Red Hat CloudForms 4.1
Deployment Planning Guide

Planning for the deployment of Red Hat CloudForms

Red Hat CloudForms Documentation Team

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Abstract

This guide provides guidance on planning for the deployment of Red Hat CloudForms to suit your cloud environment. If you have a suggestion for improving this guide or have found an error, please submit a Bugzilla report at http://bugzilla.redhat.com against Red Hat CloudForms Management Engine for the Documentation component. Please provide specific details, such as the section number, guide name, and CloudForms version so we can easily locate the content.

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CHAPTER 1. INTRODUCTION TO RED HAT CLOUDFORMS

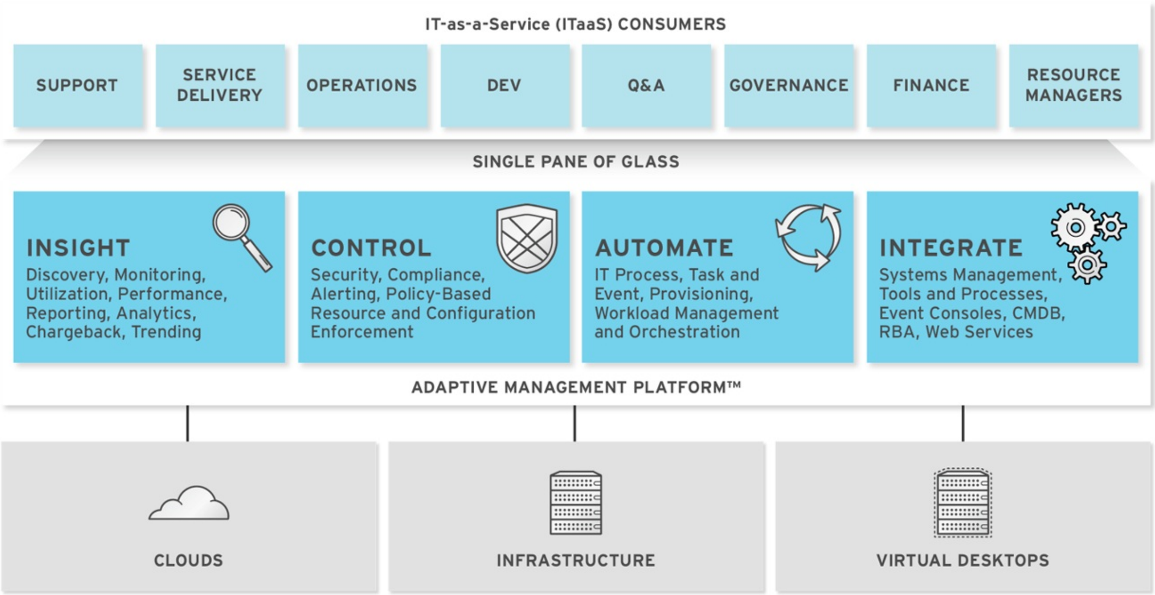
Red Hat CloudForms delivers the insight, control, and automation that enterprises need to address the challenges of managing virtual environments. This technology enables enterprises with existing virtual infrastructures to improve visibility and control, and those starting virtualization deployments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

Red Hat CloudForms provides the following feature sets:

- Insight: Discovery, Monitoring, Utilization, Performance, Reporting, Analytic, 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. Its features are designed to work together to provide robust management and maintenance of your virtual infrastructure.


IT-as-a-Service (ITaaS) CONSUMERS
SUPPORT
SERVICE DELIVERY
OPERATIONS
DEV
Q&A
GOVERNANCE
FINANCE
RESOURCE MANAGERS
SINGLE PANE OF GLASS
INSIGHT
Discovery, Monitoring, Utilization, Performance, Reporting, Analytics, Chargeback, Trending
CONTROL
Security, Compliance, Alerting, Policy-Based Resource and Configuration Enforcement
AUTOMATE
IT Process, Task and Event, Provisioning, Workload Management and Orchestration
INTEGRATE
Systems Management, Tools and Processes, Event Consoles, CMDB, RBA, Web Services
ADAPTIVE MANAGEMENT PLATFORM™
CLOUDS
INFRASTRUCTURE
VIRTUAL DESKTOPS

The architecture comprises the following components:

- The Red Hat CloudForms appliance (appliance) which is supplied as a secure, high-performance, preconfigured virtual machine. It provides support for HTTPS communications.
- The Red Hat CloudForms 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 HTTPS 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 Red Hat CloudForms 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. A SmartProxy agent must configured in each storage location, and must be visible to the appliance. The SmartProxy acts on behalf of the appliance communicating with it over HTTPS on standard port 443.

1.2. REQUIREMENTS

To use Red Hat CloudForms, certain virtual hardware, database, and browser requirements must be met in your environment.

1.2.1. Virtual Hardware Requirements

The Red Hat CloudForms appliance requires the following virtual hardware at minimum:

- 4 VCPUs

- 8 GB RAM

- 44 GB HDD + optional database disk

1.2.2. Database Requirements

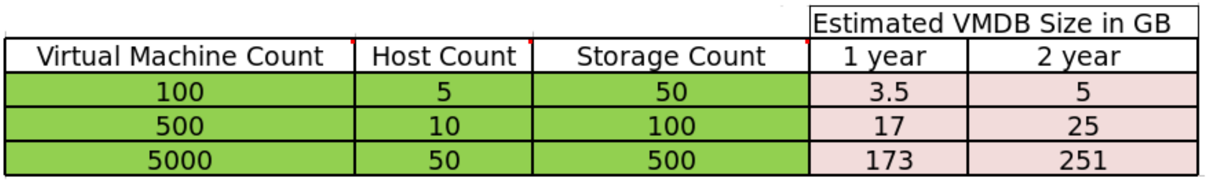
Red Hat recommends allocating the virtual machine disk fully at the time of creation. Three main factors affect the size of your database over time:

- 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.

Use the following table as a guideline to calculate minimum requirements for your database:



			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

1.2.3. Browser Requirements

To use Red Hat CloudForms, the following browser requirements must be met:

- One of the following web browsers:

  - Mozilla Firefox for versions supported under Mozilla’s Extended Support Release (ESR)

  - Internet Explorer 10 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/

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, Red Hat CloudForms does not guarantee that the browser's **Back** button will produce the desired results. Red Hat recommends using the breadcrumbs provided in the Console.

1.2.4. Additional Requirements

Additionally, the following must be configured to use Red Hat CloudForms:

- The Red Hat CloudForms 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.

1.3. TERMINOLOGY

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

Account Role

The level of access a user has to different parts and functions of the Red Hat CloudForms console. There are a variety of Account Roles, which can be assigned to users to restrict or allow access to parts of the console and virtual infrastructure.

Action

An execution that is performed after a condition is evaluated.

Alert

Red Hat CloudForms 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.

Red Hat CloudForms Appliance

A virtual machine where the virtual management database (VMDB) and Red Hat CloudForms reside.

Red Hat CloudForms Console

A web-based interface into the Red Hat CloudForms appliance.

Red Hat CloudForms Role

A designation assigned to a Red Hat CloudForms server that defines what a Red Hat CloudForms server can do.

Red Hat CloudForms Server

The application that runs on the Red Hat CloudForms appliance and communicates with the SmartProxy and the VMDB.

Cluster

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

Condition

A control policy test triggered by an event, which determines a subsequent action.

Discovery

Process run by the Red Hat CloudForms 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 Red Hat CloudForms appliance which monitors external providers for events and sends them to the Red Hat CloudForms server.

Host

A computer running a hypervisor, capable of hosting and monitoring virtual machines. Supported hypervisors include RHEV-H, VMware ESX hosts, Windows Hyper-V hosts.

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 Red Hat CloudForms 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 Red Hat CloudForms appliance to perform actions on hosts, providers, storage and virtual machines.

The SmartProxy can be configured to reside on the Red Hat CloudForms appliance or on an ESX server version. The SmartProxy can be deployed from the Red Hat CloudForms 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 Red Hat CloudForms appliance. If the SmartProxy is not embedded in the Red Hat CloudForms server, it communicates with the Red Hat CloudForms appliance over HTTPS 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 Red Hat CloudForms 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 Red Hat CloudForms 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 Red Hat CloudForms 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 Red Hat CloudForms appliance to store information about your resources, users, and anything else required to manage your virtual enterprise.

Virtual Thumbnail

An image in the web interface representing a resource, such as a provider or a virtual machine, showing the resource’s properties at a glance. Each virtual thumbnail is divided into quadrants, which provide information about the resource, such as its software and power state.

Zones

Red Hat CloudForms 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.

1.4. GETTING SUPPORT

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.

CHAPTER 2. PLANNING

This guide provides some general guidelines to planning a deployment on Red Hat CloudForms. This includes creating multiple regions containing Red Hat CloudForms appliances, CPU sizing recommendations, database sizing recommendations, and database configuration.

2.1. REGIONS

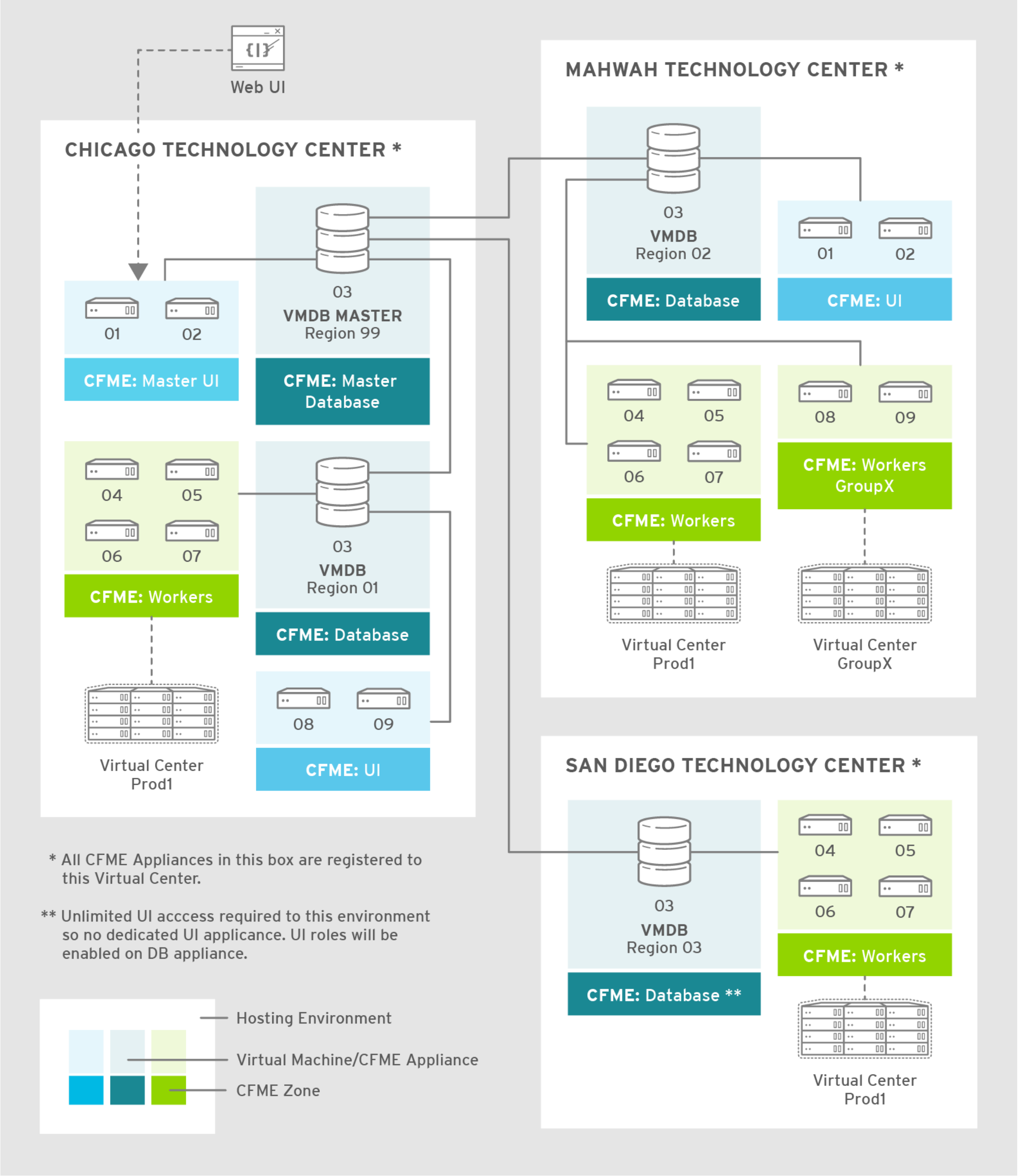
Regions are used for centralizing data which is collected from public and private virtualization environments. A region is ultimately represented as a single database for the VMDB. Regions are particularly useful when multiple geographical locations need to be managed, as they enable all the data collection to happen at each particular location and avoid 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.

Only one failover type of each server role can run in a zone. If multiple appliances have the same failover role, the extras are used as backups that activate only if the primary appliance fails. Non-failover server roles can run on multiple appliances simultaneously in a zone, so resources can be adjusted according to the workload those roles are responsible for.

The following diagram demonstrates an example of the multiple regions working together in a Red Hat CloudForms environment.

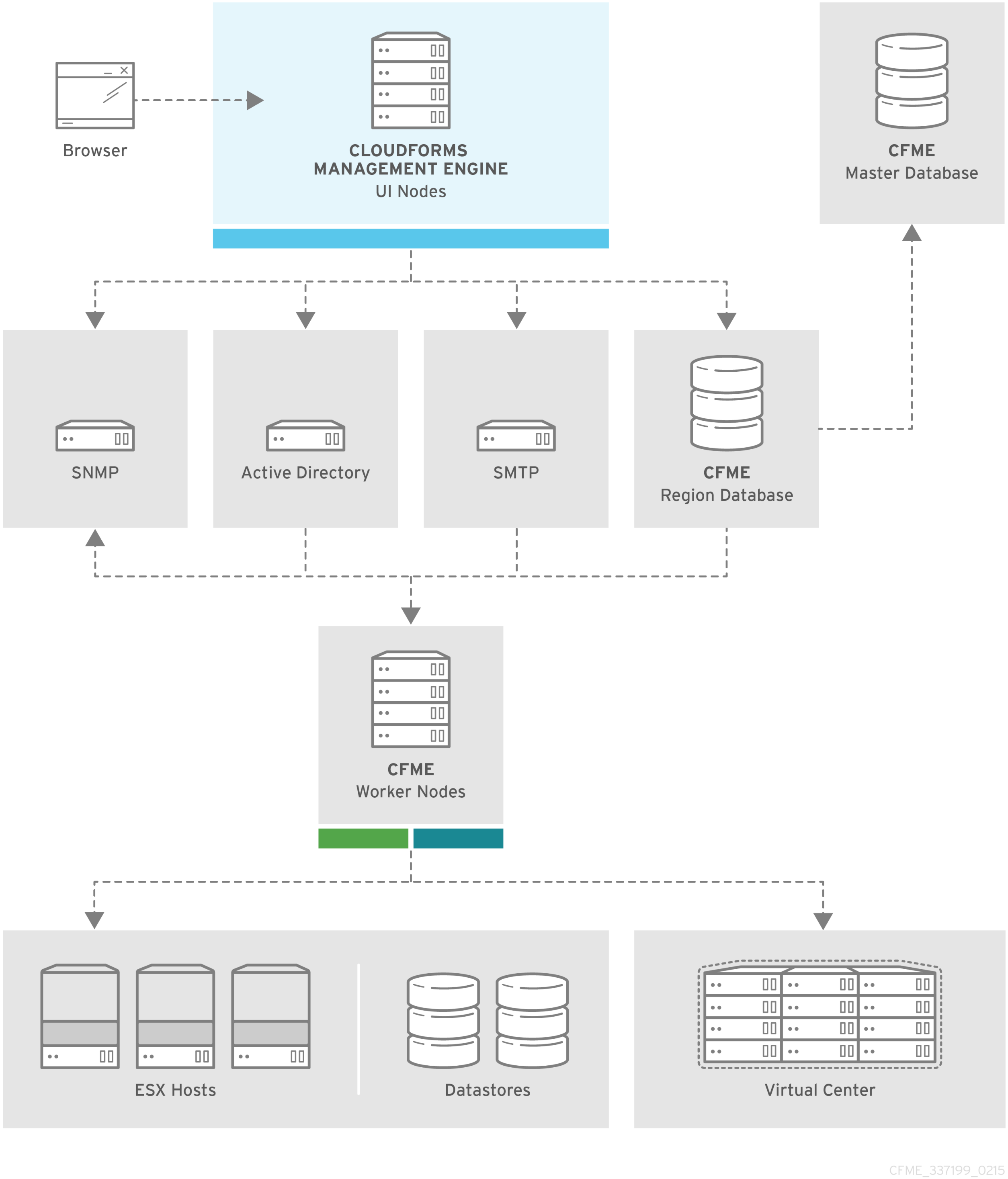


The Master appliance is located in Chicago and contains a master region and a subregion that manages the worker appliances. The Mahwah technology center contains a single subregion that manages two zones. Likewise, the San Diego technology center contains a single subregion managing a single zone.

Note

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

The following diagram provides a closer look at a region:



In this region, we have several Red Hat CloudForms appliances acting as UI nodes and worker nodes. These worker nodes execute tasks on the providers in your environment. The Region also uses a region database that reports to a master database on the main Red Hat CloudForms appliance. All appliances can connect to the authentication services (Active Directory, LDAP, Identity Management), outgoing mail (SMTP), and network services (SNMP).

2.2. TENANTS

Red Hat CloudForms supports multi-tenancy, letting you isolate one tenant’s resources and user accounts from another. In addition, tenants can be nested in a hierarchy, enabling those at the bottom to inherit permissions from those above. This configuration allows for granular user permissions to be set on specific tenants.

Tenancy Models

A number of approaches exist for tenant planning:

- **Tenantless** - Similar to the previous system without tenancy support, you can create a single large tenant and perform all your operations in there without any subdivision of resources or user accounts.
- **Enterprise model** - A common scenarios is to create a single tenant, and then subdivide it based on the structures or departments within your organization. Those departments are then able to further subdivide their resources into distinct projects. With this model, you have a single URL for user access, while still having the ability to divide resources into nested hierarchical tenants.
- **Multiple tenant model (CCP)** - Created with Certified Cloud Providers in mind, this model allows multiple tenants to enjoy complete isolation from other tenants, with separate branding and unique URLs.

2.3. EXAMPLE POSTGRESQL CONFIGURATION FILE

```
# -----------------------------
# 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
#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
#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
```

CHAPTER 3. CAPACITY PLANNING

3.1. CAPACITY AND UTILIZATION COLLECTION

Red Hat CloudForms server can collect and analyze capacity and utilization data from your virtual infrastructure. Use this data to understand the limitations of your current environment and plan for growth.

For some capacity and utilization data, Red Hat CloudForms calculates and shows trend lines in the charts. Trend lines are created using linear regression, which is calculated using the capacity and utilization data collected by Red Hat CloudForms during the interval you specify for the chart. The more data you have the better the predictive value of the trend line.

There are three server roles associated with the collection and metric creation of capacity and utilization.

- 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 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 server with this role in a zone.

- The Capacity & Utilization Data Processor processes all of the data collected, allowing Red Hat CloudForms to create charts. This role has a dedicated worker, and there can be more than one server with this role in a zone.

3.2. ASSIGNING THE CAPACITY AND UTILIZATION SERVER ROLES

1. Navigate to **Settings** → **Configuration**, and select the server to configure from **Settings** → **Zone** in the left pane of the appliance.

2. Navigate to the **Server Roles** list in the **Server** → **Server Control** section. From there, set the appropriate Capacity and Utilization roles to **ON**. Namely:

    a. **Capacity & Utilization Coordinator**

    b. **Capacity & Utilization Data Collector**

    c. **Capacity & Utilization Data Processor**

3. Click **Save**.

Data collection is enabled immediately. However, the first collection begins 5 minutes after the server is started, and every 10 minutes after that. Therefore, the longest the collection takes after enabling the Capacity & Utilization collector server role is 10 minutes. The first collection from a particular provider may take a few minutes since Red Hat CloudForms is gathering data points going one month back in time.

Note

In addition to setting the server role, you must also select which clusters and datastores to collect data for. For more information, see General Configuration. You must have super administrator rights to edit these settings.

3.3. DATA COLLECTION FOR RED HAT ENTERPRISE VIRTUALIZATION

Note

The procedure applies to version numbers Red Hat Enterprise Virtualization 3.x and Red Hat Virtualization 4.x.

To collect capacity and utilization data for Red Hat Enterprise Virtualization, you must add Red Hat CloudForms as a user to the RHEV-M database.

Perform this procedure on the PostgreSQL server where the history database is located. Usually, this is the RHEV-M server.

1. Using SSH, access the RHEV-M database server as the root user:

```
$ ssh root@example.postgres.server
```

2. Switch to the postgres user:

```
# su - postgres
```

3. Access the database prompt:

```
# psql ovirt_engine_history
```

4. Create a new user for the Red Hat CloudForms and grant read-only access to tables and views:

```
ovirt_engine_history=# CREATE ROLE cfme with LOGIN ENCRYPTED
PASSWORD 'password';

ovirt_engine_history=# SELECT 'GRANT SELECT ON ' || relname || '
TO cfme;' FROM pg_class JOIN pg_namespace ON pg_namespace.oid =
pg_class.relnamespace WHERE nspname = 'public' AND relkind IN
('r', 'v', 'S');
```

5. Exit to the RHEV-M database server prompt:

```
ovirt_engine_history=# \q
# exit
```

6. Update the server’s firewall to accept TCP communication on port 5432.

   - For Red Hat Enterprise Virtualization 3.x:

     ```
     # iptables -I INPUT -p tcp -m tcp --dport 5432 -j ACCEPT
     # service iptables save
     ```

   - For Red Hat Virtualization 4.x:

     ```
     # firewall-cmd --add-port=5432/tcp --permanent
     ```

7. Enable external md5 authentication by appending the following line to **`/var/lib/pgsql/data/pg_hba.conf`**:

   ```
   host    all      all    0.0.0.0/0     md5
   ```

8. Enable PostgreSQL to listen for remote connections by updating the **`listen_addresses`** line in **`/var/lib/pgsql/data/postgresql.conf`**:

   ```
   listen_addresses  =  '*'
   ```

9. Reload the PostgreSQL configuration.

   - For Red Hat Enterprise Virtualization 3.x:

     ```
     # service postgresql reload
     ```

   - For Red Hat Virtualization 4.x:

     ```
     # systemctl reload postgresql
     ```

3.4. ADDING DATABASE CREDENTIALS FOR DATA COLLECTION

After creating the new user, add the user’s credentials to the settings for the provider.

1. From **Compute** → **Infrastructure** → **Providers**, select an infrastructure provider to update its settings.

2. Click **Configuration**, and then **Edit Selected Infrastructure Provider**.

3. In the **Credentials** area, click **C & U Database**.

4. Type in the credentials for the new database user you created.

5. Click **Save**.

6. Restart the capacity and utilization data collector.

3.5. DATA COLLECTION FOR RED HAT ENTERPRISE LINUX OPENSTACK PLATFORM

Before you can collect data from a Red Hat Enterprise Linux OpenStack Platform (RHEL-OSP) provider, you must install Ceilometer and configure it to accept queries from external systems.

These instructions require a Red Hat Enterprise Linux 6.4 @base installation of RHEL-OSP and registration to a satellite that has access to both the **`RHEL-OSP`** and **`RHEL Server Optional`** channels. Perform all steps on your RHEL-OSP system.

1. Add the required channels and update your system:

```
# rhn-channel --add -c rhel-x86_64-server-6-ost-3 -c rhel-x86_64-
server-optional-6
# yum update -y
# reboot
```

2. Install **`Ceilometer`**:

```
# yum install *ceilometer*
```

3. Install and start the MongoDB store:

```
# yum install mongodb-server
# sed -i '/--smallfiles/!s/OPTIONS=\"/OPTIONS=\"--smallfiles /'
/etc/sysconfig/mongod
# service mongod start
```

4. Create the following users and roles:

```
# SERVICE_TENANT=$(keystone tenant-list | grep services | awk
'{print $2}')
# ADMIN_ROLE=$(keystone role-list | grep ' admin ' | awk '{print
$2}')
# SERVICE_PASSWORD=servicepass
# CEILOMETER_USER=$(keystone user-create --name=ceilometer \
--pass="$SERVICE_PASSWORD" \
--tenant_id $SERVICE_TENANT \
--email=ceilometer@example.com | awk '/ id / {print $4}')
# RESELLER_ROLE=$(keystone role-create --name=ResellerAdmin | awk
'/ id / {print $4}')
# ADMIN_ROLE=$(keystone role-list | awk '/ admin / {print $2}')
# for role in $RESELLER_ROLE $ADMIN_ROLE ; do
keystone user-role-add --tenant_id $SERVICE_TENANT \
--user_id $CEILOMETER_USER --role_id $role
done
```

5. Configure the authtoken in **`ceilometer.conf`**:

```
# openstack-config --set /etc/ceilometer/ceilometer.conf
keystone_authtoken auth_host 127.0.0.1
# openstack-config --set /etc/ceilometer/ceilometer.conf
keystone_authtoken auth_port 35357
# openstack-config --set /etc/ceilometer/ceilometer.conf
keystone_authtoken auth_protocol http
# openstack-config --set /etc/ceilometer/ceilometer.conf
keystone_authtoken admin_tenant_name services
```

```
# openstack-config --set /etc/ceilometer/ceilometer.conf
keystone_authtoken admin_user ceilometer
# openstack-config --set /etc/ceilometer/ceilometer.conf
keystone_authtoken admin_password $SERVICE_PASSWORD
```

6. Configure the user credentials in **`ceilometer.conf`**:

```
# openstack-config --set /etc/ceilometer/ceilometer.conf DEFAULT
os_auth_url http://127.0.0.1:35357/v2.0
# openstack-config --set /etc/ceilometer/ceilometer.conf DEFAULT
os_tenant_name services
# openstack-config --set /etc/ceilometer/ceilometer.conf DEFAULT
os_password $SERVICE_PASSWORD
# openstack-config --set /etc/ceilometer/ceilometer.conf DEFAULT
os_username ceilometer
```

7. Start the Ceilometer services:

```
# for svc in compute central collector api ; do
  service openstack-ceilometer-$svc start
  done
```

8. Register an endpoint with the service catalog. Replace **`$EXTERNALIFACE`** with the IP address of your external interface:

```
# keystone service-create --name=ceilometer \
--type=metering --description="Ceilometer Service"
# CEILOMETER_SERVICE=$(keystone service-list | awk '/ceilometer/
{print $2}')
# keystone endpoint-create \
--region RegionOne \
--service_id $CEILOMETER_SERVICE \
--publicurl "http://$EXTERNALIFACE:8777/" \
--adminurl "http://$EXTERNALIFACE:8777/" \
--internalurl "http://localhost:8777/"
```

9. Enable access to Ceilometer from external systems:

```
# iptables -I INPUT -p tcp -m multiport --dports 8777 -m comment
--comment "001 ceilometer incoming" -j ACCEPT
# iptables save
```

10. Confirm the status of OpenStack and the Ceilometer services:

```
# openstack-status
# for svc in compute central collector api ; do
  service openstack-ceilometer-$svc status
  done
```

11. Verify Ceilometer is working correctly by authenticating as a user with instances running, for example **`admin`**. Pipe the sample for the CPU meter to count lines, and confirm that the value changes according to the interval specified in **`/etc/ceilometer/pipeline.yaml`**. The default interval is 600 seconds.

```
# . ~/keystonerc_admin
# ceilometer sample-list -m cpu |wc -l
```

12. Add the configured OpenStack provider to Red Hat CloudForms. See Adding OpenStack Providers in *Managing Providers*. After adding the provider, capacity and utilization data for your instances populate in a few minutes.

3.6. DATA COLLECTED

Red Hat CloudForms generates charts from the collected data which can be used to plan your hardware and virtual machine needs. Depending on the type of data, these charts may include lines for averages, maximums, minimums, and trends.

Note

For reporting of daily capacity and utilization data, incomplete days (days with less than 24 hourly data points from midnight to midnight) that are at the beginning or end of the requested interval are excluded. Days with less than 24 hourly data points would be inaccurate and including them would skew trend lines. Therefore, at least one full day of hourly data from midnight to midnight is necessary for displaying the capacity and utilization charts under the **Compute** → **Infrastructure** tab.

3.6.1. Capacity and Utilization Charts for Host, Clusters, and Virtual Machines

Table 3.1. Capacity and Utilization Charts for Host, Clusters, and Virtual Machines

Resource Type	CPU Usage	CPU States	Disk I/O	Memory Usage	Network I/O	Running VMS	Running Hosts
Host	Y	Y	Y	Y	Y	Y	NA
Cluster	Y	Y	Y	Y	Y	Y	Y
Virtual Machine	Y	Y	Y	Y	Y	NA	NA

For procedures to view capacity and utilization charts for hosts, clusters, and virtual machines, see the following sections in *Managing Infrastructure and Inventory*:

- Viewing Capacity and Utilization Charts for a Host
- Viewing Capacity and Utilization Charts for a Cluster
- Viewing Capacity and Utilization Charts for a Virtual Machine

3.6.2. Capacity and Utilization Charts for Datastores

Charts created include:

Table 3.2. Capacity and Utilization Charts for Datastores

Space by VM Type	Virtual Machines and Hosts
Used Space	Number of VMs by Type
Disk files Space	Hosts
Snapshot Files Space	Virtual Machines
Memory Files Space	
Non-VM Files	
Used Disk Space	

See Viewing Capacity and Utilization Charts for a Datastore in *Managing Infrastructure and Inventory* for more information.

3.7. CHART FEATURES

Each chart provides its own set of special features including zooming in on a chart and shortcut menus.

3.7.1. Zooming into a Chart

1. Navigate to the chart you want to zoom. If you hover anywhere on the chart, two dashed lines will appear to target a coordinate of the chart.

2. Click 🔍 (**Click to zoom in**) in the lower left corner of the chart to zoom into it.

3. To go back to the regular view click 🔍 (**Click to zoom out**) on the enlarged chart.

3.7.2. Drilling into Chart Data

1. Navigate to the chart you want to get more detail from.

2. Hover over a data point to see the coordinates.

3. Click on a data point to open a shortcut menu for the chart. In this example, we can use the shortcut menu to go to the hourly chart or display the virtual machines that were running at the time the data was captured.

   - If you are viewing the **CPU**, **Disk**, **Memory**, or **Network** charts, selecting from the **Chart** option will change all of the charts on the page to the new interval selected.

   - If you are viewing the **CPU**, **Disk**, **Memory**, or **Network** charts, selecting from the **Display** option will allow you to drill into the virtual machines or **Hosts** that were running at the time.

   - If you are viewing the **VM** or **Hosts** chart, the **Display** menu will allow you to view running or stopped virtual machines. The time of the data point will be displayed in addition to the virtual machines that apply. From here, click on a virtual machine to view its details.

3.8. OPTIMIZATION

Red Hat CloudForms's optimization functions allow you to view utilization trends, and identify and project bottlenecks in your environment. In addition, you can predict where you have capacity for additional virtual machines.

Note

For reporting of daily optimization data, incomplete days (days with less than 24 hourly data points from midnight to midnight) that are at the beginning or end of the requested interval are excluded. Days with less than 24 hourly data points would be inaccurate and including them would skew trend lines. Therefore, the **Optimize** page requires at least two full days of daily data because all the charted values are derived from trend calculations and that requires at least two data points

3.9. UTILIZATION TRENDS

Red Hat CloudForms allows you to view the resource utilization of your clusters, providers, and datastores. You can choose from summary, details, or report view.

3.9.1. Viewing Utilization Trend Summary

This procedure shows you how to view utilization trend summary.

1. Navigate to **Optimize** → **Utilization**.

2. Click **Summary** if it is not already selected.

3. Expand the tree on the left side, until you can see the desired providers, clusters, or datastores.

4. Click on the item.

5. Use the **Options** section in the **Summary** tab to change the characteristics of the data.

   - Use **Trends** to select how far back you want to calculate the trend.

- Use **Selected Day** for the date you want to see percent utilization for in the chart on the **Summary** tab.
- Use **Classification** to only see trends for a specific applied tag.
- Use **Time Profile** to select an existing time profile. If the logged on user does not have any time profiles available, this option will not show.
- Select a **Time Zone**.

3.9.2. Viewing Detail Lines of a Utilization Trend

This procedure shows you how to view detail lines of a utilization trend.

1. Navigate to **Optimize** → **Utilization**.
2. Expand the tree on the left side, until you can see the desired providers, clusters, or datastores.
3. Click on the item.
4. Click **Details** if it is not already selected.
5. From the **Options** area, select how far back you want to view the trends for and any classifications you want to use.

3.9.3. Viewing a Report of a Utilization Trend

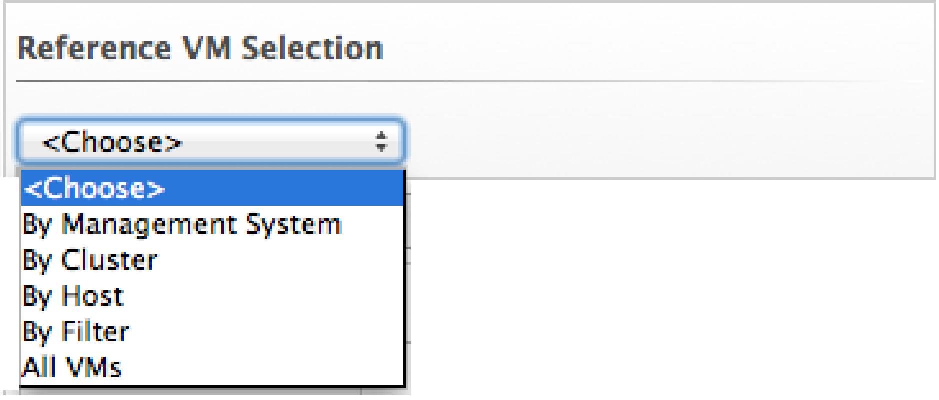
To find out more about resource utilization, view utilization trend reports.

1. Navigate to **Optimize** → **Utilization**.
2. Expand the tree on the left side, until you can see the desired providers, clusters, or datastores.
3. Click on the item.
4. Click **Report** if it is not already selected.
5. From the **Options** area, select how far back you want to view the trends for and any classifications you want to use.

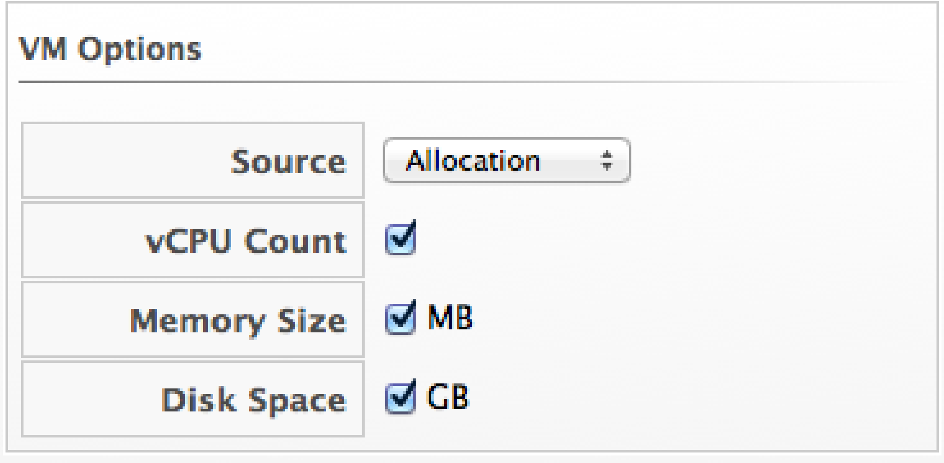
3.10. PLANNING WHERE TO PUT A NEW VIRTUAL MACHINE

You can use the data collected in the VMDB to plan where you can put additional virtual machines. Red Hat CloudForms allows you to use a reference virtual machine as an example to plan on which hosts and clusters you can place a new virtual machine.

1. Navigate to **Optimize** → **Planning**.
2. From **Reference VM Selection**, use the dropdowns to select the virtual machine that is most like the one that you want to add.



3. Select the required **VM Options** for what you want to base the calculations on.

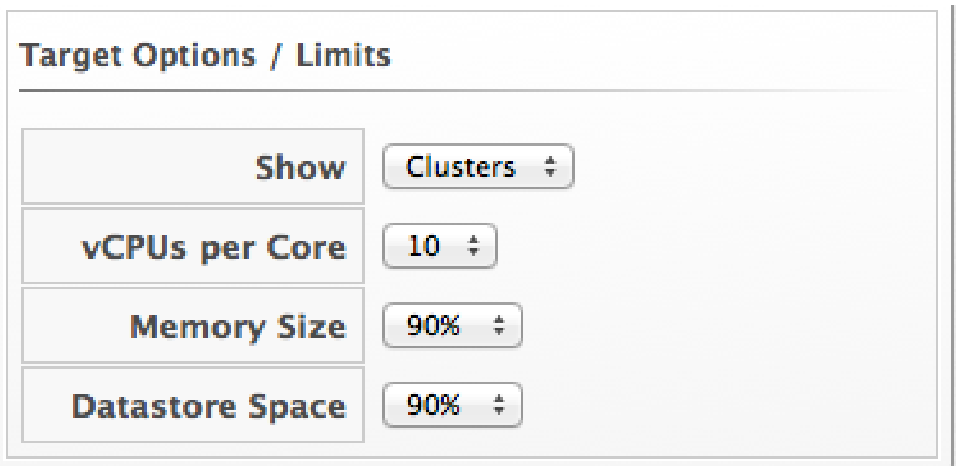


VM Options

Source	Allocation
vCPU Count	☑
Memory Size	☑ MB
Disk Space	☑ GB

From the **Source** list, select the type of data to use as the source for your projections. For example, select **Allocation** to calculate based on the current allocation values of each resource (CPU, memory, or disk space) for the reference virtual machine. Use **Reservation** to project based on the current guaranteed value of the specific resource (CPU Speed, CPU count, memory, or disk space) although that amount may not be allocated to the virtual machine at a specific moment in time. Select **Usage** if you want to calculate based on usage history of the reference virtual machine. Use **Manual Input** to enter your own set of parameters for each resource.

4. From **Target Options / Limits**, select if you want to use clusters or hosts as your targets.



Target Options / Limits

Show	Clusters
vCPUs per Core	10
Memory Size	90%
Datastore Space	90%

Also, select the limit of how high the projection can go for CPU, memory, and datastore space. If you are targeting hosts, you will be able to select a filter for which hosts can be targets.

5. From **Trend Options**, select how far back you want to use the trend data for, a **Time Profile** and **Time Zone** if applicable. Note that **Time Profile** will only show if the logged on user has a **Time Profile** available.

6. Click **Submit**.

The **Summary** tab shows the best clusters or hosts on which to place the virtual machines. The **Report** tab shows the best fit and statistics on the reference virtual machine in a tabular format. From the **Report** tab, you can also create a PDF of the report or download the data in `txt` or `csv` format.

3.11. BOTTLENECKS

Red Hat CloudForms can show where bottlenecks occur in your virtual infrastructure. You can view them either on a timeline or as a report which can be downloaded for further analysis.

3.11.1. Prerequisites

- Bottleneck reports use the same mechanism to gather data as Capacity and Utilization reports. To enable data collection in Red Hat CloudForms, see the following sections:

    - Section 3.2, “Assigning the Capacity and Utilization Server Roles”

    - Section 3.6, “Data Collected”

- Additionally, configure your Red Hat CloudForms for collecting capacity and utilization reports for clusters and datastores by following this procedure:

    - Navigate to **Settings** → **Configuration**.

    - Select **Region** from the **Settings** tab in the left pane of the appliance.

    - In the right pane, under the **C & U Collection** tab, check the boxes for **Collect for All Clusters** under **Clusters** and **Collect for All Datastores** under **Datastores**, or check the boxes for the clusters/datastores you desire.

        Note

        Collect for All Clusters must be checked to be able to collect capacity and utilization data from cloud providers such as Red Hat OpenStack or Amazon EC2.

    - Click **Save**.

- For bottleneck reports to work as expected, the data collection for Capacity and Utilization reports should also be enabled for the relevant backend provider. See the following documentation to enable data collection for Red Hat Enterprise Virtualization and Red Hat Enterprise Linux OpenStack Platform provider:

    - For Red Hat Enterprise Virtualization: Section 3.3, “Data Collection for Red Hat Enterprise Virtualization”

    - For Red Hat Enterprise Linux OpenStack Platform: Section 3.5, “Data Collection for Red Hat Enterprise Linux OpenStack Platform”

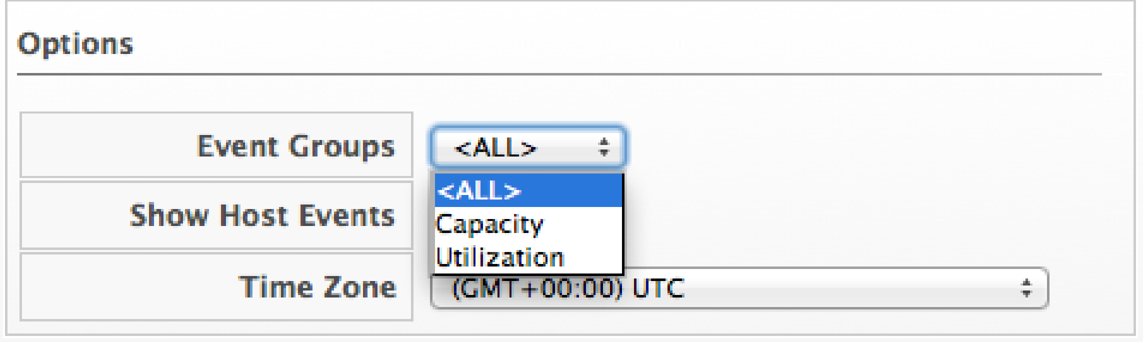
Note

For reporting of daily bottleneck data, incomplete days (days with less than 24 hourly data points from midnight to midnight) that are at the beginning or end of the requested interval are excluded. Days with less than 24 hourly data points would be inaccurate and including them would skew trend lines. Therefore, at least one full day of hourly data from midnight to midnight is necessary for displaying the bottleneck charts under the **Optimize** tab.

3.11.2. Viewing the Bottleneck Summary

To find out more about bottleneck capacity or utilization, view a bottleneck summary.

1. Navigate to **Optimize** → **Bottlenecks**.
2. Click **Summary** if it is not already selected.
3. Expand the tree on the left side, until you can see the desired providers, clusters, or datastores.
4. Click on the item.
5. Use the **Options** section to change the characteristics of the data.



Options

Event Groups: <ALL>

Show Host Events

Time Zone: (GMT+00:00) UTC

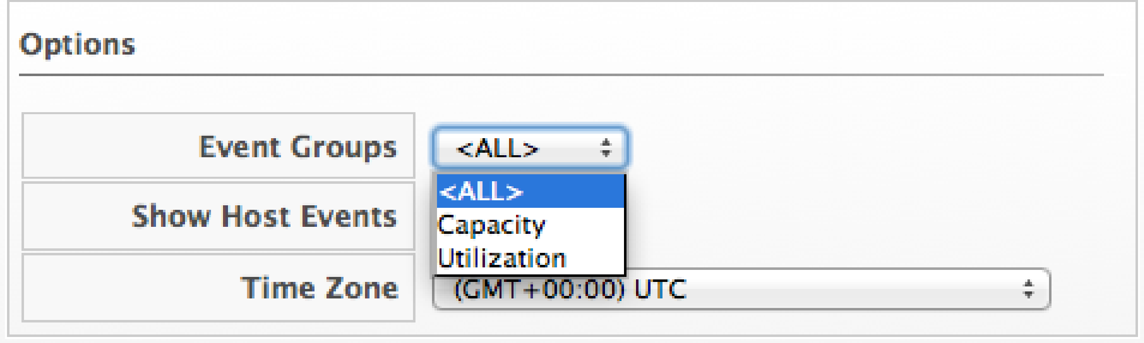
- Use **Event Groups** to select if you want to see bottlenecks based on capacity, utilization or both.
- Select a **Time Zone**.

  Data is processed, and a timeline appears. Click on an icon in the timeline to see specific information on the bottleneck.

3.11.3. Viewing a Report of the Bottlenecks Trend

1. Navigate to **Optimize** → **Bottlenecks**.
2. Click **Report**.
3. Expand the tree on the left side, until you can see the desired providers, clusters, or datastores.
4. Click on the item.

5. Use the **Options** section to change the characteristics of the data.

   Options

   Event Groups <ALL>

   Show Host Events

   Time Zone (GMT+00:00) UTC

   - Use **Event Groups** to select if you want to see bottlenecks based on capacity, utilization or both.

   - Select a **Time Zone**.

6. Expand the tree on the left side, until you can see the enterprise, provider, or datastore that you want to see the trend for.