



Certified Cloudstack Professional Sample Material

V-Skills Certifications

**A Government of India
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V-Skills



1. CONCEPTS

1.1. What is CloudStack?

CloudStack is an open source software platform that pools computing resources to build public, private, and hybrid Infrastructure as a Service (IaaS) clouds. CloudStack manages the network, storage, and compute nodes that make up a cloud infrastructure. Use CloudStack to deploy, manage, and configure cloud computing environments.

Typical users are service providers and enterprises. With CloudStack, you can:

- ✓ Set up an on-demand, elastic cloud computing service. Service providers can sell self service virtual machine instances, storage volumes, and networking configurations over the Internet.
- ✓ Set up an on-premise private cloud for use by employees. Rather than managing virtual machines in the same way as physical machines, with CloudStack an enterprise can offer self-service virtual machines to users without involving IT departments.



1.2. What Can CloudStack Do?

Multiple Hypervisor Support

CloudStack works with a variety of hypervisors, and a single cloud deployment can contain multiple hypervisor implementations. The current release of CloudStack supports pre-packaged enterprise solutions like Citrix XenServer and VMware vSphere, as well as KVM or Xen running on Ubuntu or CentOS.

Massively Scalable Infrastructure Management

CloudStack can manage tens of thousands of servers installed in multiple geographically distributed datacenters. The centralized management server scales linearly, eliminating the need for intermediate cluster-level management servers. No single component failure can cause cloud-wide outage. Periodic maintenance of the management server can be performed without affecting the functioning of virtual machines running in the cloud.

Automatic Configuration Management

CloudStack automatically configures each guest virtual machine's networking and storage settings.

CloudStack internally manages a pool of virtual appliances to support the cloud itself. These appliances offer services such as firewalling, routing, DHCP, VPN access, console proxy, storage access, and storage replication. The extensive use of virtual appliances simplifies the installation, configuration, and ongoing management of a cloud deployment.

Graphical User Interface

CloudStack offers an administrator's Web interface, used for provisioning and managing the cloud, as well as an end-user's Web interface, used for running VMs and managing VM templates. The UI can be customized to reflect the desired service provider or enterprise look and feel.

API and Extensibility

CloudStack provides an API that gives programmatic access to all the management features available in the UI. The API is maintained and documented. This API enables the creation of command line tools and new user interfaces to suit particular needs. See the Developer's Guide and API Reference, both available at Apache CloudStack Guides and Apache CloudStack API Reference respectively.

The CloudStack pluggable allocation architecture allows the creation of new types of allocators for the selection of storage and Hosts. See the Allocator Implementation Guide (http://docs.cloudstack.org/CloudStack_Documentation/Allocator_Implementation_Guide).

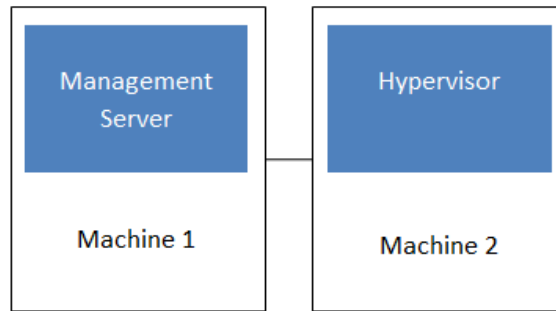
High Availability

CloudStack has a number of features to increase the availability of the system. The Management Server itself may be deployed in a multi-node installation where the servers are load balanced. MySQL may be configured to use replication to provide for a manual failover in the event of database loss. For the hosts, CloudStack supports NIC bonding and the use of separate networks for storage as well as iSCSI Multipath.

1.3. Deployment Architecture Overview

A CloudStack installation consists of two parts: the Management Server and the cloud infrastructure that it manages. When you set up and manage a CloudStack cloud, you provision resources such as hosts, storage devices, and IP addresses into the Management Server, and the Management Server manages those resources.

The minimum production installation consists of one machine running the CloudStack Management Server and another machine to act as the cloud infrastructure (in this case, a very simple infrastructure consisting of one the host running hypervisor software). In its smallest deployment, a single machine can act as both the Management Server and the hypervisor host (using the KVM hypervisor).



Simplified view of a basic deployment

A more full-featured installation consists of a highly-available multi-node Management Server installation and up to tens of thousands of hosts using any of several advanced networking setups. For information about deployment options, see the "Choosing a Deployment Architecture" section of the CloudStack Installation Guide.

Management Server Overview

The Management Server is the CloudStack software that manages cloud resources. By interacting with the Management Server through its UI or API, you can configure and manage your cloud infrastructure.

The Management Server runs on a dedicated server or VM. It controls allocation of virtual machines to hosts and assigns storage and IP addresses to the virtual machine instances. The Management Server runs in a Tomcat container and requires a MySQL database for persistence.

The machine must meet the system requirements described in System Requirements.

The Management Server:

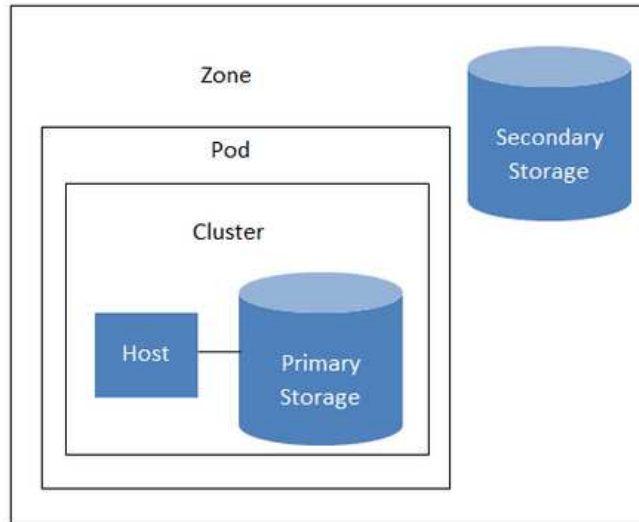
- ✓ Provides the web user interface for the administrator and a reference user interface for end users
- ✓ Provides the APIs for CloudStack
- ✓ Manages the assignment of guest VMs to particular hosts
- ✓ Manages the assignment of public and private IP addresses to particular accounts
- ✓ Manages the allocation of storage to guests as virtual disks
- ✓ Manages snapshots, templates, and ISO images, possibly replicating them across data centers
- ✓ Provides a single point of configuration for the cloud

Cloud Infrastructure Overview

The Management Server manages one or more zones (typically, datacenters) containing host computers where guest virtual machines will run. The cloud infrastructure is organized as follows:

- ✓ **Zone:** Typically, a zone is equivalent to a single datacenter. A zone consists of one or more pods and secondary storage.
- ✓ **Pod:** A pod is usually one rack of hardware that includes a layer-2 switch and one or more clusters.
- ✓ **Cluster:** A cluster consists of one or more hosts and primary storage.

- ✓ **Host:** A single compute node within a cluster. The hosts are where the actual cloud services run in the form of guest virtual machines.
- ✓ Primary storage is associated with a cluster, and it stores the disk volumes for all the VMs running on hosts in that cluster.
- ✓ Secondary storage is associated with a zone, and it stores templates, ISO images, and disk volume snapshots.



Nested organization of a zone

Networking Overview

CloudStack offers two types of networking scenario:

- ✓ **Basic.** For AWS-style networking provides a single network where guest isolation can be provided through layer-3 means such as security groups (IP address source filtering).
- ✓ **Advanced.** For more sophisticated network topologies. This network model provides the most flexibility in defining guest networks.