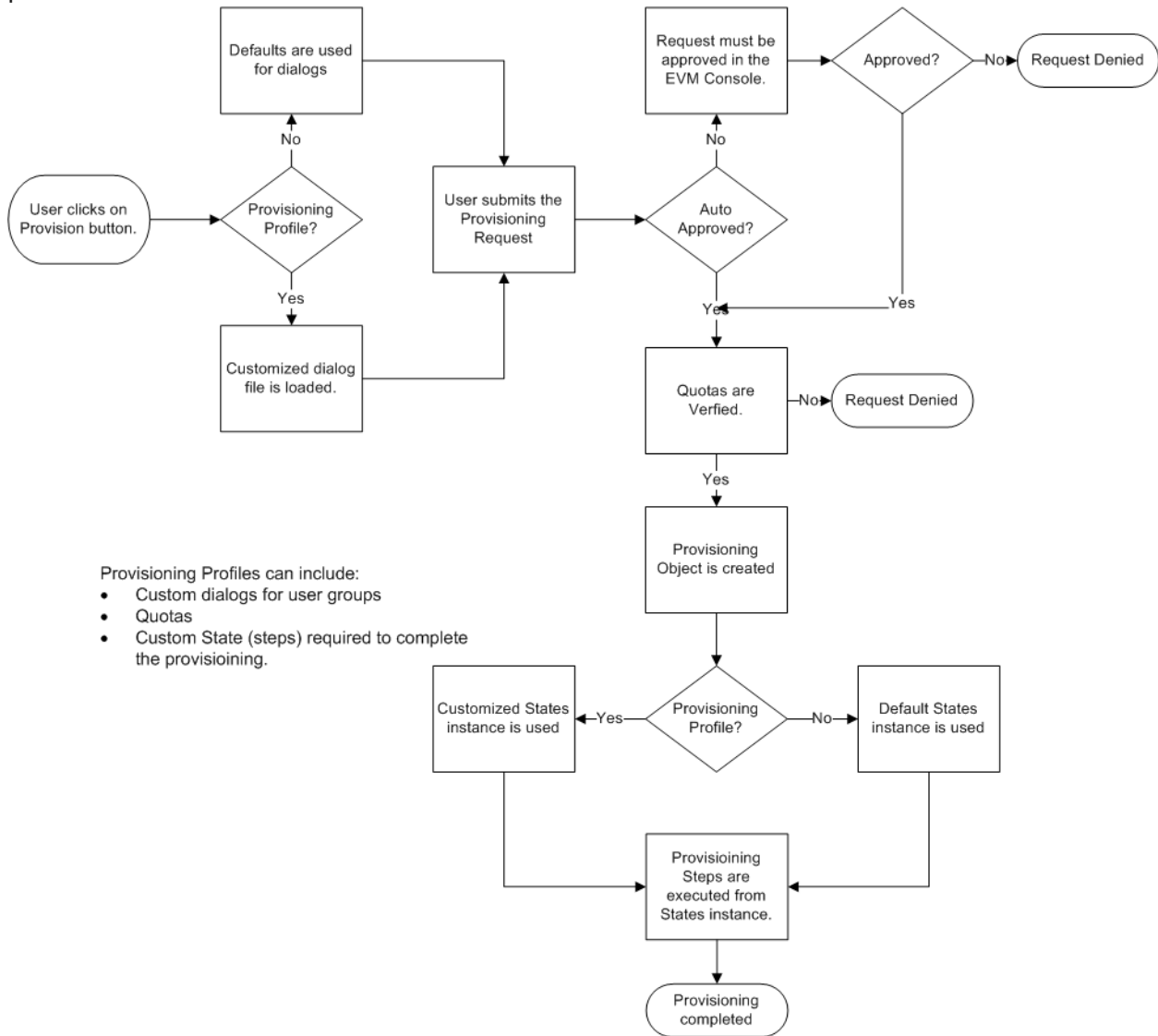
Enter the name of the new dialog into the dialog name field in the appropriate CloudForms Management Engine Applications/provisioning/profile instance. This dialog can now be referred to in an instance in the Provisioning Profiles class so that it can be used for groups of users.

2.19.6. Provisioning Profiles

Provisioning profiles can be used to customize the dialogs and the state machine (steps used to provision the machine). Profiles can be created for LDAP or CloudForms Management Engine groups. To use provisioning profiles:

- ✳ Create a **Provisioning Profile** instance for the LDAP or CloudForms Management Engine group. If no instance exists, then default settings will be used.
- ✳ If customizing dialogs, create a custom dialog file, and specify the name of that file in the provisioning profile instance. If customizing the states for provisioning, create a state instance and set the name of the state instance in the provisioning profile instance.

The diagram below shows where provisioning profiles are called during the entire provisioning process.



2.19.6.1. Creating a Provisioning Profile Instance



1. Navigate to **Automate** → **Explorer**.
2. Using the tree located in the accordion, click **DOMAIN** → **Cloud** → **VM** → **Provisioning** → **Profile**.



Note

DOMAIN must be a user-defined Domain and not the locked ManageIQ Domain. If necessary, you can copy the class from the ManageIQ domain into a custom domain.

This example uses the **Cloud** Namespace, but can also use the **Infrastructure** namespace.

3. Click  (**Configuration**),  (**Add a New Instance**).
4. Make the name of the tag identical to the name of the LDAP or CloudForms Management

Engine group you are creating the instance for, replacing spaces in the group name with underscores. For example, change **Red Hat CloudForms-test group** to **Red Hat CloudForms-test_group**.

Name	CloudForms-test_group				
Display Name					
Description					

Fields

Name	Value	On Entry	On Exit	On Error	Collect
(vmname)	/Cloud/VM/Provisioning/Na				/vmname = vmname
(pre_dialog_name)					/dialog_name = pre_dialog
(get_dialog_name)					
(vm_dialog_name_prefix)	vm_dialog_name_prefix				
(dialog_name)	miq_provision_dialogs-Cloi				/dialog_name = dialog_nam
(auto_approval_state_machine)	ProvisionRequestApproval				/state_machine = auto_app
(quota_state_machine)	ProvisionRequestQuotaVer				/state_machine = quota_st
(state_machine)	VMProvision_\${#miq_prov				/state_machine = state_ma

- In the dialog name field, enter the name of the customized dialog file. This file must reside on the CloudForms Management Engine Appliance in the **/var/www/miq/vmdb/db/fixtures** directory. Red Hat recommends naming the file in the format **miq_provision_dialogs-groupname.rb** and copying this file to all CloudForms Management Engine appliances. For example, in the image above the filename is **miq_provision_dialogs-Red Hat CloudForms-test.rb**. For instructions on creating a custom dialog file, see Customizing Provisioning Dialogs.



Note

Be sure that the custom dialog file exists. If it does not, an error will appear when the user clicks on the **Provisioning** button in the CloudForms Management Engine console.



- Click **Add**.

2.19.6.2. Setting Provisioning Scope Tags

Some non-default placement methods, for example the **redhat_best_placement_with_scope** or **vmware_best_fit_with_scope** methods, may require you to set **Provisioning Scope** tags for a host and a datastore.



To enable these resources for all groups, set the scope to **All**. To limit access to a select group, create a tag in the **Provisioning Scope** category with the exact name of the user group and set this tag on the desired resources. See Tags in General Configuration for information on creating tags.

To set the scope for a host:

- Navigate to **Infrastructure** → **Hosts**.
- Select the host to set the provisioning scope for.
- Click  (**Policy**), and then  (**Edit Tags**).
- From the **Select a customer tag to assign** drop down, select **Provisioning Scope** and then a value for the tag from the next drop down menu.

5. Click **Save**.

To set the scope for a datastore:

1. Navigate to **Infrastructure** → **Datastores**.
2. Select the datastore to set the provisioning scope for.
3. Click  (**Policy**), and then  (**Edit Tags**).
4. From the **Select a customer tag to assign** drop down, select **Provisioning Scope** and then a value for the tag from the next drop down menu.
5. Click **Save**.

CHAPTER 3. WORKING WITH REQUESTS

3.1. PROVISIONING REQUEST APPROVAL METHODS

In this chapter, you will learn about the different approval methods. The request can be approved manually in the CloudForms Management Engine console, set for automatic approval by setting options in the **Automate Explorer**, or by using an external method.



When using an external method, the approval actually takes place on the external system and is sent directly for execution. This chapter discusses how to view and edit requests in the CloudForms Management Engine Console, how to approve a request, and how to set automatic approval parameters.

3.2. WORKING WITH PROVISIONING REQUESTS


After a provisioning request is sent, if you have proper authority, you can copy, edit, delete, approve, or deny a request.

After submission, the appliance assigns each provision request a **Request ID**. If an error occurs during the approval or provisioning process, use this ID to locate the request in the appliance logs. The **Request ID** consists of the region associated with the request followed by the request number. As regions define a range of one trillion database IDs, this number can be several digits long.

Request ID Format


Request 99 in **region 123** results in **Request ID 123000000000099**.

3.2.1. Reloading the Status of Provisioning Requests


1. Navigate to **Services** → **Requests**.
2. Click  (**Reload the current display**).

3.2.2. Approving a Provisioning Request


After a user creates provisioning request, administrators have the ability to approve the request and allow CloudForms Management Engine to complete virtual machine or instance creation.

1. Navigate to **Services** → **Requests**.
2. Click on the request you want to approve.
3. Type in a **Reason** for the approval.
4. Click  (**Approve this request**).

3.2.3. Denying a Provisioning Request


1. Navigate to **Services** → **Requests**.
2. Click on the request you want to deny.
3. Type in a **Reason** for the denial.
4. Click  (**Deny this request**).

3.2.4. Copying a Provisioning Request


1. Navigate to **Services** → **Requests**.
2. Click on the request you want to copy.
3. Click  (**Copy original provision request**).
4. Make changes to the request.
5. Click **Submit**.

If the logged in user is not same as the requester or the request has been already approved or denied, you cannot edit or delete the request.

3.2.5. Editing a Provisioning Request

1. Navigate to **Services** → **Requests**.
2. Click on the request you want to edit.
3. Click  (**Edit the original provision request**).
4. Make changes to the request.
5. Click **Submit**.

3.2.6. Deleting a Provisioning Request

1. Navigate to **Services** → **Requests**.
2. Click on the request you want to delete.
3. Click  (**Delete this request**).
4. Click **OK** to confirm.

3.2.7. Automatically Approving Requests

You can set thresholds for automatic approval of provisioning requests and, therefore, remove the requirement to manually approve the request. You can do this either as a global default or on a per template basis.

3.2.7.1. Enabling Global Defaults for Automatic Approval



To enable a global set of default approval values, edit the defaults instance by navigating to **Automate** → **Explorer**, then **DOMAIN** → **Cloud|Infrastructure** → **VM** → **Provisioning** → **StateMachines** → **ProvisionRequestApproval** in the accordion menu. The parameters in this instance are used by the methods in that same class. By default, the maximum number of virtual machines or instances that can be automatically approved for provisioning is 1. To skip the check for the maximum number of virtual machines, set this field to 0. Set this field to -1 to force manual approval. At a minimum, you must change this parameter for all others to be validated.

1. Navigate to **Automate** → **Explorer**.
2. From the tree in the accordion menu, select **DOMAIN** → **Cloud** → **VM** → **Provisioning** → **StateMachines** → **ProvisionRequestApproval Class**.

Note

DOMAIN must be a user-defined Domain and not the locked ManageIQ Domain. If necessary, you can copy the class from the ManageIQ domain into a custom domain.

This example uses the **Cloud** Namespace but can also use the **Infrastructure** namespace.






3. Click  (**Configuration**), then  (**Edit this instance**).

Fields

Main Info

Fully Qualified Name	ManageIQ-Test / Cloud / VM / Provisioning / StateMachines / ProvisionRequestApproval / Default
Name	Default
Display Name	
Description	

Fields

Name	Value	On Entry	On Exit	On Error	Collect
 (max_cpus)					
 (max_vms)	1				
 (max_memory)					
 (max_retirement_days)					
 (ValidateRequest)		validate_request		pending_request	

Note

Do not change any values other than those listed below. Doing so may prevent the automatic approval process from running.

- ✳ Use **max_cpus** to set the number of CPUs allowed to approve automatically the provisioning request.

- Use **max_vms** to set the maximum number of virtual machines or instances that are allowed to be provisioned automatically approve the request. If this is set to blank, no requests will be automatically approved.
- Use **max_memory** to set the maximum memory allowed to approve automatically the provisioning request.
- Use **max_retirement_days** to set the maximum number of days until the virtual machine or instance is retired to automatically approve this request.
- If a value is blank or **0**, the parameter is ignored.

4. Click **Save**.

The thresholds for automatic approval are set. The next time a provision request is created these thresholds will be checked. If the requirements are met, the provisioning request will be approved with no user intervention.



3.2.7.2. Template Specific Approval Defaults

CloudForms Management Engine provides tags that can be used to set default automatic approval values on a per template or image basis. These values **supersede** those in the **Automate** model. Use these tags to eliminate the need for manual approval for all provisioning requests. To enable automatic approval, assign the tags directly to templates or images.

Category Display Name (Name)	Use (Sample values)
Auto Approve Max CPU (prov_max_cpus)	Sets the maximum number of CPUs that can be automatically approved in a single provisioning request. (Sample Values: 1, 2, 3, 4, 5)
Auto Approve Max Memory (prov_max_memory)	Sets the maximum number of memory that can be automatically approved in a single provisioning request. Sample Values: 1, 2, 4, 8 (in GB)
Auto Approve Max Retirement Days (prov_max_retirement_days)	Sets the maximum number of days until retirement that can be automatically approved in a single provisioning request. Sample Values: 30, 60, 90, 180 (in days)
Auto Approve Max VM (prov_max_vms)	Sets the maximum number of virtual machines or instances that can be automatically approved in a single provisioning request. Sample Values: 1, 2, 3, 4, 5

3.2.7.3. Assigning Tags to a Template for Auto Approval

1. Navigate to **Infrastructure** → **Virtual Machines**.
2. Click the **Templates** accordion, and select the templates that you want to tag.

3. Click  (**Policy**), and then  (**Edit Tags**).
4. Select a customer tag from the first dropdown, and then a value for the tag.

The thresholds for automatic approval for a specific template are set. The next time a provision request is created for this template these thresholds will be checked. If the requirements are met, the provisioning request will be approved with no user intervention.

3.2.7.4. Setting Provisioning Notification Email Addresses

CloudForms Management Engine contains a set of Automate instances for provisioning. These Automate instances also include email fields to set the sender and recipient of provisioning notifications, such as requests. These fields are set to **evmadmin@company.com** as a default.



1. Navigate to **Automate** → **Explorer**.
2. Choose the following Namespace: **DOMAIN** → **Cloud** → **VM** → **Provisioning** → **Email**.



Note

DOMAIN must be a user-defined Domain and not the locked ManageIQ Domain. If necessary, you can copy the class from the ManageIQ domain into a custom domain.






This example uses the **Cloud** Namespace, but can also use the **Infrastructure** namespace.

3. Select an instance within the chosen class.
4. Click  (**Configuration**), then  (**Edit this instance**).
5. Type the desired email addresses in the **to_email_address** and **from_email_address** fields.
6. Click **Save**.

Main Info

Fully Qualified Name	ManageIQ-Test / Cloud / VM / Provisioning / Email / MiqProvisionRequest_Approved				
Name	<input type="text" value="MiqProvisionRequest_Approved"/>				
Display Name	<input type="text"/>				
Description	<input type="text"/>				

Fields

Name	Value	On Entry	On Exit	On Error	Collect
 (to_email_address)	<input type="text" value="evmadmin@company.d"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
 (from_email_address)	<input type="text" value="evmadmin@company.d"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
 (signature)	<input type="text" value="Virtualization Infrastrucl"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
 (vm_retire_extend_days)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
 (method1)	<input type="text" value="MiqProvisionRequest_A"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

CHAPTER 4. FULFILLING REQUESTS

4.1. FULFILLING A REQUEST

After a request has been approved, CloudForms Management Engine then goes through the steps required to complete the request. The steps followed for a regular provision from a virtual machine to a virtual machine (not to a template) are found by navigating to **Automate** → **Explorer**, then listed under **DOMAIN** → **Cloud|Infrastructure** → **VM** → **Provisioning** → **VMProvision_VM** → **Provision VM from Template (template) instance**. The value for each state shows where the instance resides in the **Datastore** accordion. The default set of execution steps is shown below. For more information on state machines, see section State Machines.

4.2. DEFAULT EXECUTION STEPS IN STATES INSTANCE

Step	Description
Customize Request	Apply customizations.
Acquire IP Address	Integrates with IPAM (IP Address Management) to get an IP Address.
Acquire MAC Address	Integrates with IPAM to get a MAC Address.
Register DNS	Integrates with IPAM to register with DNS.
Register CMDB	Integrates with CMDB (Configuration Management Database) to register with the CMDB.
Register AD	Integrates with IPAM to register with active directory.
PreProvision	Pre-provisioning steps.
Provision	Create the virtual machine or instance.
CheckProvisioned	Check that the new virtual machine or instance is in the VMDB.
PostProvision	Post-provisioning steps.

Step	Description
Register DHCP	Integrate with IPAM to register the IP address with DHCP Server.
Activate CMDB	Integrate with IPAM to active the virtual machine or instance in the CMDB.
Email owner	Send email to owner that the virtual machine or instance has been provisioned.

4.2.1. Quotas

Quotas allow you to establish maximum usage thresholds for an owner or group for provisioned virtual machines or instances and are integrated into provisioning profiles. These maximums are checked after the approval but before the actual provision request is started. The quota is set for the group as a whole.

4.2.1.1. Editing the Default Quota



1. Log in as a user with administrator or super administrator rights to the CloudForms Management Engine console.
2. Navigate to **Automate** → **Explorer**.
3. From the accordion menu, click **DOMAIN** → **Cloud** → **VM** → **Provisioning** → **StateMachines** → **ProvisionRequestQuotaVerification**.



Note

DOMAIN must be a user-defined Domain and not the locked ManageIQ Domain. If necessary, you can copy the class from the ManageIQ domain into a custom domain.

This example uses the **Cloud** Namespace, but can also use the **Infrastructure** namespace.





4. Click  (**Configuration**),  (**Edit this instance**).

Fields

Main Info

Fully Qualified Name	ManageIQ-Test / Cloud / VM / Provisioning / StateMachines / ProvisionRequestQuotaVerification / Default
Name	Default
Display Name	
Description	

Fields

Name	Value	On Entry	On Exit	On Error	Collect
 Owner - Max CPUs Allowed (max_owner_cpu)					
 Owner - Max Memory Allowed (MB) (max_owner_memory)					
 Owner - Max Storage Allowed (GB) (max_owner_storage)					
 Group - Max CPUs Allowed (max_group_cpu)					

- ✳ Set the values for **Owner Max CPUs Allowed**, **Owner – Max Memory Allowed**, or **Owner – Max Storage Allowed** to be the maximums for a specific owner.
- ✳ Set the values for **Group Max CPUs Allowed**, **Group – Max Memory Allowed**, or **Group – Max Storage Allowed** to be the maximums for a specific user group.

5. Click **Save**.



4.2.1.2. Using Tags for Owner and Group Quotas

CloudForms Management Engine provides tags for enforcing quotas for the owners of virtual machines or instances. Ownership of a virtual machine or instance can be set either during the provisioning process or by using the **Configuration Set Ownership** button. If a virtual machine or instance has an owner, the value is displayed in the **Lifecycle** section of the virtual machine or instance summary page.

Quota tags can be assigned directly to **either** a group or owner **not** to a configuration item. The table below shows the tags for use in quotas.

Category Display Name (Name)	Use
Quota Max CPU (quota_max_cpu)	Sets the maximum number of CPUs summed over all virtual machines and instances owned by the group or user. Sample Values: 1, 2, 3, 4, 5, 10, 20, 30, 40, 50
Quota Max Memory (quota_max_memory)	Sets the maximum memory summed over all virtual machines and instances owned by the group or user. Sample Values: 1024, 2048, 4096, 8192, 10240, 20480, 40960, 81920 (in MB)
Quota Max Storage (quota_max_storage)	Sets the maximum storage summed over virtual machines and instances owned by the group or user. Sample Values: 10, 100, 1000, 20, 200, 40, 400 (in GB)

4.2.1.3. Applying a Tag to a User or User Group

1. Click **Configure** → **Configuration**.
2. Click the **Access Control** accordion, and select the user or group that you want to tag.
3. Click  (**Policy**), then click  (**Edit Tags**).
4. Select the appropriate customer tag to assign, then the value.
5. Click **Save**.

4.2.1.4. State Machines

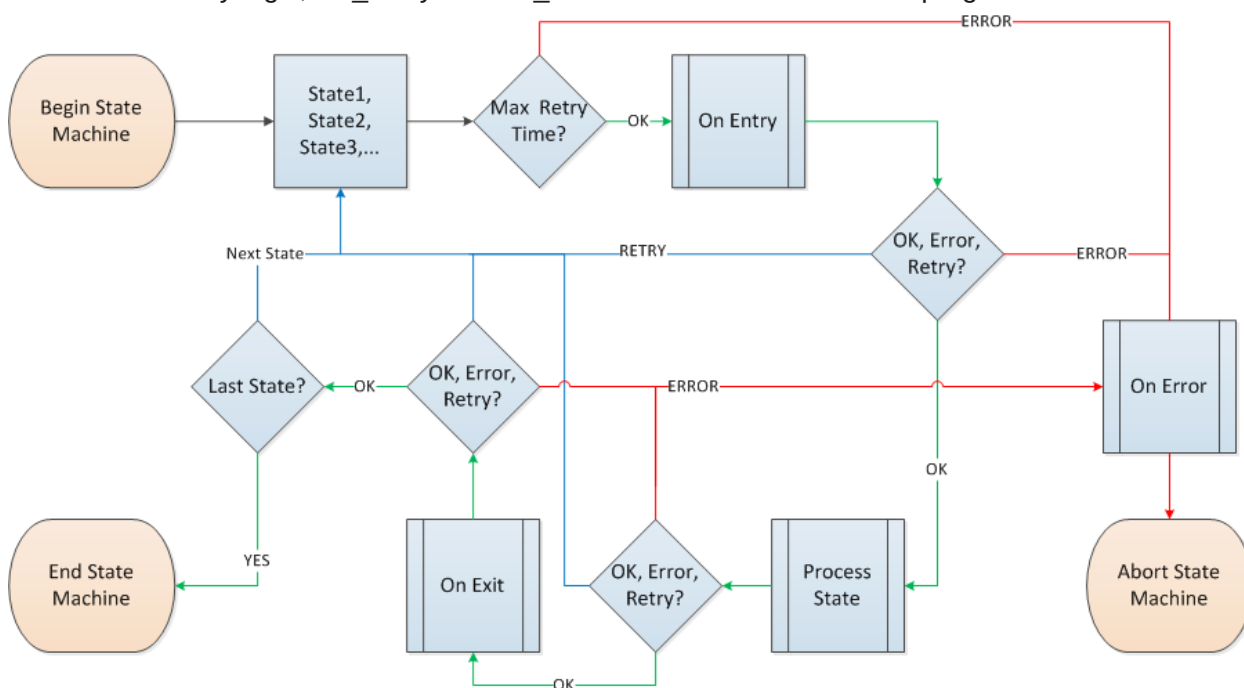
A **State Machine** stores the status of something at a given time, and can operate on input to change the status. It can also cause an action or output to take place for any given change. State machines are also designed so that State-B cannot begin until State-A completes successfully.

The following components make up a CloudForms Management Engine automate state machine:

Component	Description
On_Entry	Method to run when entering the state. It enables you to execute an automate method to do some pre-processing before the state of the state machine is processed.
On_Exit	Method to run when exiting the state.
On_Error	Method to run if an error is encountered when running the state. It enables you to execute an automate method to do some final processing before the state machine finally exits (MIQ_ABORT) due to the error.
Default Value	Runs after the On_Entry method completes (The actual state being processed).
Max Retries	Maximum number of times to retry the state before exiting.
Max Time	Maximum time in seconds to retry the state before exiting.

In the diagram below, you can see how these components combine to create a state machine workflow.

Note that the retry logic, On_Entry and On_Error are distinct cases in the program flow.



Code snippet demonstrating the state machine retry logic:

```
# Get current provisioning status
task = $evm.root['service_template_provision_task']
task_status = task['status']
result = task.status
```

Then check the result to see how it should proceed:

```
case result
when 'error'
  $evm.root['ae_result'] = 'error'
  ....
when 'retry'
  $evm.root['ae_result'] = 'retry'
  $evm.root['ae_retry_interval'] = '1.minute'
when 'ok'
  $evm.root['ae_result'] = 'ok'
end
```

```
When the result is "retry", it sets:
$evm.root['ae_result'] = 'retry'
$evm.root['ae_retry_interval'] = '1.minute'
```

The following image shows a simple state machine pertaining to approving a provision request. This instance can be found in **Datastore** → **ManageIQ** → **Infrastructure** → **VM** → **Provisioning** → **StateMachines** → **ProvisioningRequestApproval** → **Default**.

Name	Value	On Entry	On Exit	On Error	Collect	Max Retries	Max Time	Message
max_vms	1							create
ValidateRequest		validate_request		pending_request		100		create
ApproveRequest		approve_request				100		create

1. The attribute **max_vms** has a value of 1. State machine processing can use the attributes of

the state machine instance to make logic decisions. In this case, the **validate_request** method, which is processed during the **On_Entry** portion of the **ValidateRequest** state, evaluates the **max_vms** attribute. If the number of virtual machines requested is less than the **max_vms** value, the request can be auto-approved. See the **validate_request** method for more details.

2. **ValidateRequest** is the first state to be executed.
3. **ApproveRequest** is the next state to be executed.



Note

Grayed out items reflect values that are set in the class schema. These values can be overwritten on a per instance basis.

4.2.1.5. Customizing Provisioning States

The steps followed when provisioning a virtual machine or cloud instance are completed based on instances from the **DOMAIN** → **Cloud|Infrastructure** → **VM** → **Provisioning** → **StateMachines** → **VMProvision_VM** class. Depending on your environment you can remove, change, or add steps to the provisioning process. For example, if you are not integrating with IPAM or a CMDB, then you can remove those execution steps.

Main Info

Fully Qualified Name	ManagelQ-Test / Cloud / VM / Provisioning / StateMachines / VMProvision_VM / template
Name	template
Display Name	Provision VM from Template
Description	

Fields

Name	Value	On Entry	On Exit	On Error	Collect
(CustomizeRequest)	/Cloud/VM/Provisioning	update_provision_statu	update_provision_statu	update_provision_statu	
(AcquireIPAddress)		update_provision_statu	update_provision_statu	update_provision_statu	
(AcquireMACAddress)		update_provision_statu	update_provision_statu	update_provision_statu	
(RegisterDNS)		update_provision_statu	update_provision_statu	update_provision_statu	
(RegisterCMDB)		update_provision_statu	update_provision_statu	update_provision_statu	
(RegisterAD)		update_provision_statu	update_provision_statu	update_provision_statu	

4.2.1.6. Editing the Default State Instance



1. Navigate to **Automate** → **Explorer**.
2. From the accordion menu, click **DOMAIN** → **Cloud** → **VM** → **Provisioning** → **StateMachines** → **VMProvision_VM**.



Note

DOMAIN must be a user-defined Domain and not the locked ManageIQ Domain. If necessary, you can copy the class from the ManageIQ domain into a custom domain.







This example uses the **Cloud** Namespace, but can also use the **Infrastructure** namespace.

3. Click  (**Configuration**), then  (**Edit this instance**).

Main Info

Fully Qualified Name	ManageIQ-Test / Cloud / VM / Provisioning / StateMachines / VMProvision_VM / template
Name	template
Display Name	Provision VM from Template
Description	

Fields

Name	Value	On Entry	On Exit	On Error	Collect
 (CustomizeRequest)	/Cloud/VM/Provisioning	update_provision_statu	update_provision_statu	update_provision_statu	
 (AcquireIPAddress)		update_provision_statu	update_provision_statu	update_provision_statu	
 (AcquireMACAddress)		update_provision_statu	update_provision_statu	update_provision_statu	
 (RegisterDNS)		update_provision_statu	update_provision_statu	update_provision_statu	
 (RegisterCMDB)		update_provision_statu	update_provision_statu	update_provision_statu	
 (RegisterAD)		update_provision_statu	update_provision_statu	update_provision_statu	

- For each step that you want to remove, clear the entries in the **Value**, **On Entry**, **On Exit**, and **On Error** columns.
- Click **Save**.

4.2.1.7. Viewing the Status of a Provisioning Request




After a request has been approved, the various stages of fulfillment are executed. You can see the progress of the provisioning process by viewing its status.

- Navigate to **Services** → **Requests**. The list of requests is shown.
- Click on a specific request for more information. Once the provisioning begins, if the request was supposed to create more than one virtual machine or instance, a field will appear called **Provisioned VMs**. Click on the number that appears next to it for information on each of the individual provisions.

4.2.1.8. Viewing a Provisioned Virtual Machine or Instance

When a virtual machine or instance is created as a result of a provisioning request, its summary screen will show when it was provisioned in the **Lifecycle** area of the respective summary.

1. From **Services** → **Workloads**, click the virtual machine or instance that you want to view.

Discovered	 Mon Mar 01 19:52:21 UTC 2010
Last Analyzed	 Never
Retirement Date	 Never
Provisioned On	Mon Mar 01 19:53:03 UTC 2010
Owner	

4.2.1.9. Viewing a Virtual Machine or Instance Summary

From **Services** → **Workloads**, click the virtual machine or instance that you want to view.

CHAPTER 5. CATALOGS AND SERVICES

5.1. ABOUT CATALOGS AND SERVICES

Through the use of catalogs, CloudForms Management Engine provides support for multi-tier service provisioning to deploy layered workloads across hybrid environments. You can create customized dialogs that will give consumers of the services the ability to input just a few parameters and provision the entire service.

5.2. TERMINOLOGY

Terminology

Catalog Bundle

A grouping of Templates.

Catalog Item

A single Template or a group of Templates (catalog bundle).

Dialog Tabs

Part of a Service Dialog.

Element

An item on a tab in a Dialog. It can be a Button, Check Box, Drop Down List, Radio Button, Tag Control, Text Area Box, or a Text Box.

Provisioning Dialogs

Dialogs created for Host Provisioning, VM Migration, or VM Provisioning. The dialog name must be added to the appropriate provision instance to be processed.

Service Catalog

A catalog item or Catalog bundle that is available for provisioning.

Service Dialogs

Made up of fully customizable tabs, items, and values for use with Service provisioning.

Template

A template is a copy of a preconfigured virtual machine, designed to capture installed software and software configurations, as well as the hardware configuration, of the original virtual machine.

5.3. CATALOGS

5.3.1. Catalogs

Catalogs are used to create groups of virtual machines or instances for provisioning. For example, a complete package of a database server, desktop with specialized software already on it, and a firewall. You will need to complete the following steps to create and provision a service catalog.

1. Create **Catalog Items** for each virtual machine or instance that will be part of the service.
2. Create a **Service** dialog. For example, create a dropdown with three options small, medium, and large.
3. Create a method for the Service Dialog. This method defines what each of the options means to each of the individual virtual machines or cloud instances for the service. This method is called from a service provisioning instance in the Automate model.
4. Create an instance in the **DOMAIN/Service/Provisioning/StateMachines/ServiceProvision_Template** class that calls the method.





Note

DOMAIN must be a user-defined Domain and not the locked ManageIQ Domain. If necessary, you can copy the class from the ManageIQ domain into a custom domain.

5. Associate method with Automate instance.
6. Create a **Catalog Bundle**, adding each of the catalog items to it. Select the **Service Dialog** you created. Use the instance created in the **DOMAIN/Service/Provisioning/StateMachines/ServiceProvision_Template** class as the **Entry Point**. Check **Display in Catalog** box.
7. Provision a service.

5.3.2. Creating a Catalog Item

Create a catalog item for each virtual machine or cloud instance that will be part of the service.

1. Navigate to **Services** → **Catalogs**.
2. Click the **Catalog Items** accordion.
3. Click  (**Configuration**), and then  (**Add a New Catalog Item**).
4. Select the **Catalog Item Type** you are adding. The dialogs that appear will be filtered based on the selected type of provider. For example, you will only see templates residing on Red Hat Providers, if the **Catalog Item Type** is **Redhat**.

5. In the **Basic Info** subtab:
 - a. Type a **Name/Description**.

- b. Check **Display in Catalog** to edit **Catalog**, **Dialog**, and **Entry Point(NS/Cls/Inst)** options.

- i. **Provisioning Entry Point (Domain/NS/Cls/Inst)** requires you to select an Automate instance to run upon provisioning.
- ii. **Retirement Entry Point (Domain/NS/Cls/Inst)** requires you to select an Automate instance to run upon retirement.

[Basic Info](#) [Details](#)

Basic Info

Name / Description	test / test	<input checked="" type="checkbox"/> Display in Catalog
Catalog	<_Unassigned>	
Dialog	<No Dialog>	
Provisioning Entry Point (NS/Cls/Inst)	/Service/Provisioning/StateMachines/ServiceProvisic	X
Reconfigure Entry Point (NS/Cls/Inst)		
Retirement Entry Point (NS/Cls/Inst)	/Service/Retirement/StateMachines/ServiceRetireme	X

[Add](#) [Cancel](#)

Note

The entry point must be a State Machine since the **Provisioning Entry Point** list is filtered to only show State Machine class instances. No other entry points will be available from the **Provisioning Entry Point** field.

Note





You can only choose from the catalogs and dialogs you have already created. If you haven't done so, leave the values blank and edit later.



- In the **Details** subtab, write a **Long Description** for the catalog item.
- In the **Request Info** subtab, select provisioning options that apply to the provider chosen. For more information, refer to the sections on Provisioning Virtual Machines and Provisioning Instances.
- Click **Add**.

5.3.3. Service Dialogs

When provisioning a service, input will be needed from the requester. **Service Dialogs** are used to take input from the user. This input is connected to a method in the **Automate** model that defines how the users input is translated into the provision request. Before creating a **Service Dialog**, be sure to plan what items you need the user to input.

5.3.3.1. Adding a Service Dialog



1. Navigate to **Automate** → **Customization**.
2. Click the **Service Dialogs** accordion.
3. Click  (**Configuration**), and then  (**Add a new Dialog**).
4. In **Dialog Information**, type in a **Label** and **Description**. Check the boxes for the buttons you want available at the bottom of the dialog form. The description will appear as hover text.
5. Click **Add**.
6. Select the dialog you just created.
7. Click  (**Configuration**), and then  (**Edit this Dialog**).
8. Add a tab to the dialog.

- a. Click  (**Add**), then  (**Add a New Tab to this Dialog**).
- b. Type in a **Label** and **Description** for this tab.

9. Add a box to this tab.

- a. Click  (**Add**), then  (**Add a New Box to this Tab**).
- b. Type in a **Label** and **Description** for this box.

10. Add an element to this box. Elements are controls that accept input.

- a. Click  (**Add**), then  (**Add a New Element to this Box**).
- b. Type in a **Label**, **Name**, and **Description** for this element.



Important

Name must use only alphanumeric characters and underscores without spaces. It is also used to retrieve the value of this element in the method used with the dialog and must start with **dialog_service_type**

- c. Select a **Type** for an element type. All **Type** options have a **Required** and **Default Value** field. Check **Required** or set **Required** to **true** if the element is required to proceed. You can also specify a default value. The rest of the options presented are based on which type of element you select.

Element Types	Additional Info
Check Box	Check Default Value if you want this check box checked by default.
Date Control	Use Date Control to create a field where users can select a date. If you want users to be able to select a date and time, use the Date/Time Control option.
Date/Time Control	Use Date/Time Control to create a field where users can select a date and time. Only one Date Control or Date/Time Control element can be present in a dialog.
Drop Down Dynamic List	Use Drop Down Dynamic List if you want the list options to be created using automate methods. Use Entry Point (NS/Cls/Inst) to select an automate instance. Check Show Refresh Button to allow users to refresh the list options manually.
Radio Button	This element type serves the same purpose as Drop Down List but displays options using radio buttons.
Tag Control	Select a Category of tags you want assigned to the virtual machines associated with this service dialog. Check Single Select if only one tag can be selected.
Text Area Box	Provides text area for users to type in some text. You can also leave a message to users by typing in the Default Value field or leave it as blank.
Text Box	This element type serves the same purpose as Text Area Box with the option to check Protected so the text is shown as asterisks (*), instead of plain text.

11. Click **Save**.

5.3.3.2 Importing Service Dialogs

5.3.3.2. Importing Service Dialogs

You can share service dialogs between appliances using the export and import features.

1. Navigate to **Automate** → **Customization**.
2. In the **Import/Export** accordion, click **Service Dialog Import/Export**.
3. In the **Import** area, click **Browse** to select an import file.
4. Click **Upload**.

5.3.3.3. Exporting Service Dialogs

You can share service dialogs between appliances using the export and import features.

1. Navigate to **Automate** → **Customization**.
2. In the **Import/Export** accordion, click **Service Dialog Import/Export**.
3. In the **Export** area, select the service dialogs that you want to export.
4. Click **Export**.

5.3.4. Methods

5.3.4.1. Creating a Method to Associate with the Dialog

You will need to create a method that connects the values in the dialog with the provisioning request. The method should be created in the **DOMAIN/Service/Provisioning/StateMachines/ServiceProvision_Template** class of the **Automate** model.



Note

DOMAIN must be a user-defined Domain and not the locked ManageIQ Domain. If necessary, you can copy the class from the ManageIQ domain into a custom domain.

A method is provided below that was created for the following scenario:

- ✎ You want to provision a three-tiered Service that contains catalog items of web, app and DB. Each of these virtual machines (or cloud instances) has been tagged under the **Service** category with the appropriate value. Then, added as a catalog item and combined into a catalog bundle.
- ✎ The **Service Dialog** captures the selection of small, medium or large application in a dropdown called **service_type**. When referring to a value captured in an element in a dialog, the name of the element should be prefixed with **dialog_**. For example, **service_type** becomes **dialog_service_type** when used in the method.
- ✎ The method will set the memory sizes for each of the catalog items based on the **service_type** selection.

```
# CloudForms Management Engine Automate Method
```

```

#
$evm.log("info", "CloudForms Management Engine Automate Method
ConfigureChildDialog Started")
#
#           Method Code Goes here
#
$evm.log("info", "=====")
$evm.log("info", "Listing ROOT Attributes:")
$evm.root.attributes.sort.each { |k, v| $evm.log("info", "\t#{k}: #
{v}")}
$evm.log("info", "=====")

stp_task = $evm.root["service_template_provision_task"]
$evm.log("info", "=====")
$evm.log("info", "Listing task Attributes:")
stp_task.attributes.sort.each { |k, v| $evm.log("info", "\t#{k}: #
{v}")}
$evm.log("info", "=====")

#####
#### This is how the method would look for dialog variables
#####
dialog_service_type = $evm.root['dialog_service_type']
$evm.log("info", "User selected Dialog option = [#
{dialog_service_type}]" )

stp_miq_request_task = stp_task.miq_request_task
#$evm.log("info", "(parent) miq_request_task: = [#
{stp_miq_request_task}]" )

#####
#### This is how you get the catalog items for the catalog bundle
#####

stp_miq_request_tasks = stp_task.miq_request_tasks
#$evm.log("info", "(children) miq_request_tasks count: = [#
{stp_miq_request_tasks.count}]" )

#####
#### By going through the children, you can set the dialog variable for
each of the children (we based our values on the childrens service
tags)
#####

stp_miq_request_tasks.each do |t|

  $evm.log("info", " Setting dialog for: #{t.description}")
  service = t.source
  service_resource = t.service_resource
  #$evm.log("info", " Child service resource name: #
{service_resource.resource_name}")
  #$evm.log("info", " Child service resource description: #
{service_resource.resource_description}")

  service_tag_array = service.tags(:app_tier)
  service_tag = service_tag_array.first.to_s

```

```

memory_size = nil

#####
#### The dialog_service_type is the attribute set on the service dialog
#### We use the service_tag to decide what child gets what dialog
#####

case dialog_service_type
when "Small"
  case service_tag
  when "app"
    memory_size = 1024
  when "web"
    memory_size = 1024
  when "db"
    memory_size = 4096
  else
    $evm.log("info","Unknown Dialog type")
  end
when "Large"
  case service_tag
  when "app"
    memory_size = 4096
  when "web"
    memory_size = 4096
  when "db"
    memory_size = 8192
  else
    $evm.log("info","Unknown Dialog type")
  end
else
  $evm.log("info","Unknown Dialog type - setting Dialog options
here")
end

#####
#### set_dialog_option sets the dialog for the child
#####

t.set_dialog_option('memory',memory_size) unless memory_size.nil?
$evm.log("info","Set dialog for selection: [{dialog_service_type}]
Service_Tier: [{service_tag}] Memory size: [{memory_size}]")

end
#
#
#
$evm.log("info", "CloudForms Management Engine Automate Method
ConfigureChildDialog Ended")
exit MIQ_OK

```



5.3.4.2. Creating a Method in the Service Class

Service methods have been split based on purpose.

1. Navigate to **Automate** → **Explorer**.
2. Service Class is located at **DOMAIN** → **Service** → **Provisioning** → **StateMachines** → **Methods** and **Domain** → **Service** → **Retirement** → **StateMachines** → **Methods**.

**Note**

DOMAIN must be a user-defined Domain and not the locked ManageIQ Domain. If necessary, you can copy the class from the ManageIQ domain into a custom domain.

3. Click the **Methods** tab.
4. Click  (**Configuration**), then  (**Add a New Method**).
5. Type in a **Name** and **Display Name**.
6. In the **Data** field, type in the method contents.
7. Click **Validate** and wait for your data entry to be successfully validated.
8. Click **Add**.

Main Info

Fully Qualified Name	ManageIQ / Service / Provisioning / StateMachines / Methods
Name	<input type="text"/>
Display Name	<input type="text"/>
Location	<input type="text" value="inline"/>

Data

```

1 #
2 # Description: <Method description here>
3 #
4 #

```



Input Parameters

5.3.4.3. Creating an Instance in the Service Class

1. Navigate to **Automate** → **Explorer**.
2. Service Class is located at **DOMAIN** → **Service** → **Provisioning** → **StateMachines** → **Methods** and **Domain** → **Service** → **Retirement** → **StateMachines** → **Methods**.

**Note**

DOMAIN must be a user-defined Domain and not the locked ManageIQ Domain. If necessary, you can copy the class from the ManageIQ domain into a custom domain.


3. Click the **Instances** tab.
4. Click  (**Configuration**), then  (**Add a new Instance**).
5. Type in a **Name** and **Display Name**.
6. In the **Fields** area, type in the method's name in **Value**.
7. Click **Add**.

The instance is created so that it can be called from the **ServiceProvision** class.

Main Info

Fully Qualified Name	ManageIQ-Test / Service / Provisioning / StateMachines / Methods
Name	<input type="text"/>
Display Name	<input type="text"/>
Description	<input type="text"/>

Fields

Name	Value	On Entry	On Exit	On Error	Collect
 (execute)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Add
Cancel



Note

After the method has been created, it must be mapped to an instance in the **DOMAIN/Service/Service/Provisioning/StateMachines** class. The name of the instance must be specified as the **Entry Point**. This method must be called before the provision job begins.

5.3.4.4. Associating a Method with an Automate Instance

Service methods have been split based on purpose.



1. Navigate to **Automate** → **Explorer**.
2. From the accordion menu, click the required service method. Service Class is located at **DOMAIN** → **Service** → **Provisioning** → **StateMachines** → **Methods** and **Domain** → **Service** → **Retirement** → **StateMachines** → **Methods**.



Note



DOMAIN must be a user-defined Domain and not the locked ManageIQ Domain. If necessary, you can copy the class from the ManageIQ domain into a custom domain.

3. Either create a new instance or select the **clone_to_service** instance.

4. Click  (**Configuration**), then  (**Edit Selected Instance**).
5. In the **configurechilddialog** value, put the path to the method.
6. Click **Save** or **Add** if you are adding this to a new instance.

Now that the catalog items, service dialog, dialog methods, and service provision instance have been created, you can create the catalog bundle.

5.3.5. Creating a Catalog Bundle

1. Navigate to **Services** → **Catalogs**.
2. Click the **Catalog Items** accordion.
3. Click  (**Configuration**), and then  (**Add a New Catalog Bundle**).
4. In **Basic Info**, type in a name and description images:2362.png[]
5. Click **Display in Catalog**.
6. Select the appropriate dialog name.
7. Select the path to the appropriate **ServiceProvision** instance.
8. Click on the **Resources** tab, then select the catalog items you want added to the bundle from the **Add a Resource** dropdown.
9. Click **Add**.

A catalog bundle is created and visible in the **Service Catalog** accordion.



Note

You should also create and specify an Entry Point in the **DOMAIN/Service/Provisioning/StateMachines/Methods/CatalogBundle** class for each catalog item that is part of a bundle. If you do not, then the pre and post provision processing will occur for each item in the bundle in addition to processing for the **Catalog Bundle**. To set the entry point, go into each **Catalog Item** and check **Display in Catalog**. Then, you will see the **Entry Point** field.

5.3.5.1. Provisioning a Service

1. Navigate to **Services** → **Catalogs**.
2. Click the **Service Catalogs** accordion, and select the service to provision.
3. Click **Order**. The dialog appears.
4. Select the options in the **Service** dialog.

The parameters are passed to the children based on the method tied to the choices made in the dialog.

CHAPTER 6. RETIREMENT

6.1. RETIRING VIRTUAL MACHINES

6.1.1. Retiring Virtual Machines and Instances

When a virtual machine or instance is no longer required, it can be retired. Once a virtual machine or instance reaches its retirement date, it is immediately shut down and not allowed to restart. If an attempt to restart is made, CloudForms Management Engine will shut down the virtual machine or instance.



There are three built-in policies involved with retirement. * If the virtual machine or instance reaches its retirement date, it will be stopped even if it is running. * If a retired virtual machine or instance is requested to start through CloudForms Management Engine, the virtual machine or instance will not be allowed to start. * If a provider starts a retired virtual machine or instance outside of CloudForms Management Engine, the virtual machine or instance will be stopped.

CloudForms Management Engine provides a number of ways to retire a virtual machine or instance. * By using the allocated buttons in the CloudForms Management Engine console. * When creating a provision request, a retirement date can be set up.

6.1.2. Using the CloudForms Management Engine Console to Retire



Through the CloudForms Management Engine console, you can retire a virtual machine on a specific date or immediately.

6.1.3. Retiring a Virtual Machine Immediately

1. Navigate to **Services** → **Workloads**.
2. Select the virtual machine or instance that you want to retire.
3. Click  (**Lifecycle**), then  (**Retire this VM/Instance**).

The virtual machine or instance is immediately stopped, and will be shut down if an attempt is made to restart it.




6.1.4. Setting a Retirement Date for a Virtual Machine or Instance

1. Navigate to **Services** → **Workloads**.
2. Select the virtual machine that you want to set a retirement date for.
3. Click  (**Lifecycle**), then  (**Set/remove retirement date**).
4. Select a date using the calendar control.
5. Click **Save**.

The retirement date is set, and displays in the virtual machine or instance summary screen.

6.1.5. Removing Retirement Date from Virtual Machine or Instance

6.1.5. Removing a Retirement Date for a Virtual Machine or Instance

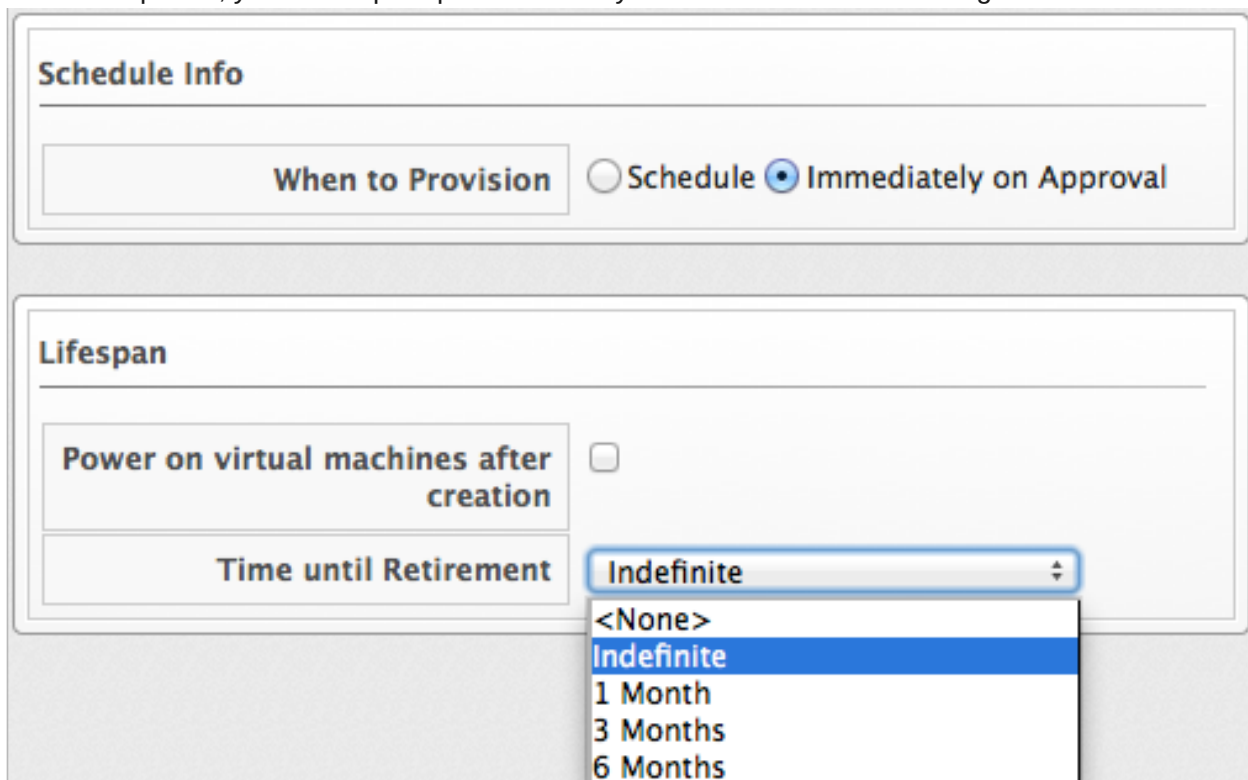
1. Navigate to **Services** → **Workloads**.
2. Select the virtual machine or instance that you want to remove the retirement date from.
3. Click  (**Lifecycle**), then click  (**Set Retirement Date**).
4. Click  (**Remove Retirement Date**).

6.2. SETTING RETIREMENT IN A PROVISION REQUEST

If you are using CloudForms Management Engine to provision, you can set when you want retirement in the provision request. To see how to create a request, go to Provisioning Requests. A warning email will be sent to the owner before the retirement.

6.2.1. Scheduling Retirement in a Provision Request

After provisioning either a Cloud Instance or Virtual Machine, a multi-tabbed screen appears where you can set up your provision requests. The **Schedule** tab allows you to choose to power on the virtual machines or instances after they are created, and to set a retirement date. If you select a retirement period, you will be prompted for when you want a retirement warning.





The screenshot shows the 'Schedule Info' and 'Lifespan' sections of a provision request form. In the 'Schedule Info' section, there are two radio buttons: 'When to Provision' (unselected) and 'Schedule' (selected). Below this, in the 'Lifespan' section, there is a checkbox for 'Power on virtual machines after creation' which is unchecked. Below the checkbox is a dropdown menu for 'Time until Retirement'. The dropdown is currently set to 'Indefinite' and is open, showing options: '<None>', 'Indefinite', '1 Month', '3 Months', and '6 Months'.

6.3. EXTENDING RETIREMENT DATES

CloudForms Management Engine **Automate** includes a method to extend the retirement of a virtual machine or instance by 14 days. This section describes how to create a button that invokes this method and how to edit the method to change the number of days.

6.3.1. Creating a Custom Button to Extend Retirement



1. Navigate to **Automate** → **Customization**.
2. Click the **Buttons** accordion.
3. From the **Object Types** tree, select **VM and Instance**.
4. Navigate to the button group to which you want to add this button. (If you do not have a button group, add one and then create the button.)
5. Click  (**Configuration**), then  (**Add a new Button**).
6. Type in a button text and button hover text, and select the image you want to use.
7. In **Object Details**, select **Request** from the **/System/Process/** dropdown. By default, the message is **create**. Do not change it.
8. In **Request**, type **vm_retire_extend**.
9. Click **Add**.

6.3.2. Changing the Number of Days to Extend Retirement

1. Navigate to **Automate** → **Explorer**.
2. Click **DOMAIN** → **Cloud** → **VM** → **Retirement** → **Email** → **vm_retire_extend**.

DOMAIN must be a user-defined Domain and not the locked ManageIQ Domain. If necessary, you can copy the class from the ManageIQ domain into a custom domain.






This example uses the **Cloud** Namespace, but you can also use the **Infrastructure** namespace.

1. Click  (**Configuration**), then  (**Edit this Instance**).
2. In the Value field, change the **vm_retire_extend_days** attribute to the new value.
3. Click **Save**.

Main Info

Fully Qualified Name	ManageIQ-Test / Cloud / VM / Retirement / Email				
Name	vm_retire_extend				
Display Name					
Description					

Fields

Name	Value	On Entry	On Exit	On Error	Collect
 (to_email_address)	evmadmin@company.d				
 (from_email_address)	evmadmin@company.d				
 (signature)	Virtualization Infrastruc				
 (vm_retire_extend_days)	14				
 (method1)	vm_retire_extend				

Save Reset Cancel