Cloud Computing

Unit -6 Case Studies on Open Source Cloud and Commercial Cloud

6.1 Eucalyptus

- Eucalyptus
- Features
- Main components of Eucalyptus
- Architecture
- Modes of operation

Eucalyptus provides the platform for private cloud computing implementation on computer clusters.

Eucalyptus is an open source software to build private and hybrid cloud in Amazon Web Services (AWS). It stands for Elastic Utility Computing Architecture for Linking Your Programs To Useful Systems. Eucalyptus is the world's most widely deployed s/w platform for on premise infrastructure as a service (laaS) clouds.

The 5 main components of Eucalyptus cloud architecture are as follows:

1. Cloud Controller (CLC): This is the controller that manages virtual resources like servers, network and storage. It is at the highest level in hierarchy. It is a Java program with web interface for outside world. It can do resource scheduling as well as system accounting. There is only one CLC per cloud. It can handle authentication, accounting, reporting and quota management in cloud.
2. Walrus: This is another Java program in Eucalyptus that is equivalent to AWS S3 storage. It provides persistent storage. It also contains images, volumes and snapshots similar to AWS. There is only one Walrus in a cloud.
3. Cluster Controller (CC): It is a C program that is the front end for a Eucalyptus cloud cluster. It can communicate with Storage controller and Node controller. It manages the instance execution in cloud.

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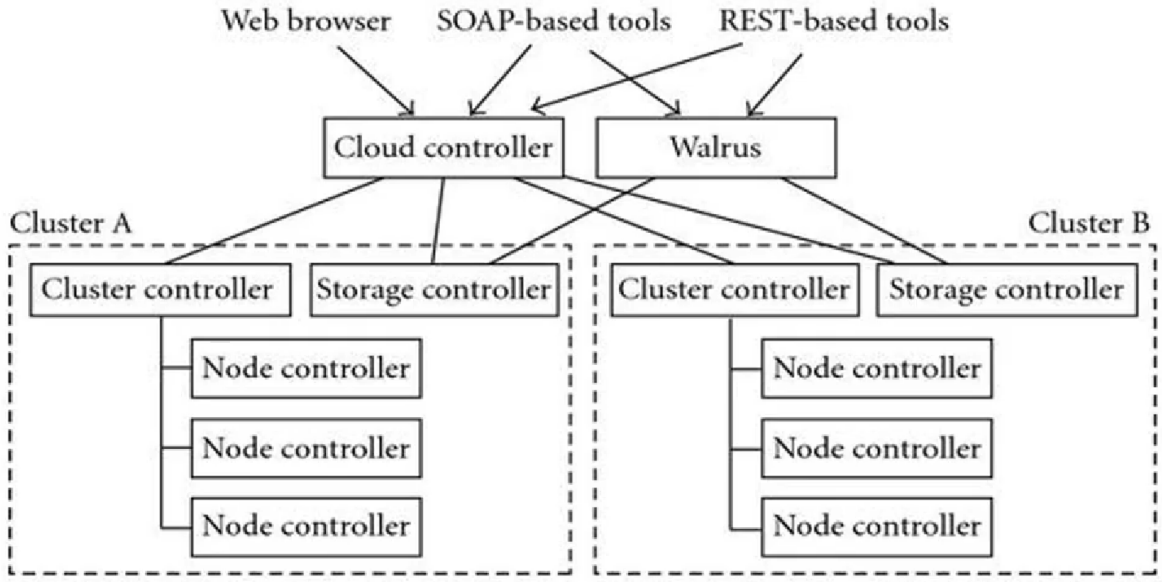
6. VMWare Broker(optional): It is an optional component in Eucalyptus. It provides AWS compatible interface to VMWare environment.

Architecture of Eucalyptus



Services provided by Eucalyptus:

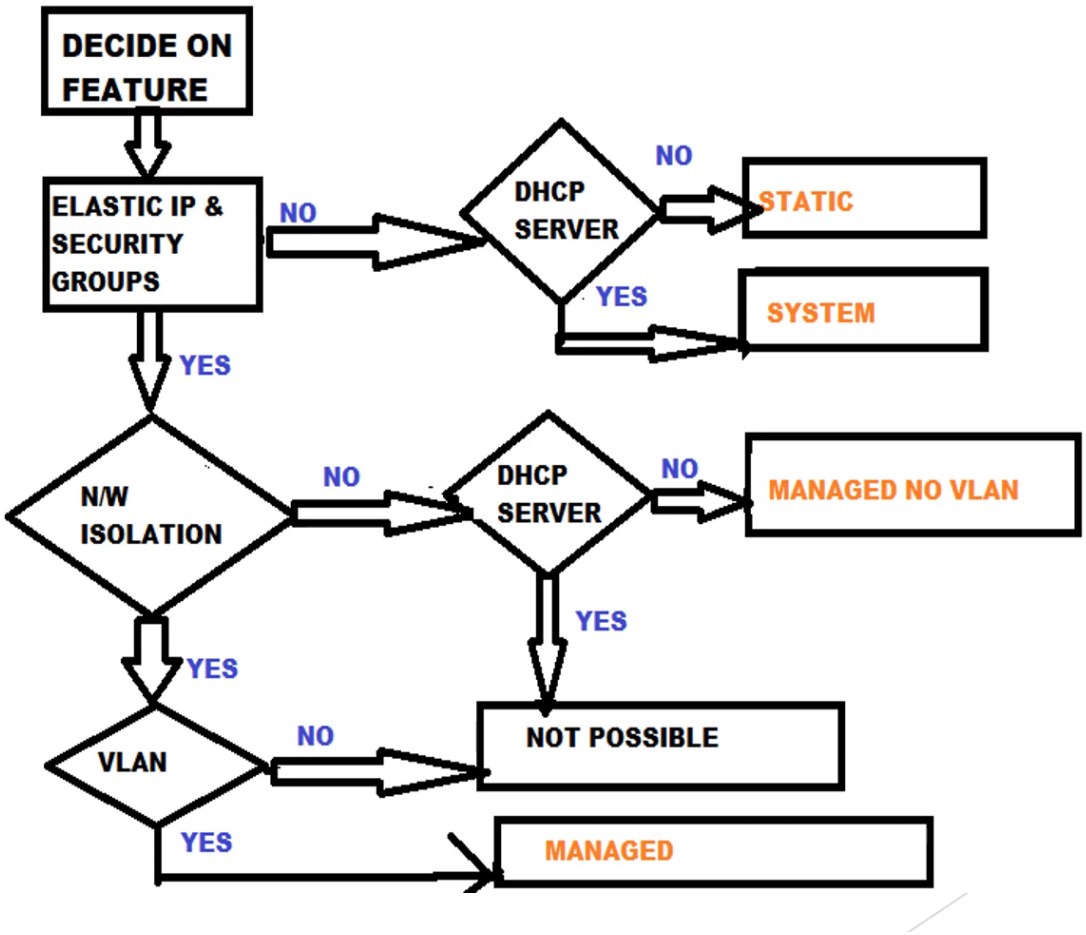
1. Network Isolation: Network isolation is an vital part of any layered security approach. It's used by all players, from small businesses to large organizations, in different capacities
2. Elastic IP's: An Elastic IP address is a static IPv4 address designed for dynamic cloud computing. An Elastic IP address is associated with your AWS account.
3. Security groups: Security groups are used to collect user accounts, computer accounts, and other groups into manageable units.
4. Meta data services: Metadata Catalog Service in the cloud is a mechanism for storing and accessing descriptive metadata and allows cloud users to query for

data items based on desired attributes.

4 Modes of operation

1. MANAGED MODE: (uses all 4 services) Managed mode is the most feature rich mode offered by Eucalyptus. In this mode, the Eucalyptus administrator defines a large network (usually private and un routable) from which VM instances will draw their IP addresses. As with Static mode, CC will maintain a DHCP server with static mappings for each instance that is raised and allocate the right IPs at the time of requesting an NC to raise the instance. The user can define ingress filtering rules at the 'security group' level. More on this in the chapter on Security. In addition, the administrator can specify a pool of public IP addresses that users may allocate, either while raising the instances or later at run-time. This functionality is similar to 'elastic IPs' of AWS. Eucalyptus administrators who need to implement require security groups, elastic IPs, and VM network isolation must use this mode.
2. Managed No VLAN Mode: This mode is identical to MANAGED mode in terms of features (dynamic IPs and security groups), but does not provide VM network isolation. Eucalyptus administrators who want dynamic assignable IPs and the security groups, but are not in a position to run on a network that allows VLAN tagged packets or those who do not have a need for VM network isolation can use this mode.
3. SYSTEM MODE: In System mode, CC generates and assigns a random MAC address to the VM instance while requesting NC to bring upthe instance. NC attaches the VM instance's virtual NIC to the physical NIC on the node through a bridge. This mode requires that the Nodes are connected to the enterprise network directly. Instances obtain an IP address using DHCP, just as physical machines on the network do. This mode is very easy to setup as it does not have any additional prerequisites in terms of networking, except for a running DHCP server on enterprise network, and is a good way to get started with Eucalyptus, particularly if you want to set it up on your laptop/desktop to get a basic understanding
4. STATIC MODE: Static mode offers the Eucalyptus administrator more control over VM IP address assignment than System mode does. In this mode, the administrator configures Eucalyptus with a 'map' of MAC address/IP Address pairs on CC. Running Eucalyptus in System or Static mode disables some of the following key functionalities that would make an enterprise deployment more manageable:

- Ingress filtering for the instances (Security Groups)
- User Controlled dynamic assignment of IPs to instances (Elastic IPS)
- Isolation of network traffic between instances VMs



6.2 Open Stack

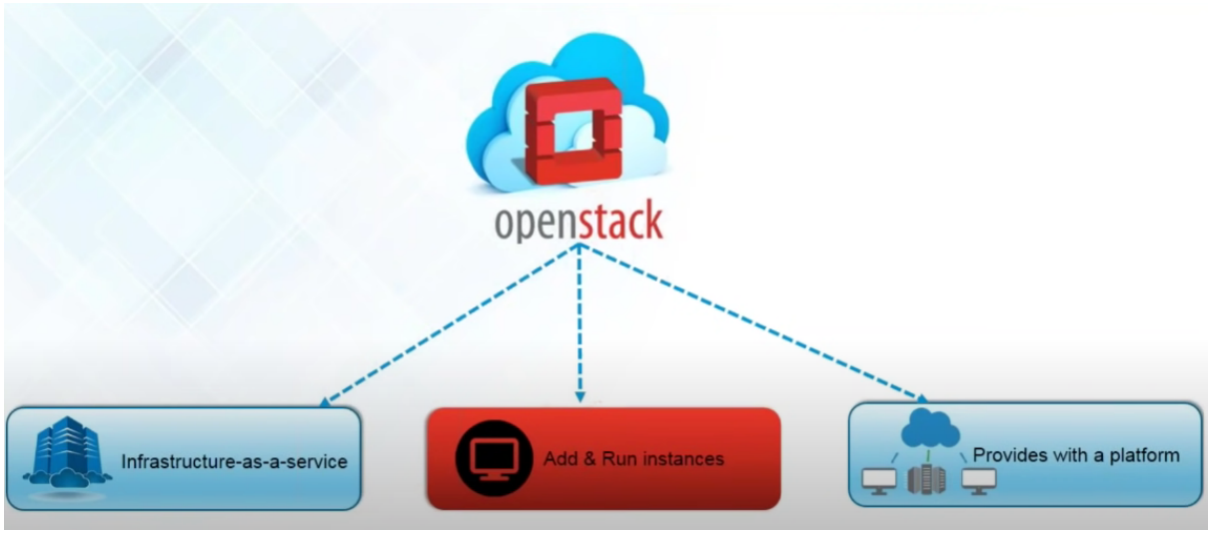
✓ What is OpenStack
✓ OpenStack in Cloud
✓ Deployment Models
✓ OpenStack Architecture
✓ OpenStack Components
✓ Use Case

OpenStack is a set of software tools for building and managing cloud computing platforms for public and private clouds.

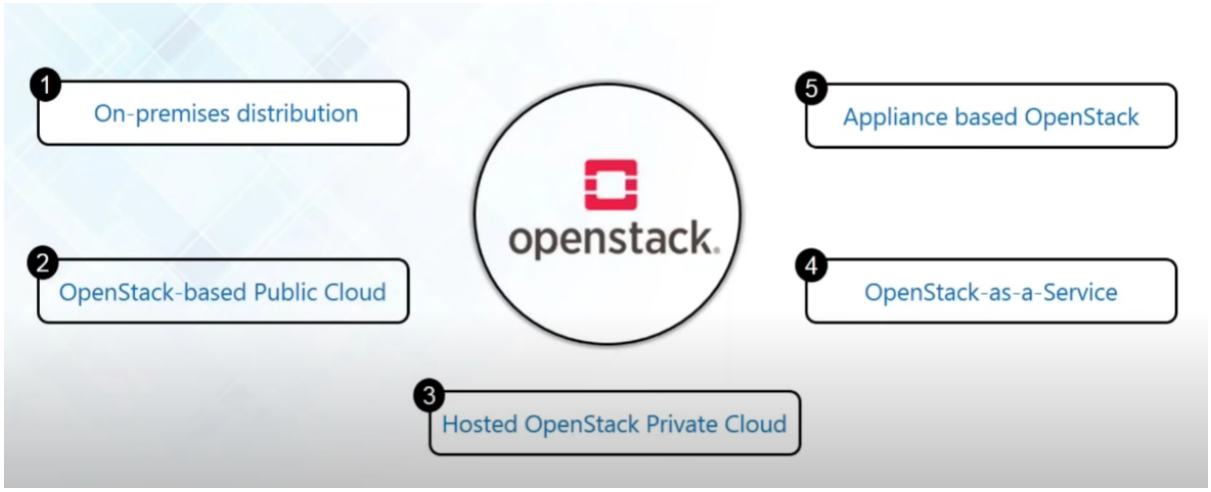
OpenStack is managed by the OpenStack Foundation, a non-profit that oversees both development and community-building around the project.
OpenStack is the future of cloud computing backed by some of the biggest companies.\

companies contributing to openstack:

IBM, Redhat, VMWare, HP, DELL, CISCO

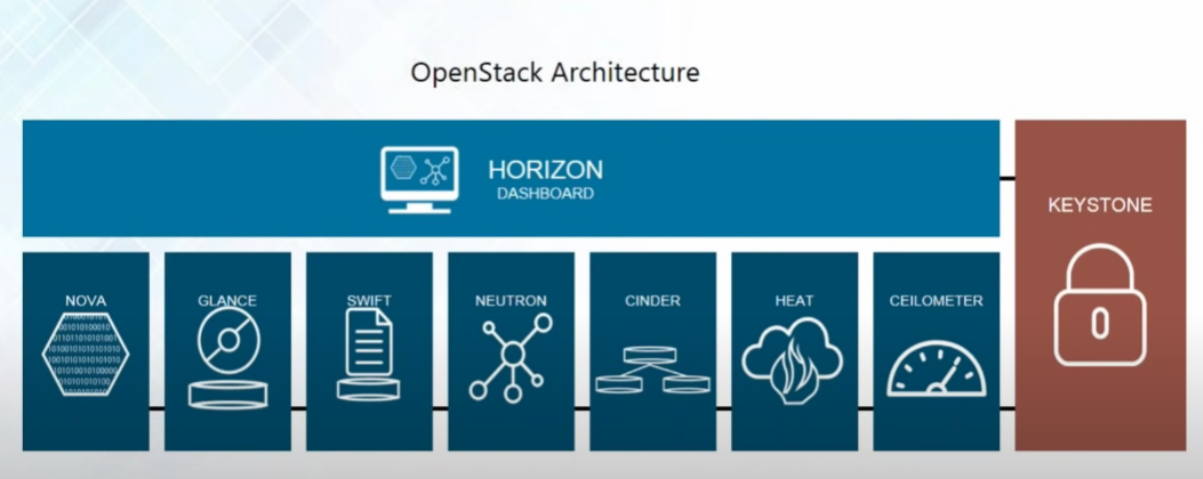


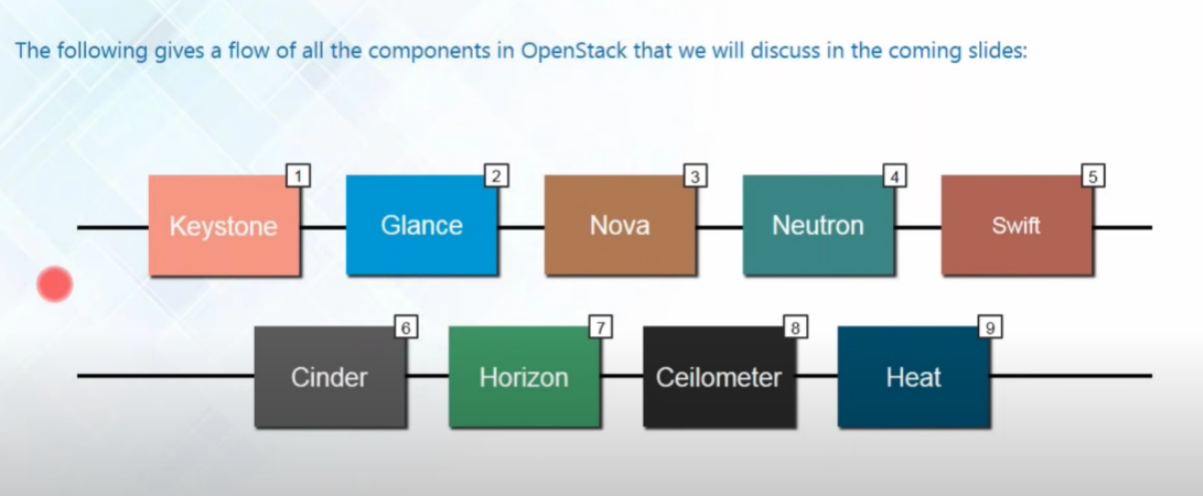
Deployment Models



1. On-premises distribution - In this model, a customer downloads and installs an OpenStack distribution within their internal network

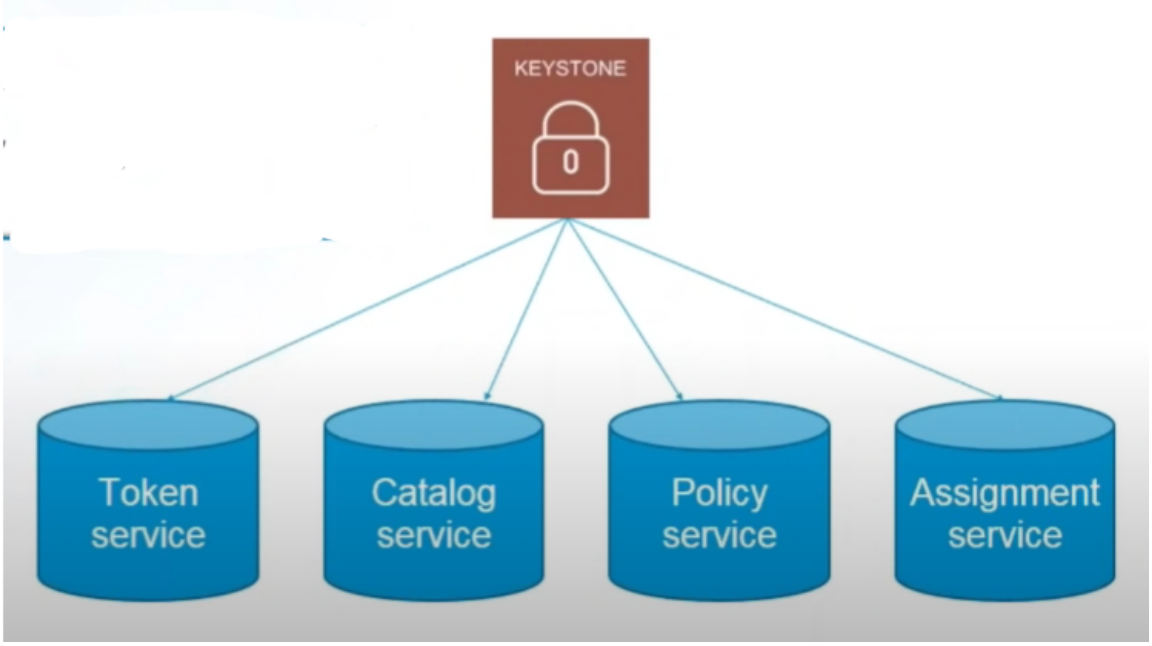
2. OpenStack-based Public Cloud - A vendor provides a public cloud computing system based on the OpenStack project
3. Hosted OpenStack Private Cloud - A vendor provides a public cloud computing system based on the OpenStack project
4. OpenStack-as-a-Service - A vendor hosts OpenStack management software as a service and customers use the software service
5. Appliance based OpenStack - Nebula was a vendor that sold appliances that could be plugged into a network which spawned an OpenStack deployment.





1. Keystone

Keystone is an OpenStack service that provides API client authentication, service discovery and discovery and distributed multi-tenant authorization by implementing OpenStack's Identity API.



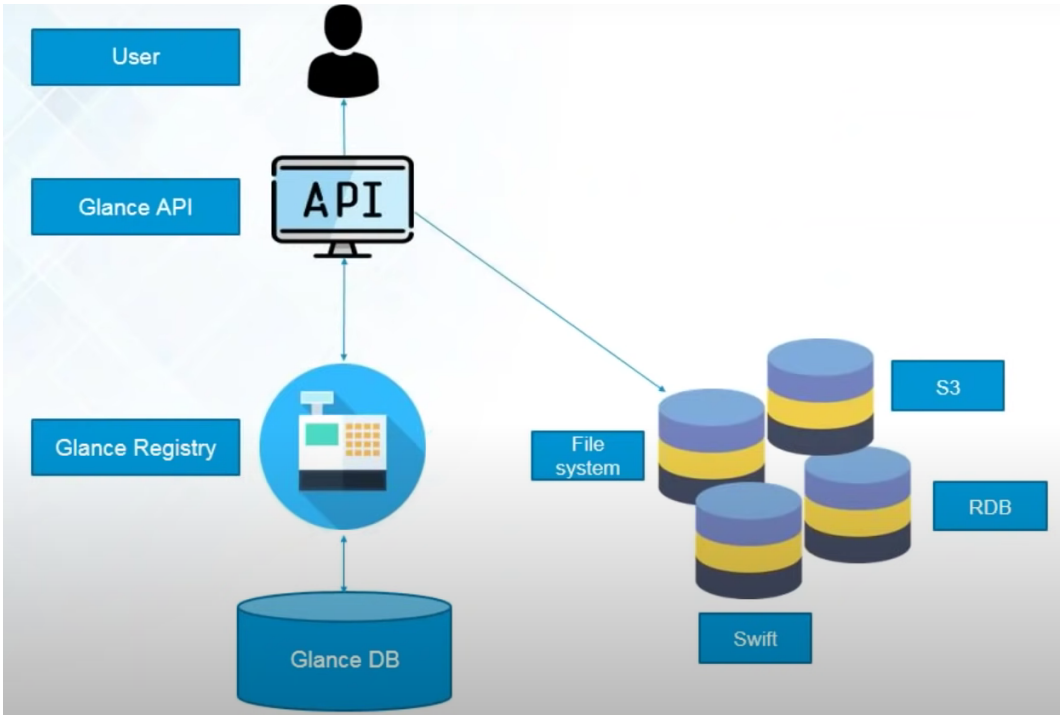
2. Glance

The Glance project provides a service where users can upload and discover data assets that are meant to be used with other services.

This currently includes images and metadata definitions.

Glance image services include discovering, registering and retrieving virtual machine images.

Glance Architecture



3. Nova

Nova is an OpenStack project designed to provide power massively scalable, on demand, self service access to compute resources.

It is fault tolerant, recoverable and provides API-compatibility with systems like Amazon EC2.

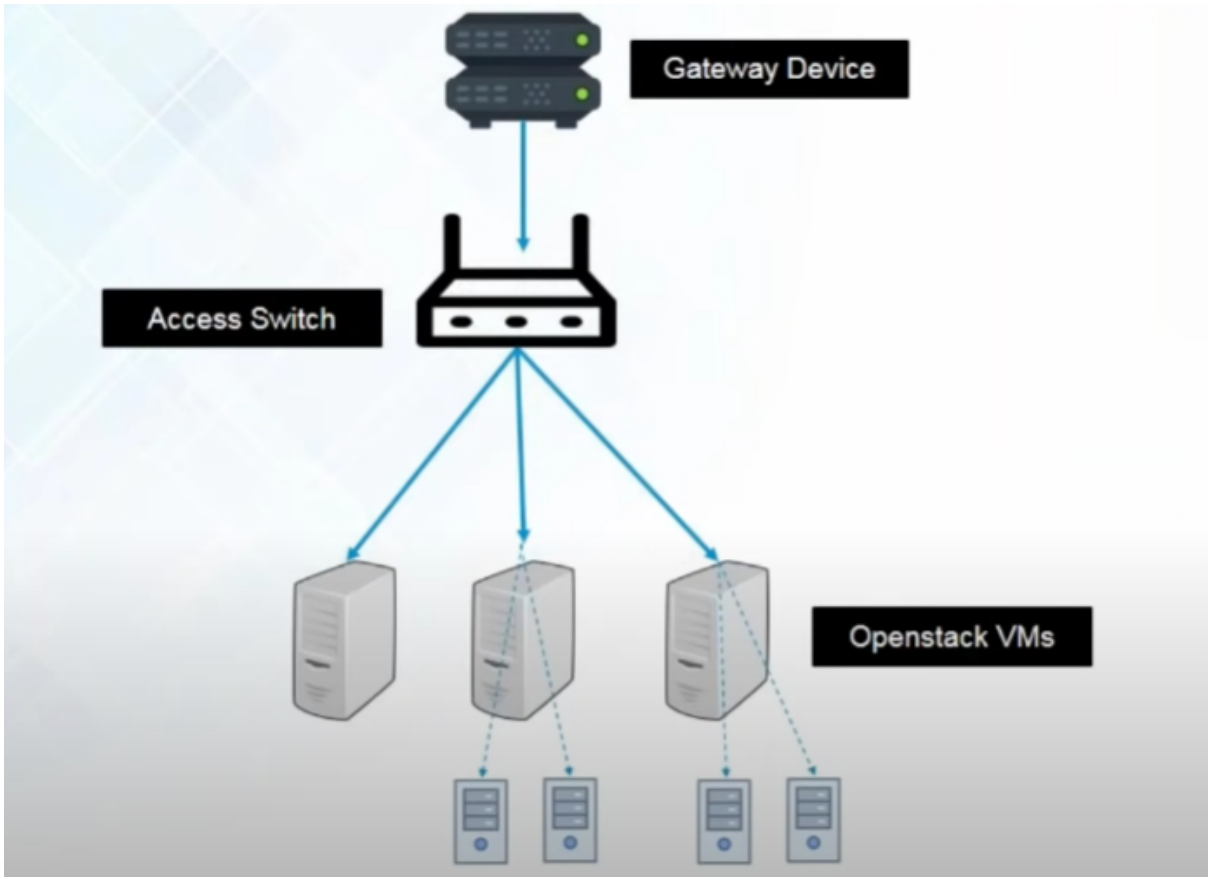
It is built on a messaging architecture and all of its components can typically be run on several servers.

4. Neutron

Neutron is a networking project focused on delivering Networking-as-a-Service (NaaS) in virtual compute environments.

Neutron has replaced the original networking application program interface (API) called Quantum in OpenStack.

Neutron is designed to address deficiencies in "baked-in" networking technology found in cloud environments.

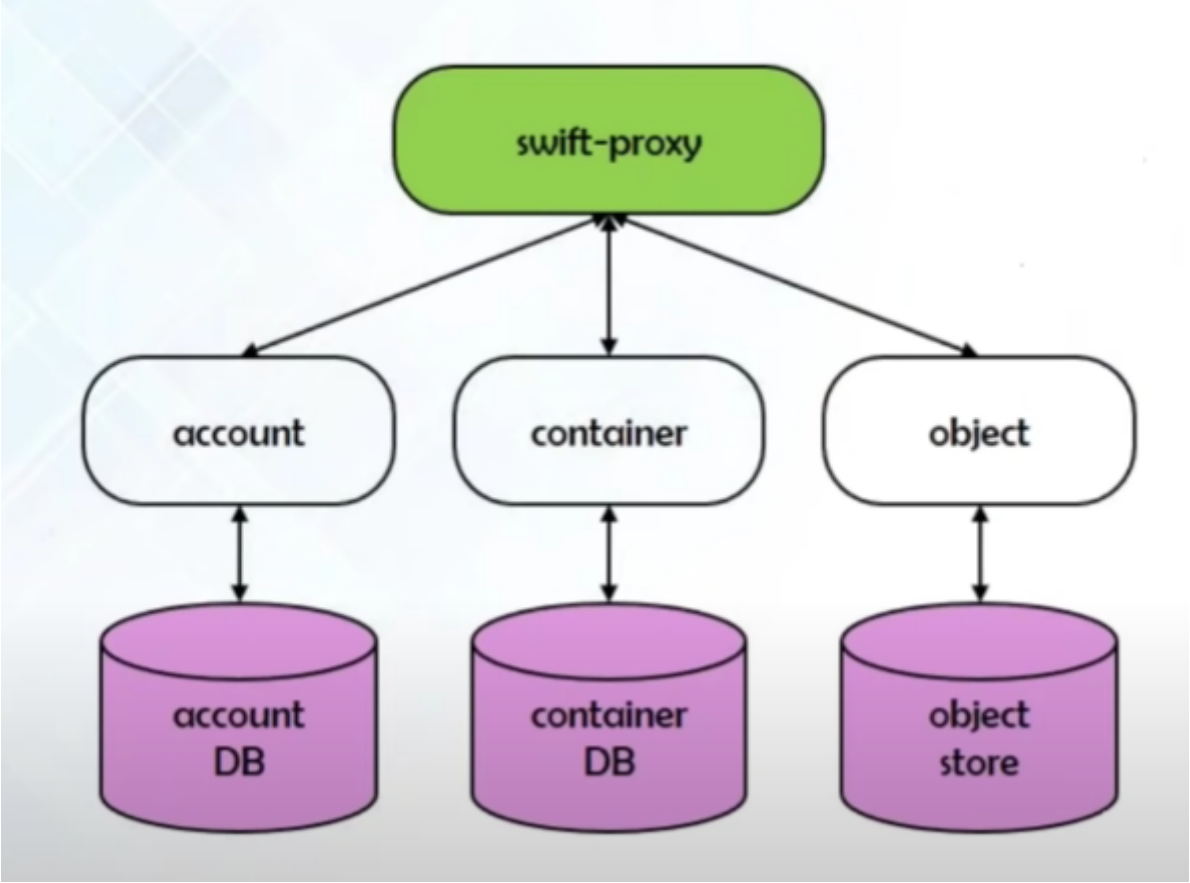


5. Swift

Swift is a highly available, distributed and consistent object store.

Organizations can use Swift to store lots of data efficiently, safely and cheaply.

Swift powers storage clouds at Comcast, Time Warner, Globo and Wikipedia as well as public clouds like Rackspace, NTT, OVH and IBM SoftLayer.

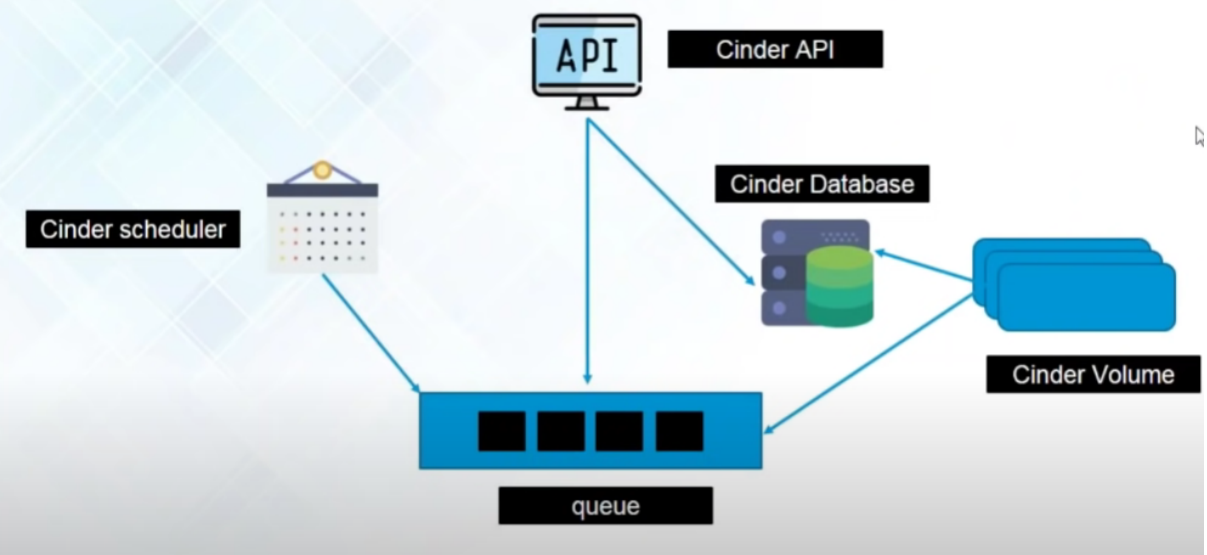


6. Cinder

Cinder is OpenStack's Block Storage Service and provides persistent block storage resources that OpenStack Compute instances can consume.

This includes secondary attached storage similar to the Amazon Elastic Block Storage (EBS) offering.

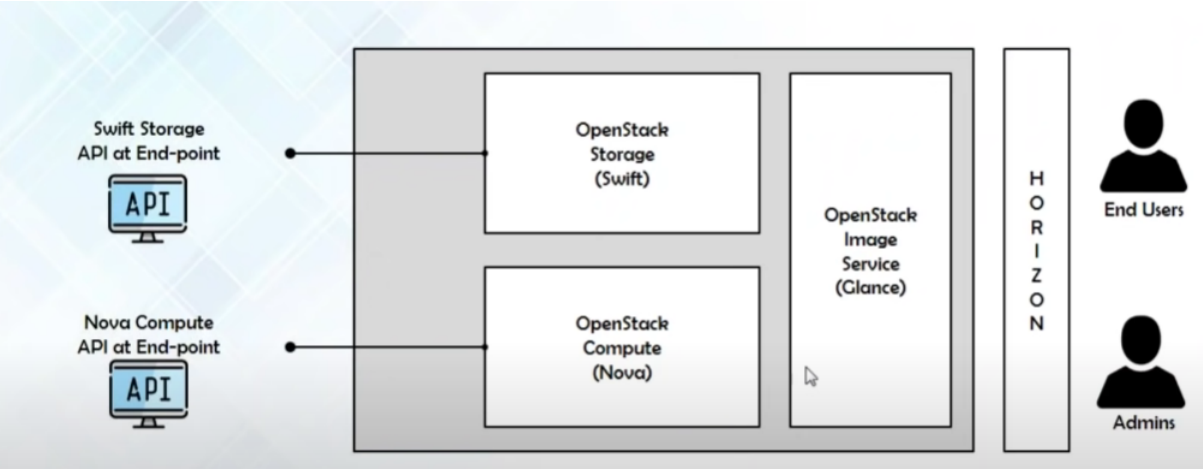
In addition, you can write images to a Block Storage device to use as a bootable persistent instance.



7. Horizon

Horizon is the OpenStack's Dashboard which provides a web based user interface to OpenStack services including Nova, Swift, Keystone, etc.

It allows users and administrators of the environment to interact with and manage the various functional components without having to install any local client tools other than a web browser.



Case Study - Open Stack Architecture

6.3 Google Cloud

6.4 AWS