CloudForms 3.1
Management Engine 5.3 Quick Start Guide

An introduction to using CloudForms Management Engine's main features

Red Hat CloudForms Documentation Team

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Legal Notice

Abstract

This guide provides instructions on the main features for getting started with CloudForms Management Engine, including information on customizing provisioning dialogs and on database planning. Information and procedures in this book are relevant to CloudForms Management Engine administrators.

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Chapter 1. Introduction to Red Hat CloudForms

Red Hat CloudForms Management Engine delivers the insight, control, and automation enterprises need to address the challenges of managing virtual environments. This technology enables enterprises with existing virtual infrastructures to improve visibility and control, and those starting virtualization deployments to build and operate a well-managed virtual infrastructure.

Red Hat CloudForms 3.1 is comprised of a single component, the CloudForms Management Engine. It has the following feature sets:

- Insight: Discovery, Monitoring, Utilization, Performance, Reporting, Analytics, Chargeback, and Trending.
- Control: Security, Compliance, Alerting, and Policy-Based Resource, and Configuration Enforcement.
- Automate: IT Process, Task and Event, Provisioning, and Workload Management and Orchestration.
- Integrate: Systems Management, Tools and Processes, Event Consoles, Configuration Management Database (CMDB), Role-based Administration (RBA), and Web Services.

1.1. Architecture

The diagram below describes the capabilities of Red Hat CloudForms Management Engine. Its features are designed to work together to provide robust management and maintenance of your virtual infrastructure.

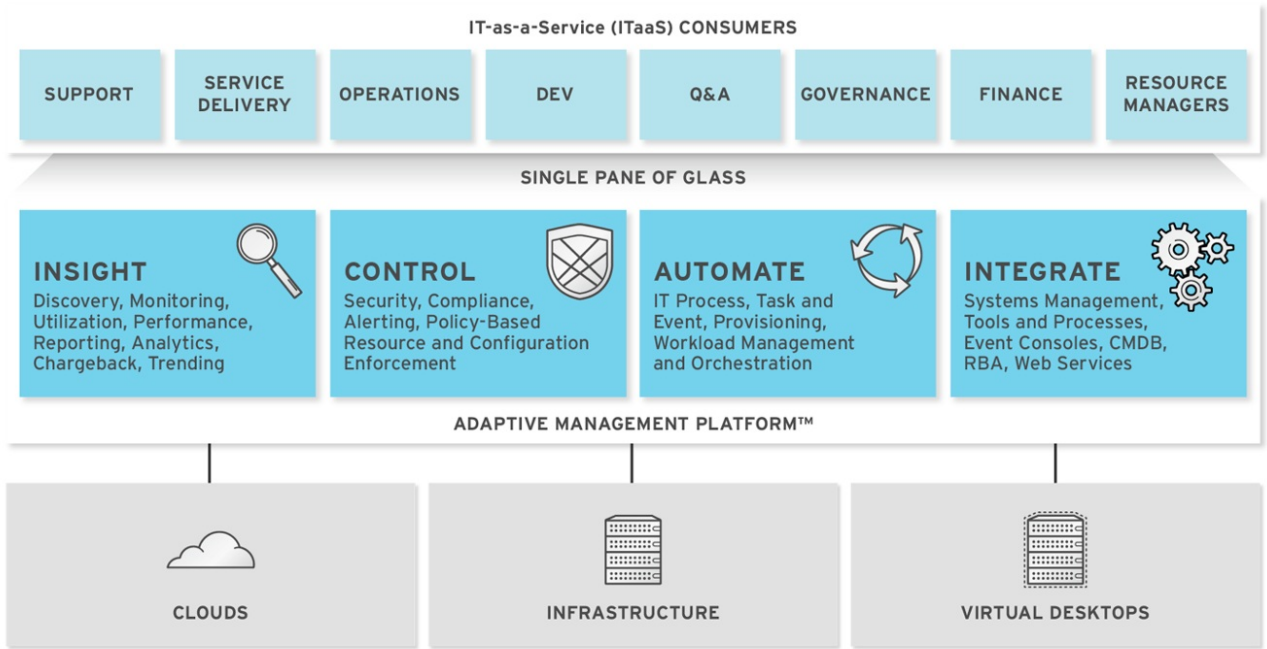

Figure 1.1. Features

The architecture comprises the following components:

- The CloudForms Management Engine Appliance (Appliance) which is supplied as a secure, high-performance, preconfigured virtual machine. It provides support for Secure Socket Layer (SSL) communications.
- The CloudForms Management Engine Server (Server) resides on the Appliance. It is the software layer that communicates between the SmartProxy and the Virtual Management Database. It includes support for Secure Socket Layer (SSL) communications.
- The Virtual Management Database (VMDB) resides either on the Appliance or another computer accessible to the Appliance. It is the definitive source of intelligence collected about your Virtual Infrastructure. It also holds status information regarding Appliance tasks.
- The CloudForms Management Engine Console (Console) is the Web interface used to view and control the Server and Appliance. It is consumed through Web 2.0 mash-ups and web services (WS Management) interfaces.
- The SmartProxy can reside on the Appliance or on an ESX Server. If not embedded in the Server, the SmartProxy can be deployed from the Appliance. Each storage location must have a SmartProxy with visibility to it. The SmartProxy acts on behalf of the Appliance communicating with it over HTTPS (SSL) on standard port 443.

1.2. Terminology

The following terms are used throughout this document. Review them before proceeding.

Account Role

A designation assigned to a user allowing or restricting a user to parts and functions of the CloudForms Management Engine console.

Action

An execution that is performed after a condition is evaluated.

Alert

CloudForms Management Engine alerts notify administrators and monitoring systems of critical configuration changes and threshold limits in the virtual environment. The notification can take the form of either an email or an SNMP trap.

Analysis Profile

A customized scan of hosts, virtual machines, or instances. You can collect information from categories, files, event logs, and registry entries.

Cloud

A pool of on-demand and highly available computing resources. The usage of these resources are scaled depending on the user requirements and metered for cost.

CloudForms Management Engine Appliance

A virtual machine on which the virtual management database (VMDB) and CloudForms Management Engine server reside.

CloudForms Management Engine Console

A web-based interface into the CloudForms Management Engine Appliance.

CloudForms Management Engine Role

A designation assigned to a CloudForms Management Engine server that defines what a CloudForms Management Engine server can do.

CloudForms Management Engine Server

The application that runs on the CloudForms Management Engine Appliance and communicates with the SmartProxy and the VMDB.

Cluster

Hosts that are grouped together to provide high availability and load balancing.

Condition

A test of criteria triggered by an event.

Discovery

Process run by the CloudForms Management Engine server which finds virtual machine and cloud providers.

Drift

The comparison of a virtual machine, instance, host, cluster to itself at different points in time.

Event

A trigger to check a condition.

Event Monitor

Software on the CloudForms Management Engine Appliance which monitors external providers for events and sends them to the CloudForms Management Engine server.

Host

A computer on which virtual machine monitor software is loaded.

Instance/Cloud Instance

A on-demand virtual machine based upon a predefined image and uses a scalable set of hardware resources such as CPU, memory, networking interfaces.

Managed/Registered VM

A virtual machine that is connected to a host and exists in the VMDB. Also, a template that is connected to a provider and exists in the VMDB. Note that templates cannot be connected to a host.

Managed/Unregistered VM

A virtual machine or template that resides on a repository or is no longer connected to a provider or host and exists in the VMDB. A virtual machine that was previously considered registered may become unregistered if the virtual machine was removed from provider inventory.

Provider

A computer on which software is loaded which manages multiple virtual machines that reside on multiple hosts.

Policy

A combination of an event, a condition, and an action used to manage a virtual machine.

Policy Profile

A set of policies.

Refresh

A process run by the CloudForms Management Engine server which checks for relationships of the provider or host to other resources, such as storage locations, repositories, virtual machines, or instances. It also checks the power states of those resources.

Regions

Regions are used to create a central database for reporting and charting. Regions are used primarily to consolidate multiple VMDBs into one master VMDB for reporting.

Resource

A host, provider, instance, virtual machine, repository, or datastore.

Resource Pool

A group of virtual machines across which CPU and memory resources are allocated.

Repository

A place on a datastore resource which contains virtual machines.

SmartProxy

The SmartProxy is a software agent that acts on behalf of the CloudForms Management Engine Appliance to perform actions on hosts, providers, storage and virtual machines.

The SmartProxy can be configured to reside on the CloudForms Management Engine Appliance or on an ESX server version. The SmartProxy can be deployed from the CloudForms Management Engine Appliance, and provides visibility to the VMFS storage. Each storage location must have a SmartProxy with visibility to it. The SmartProxy acts on behalf of the CloudForms Management Engine Appliance. If the SmartProxy is not embedded in the CloudForms Management Engine server, it communicates with the CloudForms Management Engine Appliance over HTTPS (SSL) on standard port 443.

SmartState Analysis

Process run by the SmartProxy which collects the details of a virtual machine or instance. Such details include accounts, drivers, network information, hardware, and security patches. This process is also run by the CloudForms Management Engine server on hosts and clusters. The data is stored in the VMDB.

SmartTags

Descriptors that allow you to create a customized, searchable index for the resources in your clouds and infrastructure.

Storage Location

A device, such as a VMware datastore, where digital information resides that is connected to a resource.

Tags

Descriptive terms defined by a CloudForms Management Engine user or the system used to categorize a resource.

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.

Unmanaged Virtual Machine

Files discovered on a datastore that do not have a virtual machine associated with them in the VMDB. These files may be registered to a provider that the CloudForms Management Engine server does not have configuration information on. Possible causes may be that the provider has not been discovered or that the provider has been discovered, but no security credentials have been provided.

Virtual Machine

A software implementation of a system that functions similar to a physical machine. Virtual machines utilize the hardware infrastructure of a physical host, or a set of physical hosts, to provide a scalable and on-demand method of system provisioning.

Virtual Management Database (VMDB)

Database used by the CloudForms Management Engine Appliance to store information about your resources, users, and anything else required to manage your virtual enterprise.

Virtual Thumbnail

An icon divided into smaller areas that summarize the properties of a resource.

Zones

CloudForms Management Engine Infrastructure can be organized into zones to configure failover and to isolate traffic. Zones can be created based on your environment. Zones can be based on geographic location, network location, or function. When first started, new servers are put into the default zone.

1.3. Requirements

To use CloudForms Management Engine, the following requirements must be met:

- One of the following Web Browsers:
  - Mozilla Firefox for versions supported under Mozilla's Extended Support Release (ESR) [1]
  - Internet Explorer 8 or higher
  - Google Chrome for Business
- A monitor with minimum resolution of 1280x1024.

- Adobe Flash Player 9 or above. At the time of publication, you can access it at http://www.adobe.com/products/flashplayer/.
- The CloudForms Management Engine Appliance must already be installed and activated in your enterprise environment.
- The SmartProxy must have visibility to the virtual machines and cloud instances that you want to control.
- The resources that you want to control must have a SmartProxy associated with them.

Regions and Zones

Use **regions** for centralizing data which is collected from public and private virtualization environments. A region is ultimately represented as a single database for the VMDB. Regions are particularly useful when multiple geographical locations need to be managed as they enable all the data collection to happen at each particular location and avoids data collection traffic across slow links between networks.

When multiple regions are being used, each with their own unique ID, a master region can be created to centralize the data of all the children regions into a single master database. To do this, configure each child region to replicate its data to the master region database (Red Hat recommends use of region 99). This parent and child region is a one-to-many relationship.

Regions can contain multiple zones, which in turn contain appliances. Zones are used for further segregating network traffic along with enabling failover configurations. Each appliance has the capability to be configured for a number of specialized server roles. These roles are limited to the zone containing the appliance they run on. If multiple appliances in a zone are configured with duplicate server roles, CFME determines whether the roles use a failover configuration or dependent on the role, as yet another resource for executing its specialized tasks.

Note

- Replicating a parent region to a higher-level parent is not supported.
- Parent region can be configured after the child regions are online.

Important

Due to browser limitations, Red Hat supports logging in to only one tab for each multi-tabbed browser. Console settings are saved for the active tab only. For the same reason, CloudForms Management Engine does not guarantee that the browser's **Back** button will produce the desired results. CloudForms Management Engine recommends using the breadcrumbs provided in the Console.

1.4. Getting Help and Giving Feedback

If you experience difficulty with a procedure described in this documentation, visit the Red Hat Customer Portal at http://access.redhat.com. Through the customer portal, you can:

- search or browse through a knowledgebase of technical support articles about Red Hat products

- submit a support case to Red Hat Global Support Services (GSS)
- access other product documentation

Red Hat also hosts a large number of electronic mailing lists for discussion of Red Hat software and technology. You can find a list of publicly available mailing lists at https://www.redhat.com/mailman/listinfo. Click on the name of any mailing list to subscribe to that list or to access the list archives.

Documentation Feedback

If you find a typographical error in this manual, or if you have thought of a way to make this manual better, please submit a report to GSS through the customer portal.

When submitting a report, be sure to mention the manual's identifier: *Quick Start Guide*

If you have a suggestion for improving the documentation, try to be as specific as possible when describing it. If you have found an error, please include the section number and some of the surrounding text so we can find it easily.

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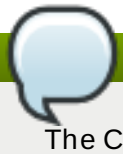
[1] http://www.mozilla.org/en-US/firefox/organizations/faq/

Chapter 2. Initial Configuration of the CloudForms Management Engine Appliance

Although the CloudForms Management Engine Appliance comes configured to be integrated immediately into your environment, you can make some changes to its configuration.



Note

The CloudForms Management Engine Appliance is intended to have minimal configuration options.

2.1. Changing Configuration Settings

The procedure describes how to make changes to the configuration settings on the CloudForms Management Engine appliance.

Procedure 2.1. To Change Settings on the CloudForms Management Engine Appliance

1. After starting the appliance, log in with a user name of **admin** and the default password of **smartvm**. The CloudForms Management Engine Appliance summary screen displays.
2. Press **Enter** to manually configure settings.
3. Press the number for the item you want to change, and press **Enter**. The options for your selection are displayed.
4. Follow the prompts to make the changes.
5. Press **Enter** to accept a setting where applicable.

Note

The CloudForms Management Engine Appliance console automatically logs out after five minutes of inactivity.

2.2. Advanced Configuration Settings

After logging in you can use the following menu items for advanced configuration of the appliance:

- Use **Set DHCP Network Configuration** to use DHCP to obtain the IP address and network configuration for your CloudForms Management Engine Appliance. The appliance is initially configured as a DHCP client with bridged networking.
- Use **Set Static Network Configuration** if you have a specific IP address and network settings you need to use for the CloudForms Management Engine Appliance.
- Use **Test Network Configuration** to check that name resolution is working correctly.
- Use **Set Hostname** to specify a hostname for the CloudForms Management Engine Appliance.

- Use **Set Timezone, Date, and Time** to configure the time zone, date, and time for the CloudForms Management Engine Appliance.
- Use **Disable PostgreSQL Database Server** if you know that you will be using another database server and do not want these additional services loaded. This option will disable **PostgreSQL** and unmount the disk associated with the database. The CloudForms Management Engine Appliance will need a restart.
- Use **Restore Factory Configuration** to overwrite any changes you have made to the CloudForms Management Engine Appliance, restore the factory configuration, add the **PostgreSQL** service, and restart the CloudForms Management Engine Appliance. Note that this does not set the Appliance to use the internal PostgreSQL database.
- Use **Restore Database from Backup** to restore the VMDB database from a previous backup.
- Use **Setup Database Region** to create regions for VMDB replication.
- Use **Configure Database** to configure the VMDB database. Use this option to configure the database for the appliance after installing and running it for the first time.
- Use **Stop Server Processes** to stop all server processes. You may need to do this to perform maintenance.
- Use **Start Server Processes** to start the server. You may need to do this after performing maintenance.
- Use **Restart Appliance** to restart the CloudForms Management Engine Appliance. You can either restart the appliance and clear the logs or just restart the appliance.
- Use **Shut Down Appliance** to power down the appliance and exit all processes.
- Use **Summary Information** to go back to the network summary screen for the CloudForms Management Engine Appliance.
- Use **Log Off** to log out of the CloudForms Management Engine Appliance console.

2.3. Configuring a Database for CloudForms Management Engine

Before using CloudForms Management Engine, configure the database options for it. CloudForms Management Engine provides two options for database configuration:

- Install an *Internal* PostgreSQL database to the appliance
- Configure the appliance to use an *External* PostgreSQL database

Note

See Section B.1, “CPU Sizing Assistant” for CPU requirement guidelines.

2.3.1. Configuring an Internal Database

Important

Before installing an internal database, add a disk to the infrastructure hosting your appliance. See the documentation specific to your infrastructure for instructions on how to add a disk. As a storage disk usually cannot be added while a virtual machine is running, Red Hat recommends adding the disk before starting the appliance.

Procedure 2.2. To Configure a CloudForms Management Engine Internal Database

1. Start the appliance and open a terminal from your virtualization or cloud provider.
2. The login screen appears:

   ```
   To administer this appliance, browse to https://192.168.0.40/

   Username:
   ```

   Enter the administration username and password.
3. The status screen appears and displays details about the CloudForms Management Engine Appliance. Press **Enter** to change to the configuration menu.
4. Select **10) Configure Database** from the menu.
5. Choose **1) Internal** for the database location.
6. Choose a disk for the database. For example:

   ```
   1) /dev/vdb: 20480

   Choose disk:
   ```

   Enter **1** to choose **/dev/vdb** for the database location.
7. When prompted, enter a unique three digit region ID to create a new region.

   Important

   Creating a new region destroys any existing data on the chosen database.
8. Confirm the configuration when prompted.

Result:

CloudForms Management Engine configures the internal database.

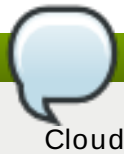
2.3.2. Configuring an External Database

The **postgresql.conf** file used with CloudForms Management Engine databases requires specific settings for correct operation. For example, it must correctly reclaim table space, control session timeouts, and format the PostgreSQL server log for improved system support. Due to these requirements, Red Hat recommends that external CloudForms Management Engine databases use a

postgresql.conf file based on the standard file used by the CloudForms Management Engine appliance. For an example **postgresql.conf** file, see Section B.3, “Example PostgreSQL Configuration File”.

Ensure you configure the settings in the **postgresql.conf** to suit your system. For example, customize the **shared_buffers** setting according to the amount of real storage available in the external system hosting the PostgreSQL instance. In addition, depending on the aggregate number of appliances expected to connect to the PostgreSQL instance, it may be necessary to alter the **max_connections** setting.

Because the **postgresql.conf** file controls the operation of all databases managed by a single instance of PostgreSQL, do not mix CloudForms Management Engine databases with other types of databases in a single PostgreSQL instance.



Note

CloudForms Management Engine 3.x requires PostgreSQL version 9.2.4.

Procedure 2.3. To Configure a CloudForms Management Engine External Database

1. Start up the appliance and open a terminal console from your virtualization or cloud provider.
2. The login screen appears:

   ```
   To administer this appliance, browse to https://192.168.0.40/

   Username:
   ```

   Enter the administration username and password.
3. The status screen appears and displays details about the CloudForms Management Engine Appliance. Press **Enter** to change to the configuration menu.
4. Select **10) Configure Database** from the menu.
5. Choose **2) External** for the database location.
6. Enter the database hostname or IP address when prompted.
7. Enter the database name or leave blank for the default (**vmdb_production**).
8. Enter the database username or leave blank for the default (**root**).
9. Enter the chosen database user's password.
10. Confirm the configuration if prompted.

Result:

CloudForms Management Engine configures the external database.

Chapter 3. Navigating the CloudForms Management Engine Console

The CloudForms Management Engine Console is a web interface used to manage your virtual environment. It is highly customizable and allows easy access to your management tasks.

Note

While the Server is starting, you will not be able to log in to the Console. The Console will retry connecting every 10 seconds until all workers and processes have started.

3.1. Console Requirements

To access the CloudForms Management Engine Console, you must have one of the following web browsers:

- Mozilla Firefox for versions supported under Mozilla's Extended Support Release (ESR) [2]
- Internet Explorer 8 or higher

You will need a monitor with minimum resolution of 1280x1024 and Adobe Flash Player 9 or above. At the time of this writing, you can access it at http://www.adobe.com/products/flashplayer/

Note

Due to browser limitations, Red Hat supports logging in to only one tab for each multi-tabbed browser. Console settings are saved for the active tab only. For the same reason, CloudForms Management Engine does not guarantee that the browser's Back button will produce the desired results. CloudForms Management Engine recommends using the breadcrumbs provided in the console.

3.2. Accessing the Console

Log in to the CloudForms Management Engine Console using the following procedure.

Procedure 3.1. To Access the CloudForms Management Engine Console

1. From a computer with network access to the CloudForms Management Engine Appliance, open your Web browser.
2. Go to **https://*<CloudForms Management Engine Appliance IP>*.**
3. Read and accept any security certificate dialogs.
4. Log in to the Console with a user name of **admin** and the default password of **smartvm**.

Result:

The CloudForms Management Engine Console now displays.

Important

Change your default password immediately after logging in for the first time.

3.3. Navigating the Console

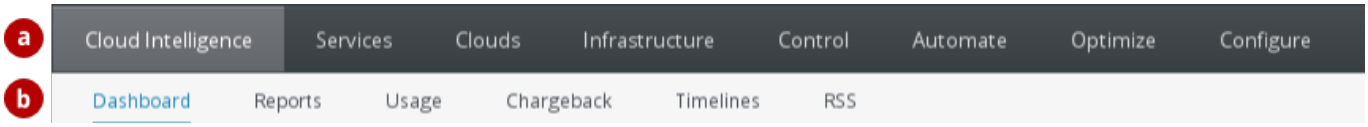


Figure 3.1. CloudForms Management Engine's Main Navigation Menu

1. Primary Navigation Bar
2. Secondary Navigation Bar

Click an item on the Primary Navigation Bar to go to that category. Then, you can click on a secondary item to refine the type of function.

The Console consists of the following items on the Primary Navigation Bar:

- **Cloud Intelligence** uses Really Simple Syndication (RSS) feeds and charts to display information on your virtual enterprise devices. It also includes reports both out of the box and custom.
- **Services** provides a view of all of your discovered Catalogs of services and Workloads (Virtual Machines and Cloud Instances combined).
- **Clouds** enables you to see your Cloud Providers, Availability Zones, Hardware Flavors, Security Groups and Cloud Instances.
- **Infrastructure** enables you to see your Virtualization Providers, Clusters, Hosts, Virtual Machines, Resource Pools, Datastores, and Repositories.
- **Control** manages your policies through the Explorer, Simulation, Import/Export and the Log tabs. It further defines your policies by using Events, Conditions, and Actions.
- **Automate** provides models for process integration and adaptive automation for events and activities.
- **Optimize** enables you to identify bottlenecks and plan placement of Virtual Machines.

In addition to the items on the navigation bar, you can also use **Configure** to manage the user interface, create tags, set server, database and SmartProxy options, administer users, and update the software and view the documentation.

[2] http://www.mozilla.org/en-US/firefox/organizations/faq/

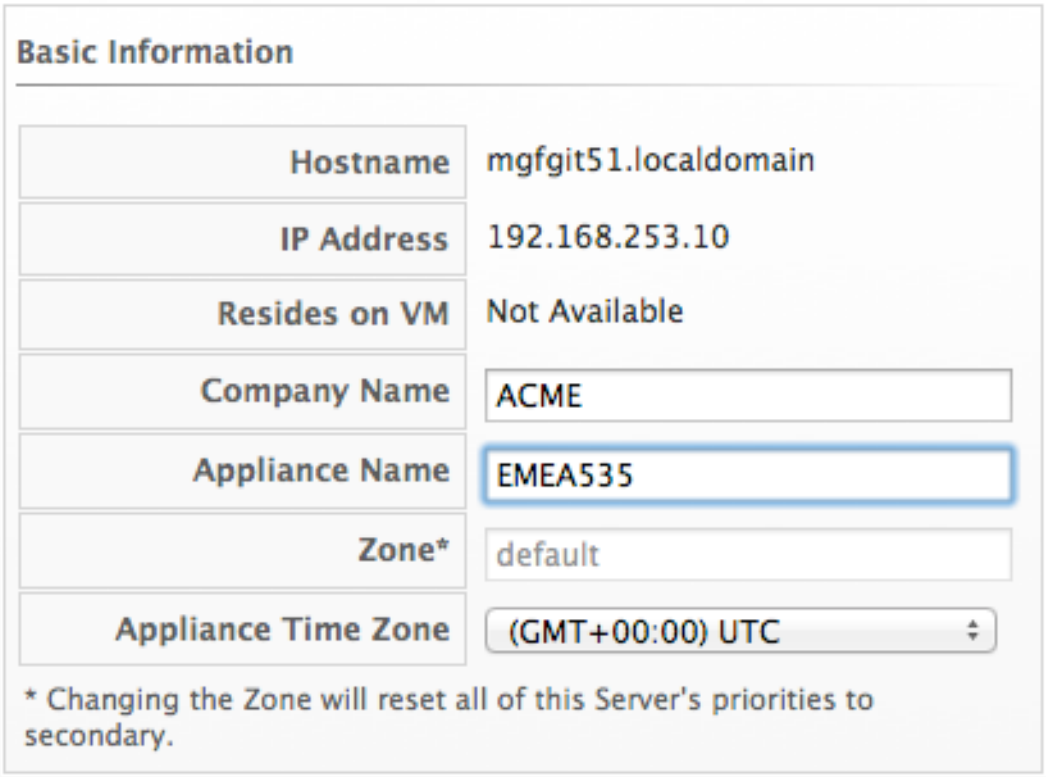
Chapter 4. Configuring CloudForms Management Engine

4.1. Changing Server Settings

Procedure 4.1. To Change Server Settings

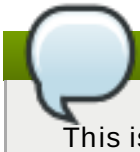
1. Navigate to **Configure** → **Configuration**.
2. Click on the **Settings** accordion, then click **Zones**.
3. Click the zone where the CloudForms Management Engine server is located.
4. In the **Servers** area, click on the CloudForms Management Engine server.
5. Click **Server**.
6. Make any required changes.
7. Click **Save**.

4.1.1. Basic Information Settings



- Use **Company Name** (maximum 20 characters) to customize the interface with your company's name. You will see the company name when you are viewing or modifying the tags of an infrastructure object or virtual machine.
- Specify the **Appliance Name** (maximum 20 characters) you want displayed as the appliance that you are logged into. You will see this in the upper right corner of the interface with the name of the consoles logged on user.
- Use **Zone** to isolate traffic and provide load balancing capabilities. Specify the zone that you want this CloudForms Management Engine Appliance to be a member of. At startup, the zone is set to default.

- Use **Appliance Time Zone** to set the time zone for this server.



Note

This is the time zone used when created scheduled analyses. This is not the same as the **Time Zone** parameter, which is found by navigating to **Configure** → **My Settings**, then exploring the **Display Settings** area, and is the time zone displayed in the console.

4.1.2. Server Control Settings

Server role defines what a server can do. Red Hat recommends that **Database Operations**, **Event Monitor**, **Reporting**, **Scheduler**, **SmartState Analysis**, **User Interface**, **Provider Inventory**, **Provider Operations**, and **Web Services** be enabled on at least one server in each zone. These roles are enabled by default on all servers.

- Use **Default Repository SmartProxy** to set the SmartProxy from which you will be refreshing your virtual machine repositories. This host must have access to your repositories to analyze its virtual machines.

Note

- Only super administrators can change server roles.
- If you are using more than one CloudForms Management Engine Appliance, be sure to set this on all of the appliances.

4.1.2.1. Server Roles

Server Role	Description
Automation Engine	Use this role if you want to use this CloudForms Management Engine server to process automation tasks.

Server Role	Description
Capacity and Utilization (3 Server Roles)	▸ The **Capacity & Utilization Coordinator** role checks to see if it is time to collect data, somewhat like a scheduler. If it is time, a job is queued for the Capacity and Utilization Data Collector. The coordinator role is required to complete Capacity and Utilization data collection. If more than one CloudForms Management Engine server in a specific zone has this role, only one will be active at a time. ▸ The **Capacity & Utilization Data Collector** performs the actual collection of capacity and utilization data. This role has a dedicated worker, and there can be more than one CloudForms Management Engine server with this role in a zone. ▸ The **Capacity & Utilization Data Processor** processes all of the data collected, allowing CloudForms Management Engine to create charts. This role has a dedicated worker, and there can be more than one CloudForms Management Engine server with this role in a zone.
Database Operations	Use Database Operations to enable this CloudForms Management Engine server to run database backups or garbage collection.
Database Synchronization	Use **Database Synchronization** to enable this CloudForms Management Engine server's VMDB to replicate to a higher-level VMDB. This should only be enabled after creating settings for the Replication Worker.
Event Monitor	This role is enabled by default and provides the information shown in timelines. **Event Monitor** is responsible for the work between the CloudForms Management Engine server and your providers. It starts 2 workers for each provider. One worker, the monitor, is responsible for maintaining a connection to a provider, catching events, and putting them on the CloudForms Management Engine message queue for processing. The second worker, the handler, is a message queue worker responsible for delivering only those messages for a provider. You should have at least one of these in each zone.

Server Role	Description
Provider Inventory	This role is enabled by default. This role is responsible for refreshing provider information including EMS, hosts, virtual machines, and clusters, and is also responsible for capturing datastore file lists. If more than one CloudForms Management Engine server in a specific zone has this role, only one will be active at a time.
Provider Operations	This role is enabled by default. This role sends stop, start, suspend, shutdown guest, clone, reconfigure, and unregister to the provider, directly from the console or through a policy action if you have CloudForms Management Engine Control. More than one CloudForms Management Engine server can have this role in a zone.
Notifier	Use this role if you will be using CloudForms Management Engine Control or Automate to forward SNMP traps to a monitoring system or send e-mails. See the *CloudForms Management Engine Control Guide* for details on creating SNMP alerts. If more than one CloudForms Management Engine server in a specific zone has this role, only one will be active at a time.
Reporting	This role is enabled by default. The **Reporting** role specifies which CloudForms Management Engine servers can generate reports. If you do not have a CloudForms Management Engine server set to this role in a zone, then no reports can be generated in that zone. You should have at least one of these in each zone.
RHN Mirror	An appliance with **RHN Mirror** enabled acts as a server containing a repository with the latest CloudForms Management Engine packages. This also configures other Appliances within the same region to point to the chosen **RHN Mirror** server for updates. This provides a low bandwidth method to update environments with multiple Appliances.
Scheduler	This role is enabled by default. The **Scheduler** sends messages to start all scheduled activities such as report generation and SmartState Analysis. This role also controls all system schedules such as capacity and utilization data gathering. One server in each zone must be assigned this role or scheduled CloudForms Management Engine events will not occur. If more than one CloudForms Management Engine server in a specific zone has this role, only one will be active at a time.

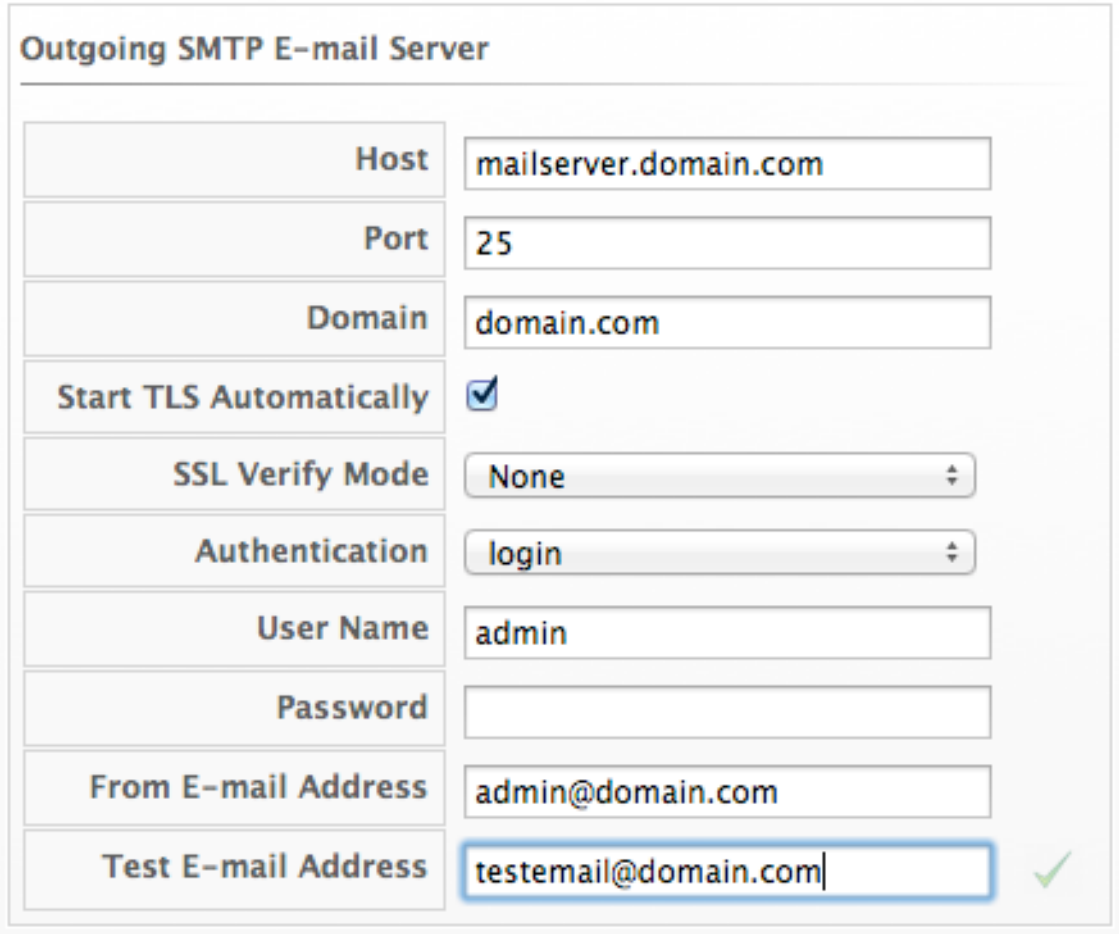
Server Role	Description
SmartProxy	Enabling the **SmartProxy** role turns on the embedded SmartProxy on the CloudForms Management Engine server. The embedded SmartProxy can analyze virtual machines that are registered to a Host and templates that are associated with a provider. To provide visibility to repositories, install the SmartProxy on a host from the CloudForms Management Engine console. This SmartProxy can also analyze virtual machines on the host on which it is installed.
SmartState Analysis	This role is enabled by default. The **SmartState Analysis** role controls which CloudForms Management Engine servers can control SmartState Analyses and process the data from the analysis. You should have at least one of these in each zone.
User Interface	This role is enabled by default. Uncheck **User Interface** if you do *not* want users to be able to access this CloudForms Management Engine server using the CloudForms Management Engine console. For example, you may want to turn this off if the CloudForms Management Engine server is strictly being used for capacity and utilization or reporting generation. More than one CloudForms Management Engine server can have this role in a zone.
Web Services	This role is enabled by default. Uncheck **Web Services** to stop this CloudForms Management Engine server from acting as a Web service provider. More than one CloudForms Management Engine server can have this role in a zone.

4.1.3. Outgoing SMTP Email Settings

To use the email action in CloudForms Management Engine, set an email address that you will have the emails sent from.

Note

To be able to send any emails from the server, you must have the **Notifier** server role enabled. You can test the settings without the role enabled.



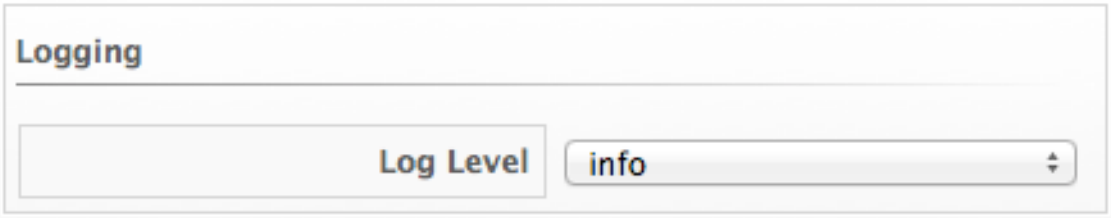
- Use **Host** to specify the host name of the mail server.
- Use **Port** to specify the port for the mail server.
- Use **Domain** to specify domain name for the mail server.
- Check **Start TLS Automatically** if the mail server requires TLS.
- Select the appropriate **SSL Verify Mode**.
- Use the **Authentication** drop down to specify if you want to use login or plain authentication.
- Use **User Name** to specify the user name required for login authentication.
- Use **Password** to specify the password for login authentication.
- Use **From Email Address** to set the address you want to send the email from.
- Use **To Email Address** if you want to test your email settings.

4.1.3.1. Testing Outgoing SMTP Email Server Settings

Procedure 4.2. To Test Outgoing SMTP Email Server Settings

1. Type in all settings in the Outgoing SMTP Email Server settings, including **Test Email Address**.
2. Click (**Send test email**).

4.1.4. Logging Settings



- Use **Log Level** to set the level of detail you want in the log. You can select from fatal, error, warn, info, and debug. The default setting is 'info'.

4.2. Registering and Updating CloudForms Management Engine

The **Red Hat Updates** page enables you to edit customer information, register appliances, and update appliances. Editing customer information enables you to determine the registration point, User ID, and password. CloudForms prompts you to update the Server URL when updating the registration point to a local Red Hat Satellite. The **Status of Available Servers** area provides options to refresh, register, check for updates, and to update. The Red Hat Updates page enables the Content Delivery Network (CDN) to assign the necessary update packages to the CloudForms Management Engine Server.

Using the **Check For Updates** task button, the CDN assigns any necessary update packages to your server and notifies you. Click **Update** and the CloudForms Management Engine packages install and update.

Three steps are required for updating the CloudForms Management Engine Appliance:

1. Register the CloudForms Management Engine for updates if it is not already registered.
2. Update the CloudForms Management Engine Appliance.
3. Update other system packages.

The following tools are used during the update process:

- **Yum** provides package installation, updates, and dependency checking.
- **Red Hat Subscription Manager** manages subscriptions and entitlements.
- **Red Hat Satellite Server** runs at customer locations providing local system registration and updates from inside the customer's firewall.

Important

The update worker synchronizes the VMDB with the status of available CloudForms Management Engine content every 12 hours.

Note

Servers with the **RHN Mirror** role also act as a repository for other Appliances to pull CloudForms Management Engine packages updates.

4.2.1. Editing Customer Information

The **Red Hat Updates** page enables you to edit customer information.

Procedure 4.3. To Edit Customer Information

1. Navigate to **Configure** → **Configuration**. Select **Region** in the accordian menu and click the **Red Hat Updates** tab.
2. Click **Edit Registration**.
3. The Customer Information area displays options to edit registration, User ID and Password.
   - **Register to** field provides options for the Customer Portal, RHN Satellite v5 for Red Hat Satellite 5.x servers, and RHN Satellite v6 for Red Hat Satellite 6.x servers. If switching to RHN Satellite v5 or v6, the page will refresh and a prompt for a Server URL will be included in the Customer Information area.
   - The HTTP Proxy area displays options to enable usage of the HTTP Proxy.
   - The **User ID** and **Password** are the customer account details for the Customer Portal or Satellite.

4.2.2. Registering Appliances

The **Red Hat Updates** page enables you to register appliances.

Procedure 4.4. To Register a CloudForms Management Engine Appliance

1. Navigate to **Configure** → **Configuration**. Select **Region** in the accordian menu and click the **Red Hat Updates** tab.
2. Click **Edit Registration**. Three options are available for registering the CloudForms Management Engine Appliance:

Option	Use
Red Hat Subscription Management	Registers to the Red Hat hosted server (**subscription-manager** commands). Due to dependency issues, you must enable the CloudForms repo to use this option. To enable the repo, open a terminal to the appliance and run **yum-config-manager --enable cf-me-5.3-for-rhel-6-rpms**.
Red Hat Satellite 5	Registers to a Satellite 5 server that you have installed inside your firewall (**rhn** commands). This option is recommended for large, multi-appliance CloudForms Management Engine deployments.
Red Hat Satellite 6	Register to a Satellite 6 server (pending release) that you have installed inside your firewall (**subscription-manager** commands).

4.2.3. Updating Appliances

The **Red Hat Updates** page enables you to check for updates and update registered appliances.

Procedure 4.5. To Update a CloudForms Management Engine Appliance

1. Navigate to **Configure** → **Configuration**. Select **Region** in the accordian menu and click the **Red Hat Updates** tab.

2. After registering, the following options are available in the **Appliance Updates** section of the **Red Hat Updates** tab:

Option	Use
Check for Updates	Checks for available updates using **yum**.
Register	Attempts to register the appliance if it is not already registered. CloudForms Management Engine subscribes to the **rhel-x86_64-server-6-cf-me-3** RHN channel for RHN registered appliances, and to the products designated by Red Hat product certification for **subscription-manager** registered appliances. The Red Hat Enterprise Linux channels are enabled by default on registration. In addition, CloudForms Management Engine checks for updates after registering.
Apply CFME Update	Applies updates to CloudForms Management Engine packages only. Specifically, this option runs the **yum -y update cfme-appliance** command. This command installs every package listed in the dependency tree if it is not already installed. If a specific version of a package is required, that version of the package is installed or upgraded. No other packages, such as PostgreSQL or Red Hat Enterprise Linux, are updated.

4.3. 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.

Procedure 4.6. To Change the Email Address for Provisioning Notifications

1. Navigate to **Automate** → **Explorer**.

2. Choose the following Namespace: **Datastore** → **Alert**.

3. Select the **Email Notifications (EmailNotifications)** class.

4. Select an instance within the chosen class.

5. Navigate to **Configuration** → **Edit Selected Instance**.

6. Type the desired email addresses in the **to_email_address** and **from_email_address** fields.

7. Click **Save**.

Chapter 5. Using Virtualization Infrastructure

5.1. Providers

A provider is a server with software to manage multiple virtual machines that reside on multiple hosts. The **Providers** page, found under the Infrastructure tab, displays all discovered or added providers in your enterprise.

Note

Any applied filters will be in effect on this page.

Use the **Providers** taskbar to manage the existence of your providers and to initiate a refresh of them. These buttons are used to manage multiple providers at one time. To manage one provider, click on that item in the main area of the screen.

Console uses virtual thumbnails to describe providers. Each thumbnail contains four quadrants by default. This enables a user to glance at a provider for a quick view of its number of hosts and authentication status.

1. Top left quadrant: Number of hosts
2. Bottom left quadrant: Management system software
3. Top right quadrant: For future use
4. Bottom right quadrant: Authentication status

Icon	Description
	Validated: Valid authentication credentials have been added.
	Invalid: Authentication credentials are invalid.
	Unknown: Authentication status is unknown or no credentials have been entered.

5.1.1. Adding a Provider

After initial installation and creation of a CloudForms Management Engine environment, you can add providers to the appliance.

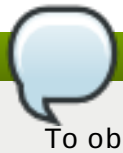
Procedure 5.1. To Add a Provider

1. Navigate to **Infrastructure** → **Providers**.

2. Click **(Configuration)**, then click **(Add a New Infrastructure Provider)**.
3. Type in the **Name** of the provider to add. The **Name** is how the device is labeled in the console.
4. Select the **Type** of provider: **Red Hat Enterprise Virtualization Manager** or **VMware vCenter**.
5. Type in the **Host Name**, and **IP Address** of the provider to add.
6. For Red Hat Enterprise Virtualization providers, enter the **API Port** if your provider uses a non-standard port for access.
7. If you have multiple zones, select the appropriate one from **Zone**.
8. Type in a **User ID** and **Password** with administrator privileges to the provider. To refresh a provider, these credentials are required.
9. Click **Validate** to confirm that the user and password connects.
10. Click **Save**.

Result:

CloudForms Management Engine adds a new provider. Use this provider for virtual machine provisioning.



Note

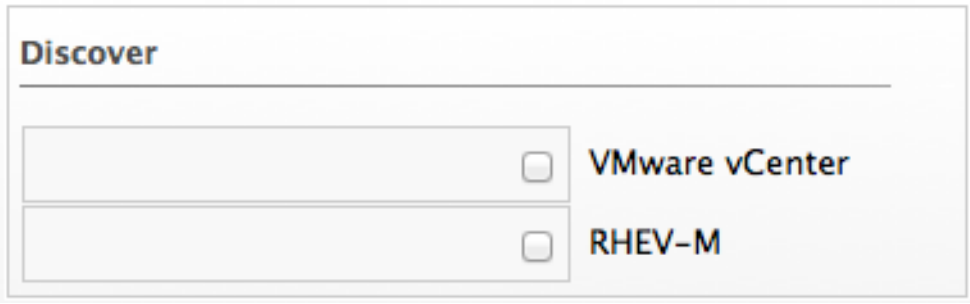
To obtain historical Capacity and Utilization (C & U) data for Red Hat Enterprise Virtualization Manager, you will need to add credentials for the Red Hat C & U Database. Once discovered, and set up for C & U in CloudForms Management Engine, you can use CloudForms Management Engine to collect C & U from this point forward. For further information, refer to *Chapter 4. Data Collection Setup and Reports Installation* in the *Red Hat Enterprise Virtualization 3.1 Installation Guide*.

5.1.2. Discovering Providers

After initial creation of a CloudForms Management Engine environment, discover the providers in your environment. To do this, use CloudForms Management Engine's ability to discover using a range of IP addresses.

Procedure 5.2. To Discover Providers by Subnet Range

1. Navigate to **Infrastructure → Providers**.
2. Click **(Configuration)**, then click **(Discover Infrastructure Providers)**.
3. Check the type of provider to discover.



4. Type in a **Subnet Range** of IP addresses staring with a **From Address** and ending with a **To Address**. The cursor automatically advances as you complete each octet.

5. Click **Start** to confirm the discovery process.

6. You must authenticate hosts on the VMware vCenter server to enable full functionality. For the procedure to authenticate VMware vCenter hosts, see Section 5.1.3, “Authenticating VMware vCenter Hosts”.

Result:

The server searches for computers running supported providers. When available, the new providers display. These providers are named using a Hostname and IP address. To make them identifiable, edit the basic information for each provider.

5.1.3. Authenticating VMware vCenter Hosts

You must authenticate hosts on the VMware vCenter server to enable full functionality. The procedure below describes how to authenticate the VMware vCenter hosts.

Procedure 5.3. To Authenticate VMWare vCenter Hosts

1. Navigate to **Infrastructure** → **Providers**.

2. Click on a provider to display its summary screen.

3. On the summary screen, click **Hosts** in the **Relationships** information box. That displays only the hosts that are on the vCenter server.

4. Select all hosts by using the appropriate check box.

5. Click  **(Configuration)**

6. Click  **(Edit Selected Hosts)**.

7. On the **Credentials** screen, provide your VMware ESXi log on credentials.

8. Using the **Select Host to validate against** drop down, choose a host to validate the credentials against.
9. Click **Save**.

Result:

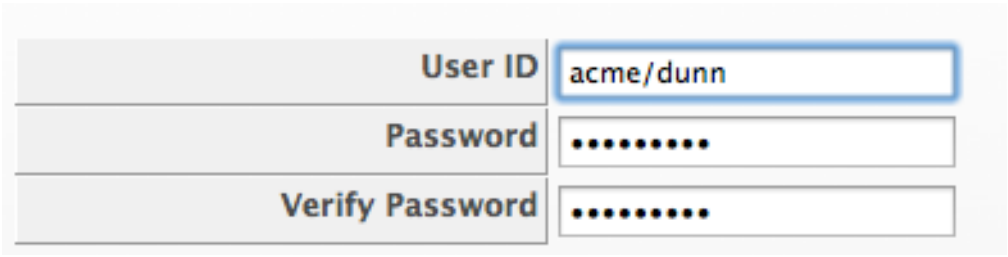
For all hosts selected, the authentication status in the bottom right quadrant changes from a question mark into a tick mark indicating a successful validated connection.

5.1.4. Editing Provider Information

Edit information about a provider such as the name, IP address, and login credentials.

Procedure 5.4. To Edit Provider Information

1. Navigate to **Infrastructure** → **Providers**.
2. Click the provider to edit.
3. Click **(Configuration)**, and then **(Edit Selected Infrastructure Provider)**.
4. In **Basic Info**, edit the following:
   - Use **Name** to set an easily identifiable name for the provider.
   - Use **Host Name** to specify the hostname for the device.
   - Use **IP Address** to set the IP address for communication with the provider.
   - You cannot change the **Type** of provider.
   - Edit the **API Port** if your provider uses a non-standard port for access.
   - Use **Zone** to isolate traffic and provide load balancing capabilities. Specify the **Zone** this CloudForms Management Engine Appliance is a member. At startup, the zone is set to **Default**.
5. Use **Credentials** to provide login credentials required for the provider.



   - Use **User ID** to specify a login name.
   - Use **Password** to specify the password for the **User ID**.
   - Use **Verify Password** to confirm the password.
6. Click **Validate** to confirm the user and password connects.
7. Click **Save**.

Note

To obtain historical Capacity and Utilization (C & U) data for Red Hat Enterprise Virtualization Manager, you will need to add credentials for the Red Hat C & U Database. Once discovered, and set up for C & U in CloudForms Management Engine, you can use CloudForms Management Engine to collect C & U from this point forward. For further information, refer to *Chapter 4. Data Collection Setup and Reports Installation* in the *Red Hat Enterprise Virtualization 3.1 Installation Guide*.

5.1.5. Refreshing Providers

Refresh a provider to find other resources related to it. Use **Refresh** after initial discovery to get the latest data about the provider and the virtual machines it can access. Ensure the provider has credentials to do this. If the providers were added using **Discovery**, see *Editing Provider Information*.

Procedure 5.5. To Refresh Multiple Providers

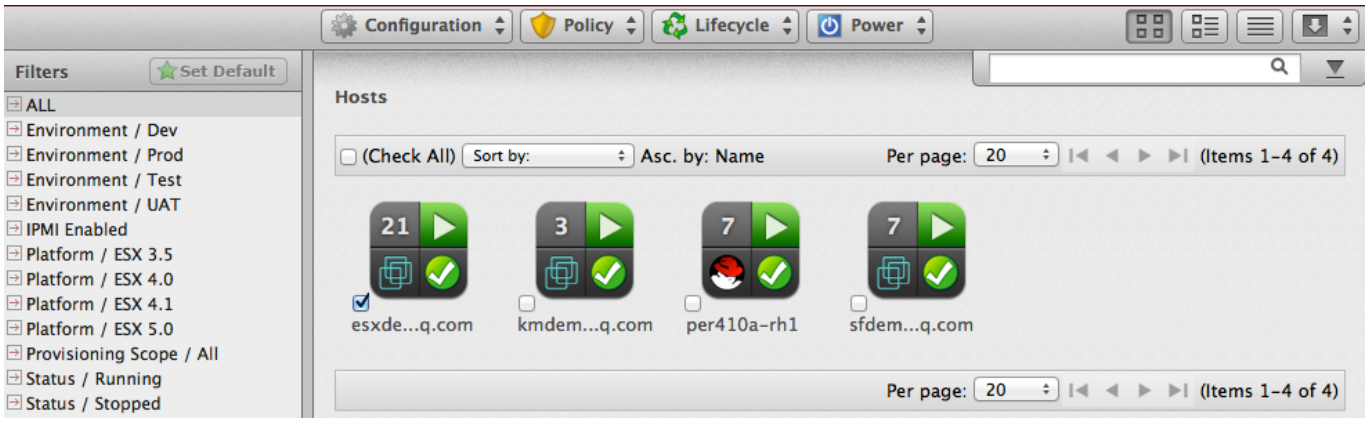
1. Navigate to **Infrastructure** → **Providers**.
2. Check the providers to refresh.
3. Click  **(Configuration)**, and then  **(Refresh Relationships and Power States)**.
4. Click **OK** to confirm.

5.2. Hosts

The **Hosts** page under **Infrastructure** displays the hosts discovered in your enterprise environment.

Note

Any applied filters will be in effect here.



After adding or sorting your hosts, click on one to examine it more closely and see its virtual machines, SmartProxy settings, and properties.

1. Top left quadrant: Number of virtual machines on this host
2. Bottom left quadrant: Virtual machine software
3. Top right quadrant: Power state of host
4. Bottom right quadrant: Authentication status

Icon	Description
	Validated: Valid authentication credentials have been added.
	Invalid: Authentication credentials are invalid
	Unknown: Authentication status is unknown or no credentials have been entered.

5.2.1. Requirements for Provisioning a Host

CloudForms Management Engine can provision hosts using PXE and Intelligent Platform Management Interface (IPMI) technologies. To do this, complete the following steps before you provision your first host.

When creating a provisioning request, you can limit the hosts, datastores, and templates from which a group can choose. To do this, create a tag value with the exact name of the user group for the **Provisioning Scope Category**. For example, if you want to limit the scope for the group named EvmGroup-desktop, create a tag value of EvmGroup-desktop. Then, assign that tag to the hosts, datastores, and template to which you want to limit this group.

Important

Provisioning requires the **Automation Engine** server role be enabled. Confirm your server role settings in **Configure** → **Configuration** → **Server** → **Server Control**. In addition, set the **Provisioning Scope** tag to **All**, for a provider, a host, and a data store.

Procedure 5.6. To Provision a Host

1. Make a PXE server accessible to the CloudForms Management Engine server.
2. Create a customization template for hosts. This customization template must contain host-specific additions, documented in the *Customization Templates for Host Provisioning* section.
3. Create system image types for the host.
4. Associate images with the image types.
5. Enable IPMI on provisioning hosts and add them to the CloudForms Management Engine Infrastructure.

5.2.1.1. 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.

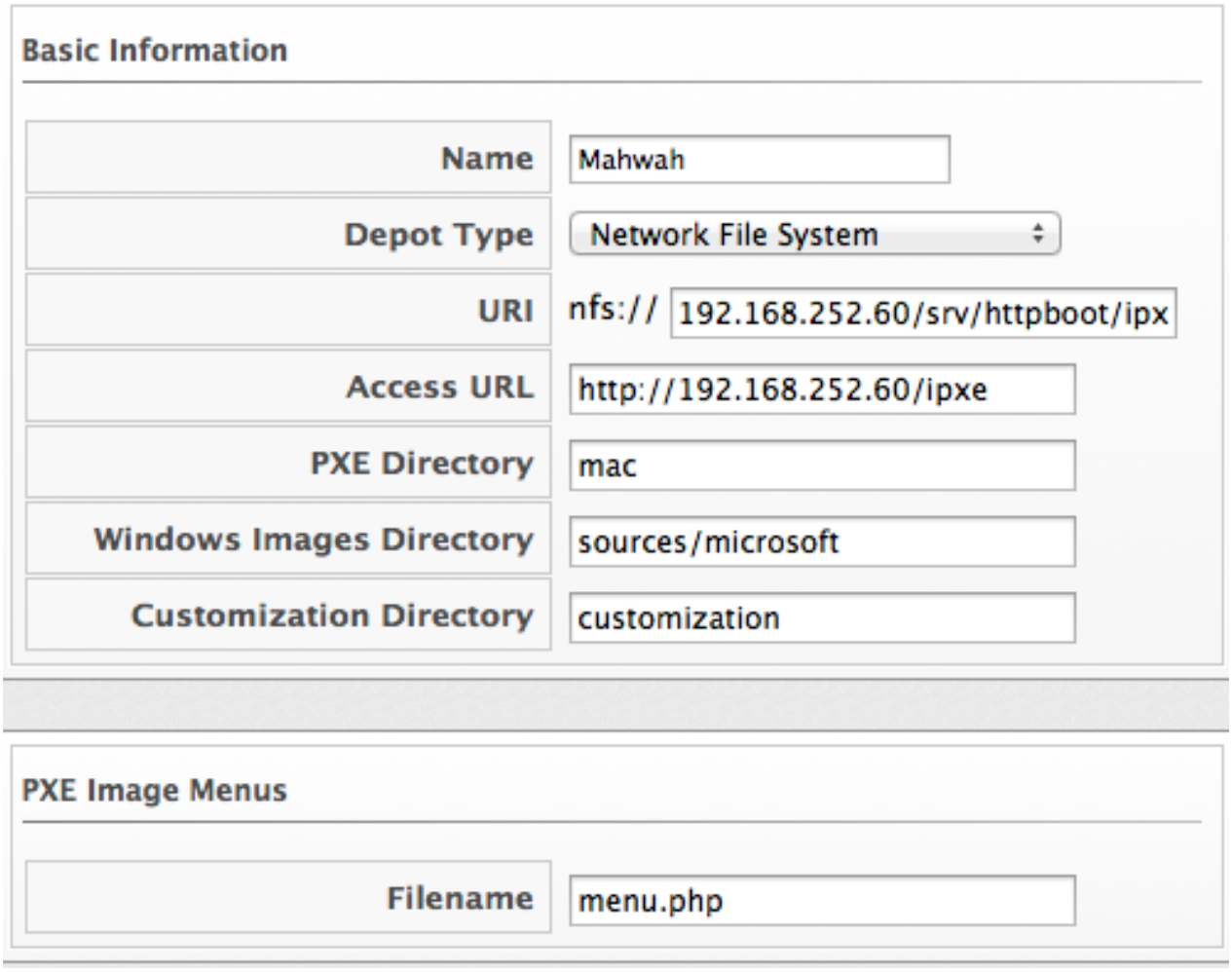
- Connect to the **PXE Server**.
- Create a **System Image Type**.
- Associate each **PXE** image with an image type.
- Create a customization template.

5.2.1.1.1. Connecting to a PXE Server

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

Procedure 5.7. To Connect to a PXE Server

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.



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.

Note

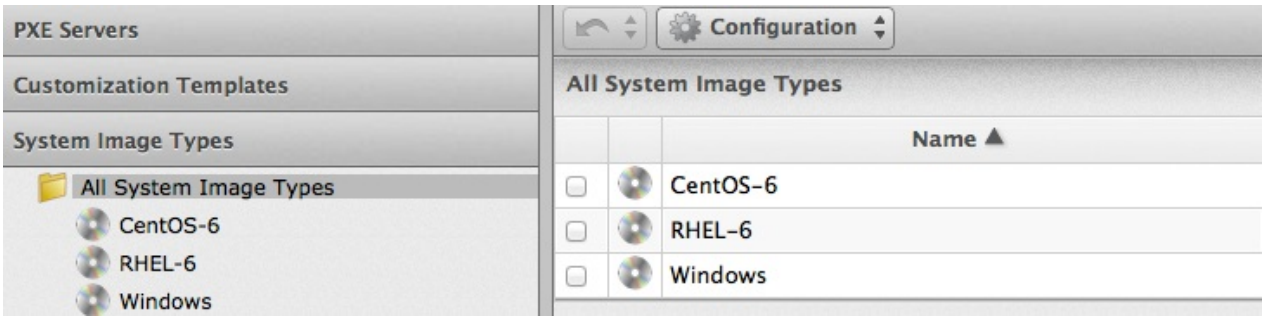
Next, create PXE Image types to associate with the customization templates and to specify if the image type is for a virtual machine, a host, or both.

5.2.1.1.2. Creating System Image Types for PXE

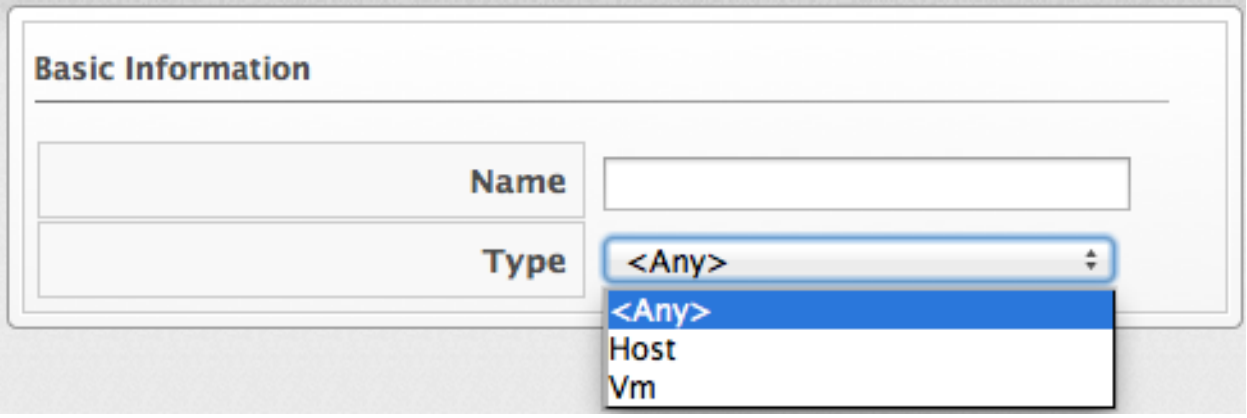
The following procedure creates a system image type for PXE servers.

Procedure 5.8. To Create System Image Types

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**.

Note

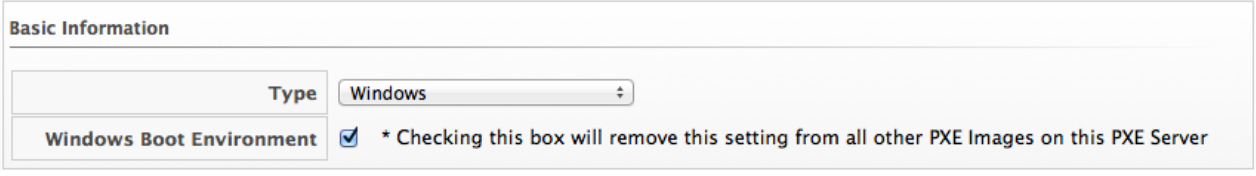
After creating the System Image Types, assign the types to each image on your PXE servers. To do this, you will select each image on the PXE server and identify its type.

5.2.1.1.3. Setting the PXE Image Type for a PXE Image

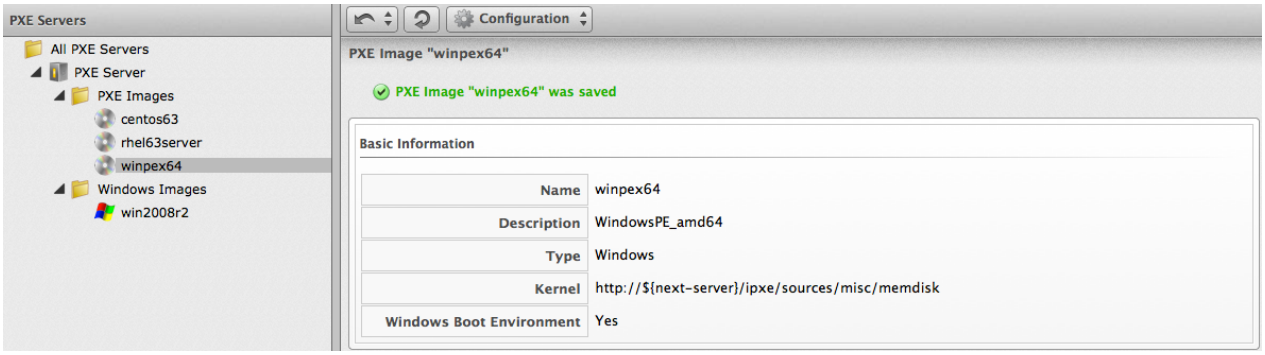
The following procedure sets the image type for a chosen PXE image.

Procedure 5.9. To Set the PXE Image Type for a 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.



5. Click **Save**.



5.2.1.2. 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.

Procedure 5.10. To Prepare for an ISO 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 the *Insight Guide*.
2. Refresh the **ISO Datastore**.
3. Create a **System Image Type**.
4. Set the **ISO Image Type**.
5. **Create** a customization template.

5.2.1.2.1. Adding an ISO Datastore

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

Procedure 5.11. To Add an ISO Datastore

1. Navigate to **Infrastructure** → **PXE**.
2. Click the **ISO Datastores** accordion.
3. Click **(Configuration)**, **(Add a new ISO Datastore)**.
4. Select the **Red Hat Enterprise Virtualization Manager** Provider hosting the ISO Datastore.
5. Click **Add**.

Result:

The ISO datastore is added to CloudForms Management Engine.

5.2.1.2.2. Refreshing an ISO Datastore

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

Procedure 5.12. To Refresh the ISO Datastore

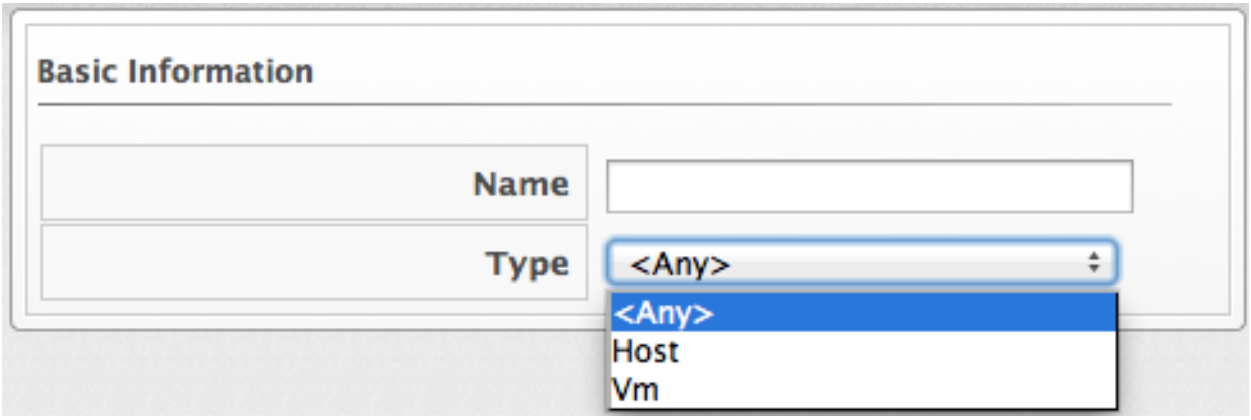
1. Navigate to **Infrastructure** → **PXE**.
2. Click the **ISO Datastores** accordion, and select an ISO datastore.
3. Click **(Configuration)**, then click **(Refresh)**.

5.2.1.2.3. Creating System Image Types for ISO

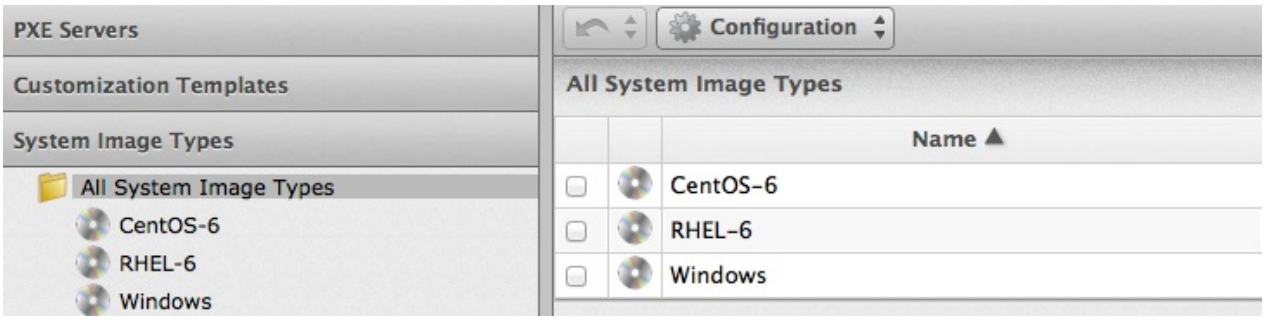
The following procedure creates a system image type for ISO Servers.

Procedure 5.13. To Create System Image Types

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**.



Note

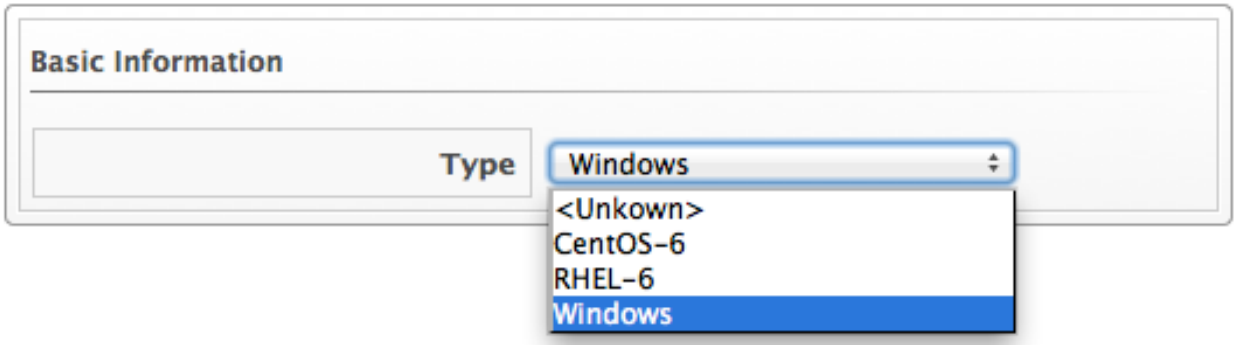
After creating the system image types, assign the types to each image on your ISO servers. To do this, you will select each image on the ISO server and identify its type.

5.2.1.2.4. Setting the Image Type for an ISO Image

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

Procedure 5.14. To Set the Image Type for an ISO 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 ISO Image)**.
4. From the **Basic Information** area, select the correct **Type**.



5. Click **Save**.

5.2.1.3. 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.

5.2.1.3.1. Customization Script Additions

Table 5.1. Customization Script Additions

Customization Type	Reason to Include	Script entries

Customization Type	Reason to Include	Script entries

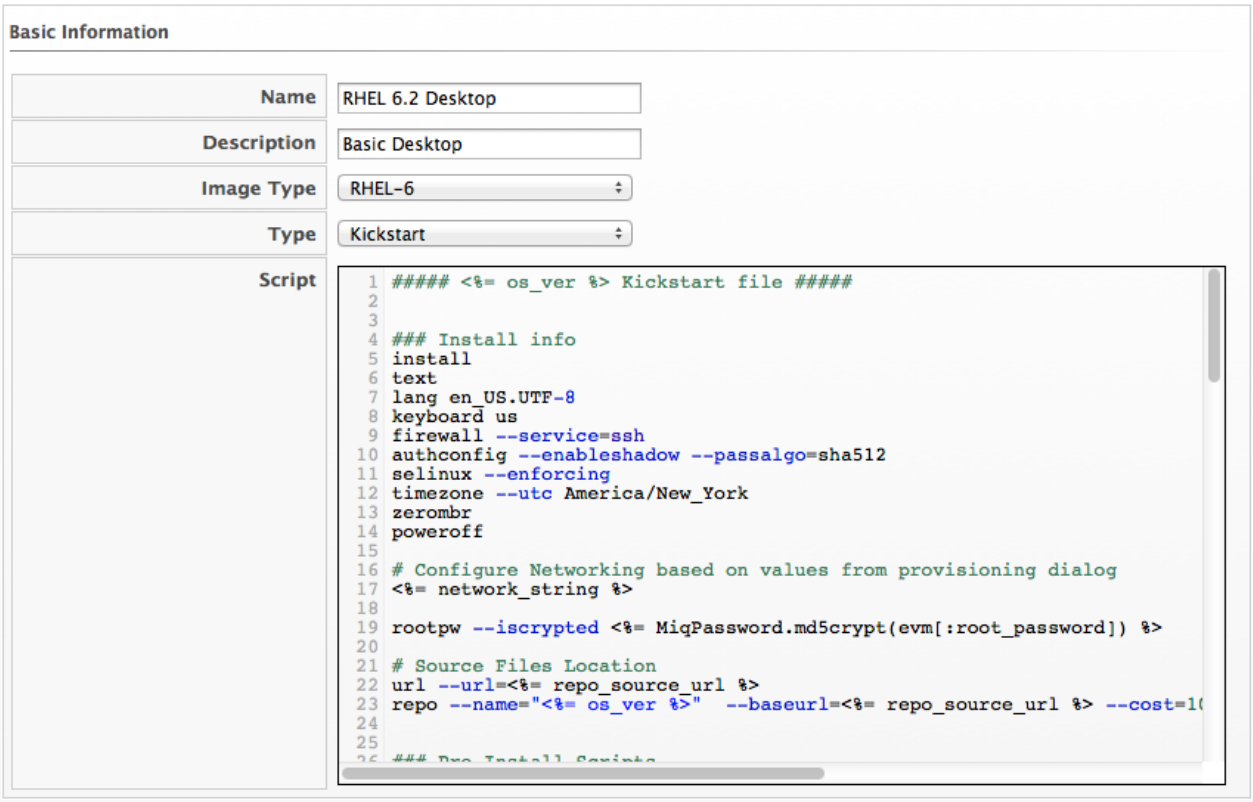
Kickstart	Takes the values from the **Customize** tab in **Provisioning Dialog** and substitutes them into the script.	`#Configure Networking based on values from provisioning dialog`
		`<% if evm[:addr_mode].first == 'static' %>`
		`  <% network_string = "network --onboot yes --device=eth0 --bootproto=static --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 for display in the CloudForms Management Engine Console.	`# Callback to EVM during post-install` `wget --no-check-certificate <%= evm[:callback_url_on_post_install] %>`

5.2.1.3.2. Adding a Customization Template

Procedure 5.15. To Add 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**.



5. Select the **Image Type** dropdown. 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**.

Note

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

5.2.1.4. 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.

5.2.1.4.1. Discovering the Management Interface for an IPMI Host

Procedure 5.16. To Discover the Management Interface for an IPMI Host

1. Navigate to **Infrastructure → Hosts**.
2. Click  **(Configuration)**, then  **(Discover Hosts)**.
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 *Adding IPMI Credentials to a Discovered Host*.

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.

5.2.1.4.2. Adding IPMI Credentials to a Discovered Host

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

Procedure 5.17. To Add IPMI Credentials

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**.

5.2.1.4.3. Adding the Management Interface for an IPMI Host

Procedure 5.18. To Add the Management Interface for an IPMI Host

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

Result:

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

5.2.2. 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.

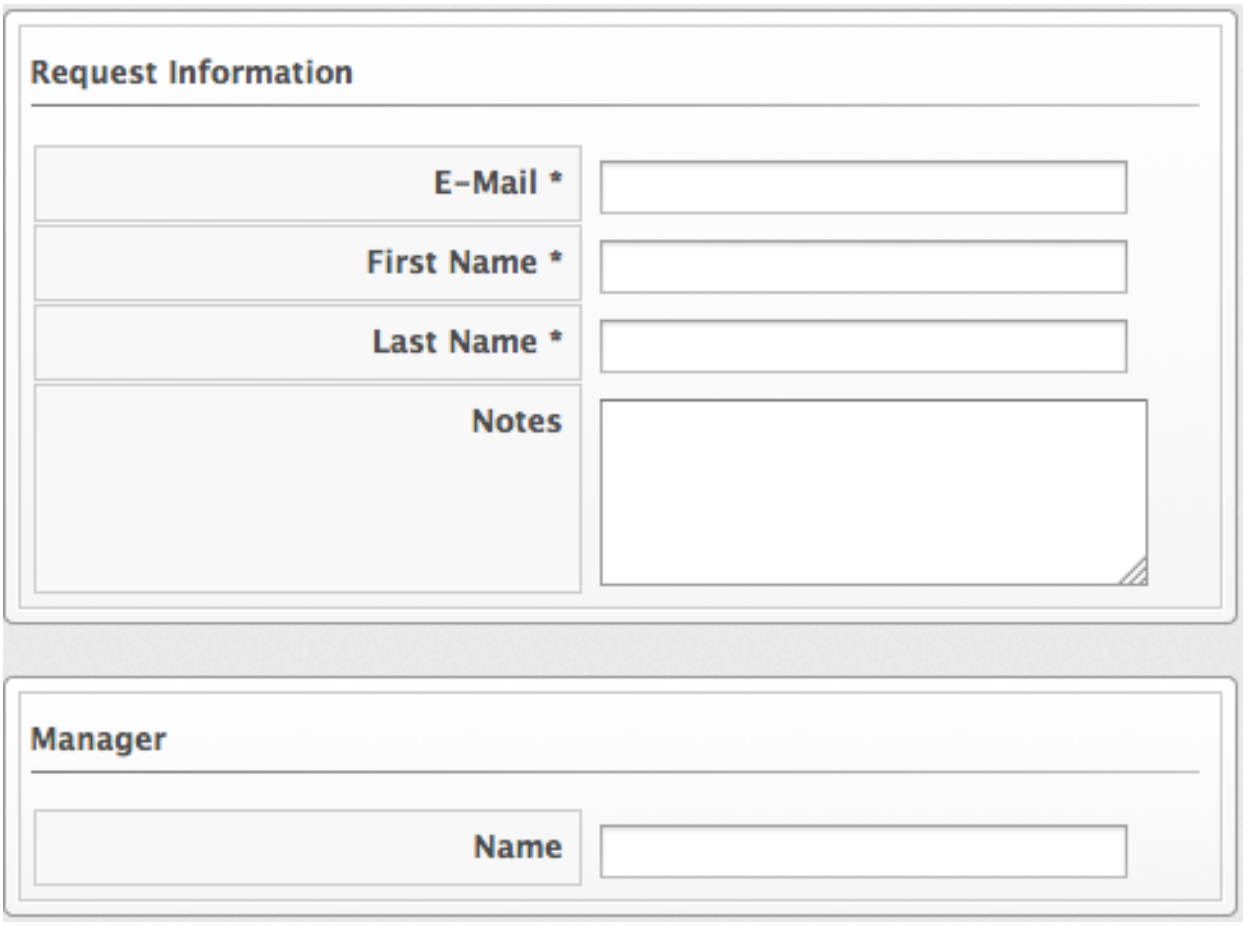
Procedure 5.19. To Provision a Host

1. Navigate to **Infrastructure** → **Hosts**.

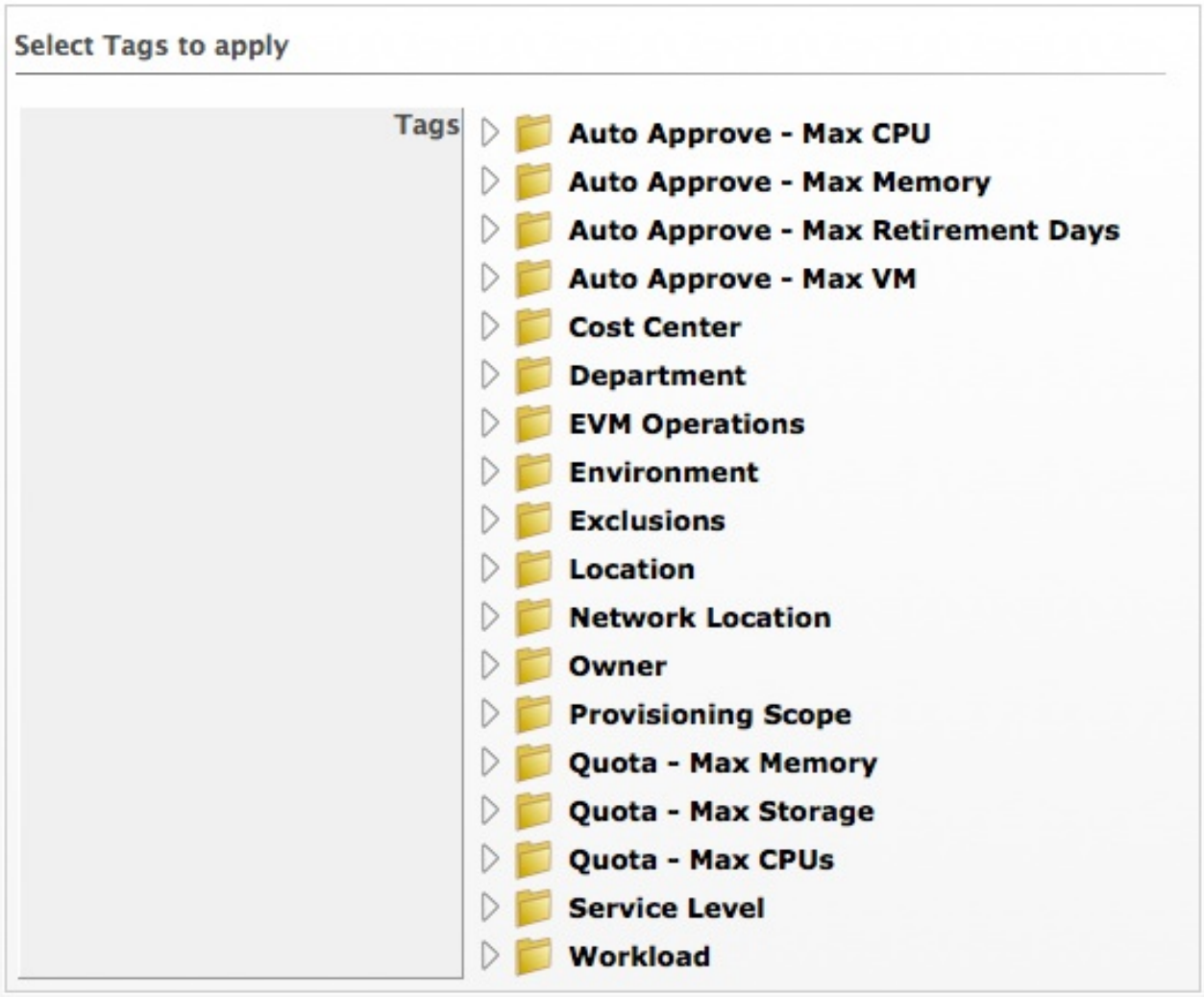
2. Select a host with IPMI enabled.

3. Click  **(Lifecycle)**, then  **(Provision Hosts)**.

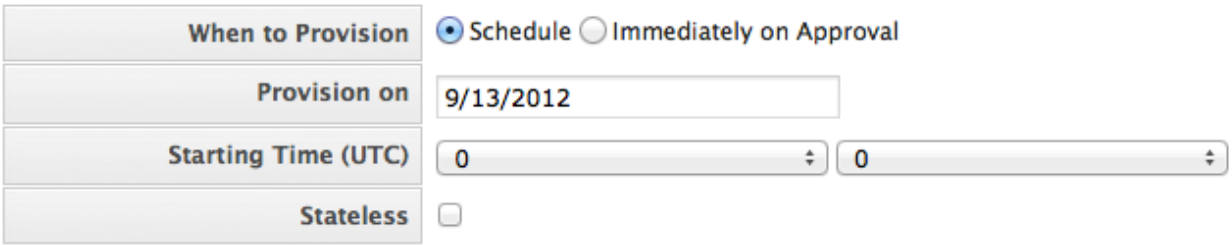
4. In **Request Information**, type in at least a **First Name** and **Last Name** and an email address. This email is used to send the requester status emails during the provisioning. The other information is optional. If the CloudForms Management Engine server is configured to use LDAP, you can use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



5. On the **Purpose** page, select the appropriate tags for the provisioned host.



6. On the **Catalog** page, select the hosts to provision.
   - In the **Host** area, select the hosts you want to provision
   - In the **PXE** area, select the PXE server and image.
7. On the **Customize** page, you can select how you might want to customize 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** page, decide if you want the provisioning to begin as soon as it is approved, or at a specific time.



- In **Schedule Info**, choose if you want the provisioning to begin as soon as it is approved, or at a specific time. If you select **Schedule**, you will be prompted to enter a date and time.
- Check **Stateless** if you do not want the files deleted after the provision completes. A stateless provision does not write to the disk so it will need the PXE files on the next boot.

9. Click **Submit**.

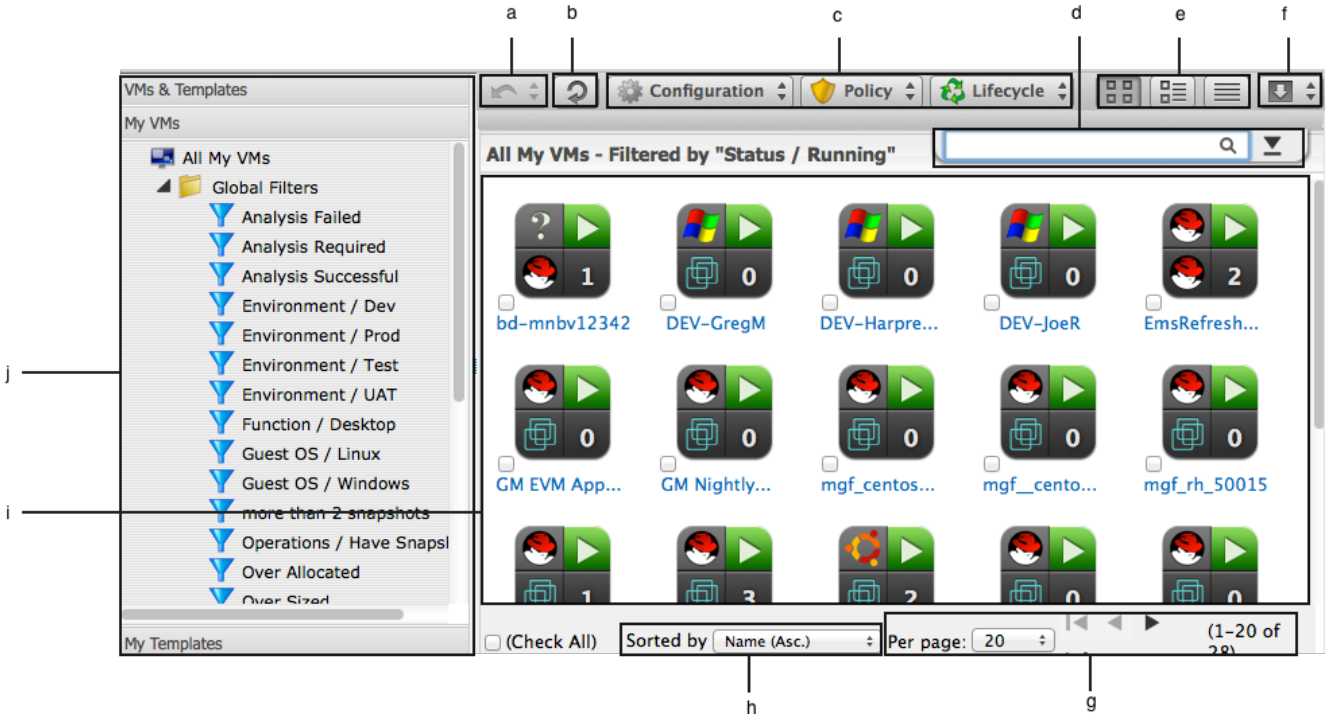
Result:

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.

5.3. Virtual Machines

The heterogeneous virtual machine container and guest support combined with the ability to analyze information inside the virtual machine - such as disk space, patch level or installed applications - provides in-depth information across the virtual environment. This rich set of information enables CloudForms Management Engine users to improve problem resolution times and effectively manage virtual machines.

The **Virtual Machines** pages display all virtual machines that were discovered by your Server. Note that if you have applied a filter to a user, it will be in effect here. The **Virtual Machines** taskbar is a menu driven set of buttons that provide access to functions related to virtual machines.



1. History button
2. Refresh screen button
3. Taskbar
4. Name search bar/Advanced Search button

5. View buttons
6. Download buttons
7. Navigation bar
8. Sort dropdown
9. Main area in Grid View
10. Provider/Filter Navigation

The console uses **Virtual Thumbnails** to describe virtual machines and templates. Each thumbnail contains four quadrants by default. This allows you to glance at a virtual machine for a quick view of its contents.

1. Top left quadrant: Operating system of the Virtual Machine
2. Bottom left quadrant: Virtual Machine Hosts software
3. Top right quadrant: Power state of Virtual Machine or Status icon
4. Bottom right quadrant: Number of Snapshots for this Virtual Machine

Icon	Description
	Template: Virtual Template
	Retired: Virtual Machine has been retired
	Archived: Virtual Machine has no Host or Datastore associated with it.
	Orphaned: Virtual Machine has no Host but does have a Datastore associated with it.
	Disconnected: Virtual Machine is disconnected.
	On: Virtual Machine is powered on.
	Off: Virtual Machine is powered off.
	Suspended: Virtual Machine has been suspended.

The **Virtual Machines** page has three accordions organizing your virtual machines and templates in different ways. All of these accordions share a set of common controls

- Use **VMs and Templates** to view your virtual machines and templates organized by Provider. In addition, you can see archived and orphaned items here.
- Use the **VMs** to view, apply filters, and collect information about all of your virtual machines.

- Use **Templates** to view, apply filters, and collect information about all of your templates.

Through the console, you are able to view your virtual machines in multiple ways. For your virtual machines, you can:

- Filter virtual machines
- Change views
- Sort
- Create a report
- Search by MyTags
- Search by collected data

5.3.1. Provisioning

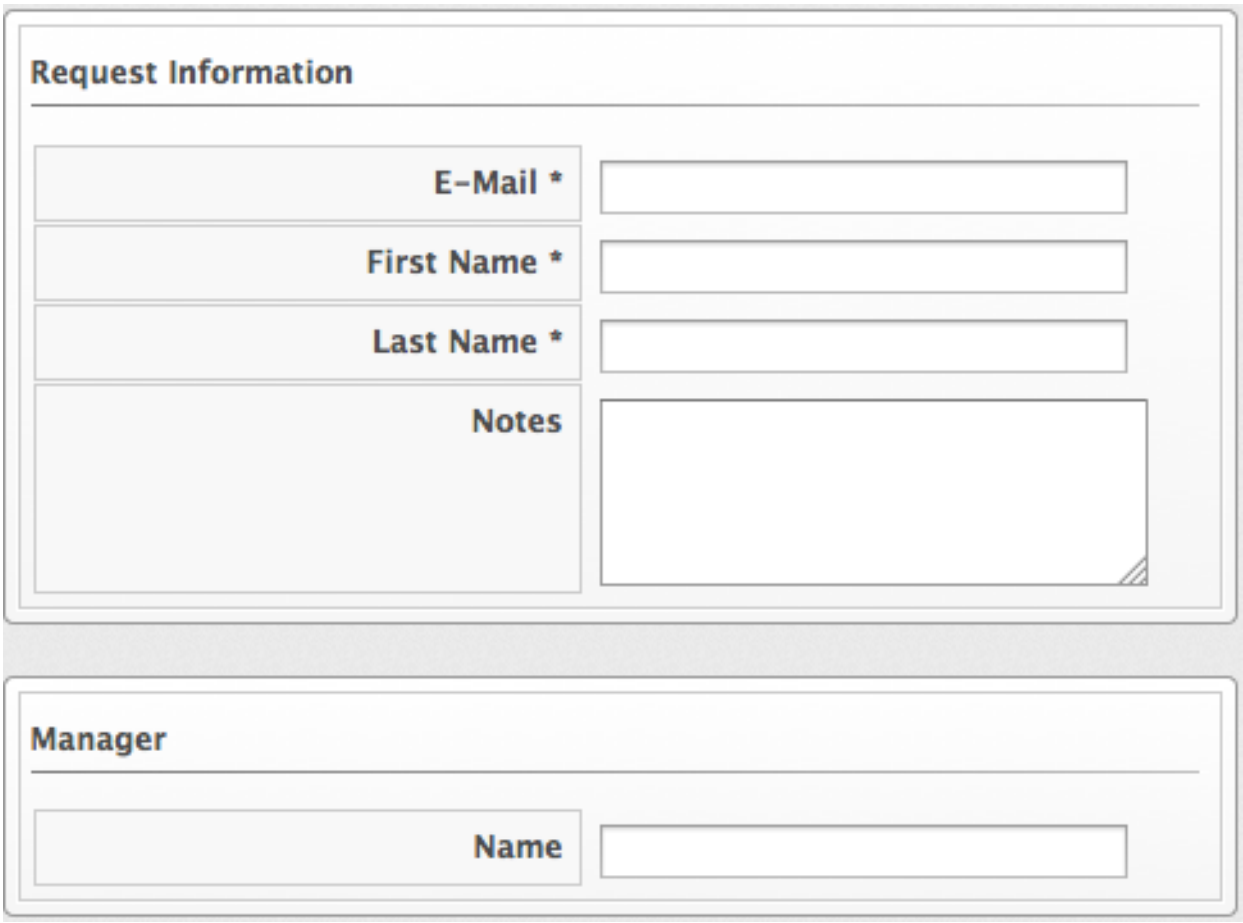
When a virtual machine or cloud instance is provisioned, it goes through multiple phases. First, the request must be made. The request includes ownership information, tags, virtual hardware requirements, the operating system, and any customization of the request. Second, the request must go through an 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.

5.3.1.1. 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.

Procedure 5.20. To Provision a Virtual Machine from a Template

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

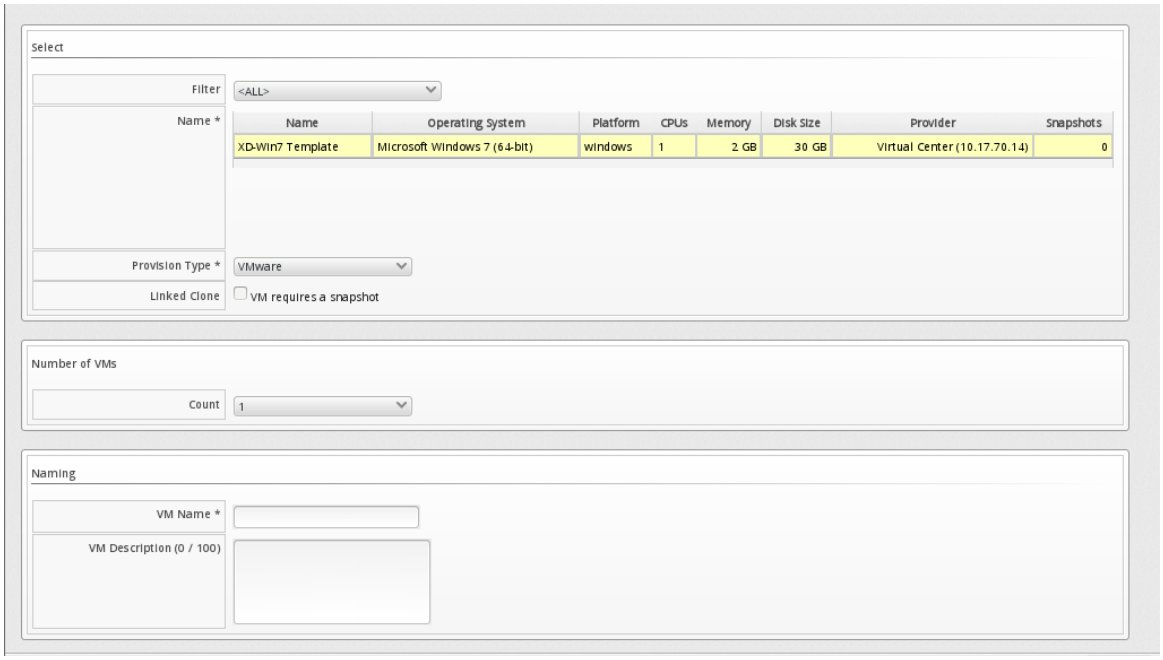


In **Request Information**, type in at least a **First Name** and **Last Name** and an email address. This email is used to send the requester status emails during the provisioning process for items such as auto-approval, quota, provision complete, retirement, request pending approval, and request denied. 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*.

6. Click the **Purpose** tab to select the appropriate tags for the provisioned virtual machines.
7. 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:



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

   i. If **VMware** is selected, check **Linked Clone** if you want 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 you want 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**.

      i. If **Native Clone** is selected, check **Linked Clone** if you want 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 Virtualisation. 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 **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.

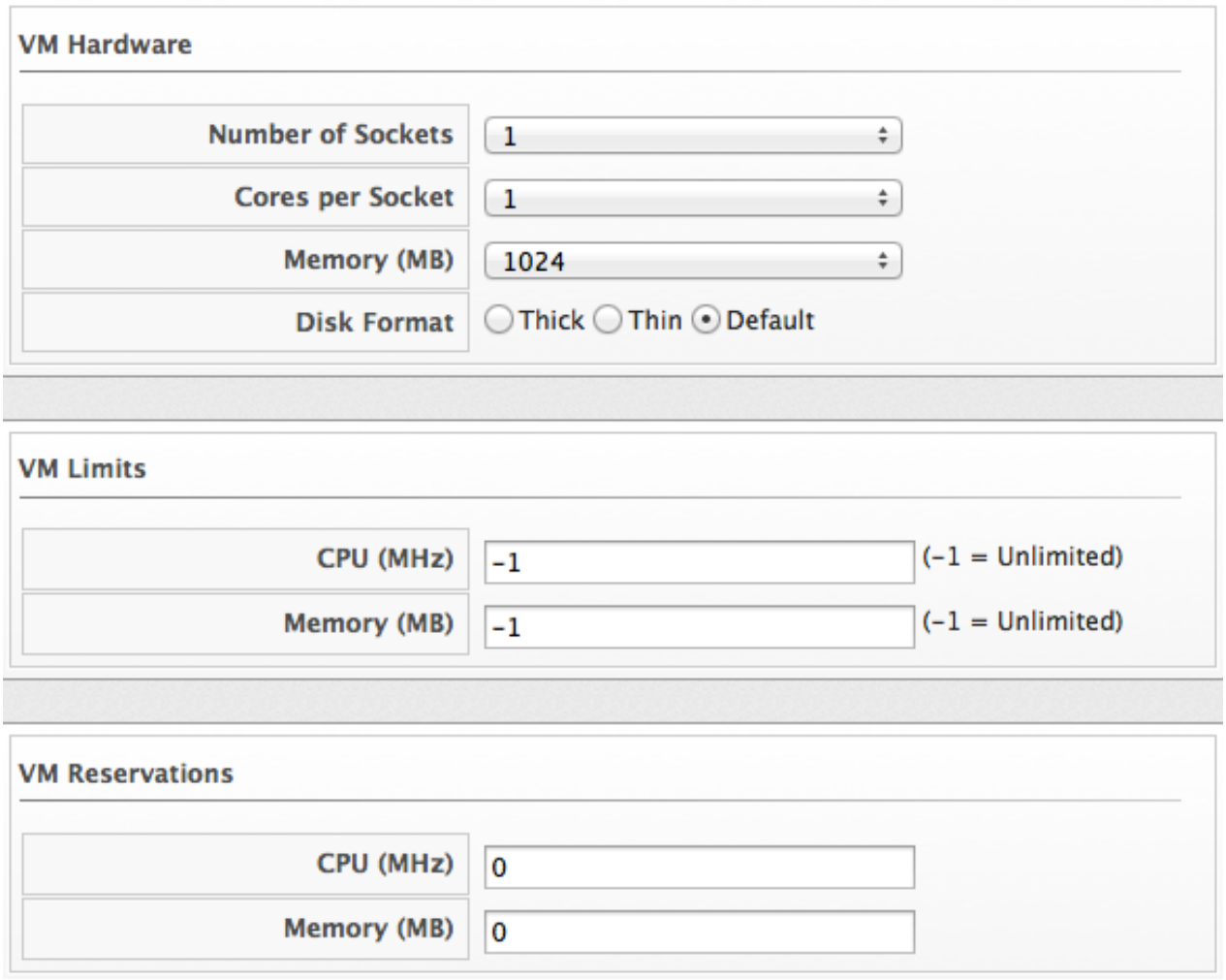
   d. Use **Naming** to specify a **VM Name** and **VM Description**. When provisioning multiple virtual machines, a number will be appended to the **VM Name**.

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.

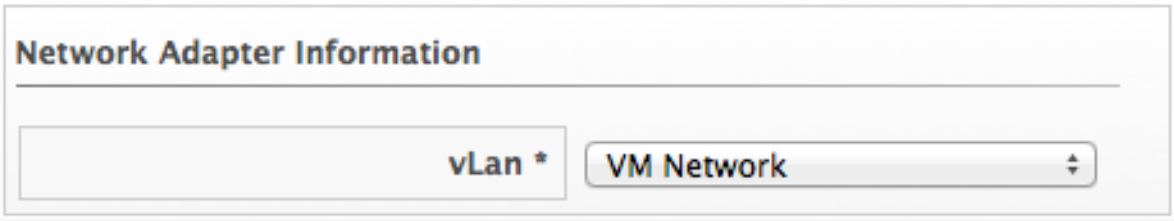


a. In **VM Hardware**, set the number of CPUs, amount of memory, and disk format: thin, pre-allocated/thick or same as the provisioning template (default).

b. For VMware provisioning, set the **VM Limits** of CPU and memory the virtual machine can use.

c. For VMware provisioning, set the In **VM Reservation** amount of CPU and memory.

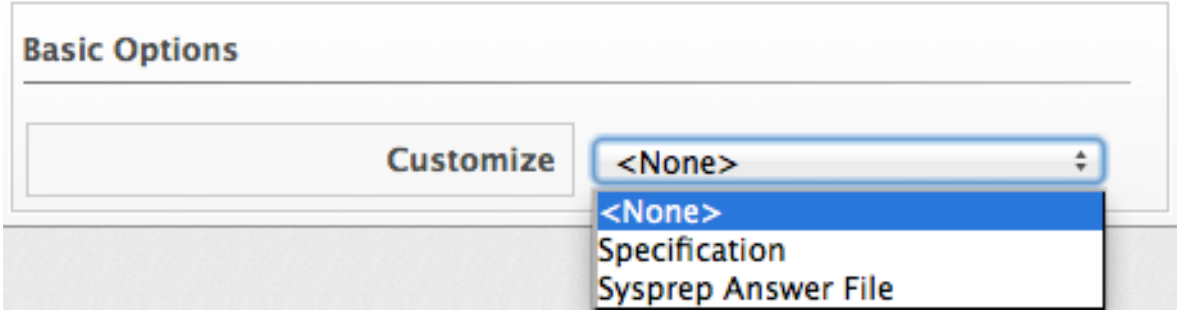
12. Click **Network** to set the vLan adapter. Additional networking settings that are internal to the operating system appear on the **Customize** tab.



a. In **Network Adapter Information**, select the **vLan**

a. In **Network Adapter Information**, select the **vLan**.

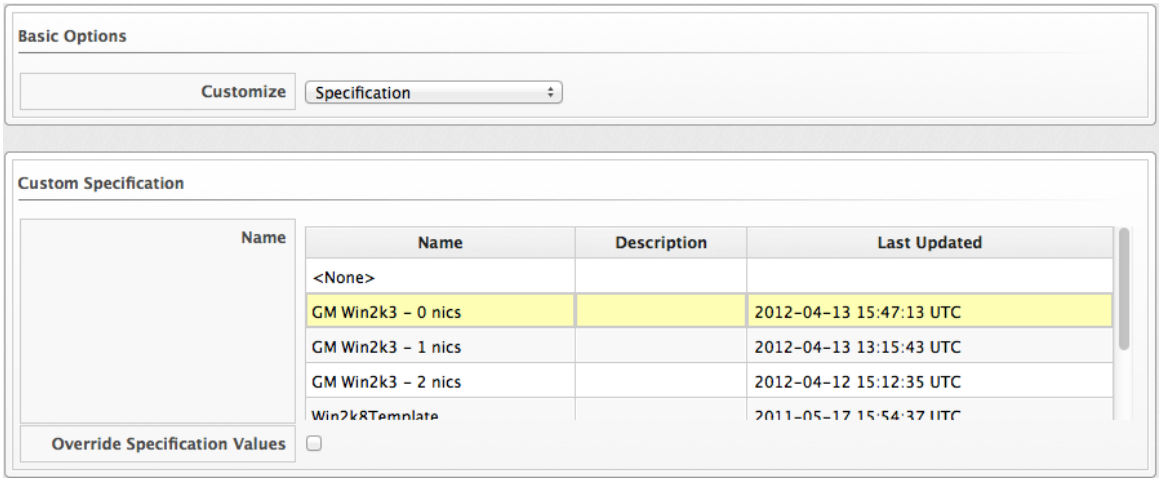
13. Click **Customize** to customize the operating system of the new virtual machine. These options vary based on the operating system of the template.



14. For Windows provisioning:

    a. To use a customer specification from the Provider, click **Specification**. To select an appropriate template, a list will be provided in the custom specification area. The values that are honored by CloudForms Management Engine will 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.



    To modify the specification, check **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**, simply 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.

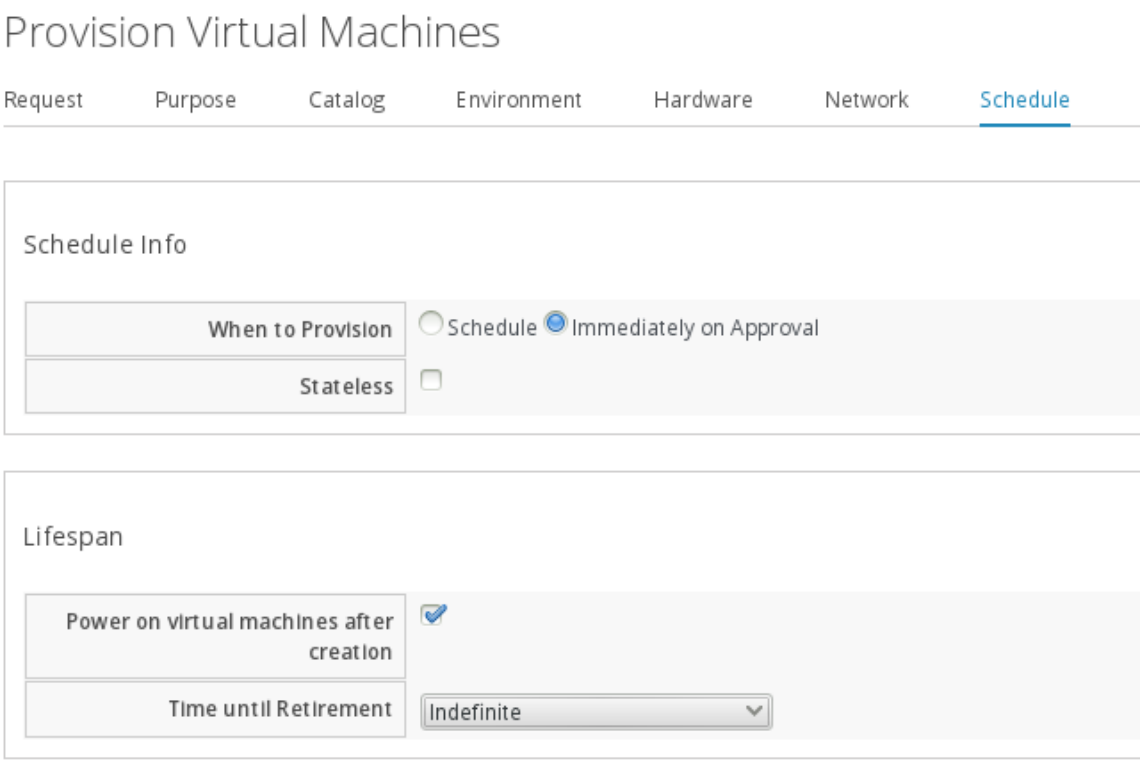
c. Enter any **DNS** information for the instance if necessary.

d. Select a **Customize Template** for additional instance configuration. Select from the Kickstart scripts stored on your appliance.

16. Click the **Schedule** tab to decide if you want the provisioning to begin as soon as it is approved, or at a specific time.

a. In **Schedule Info**, choose if you want the provisioning to begin as soon as it is approved, or at a specific time. 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 if you want to power on the virtual machines after they are created, and if you want to set a retirement date. If you select a retirement period, you will be prompted for when you want a retirement warning.



17. Click **Submit**.

Result:

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.

5.3.1.2. 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.

Procedure 5.21. To Approve a Provisioning Request

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)**.

5.3.2. Controlling Virtual Machines

You can start, stop, and suspend a virtual machine through the CloudForms Management Engine console. To do this, the following requirements must be met:

- The virtual machine must be discovered.
- The virtual machine must be registered to a host and have a SmartProxy associated with it.
- The virtual machine cannot be in **Infrastructure** → **Repositories**.

5.3.2.1. Controlling the Power State of Virtual Machines

Start, stop, and suspend any number of virtual machines through the CloudForms Management Engine console using the following procedure.

Procedure 5.22. To Control the Power State of Virtual Machines

1. Navigate to **Infrastructure** → **Virtual Machines**.
2. Check the virtual machines that you want to change the power state for.
3. Click (**Power Operations**). Note that the only operations that will be available are the ones that apply to the virtual machines' current power state.
4. Click the button for the power operation you want.
    a. Click (**Power On**) to start the selected virtual machines.
    b. Click (**Power Off**) to stop the selected virtual machines.
    c. Click (**Suspend**) to suspend the selected virtual machines.
    d. Click (**Reset**) to stop the selected virtual machines.
    e. Click (**Shutdown Guest**) to stop the guest operating system.
    f. Click (**Restart Guest**) to restart the guest operating system.
5. Click **OK** to confirm.

5.3.3. Analyzing Virtual Machines and Templates

Analyze a virtual machine to collect metadata such as user accounts, applications, software patches, and other internal information. If CloudForms Management Engine is not set up for automatic analysis, perform a manual analysis of a virtual machine. To perform a SmartState analysis, CloudForms Management Engine requires a running SmartProxy with visibility to the virtual machine's storage location. If the virtual machine is associated with a host or provider, ensure the virtual machine is registered with that system to be properly analyzed; the server requires this information since a snapshot might be created.

Note

SmartState Analysis of a virtual machine requires access to its host. To perform a successful analysis, edit the virtual machine's host and enter the host's authentication credentials.

Procedure 5.23. To Analyze Multiple Virtual Machines or Templates

1. Navigate to **Infrastructure → Virtual Machines**.
2. Click the accordion for the items to analyze.
3. Check the **Virtual Machines** and **Templates** to analyze.
4. Click  **(Configuration)**, and then  **(Perform SmartState Analysis)** on the taskbar.
5. Click **OK** to confirm.

5.3.3.1. Red Hat Enterprise Virtualization Prerequisites

5.3.3.1.1. SmartState Analysis on Red Hat Enterprise Virtualization Manager 3.1 and Above - Storage Support Notes

Note the following requirements when performing SmartState Analysis on Red Hat Enterprise Virtualization Manager 3.1.

NFS

- The CloudForms Management Engine appliance requires a mount to the NFS datastore.

iSCSI / FCP

- For Red Hat Enterprise Virtualization 3.1 and 3.2, clusters must use full Red Hat Enterprise Linux hosts and not Red Hat Enterprise Virtualization Hypervisor hosts. You can use either type of host in Red Hat Enterprise Virtualization 3.3 and above.
- Each CloudForms Management Engine Appliance performing SmartState Analysis requires sharable, non-bootable DirectLUN access to each attached iSCSI/FCP storage domain. In order to perform smart analysis, the appliance must mount the data storage as a DirectLUN disk.
- A CloudForms Management Engine Appliance *must* reside in each datacenter with the iSCSI / FCP storage type.

Other Notes

- The **Set Server Relationship** option enables the VM SmartState Analysis job to determine the datacenter where a CloudForms Management Engine Appliance is running and thus to identify what storage it has access to in a RHEV environment.
    - After setting up a CloudForms Management Engine Appliance and performing a refresh of the provider, find the CloudForms Management Engine Appliance in the **Virtual Machine** accordion list and view its summary screen.
    - Click **Configuration** → **Edit Server Relationship**.
    - Select the server that relates to this instance of the CloudForms Management Engine Appliance.

Important

If you attach a DirectLUN disk after configuring the CloudForms Management Engine database, access the Appliance in a terminal and run **pvscan** to detect the DirectLUN disk. Alternatively, in CloudForms Management Engine 5.2.1 and above, you can restart the Appliance to detect the disk automatically.

5.3.3.1.2. SmartState Analysis on Red Hat Enterprise Virtualization Manager 3.0 - Storage Support Notes

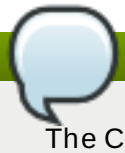
There are two additional steps required to perform a SmartState Analysis on Red Hat Enterprise Virtualization Manager 3.0 using iSCSI or FCP storage. NFS storage does not have these requirements.

1. Enable DirectLUN support for the host and CloudForms Management Engine Appliance that performs the analysis.
    - Enable DirectLUN on host.
    - Enable DirectLUN on the CloudForms Management Engine Appliance. To do this, edit the desired Red Hat Enterprise Virtualization storage and get the LUNID value. Then, on the CloudForms Management Engine Appliance virtual machine in the Red Hat Enterprise Virtualization user interface, right-click and select **Edit**+**Custom Properties** and enter the following in the **Custom Properties** edit box:

      ```
      directlun=<LUN ID>:readonly
      ```

      If you have multiple storage domains separate them by a comma, similar to:

      ```
      directlun=<LUN ID 1>:readonly,<LUN ID 2>:readonly,<LUN ID N>:readonly
      ```



Note

The CloudForms Management Engine Appliance must reside in the same data center as the storage you are trying to connect. If you have multiple data centers with iSCSI or FCP storage, you need a CloudForms Management Engine Appliance in each data center to support virtual machine scanning.

2. Set Server Relationship - This is required to allow the virtual machine SmartState analysis job to determine which data center a CloudForms Management Engine Appliance is running and therefore identify what storage it has access to in a Red Hat Enterprise Virtualization environment.

    a. After setting up a CloudForms Management Engine Appliance and performing a refresh of the Provider, find the CloudForms Management Engine Appliance in the **Virtual Machine** accordion list and view its summary screen.

    b. Click  **(Configuration)**, and then  **(Edit Server Relationship)**

    c. Select the server that relates to this instance of the CloudForms Management Engine Appliance.

5.3.3.1.3. Upgrades from Red Hat Enterprise Virtualization Manager 3.0 to 3.1

Environments upgrading from Red Hat Enterprise Virtualization Manager 3.0 to 3.1 might encounter issues regarding SSL communications with CloudForms Management Engine. This issue occurs from version 3.1 due to Apache being used as a front end to handle the SSL requests. The upgrade to 3.1 does not reconfigure the Management System for this. [3]

A change to the Red Hat Enterprise Virtualization Manager configuration allows CloudForms Management Engine to use SSL to connect rather than the current TLS.

1. Log into the Red Hat Enterprise Virtualization Manager server's terminal as the **root** user.
2. Modify the **/usr/share/ovirt-engine/service/engine-service.xml.in** file.
3. Scroll to **protocols** inside the **ssl** tag. The current value of the protocols attribute is **TLSv1**.

```
<ssl>
  <protocols>TLSv1</protocols>
</ssl>
```

4. Replace the value of the **protocols** attribute with **SSLv3,TLSv1**.

```
<ssl>
  <protocols>SSLv3,TLSv1</protocols>
</ssl>
```

5. Save the file.
6. Restart the Red Hat Enterprise Virtualization Manager server.

In addition, set the **Server Relationship** for CloudForms Management Engine.

1. Select the CloudForms Management Server's virtual machine from **Services** → **Virtual Machines**.
2. Go to **Configuration** → **Edit Server Relationship** and select the appropriate CloudForms Management Engine Server.

5.3.3.2. VMware vSphere Prerequisites

5.3.3.2.1. Installing VMware VDDK on CloudForms Management Engine

Execution of SmartState Analysis on virtual machines within a VMware environment requires the Virtual Disk Development Kit (VDDK). CloudForms Management Engine supports VDDK 5.5.

Procedure 5.24. To install the VDDK on a CloudForms Management Engine Appliance

1. Download VDDK 5.5 (**VMware-vix-disklib-5.5.0-1284542.x86_64.tar.gz** at the time of this writing) from the VMware website.

Note

If you do not already have a login ID to VMware, then you will need to create one. At the time of this writing, the file can be found by navigating to **Downloads → All Downloads, Drivers & Tools → VMware vSphere → Drivers & Tools**. Expand **Automation Tools and SDKs**, and select **vSphere Virtual Disk Development Kit 5.5**. Alternatively, find the file by searching for it using the **Search** on the VMware site.

2. Download and copy the **VMware-vix-disklib-5.5.0-1284542.x86_64.tar.gz** file to the **/root** directory of the appliance.
3. Start an SSH session into the appliance.
4. Extract and install VDDK 5.5. using the following commands:

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

5. Accept the defaults during the installation

```
Installing VMware VIX DiskLib API.
You must read and accept the VMware VIX DiskLib API End User License Agreement
to continue.
Press enter to display it.
Do you accept? (yes/no) yes

Thank you.
What prefix do you want to use to install VMware VIX DiskLib API?
The prefix is the root directory where the other folders such as man, bin,
doc, lib, etc. will be placed.
[/usr]

(Press Enter)

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

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

Note

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

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

7. Restart the CloudForms Management Engine Appliance.

Result:

The VDDK is now installed on the CloudForms Management Engine Appliance. This enables use of the SmartState Analysis Server Role on the appliance.

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[3] This is documented in the following link on Red Hat Bugzilla: https://bugzilla.redhat.com/show_bug.cgi?id=893979

Chapter 6. Using Clouds

6.1. Clouds

Cloud computing provides a set of pooled resources used to create a set of scalable virtual machine instances. Resources includes CPUs, memory, storage, and networking. While users of virtualization infrastructure environments provision whole virtual machines, users of cloud computing environments provision only the necessary resources to build their instances. This means the customer can easily scale their instances by provisioning more resources. Metric usage is focused on the hardware layer, and results in the user paying only the necessary resources.

For example, a user might use an instance to store a web server. During peak times of use, the user provisions more cloud resources to maintain the performance of the server. During quiet times, the user reduces the consumption of cloud resources. As a result, the user only uses and pays for the resources used.

CloudForms Management Engine offers a set of tools for viewing and maintaining cloud providers and their associated resources. Supported cloud providers include:

- **Amazon EC2 (public cloud)**: is a central part of Amazon.com's cloud computing platform that allows users to rent virtual computers on which to run their own computer applications. It allows scalable deployment of applications by providing a Web service through which a user can boot an Amazon Machine Image to create a virtual machine, which Amazon calls an "instance", containing any software desired.
- **OpenStack (private cloud)**: Red Hat Enterprise Linux OpenStack Platform provides the foundation to build a private or public Infrastructure-as-a-Service (IaaS) cloud on top of Red Hat Enterprise Linux. It offers a massively scalable, fault-tolerant platform for the development of cloud-enabled workloads. To learn more about OpenStack, see the Red Hat Enterprise Linux OpenStack Platform Getting Started Guide.

6.1.1. Adding a Cloud Provider

After initial installation and creation of a CloudForms Management Engine environment, add cloud providers with the following procedure.

Procedure 6.1. To Add a Cloud Provider

1. Navigate to **Clouds** → **Providers**.
2. Click  **(Configuration)**, then click  **(Add a New Cloud Provider)**.
3. Enter a **Name** for the provider.
4. Select the **Type** of cloud provider from the drop down menu.
5. Select the appropriate **Zone** if you have more than one available.
6. Fill out the **Credentials** by typing in a **User ID**, **Password**, and a verification of this password (**Verify Password**).
7. Click **Validate** to validate the credentials.
8. Click **Add**.

6.1.2. Adding an OpenStack Provider

6.1.2. Adding an OpenStack Provider

CloudForms Management Engine supports operating with the OpenStack "admin" tenant. When creating an OpenStack provider in CloudForms Management Engine, select the OpenStack provider's admin user because it is the default administrator of the OpenStack admin tenant. When using the admin credentials, a user in CloudForms Management Engine provisions into the admin tenant, and sees images, networks, and instances that are associated with the admin tenant.

Procedure 6.2. To Add an OpenStack Provider

1. Navigate to **Clouds** → **Providers**.
2. Click **(Configuration)**, then click **(Add a New Cloud Provider)**.
3. Enter a **Name** for the provider.
4. From the **Type** drop down menu select **OpenStack**.
5. Enter the **Host Name** of the provider.
6. Enter **IP Address** of the provider.
7. Enter the **API Port** of your Keystone service.
8. If QPID credentials were changed during the OpenStack provider install, use the **AMQP** subtab to provide credentials required for the Advanced Message Queuing Protocol service on your OpenStack Nova component.
9. Select the appropriate **Zone** if you have more than one available.
10. Fill out the **Credentials** by typing in a **User ID**, **Password**, and a verification of this password (**Verify Password**). Use the Keystone User ID and Password for your login credentials.

Important

To enable discovery of OpenStack cloud providers, ensure that the **iptables** for the OpenStack host providing Keystone services allows port 5000 access to all hosts on the same network.

11. Click **Validate** to validate the credentials.
12. Click **Add**.

6.1.3. Adding Amazon EC2 Provider

After initial installation and creation of a CloudForms Management Engine environment, add Amazon EC2 cloud provider by following this procedure:

Procedure 6.3. To Add Amazon EC2 Provider

1. Navigate to **Clouds** → **Providers**.
2. Click **(Configuration)**, then click **(Add a New Cloud Provider)**.

3. Enter a **Name** for the provider.
4. From the **Type** drop down menu select **Amazon EC2**.
5. Select an **Amazon Region**.
6. Select the appropriate **Zone** if you have more than one available.
7. Generate an **Access Key** in the **Security Credentials** of your Amazon AWS account. The **Access Key ID** acts as your **User ID**, and your **Secret Access Key** acts as your **Password**.
8. Click **Validate** to validate the credentials.
9. Click **Add**.

6.1.4. Discovering Amazon EC2 Cloud Providers

CloudForms Management Engine provides the ability to discover cloud providers associated with a particular set of Amazon EC2 account details.

Procedure 6.4. To Discover an Amazon EC2 Cloud Provider

1. Navigate to **Clouds** → **Providers**.
2. Click **(Configuration)**, then click **(Discover Cloud Providers)**.
3. Enter your Amazon EC2 **User ID** and **Password**. Reenter your password in the **Verify Password** field.
4. Click **Start**.

Result:

The Amazon EC2 providers discovery begins. CloudForms Management Engine adds all cloud providers associated with the chosen account.

6.1.5. Editing a Cloud Provider

Edit information about a provider such as the name, IP address, and login credentials.

Note

The **Type** value is unchangeable. To use a different cloud provider, create a new one.

Procedure 6.5. To Edit a Cloud Provider

1. Navigate to **Clouds** → **Providers**.
2. Click the cloud provider to edit.
3. Click **(Configuration)**, and then **(Edit Selected Cloud Provider)**.

4. Edit the **Basic Information**. This varies depending on the **Type** of provider.
5. Fill out the **Credentials** by typing in a **User ID**, **Password**, and a verification of this password (**Verify Password**).
   - If selecting an **Amazon EC2**, generate an **Access Key** in the **Security Credentials** of your Amazon AWS account. The **Access Key ID** acts as your **User ID**, and your **Secret Access Key** acts as your **Password**.
   - If selecting **OpenStack**, use the Keystone User ID and Password for your login credentials.
6. If editing an OpenStack provider, use the **AMQP** subtab to provide credentials required for the Advanced Message Queuing Protocol service on your OpenStack Nova component.
7. Click **Validate** and wait for notification of successful validation.
8. Click **Save**.

6.1.6. Refreshing Cloud Providers

Refresh a cloud provider to find other resources related to it. Ensure the chosen cloud providers have the correct credentials before refreshing.

Procedure 6.6. To Refresh Cloud Providers

1. Navigate to **Clouds** → **Providers**.
2. Select the checkboxes for the cloud providers to refresh.
3. Click **(Configuration)**, and then **(Refresh Relationships and Power States)**.
4. Click **OK** to confirm.

6.2. 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.

6.2.1. Provisioning Instance

6.2.1.1. Provisioning an Instance from an Image

Procedure 6.7. To Provision an 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**. If no specific availability zone is require, select the **Choose Automatically** checkbox.

9. Click the **Hardware** 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. In **Security Groups**, select which security group suits your allowed port and IP address requirements. Otherwise, leave at the default group.

    d. If provisioning from an Amazon EC2 provider, select the **CloudWatch** monitoring level. Leave as **Basic** for the default EC2 monitoring.

    e. In **Public IP Address**, select the public IP address that suits your requirements.

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 Cloudinit 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**.

Result:

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.

6.2.1.2. 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.

Procedure 6.8. To Approve a Provisioning Request

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)**.

6.2.2. Controlling Instances

6.2.2.1. Controlling the Power State of an Instance

Start, stop, and suspend an instance through the CloudForms Management Engine console using the following procedure.

Procedure 6.9. To Control the Power State of a Instance

1. Navigate to **Cloud** → **Instance**.
2. Click the instance to change the power state.
3. Click **Power Operations**, then click the button for the desired power operation.

    a. Click (**Power On**) to start the selected instances.

    b. Click (**Power Off**) to stop the selected instances.

    c. Click (**Suspend**) to suspend the selected instances.

d. Click  (**Reset**) to stop the selected instances.

e. Click  (**Stop Guest**) to stop the guest operating system.

f. Click  (**Restart Guest**) to restart the guest operating system.

4. Click **OK** to confirm.

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.

A.1. Adding a Provision Dialog for All Users

Procedure A.1. To Add a Provision Dialog for All Users

1. Navigate to **Automate** → **Customization**.
2. Click the **Provisioning Dialogs** accordion.
3. Click 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. Type a new **Name** and **Description** for the dialog.
7. 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.
8. Click **Add**.

Result:

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.

Additional CloudForms Management Engine Database Planning

B.1. CPU Sizing Assistant

CloudForms Management Engine
Database CPU Sizing Assistant Based on projected Appliance counts

Projected User CPU % Utilization for Idling CFME Environment
Varying database CPU counts and Environment Appliance Counts

Region Appliance Count	Avg worker processes (sessions) per appliance = 20					Database Appliance CPU Counts						CPU consumed per postgres session=0.00435				
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
1	4.35%	2.18%	1.45%	1.09%	0.87%	0.73%	0.62%	0.54%	0.48%	0.44%	0.40%	0.36%	0.33%	0.31%	0.29%	0.27%
2	8.70%	4.35%	2.90%	2.18%	1.74%	1.45%	1.24%	1.09%	0.97%	0.87%	0.79%	0.73%	0.67%	0.62%	0.58%	0.54%
3	13.05%	6.53%	4.35%	3.26%	2.61%	2.18%	1.86%	1.63%	1.45%	1.31%	1.19%	1.09%	1.00%	0.93%	0.87%	0.82%
4	17.40%	8.70%	5.80%	4.35%	3.48%	2.90%	2.49%	2.18%	1.93%	1.74%	1.58%	1.45%	1.34%	1.24%	1.16%	1.09%
5	21.75%	10.88%	7.25%	5.44%	4.35%	3.63%	3.11%	2.72%	2.42%	2.18%	1.98%	1.81%	1.67%	1.55%	1.45%	1.36%
6	26.10%	13.05%	8.70%	6.53%	5.22%	4.35%	3.73%	3.26%	2.90%	2.61%	2.37%	2.18%	2.01%	1.86%	1.74%	1.63%
7	30.45%	15.23%	10.15%	7.61%	6.09%	5.08%	4.35%	3.81%	3.38%	3.05%	2.77%	2.54%	2.34%	2.18%	2.03%	1.90%
8	34.80%	17.40%	11.60%	8.70%	6.96%	5.80%	4.97%	4.35%	3.87%	3.48%	3.16%	2.90%	2.68%	2.49%	2.32%	2.18%
9	39.15%	19.58%	13.05%	9.79%	7.83%	6.53%	5.59%	4.89%	4.35%	3.92%	3.56%	3.26%	3.01%	2.80%	2.61%	2.45%
10	43.50%	21.75%	14.50%	10.88%	8.70%	7.25%	6.21%	5.44%	4.83%	4.35%	3.95%	3.63%	3.35%	3.11%	2.90%	2.72%
11	47.85%	23.93%	15.95%	11.96%	9.57%	7.98%	6.84%	5.98%	5.32%	4.79%	4.35%	3.99%	3.68%	3.42%	3.19%	2.99%
12	52.20%	26.10%	17.40%	13.05%	10.44%	8.70%	7.46%	6.53%	5.80%	5.22%	4.75%	4.35%	4.02%	3.73%	3.48%	3.26%
13	56.55%	28.28%	18.85%	14.14%	11.31%	9.43%	8.08%	7.07%	6.28%	5.66%	5.14%	4.71%	4.35%	4.04%	3.77%	3.53%
14	60.90%	30.45%	20.30%	15.23%	12.18%	10.15%	8.70%	7.61%	6.77%	6.09%	5.54%	5.08%	4.68%	4.35%	4.06%	3.81%
15	65.25%	32.63%	21.75%	16.31%	13.05%	10.88%	9.32%	8.16%	7.25%	6.53%	5.93%	5.44%	5.02%	4.66%	4.35%	4.08%
16	69.60%	34.80%	23.20%	17.40%	13.92%	11.60%	9.94%	8.70%	7.73%	6.96%	6.33%	5.80%	5.35%	4.97%	4.64%	4.35%
17	73.95%	36.98%	24.65%	18.49%	14.79%	12.33%	10.56%	9.24%	8.22%	7.40%	6.72%	6.16%	5.69%	5.28%	4.93%	4.62%
18	78.30%	39.15%	26.10%	19.58%	15.66%	13.05%	11.19%	9.79%	8.70%	7.83%	7.12%	6.53%	6.02%	5.59%	5.22%	4.89%
19	82.65%	41.33%	27.55%	20.66%	16.53%	13.78%	11.81%	10.33%	9.18%	8.27%	7.51%	6.89%	6.36%	5.90%	5.51%	5.17%
20	87.00%	43.50%	29.00%	21.75%	17.40%	14.50%	12.43%	10.88%	9.67%	8.70%	7.91%	7.25%	6.69%	6.21%	5.80%	5.44%
21	91.35%	45.68%	30.45%	22.84%	18.27%	15.23%	13.05%	11.42%	10.15%	9.14%	8.30%	7.61%	7.03%	6.53%	6.09%	5.71%
22	95.70%	47.85%	31.90%	23.93%	19.14%	15.95%	13.67%	11.96%	10.63%	9.57%	8.70%	7.98%	7.36%	6.84%	6.38%	5.98%
23	100.05%	50.03%	33.35%	25.01%	20.01%	16.68%	14.29%	12.51%	11.12%	10.01%	9.10%	8.34%	7.70%	7.15%	6.67%	6.25%
24	104.40%	52.20%	34.80%	26.10%	20.88%	17.40%	14.91%	13.05%	11.60%	10.44%	9.49%	8.70%	8.03%	7.46%	6.96%	6.53%
25	108.75%	54.38%	36.25%	27.19%	21.75%	18.13%	15.54%	13.59%	12.08%	10.88%	9.89%	9.06%	8.37%	7.77%	7.25%	6.80%
26	113.10%	56.55%	37.70%	28.28%	22.62%	18.85%	16.16%	14.14%	12.57%	11.31%	10.28%	9.43%	8.70%	8.08%	7.54%	7.07%
27	117.45%	58.73%	39.15%	29.36%	23.49%	19.58%	16.78%	14.68%	13.05%	11.75%	10.68%	9.79%	9.03%	8.39%	7.83%	7.34%

Figure B.1. Projected User CPU % Utilization for Idling CFME Environment Table 1

CloudForms Management Engine
Database CPU Sizing Assistant Based on projected Appliance counts

Projected User CPU % Utilization for Idling CFME Environment
Varying database CPU counts and Environment Appliance Counts

Region Appliance Count	Avg worker processes (sessions) per appliance = 20					Database Appliance CPU Counts						CPU consumed per postgres session=0.00435				
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
28	121.80%	60.90%	40.60%	30.45%	24.36%	20.30%	17.40%	15.23%	13.53%	12.18%	11.07%	10.15%	9.37%	8.70%	8.12%	7.61%
29	126.15%	63.08%	42.05%	31.54%	25.23%	21.03%	18.02%	15.77%	14.02%	12.62%	11.47%	10.51%	9.70%	9.01%	8.41%	7.88%
30	130.50%	65.25%	43.50%	32.63%	26.10%	21.75%	18.64%	16.31%	14.50%	13.05%	11.86%	10.88%	10.04%	9.32%	8.70%	8.16%
31	134.85%	67.43%	44.95%	33.71%	26.97%	22.48%	19.26%	16.86%	14.98%	13.49%	12.26%	11.24%	10.37%	9.63%	8.99%	8.43%
32	139.20%	69.60%	46.40%	34.80%	27.84%	23.20%	19.89%	17.40%	15.47%	13.92%	12.65%	11.60%	10.71%	9.94%	9.28%	8.70%
33	143.55%	71.78%	47.85%	35.89%	28.71%	23.93%	20.51%	17.94%	15.95%	14.36%	13.05%	11.96%	11.04%	10.25%	9.57%	8.97%
34	147.90%	73.95%	49.30%	36.98%	29.58%	24.65%	21.13%	18.49%	16.43%	14.79%	13.45%	12.33%	11.38%	10.56%	9.86%	9.24%
35	152.25%	76.13%	50.75%	38.06%	30.45%	25.38%	21.75%	19.03%	16.92%	15.23%	13.84%	12.69%	11.71%	10.88%	10.15%	9.52%
36	156.60%	78.30%	52.20%	39.15%	31.32%	26.10%	22.37%	19.58%	17.40%	15.66%	14.24%	13.05%	12.05%	11.19%	10.44%	9.79%
37	160.95%	80.48%	53.65%	40.24%	32.19%	26.83%	22.99%	20.12%	17.88%	16.10%	14.63%	13.41%	12.38%	11.50%	10.73%	10.06%
38	165.30%	82.65%	55.10%	41.33%	33.06%	27.55%	23.61%	20.66%	18.37%	16.53%	15.03%	13.78%	12.72%	11.81%	11.02%	10.33%
39	169.65%	84.83%	56.55%	42.41%	33.93%	28.28%	24.24%	21.21%	18.85%	16.97%	15.42%	14.14%	13.05%	12.12%	11.31%	10.60%
40	174.00%	87.00%	58.00%	43.50%	34.80%	29.00%	24.86%	21.75%	19.33%	17.40%	15.82%	14.50%	13.38%	12.43%	11.60%	10.88%
41	178.35%	89.18%	59.45%	44.59%	35.67%	29.73%	25.48%	22.29%	19.82%	17.84%	16.21%	14.86%	13.72%	12.74%	11.89%	11.15%
42	182.70%	91.35%	60.90%	45.68%	36.54%	30.45%	26.10%	22.84%	20.30%	18.27%	16.61%	15.23%	14.05%	13.05%	12.18%	11.42%
43	187.05%	93.53%	62.35%	46.76%	37.41%	31.18%	26.72%	23.38%	20.78%	18.71%	17.00%	15.59%	14.39%	13.36%	12.47%	11.69%
44	191.40%	95.70%	63.80%	47.85%	38.28%	31.90%	27.34%	23.93%	21.27%	19.14%	17.40%	15.95%	14.72%	13.67%	12.76%	11.96%
45	195.75%	97.88%	65.25%	48.94%	39.15%	32.63%	27.96%	24.47%	21.75%	19.58%	17.80%	16.31%	15.06%	13.98%	13.05%	12.23%
46	200.10%	100.05%	66.70%	50.03%	40.02%	33.35%	28.59%	25.01%	22.23%	20.01%	18.19%	16.68%	15.39%	14.29%	13.34%	12.51%
47	204.45%	102.23%	68.15%	51.11%	40.89%	34.08%	29.21%	25.56%	22.72%	20.45%	18.59%	17.04%	15.73%	14.60%	13.63%	12.78%
48	208.80%	104.40%	69.60%	52.20%	41.76%	34.80%	29.83%	26.10%	23.20%	20.88%	18.98%	17.40%	16.06%	14.91%	13.92%	13.05%
49	213.15%	106.58%	71.05%	53.29%	42.63%	35.53%	30.45%	26.64%	23.68%	21.32%	19.38%	17.76%	16.40%	15.23%	14.21%	13.32%
50	217.50%	108.75%	72.50%	54.38%	43.50%	36.25%	31.07%	27.19%	24.17%	21.75%	19.77%	18.13%	16.73%	15.54%	14.50%	13.59%

Figure B.2. Projected User CPU % Utilization for Idling CFME Environment Table 2

B.2. Database Sizing Assistant

Red Hat recommends allocating the virtual machine disk fully at the time of creation. Three main factors affect the size of your database over time:

- Virtual Machine Count: the most important factor in the calculation of virtual machine database (VMDB) size over time.
- Host Count: the number of hosts associated with the provider.
- Storage Count: the number of individual storage elements as seen from the perspective of the provider or host. It is not the total number of virtual disks for all virtual machines.

			Estimated VMDB Size in GB	
Virtual Machine Count	Host Count	Storage Count	1 year	2 year
100	5	50	3.5	5
500	10	100	17	25
5000	50	500	173	251

Figure B.3. Database Size Estimates in Gigabytes (GB)

B.3. Example PostgreSQL Configuration File

The following file is an example of a **postgresql.conf** file modified for an external database. It is similar to the default file installed with the CloudForms Management Engine appliance for an internal database.

```
# -----------------------------
# PostgreSQL configuration file - MIQ Dedicated Appliance Configuration
# -----------------------------
#
# This file consists of lines of the form:
#
#   name = value
#
# (The "=" is optional.)  Whitespace may be used.  Comments are introduced with
# "#" anywhere on a line.  The complete list of parameter names and allowed
# values can be found in the PostgreSQL documentation.
#
# The commented-out settings shown in this file represent the default values.
# Re-commenting a setting is NOT sufficient to revert it to the default value;
# you need to reload the server.
#
# This file is read on server startup and when the server receives a SIGHUP
# signal.  If you edit the file on a running system, you have to SIGHUP the
# server for the changes to take effect, or use "pg_ctl reload".  Some
# parameters, which are marked below, require a server shutdown and restart to
# take effect.
#
# Any parameter can also be given as a command-line option to the server, e.g.,
# "postgres -c log_connections=on".  Some parameters can be changed at run time
# with the "SET" SQL command.
#
# Memory units:  kB = kilobytes        Time units:  ms  = milliseconds
#                MB = megabytes                     s   = seconds
#                GB = gigabytes                     min = minutes
#                                                   h   = hours
#                                                   d   = days


#------------------------------------------------------------------------------
# FILE LOCATIONS
#------------------------------------------------------------------------------

# The default values of these variables are driven from the -D command-line
# option or PGDATA environment variable, represented here as ConfigDir.

#data_directory = 'ConfigDir'  # use data in another directory
     # (change requires restart)
#hba_file = 'ConfigDir/pg_hba.conf' # host-based authentication file
     # (change requires restart)
#ident_file = 'ConfigDir/pg_ident.conf' # ident configuration file
     # (change requires restart)

# If external_pid_file is not explicitly set, no extra PID file is written.
#external_pid_file = '(none)'  # write an extra PID file
     # (change requires restart)


#------------------------------------------------------------------------------
# CONNECTIONS AND AUTHENTICATION
#------------------------------------------------------------------------------

# - Connection Settings -

listen_addresses = '10.132.50.128' # MIQ Value;
#listen_addresses = 'localhost'  # what IP address(es) to listen on;
     # comma-separated list of addresses;
```

```
     # defaults to 'localhost', '*' = all
     # (change requires restart)
#port = 5432    # (change requires restart)
max_connections = 1600   # MIQ Value increased for customer
#max_connections = 100   # (change requires restart) Note:  Increasing
max_connections costs ~400 bytes of shared memory per connection slot, plus lock
space (see max_locks_per_transaction).
#superuser_reserved_connections = 3 # (change requires restart)
#unix_socket_directory = ''  # (change requires restart)
#unix_socket_group = ''   # (change requires restart)
#unix_socket_permissions = 0777  # begin with 0 to use octal notation
     # (change requires restart)
#bonjour = off    # advertise server via Bonjour
     # (change requires restart)
#bonjour_name = ''   # defaults to the computer name
     # (change requires restart)

# - Security and Authentication -

#authentication_timeout = 1min  # 1s-600s
#ssl = off    # (change requires restart)
#ssl_ciphers = 'ALL:!ADH:!LOW:!EXP:!MD5:@STRENGTH' # allowed SSL ciphers
     # (change requires restart)
#ssl_renegotiation_limit = 512MB # amount of data between renegotiations
#password_encryption = on
#db_user_namespace = off

# Kerberos and GSSAPI
#krb_server_keyfile = ''
#krb_srvname = 'postgres'  # (Kerberos only)
#krb_caseins_users = off

# - TCP Keepalives -
# see "man 7 tcp" for details

tcp_keepalives_idle = 3   # MIQ Value;
#tcp_keepalives_idle = 0  # TCP_KEEPIDLE, in seconds;
     # 0 selects the system default
tcp_keepalives_interval = 75  # MIQ Value;
#tcp_keepalives_interval = 0  # TCP_KEEPINTVL, in seconds;
     # 0 selects the system default
tcp_keepalives_count = 9  # MIQ Value;
#tcp_keepalives_count = 0  # TCP_KEEPCNT;
     # 0 selects the system default


#------------------------------------------------------------------------------
# RESOURCE USAGE (except WAL)
#------------------------------------------------------------------------------

# - Memory -

#shared_buffers = 128MB   # MIQ Value SHARED CONFIGURATION
shared_buffers = 4GB   # MIQ Value DEDICATED CONFIGURATION increased for customer
#shared_buffers = 32MB   # min 128kB
     # (change requires restart)
#temp_buffers = 8MB   # min 800kB
#max_prepared_transactions = 0  # zero disables the feature
     # (change requires restart)
# Note:  Increasing max_prepared_transactions costs ~600 bytes of shared memory
# per transaction slot, plus lock space (see max_locks_per_transaction).
# It is not advisable to set max_prepared_transactions nonzero unless you
# actively intend to use prepared transactions.
#work_mem = 1MB    # min 64kB
#maintenance_work_mem = 16MB  # min 1MB
#max_stack_depth = 2MB   # min 100kB
```

```
# - Kernel Resource Usage -

#max_files_per_process = 1000  # min 25
     # (change requires restart)
#shared_preload_libraries = ''  # (change requires restart)

# - Cost-Based Vacuum Delay -

#vacuum_cost_delay = 0ms  # 0-100 milliseconds
#vacuum_cost_page_hit = 1  # 0-10000 credits
#vacuum_cost_page_miss = 10  # 0-10000 credits
#vacuum_cost_page_dirty = 20  # 0-10000 credits
#vacuum_cost_limit = 200  # 1-10000 credits

# - Background Writer -

#bgwriter_delay = 200ms   # 10-10000ms between rounds
#bgwriter_lru_maxpages = 100  # 0-1000 max buffers written/round
#bgwriter_lru_multiplier = 2.0  # 0-10.0 multipler on buffers scanned/round

# - Asynchronous Behavior -

#effective_io_concurrency = 1  # 1-1000. 0 disables prefetching


#------------------------------------------------------------------------------
# WRITE AHEAD LOG
#------------------------------------------------------------------------------

# - Settings -

#wal_level = minimal   # minimal, archive, or hot_standby
     # (change requires restart)
#fsync = on    # turns forced synchronization on or off
#synchronous_commit = on  # synchronization level; on, off, or local
#wal_sync_method = fsync  # the default is the first option
     # supported by the operating system:
     #   open_datasync
     #   fdatasync (default on Linux)
     #   fsync
     #   fsync_writethrough
     #   open_sync
#full_page_writes = on   # recover from partial page writes
wal_buffers = 16MB   # MIQ Value;
#wal_buffers = -1   # min 32kB, -1 sets based on shared_buffers
     # (change requires restart)
#wal_writer_delay = 200ms  # 1-10000 milliseconds

#commit_delay = 0   # range 0-100000, in microseconds
#commit_siblings = 5   # range 1-1000

# - Checkpoints -

checkpoint_segments = 15  # MIQ Value;
#checkpoint_segments = 3  # in logfile segments, min 1, 16MB each
#checkpoint_timeout = 5min  # range 30s-1h
checkpoint_completion_target = 0.9 # MIQ Value;
#checkpoint_completion_target = 0.5 # checkpoint target duration, 0.0 - 1.0
#checkpoint_warning = 30s  # 0 disables

# - Archiving -

#archive_mode = off  # allows archiving to be done
    # (change requires restart)
#archive_command = ''  # command to use to archive a logfile segment
```

```
#archive_timeout = 0  # force a logfile segment switch after this
    # number of seconds; 0 disables


#------------------------------------------------------------------------------
# REPLICATION
#------------------------------------------------------------------------------

# - Master Server -

# These settings are ignored on a standby server

#max_wal_senders = 0  # max number of walsender processes
    # (change requires restart)
#wal_sender_delay = 1s  # walsender cycle time, 1-10000 milliseconds
#wal_keep_segments = 0  # in logfile segments, 16MB each; 0 disables
#vacuum_defer_cleanup_age = 0 # number of xacts by which cleanup is delayed
#replication_timeout = 60s # in milliseconds; 0 disables
#synchronous_standby_names = '' # standby servers that provide sync rep
    # comma-separated list of application_name
    # from standby(s); '*' = all

# - Standby Servers -

# These settings are ignored on a master server

#hot_standby = off   # "on" allows queries during recovery
     # (change requires restart)
#max_standby_archive_delay = 30s # max delay before canceling queries
     # when reading WAL from archive;
     # -1 allows indefinite delay
#max_standby_streaming_delay = 30s # max delay before canceling queries
     # when reading streaming WAL;
     # -1 allows indefinite delay
#wal_receiver_status_interval = 10s # send replies at least this often
     # 0 disables
#hot_standby_feedback = off  # send info from standby to prevent
     # query conflicts


#------------------------------------------------------------------------------
# QUERY TUNING
#------------------------------------------------------------------------------

# - Planner Method Configuration -

#enable_bitmapscan = on
#enable_hashagg = on
#enable_hashjoin = on
#enable_indexscan = on
#enable_material = on
#enable_mergejoin = on
#enable_nestloop = on
#enable_seqscan = on
#enable_sort = on
#enable_tidscan = on

# - Planner Cost Constants -

#seq_page_cost = 1.0   # measured on an arbitrary scale
#random_page_cost = 4.0   # same scale as above
#cpu_tuple_cost = 0.01   # same scale as above
#cpu_index_tuple_cost = 0.005  # same scale as above
#cpu_operator_cost = 0.0025  # same scale as above
#effective_cache_size = 128MB
```

```
# - Genetic Query Optimizer -

#geqo = on
#geqo_threshold = 12
#geqo_effort = 5   # range 1-10
#geqo_pool_size = 0   # selects default based on effort
#geqo_generations = 0   # selects default based on effort
#geqo_selection_bias = 2.0  # range 1.5-2.0
#geqo_seed = 0.0   # range 0.0-1.0

# - Other Planner Options -

#default_statistics_target = 100 # range 1-10000
#constraint_exclusion = partition # on, off, or partition
#cursor_tuple_fraction = 0.1  # range 0.0-1.0
#from_collapse_limit = 8
#join_collapse_limit = 8  # 1 disables collapsing of explicit
     # JOIN clauses


#------------------------------------------------------------------------------
# ERROR REPORTING AND LOGGING
#------------------------------------------------------------------------------

# - Where to Log -


log_destination = 'stderr'  # Valid values are combinations of
     # stderr, csvlog, syslog, and eventlog,
     # depending on platform.  csvlog
     # requires logging_collector to be on.

# This is used when logging to stderr:
logging_collector = on  # Enable capturing of stderr and csvlog
     # into log files. Required to be on for
     # csvlogs.
     # (change requires restart)

# These are only used if logging_collector is on:
log_directory = '/www/postgres/log' # Customer specific setting
#log_directory = 'pg_log'  # directory where log files are written,
     # can be absolute or relative to PGDATA
log_filename = 'postgresql-%Y-%m-%d.log'        # log file name pattern,
     # can include strftime() escapes
log_file_mode = 0644                    # creation mode for log files,
     # begin with 0 to use octal notation
log_truncate_on_rotation = on           # If on, an existing log file with the
     # same name as the new log file will be
     # truncated rather than appended to.
     # But such truncation only occurs on
     # time-driven rotation, not on restarts
     # or size-driven rotation.  Default is
     # off, meaning append to existing files
     # in all cases.
log_rotation_age = 1d                   # Automatic rotation of logfiles will
     # happen after that time.  0 disables.
log_rotation_size = 0                   # Automatic rotation of logfiles will
     # happen after that much log output.
     # 0 disables.

# These are relevant when logging to syslog:
#syslog_facility = 'LOCAL0'
#syslog_ident = 'postgres'

#silent_mode = off   # Run server silently.
     # DO NOT USE without syslog or
```

```
     # logging_collector
     # (change requires restart)


# - When to Log -

#client_min_messages = notice  # values in order of decreasing detail:
     #   debug5
     #   debug4
     #   debug3
     #   debug2
     #   debug1
     #   log
     #   notice
     #   warning
     #   error

#log_min_messages = warning  # values in order of decreasing detail:
     #   debug5
     #   debug4
     #   debug3
     #   debug2
     #   debug1
     #   info
     #   notice
     #   warning
     #   error
     #   log
     #   fatal
     #   panic

#log_min_error_statement = error # values in order of decreasing detail:
      #   debug5
     #   debug4
     #   debug3
     #   debug2
     #   debug1
      #   info
     #   notice
     #   warning
     #   error
     #   log
     #   fatal
     #   panic (effectively off)

log_min_duration_statement = 5000 # MIQ Value- ANY statement > 5 seconds
#log_min_duration_statement = -1 # -1 is disabled, 0 logs all statements
     # and their durations, > 0 logs only
     # statements running at least this number
     # of milliseconds


# - What to Log -

#debug_print_parse = off
#debug_print_rewritten = off
#debug_print_plan = off
#debug_pretty_print = on
#log_checkpoints = off
#log_connections = off
#log_disconnections = off
#log_duration = off
#log_error_verbosity = default  # terse, default, or verbose messages
#log_hostname = off
log_line_prefix = '%t:%r:%c:%u@%d:[%p]:' # MIQ Value;
#log_line_prefix = ''   # special values:
```

```
     #   %a = application name
     #   %u = user name
     #   %d = database name
     #   %r = remote host and port
     #   %h = remote host
     #   %p = process ID
     #   %t = timestamp without milliseconds
     #   %m = timestamp with milliseconds
     #   %i = command tag
     #   %e = SQL state
     #   %c = session ID
     #   %l = session line number
     #   %s = session start timestamp
     #   %v = virtual transaction ID
     #   %x = transaction ID (0 if none)
     #   %q = stop here in non-session
     #        processes
     #   %% = '%'
     # e.g. '<%u%%%d> '
log_lock_waits = on   # MIQ Value - used to track possible deadlock issues
#log_lock_waits = off   # log lock waits >= deadlock_timeout
#log_statement = 'none'   # none, ddl, mod, all
#log_temp_files = -1   # log temporary files equal or larger
     # than the specified size in kilobytes;
     # -1 disables, 0 logs all temp files
#log_timezone = '(defaults to server environment setting)'


#------------------------------------------------------------------------------
# RUNTIME STATISTICS
#------------------------------------------------------------------------------

# - Query/Index Statistics Collector -

#track_activities = on
track_counts = on   # MIQ Value;
#track_counts = on
#track_functions = none   # none, pl, all
#track_activity_query_size = 1024  # (change requires restart)
#update_process_title = on
#stats_temp_directory = 'pg_stat_tmp'


# - Statistics Monitoring -

#log_parser_stats = off
#log_planner_stats = off
#log_executor_stats = off
#log_statement_stats = off


#------------------------------------------------------------------------------
# AUTOVACUUM PARAMETERS
#------------------------------------------------------------------------------

autovacuum = on    # MIQ Value;
#autovacuum = on   # Enable autovacuum subprocess?  'on'
     # requires track_counts to also be on.
log_autovacuum_min_duration = 0  # MIQ Value;
#log_autovacuum_min_duration = -1 # -1 disables, 0 logs all actions and
     # their durations, > 0 logs only
     # actions running at least this number
     # of milliseconds.
autovacuum_max_workers = 1  # max number of autovacuum subprocesses
     # (change requires restart)
autovacuum_naptime = 30min  # MIQ Value;
```

```
#autovacuum_naptime = 1min  # time between autovacuum runs
autovacuum_vacuum_threshold = 500 # MIQ Value;
#autovacuum_vacuum_threshold = 50 # min number of row updates before
     # vacuum
autovacuum_analyze_threshold = 500 # MIQ Value;
#autovacuum_analyze_threshold = 50 # min number of row updates before
     # analyze
autovacuum_vacuum_scale_factor = 0.05 # MIQ Value;
#autovacuum_vacuum_scale_factor = 0.2 # fraction of table size before vacuum
#autovacuum_analyze_scale_factor = 0.1 # fraction of table size before analyze
#autovacuum_freeze_max_age = 200000000 # maximum XID age before forced vacuum
     # (change requires restart)
#autovacuum_vacuum_cost_delay = 20ms # default vacuum cost delay for
     # autovacuum, in milliseconds;
     # -1 means use vacuum_cost_delay
#autovacuum_vacuum_cost_limit = -1 # default vacuum cost limit for
     # autovacuum, -1 means use
     # vacuum_cost_limit


#------------------------------------------------------------------------------
# CLIENT CONNECTION DEFAULTS
#------------------------------------------------------------------------------

# - Statement Behavior -

#search_path = '"$user",public'  # schema names
#default_tablespace = ''  # a tablespace name, '' uses the default
#temp_tablespaces = ''   # a list of tablespace names, '' uses
     # only default tablespace
#check_function_bodies = on
#default_transaction_isolation = 'read committed'
#default_transaction_read_only = off
#default_transaction_deferrable = off
#session_replication_role = 'origin'
#statement_timeout = 0   # in milliseconds, 0 is disabled
#statement_timeout = 43200000   # MIQ statment timeout of 12 hours as a default
#vacuum_freeze_min_age = 50000000
#vacuum_freeze_table_age = 150000000
#bytea_output = 'hex'   # hex, escape
#xmlbinary = 'base64'
#xmloption = 'content'

# - Locale and Formatting -

datestyle = 'iso, mdy'
#intervalstyle = 'postgres'
#timezone = '(defaults to server environment setting)'
#timezone_abbreviations = 'Default'     # Select the set of available time zone
     # abbreviations.  Currently, there are
     #   Default
     #   Australia
     #   India
     # You can create your own file in
     # share/timezonesets/.
#extra_float_digits = 0   # min -15, max 3
#client_encoding = sql_ascii  # actually, defaults to database
     # encoding

# These settings are initialized by initdb, but they can be changed.
lc_messages = 'en_US.UTF-8'   # locale for system error message
     # strings
lc_monetary = 'en_US.UTF-8'   # locale for monetary formatting
lc_numeric = 'en_US.UTF-8'   # locale for number formatting
lc_time = 'en_US.UTF-8'    # locale for time formatting
```

```
# default configuration for text search
default_text_search_config = 'pg_catalog.english'

# - Other Defaults -

#dynamic_library_path = '$libdir'
#local_preload_libraries = ''


#------------------------------------------------------------------------------
# LOCK MANAGEMENT
#------------------------------------------------------------------------------

deadlock_timeout = 5s   # MIQ Value - one second is too low, 5 seconds is more
"interesting"
#deadlock_timeout = 1s
#max_locks_per_transaction = 64  # min 10
     # (change requires restart)
# Note:  Each lock table slot uses ~270 bytes of shared memory, and there are
# max_locks_per_transaction * (max_connections + max_prepared_transactions)
# lock table slots.
#max_pred_locks_per_transaction = 64 # min 10
     # (change requires restart)

#------------------------------------------------------------------------------
# VERSION/PLATFORM COMPATIBILITY
#------------------------------------------------------------------------------

# - Previous PostgreSQL Versions -

#array_nulls = on
#backslash_quote = safe_encoding # on, off, or safe_encoding
#default_with_oids = off
escape_string_warning = off  # MIQ Value no sure why this is enabled
#escape_string_warning = on
#lo_compat_privileges = off
#quote_all_identifiers = off
#sql_inheritance = on
standard_conforming_strings = off # MIQ Value not sure why this is enabled
#standard_conforming_strings = on
#synchronize_seqscans = on

# - Other Platforms and Clients -

#transform_null_equals = off


#------------------------------------------------------------------------------
# ERROR HANDLING
#------------------------------------------------------------------------------

#exit_on_error = off    # terminate session on any error?
#restart_after_crash = on   # reinitialize after backend crash?


#------------------------------------------------------------------------------
# CUSTOMIZED OPTIONS
#------------------------------------------------------------------------------

#custom_variable_classes = ''  # list of custom variable class names
```

Revision History

Revision 0.0.0-3	Tue Sep 2 2014	CloudForms Docs Team

Initial book creation.

BZ# 1093447 - Added 2 new sections 6.1.2 and 6.1.3 to describe the process of adding OpenStack and Amazon EC2 providers.