

Cloud Computing Assignment: 5

TITLE:

Assignment to install and configure your own cloud using OpenStack

AIM:

From this assignment we will understand the Configuration and installation of cloud using OpenStack.

THEORY:

Introduction

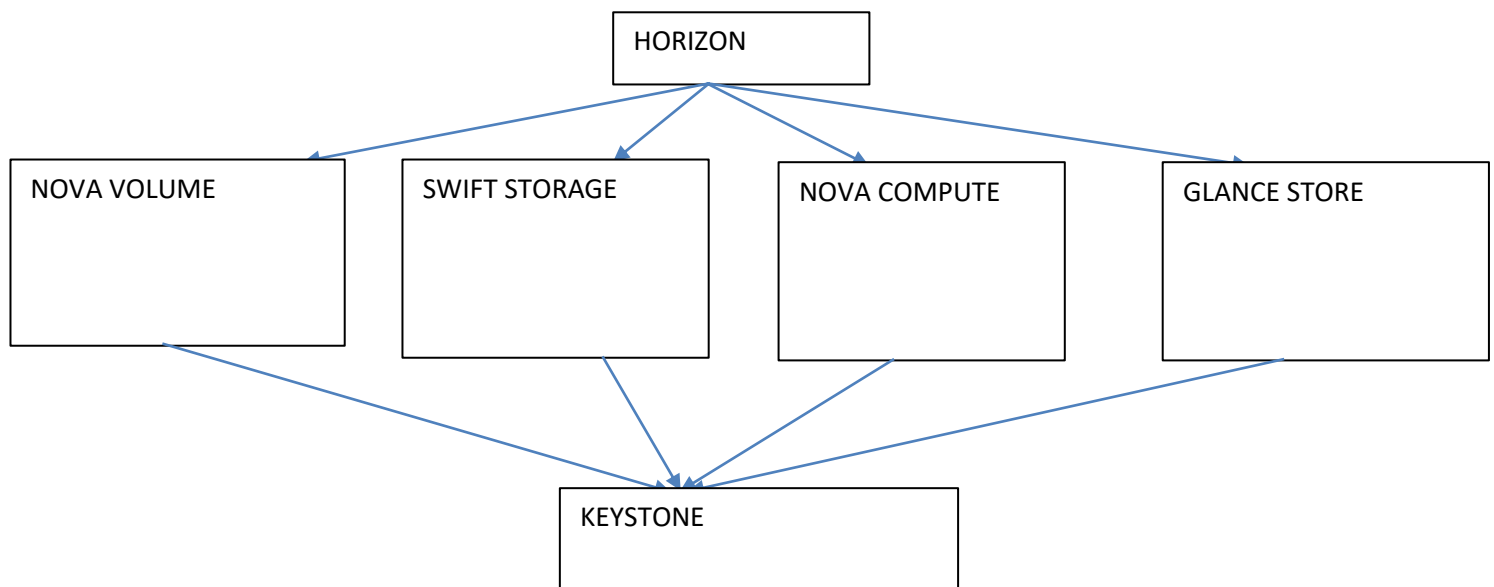
Cloud Computing allows the users to access a shared pool of computing resources like networks, servers, storage, applications, and services that can be rapidly provisioned. Essential Characteristics of Cloud Computing are on-demand, broad network access, resource pooling, measured service and rapid elasticity etc. Cloud computing has five deployment models as private cloud, public cloud, hybrid cloud, virtual private cloud and community cloud. Cloud computing has three service models, Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). We propose the system architecture for building a private cloud which is capable of providing IaaS and PaaS as a service over the internet.

OpenStack:

OpenStack is open source software which the project developers and cloud computing technologist can use to setup and run the cloud. Its services can be accessed via APIs. The important components of OpenStack are Nova, Swift, Keystone and Glance, Keystone and Horizon.

SYSTEM ARCHITECTURE

The proposed system aims to build private cloud using open source software OpenStack. The system architecture of OpenStack is as depicted in Fig.1. The proposed system consists of various modules such as Horizon, Nova, Swift, Glance, and Keystone-



- **Nova:** Nova is the Computing Fabric controller for the OpenStack Cloud. The necessary activities for the life cycle of instances within the OpenStack cloud are handled by Nova. This characteristic makes Nova a Management Platform to manage various compute resources, networking, authorization, and scalability needs of the OpenStack cloud.
- **Glance:** Glance is a standalone service which provides a catalog service for storing and querying virtual disk images. Nova and Glance together provides an end-to-end solution for cloud disk image management.
- **Swift:** Swift can store billions of virtual object distributed across the nodes. The swift offers built-in redundancy, failover management, archiving and media streaming. Swift plays an important role in scalability.
- **Keystone:** Keystone provides identity and access policy services for all components in the OpenStack family. All components of OpenStack including Swift, Glance, and Nova are authenticated and authorized by Keystone.
- **Horizon:** Horizon can be used to manage instances and images, create keypairs, attach volumes to instances, manipulate Swift containers etc.

Advantages of OpenStack:

✓ Security

Openstack allows for high level of security since the cloud deployment is done through a setup in the local machine. Additional layers of security like SSL encryption, Hypervisor security can also be done to secure the cloud system.

✓ Scalability

Openstack allows for usage of multiple machines across different locations or different servers for cloud setup. One can also scale up cloud systems by adding additional storage capacity into the system or additional processing systems.

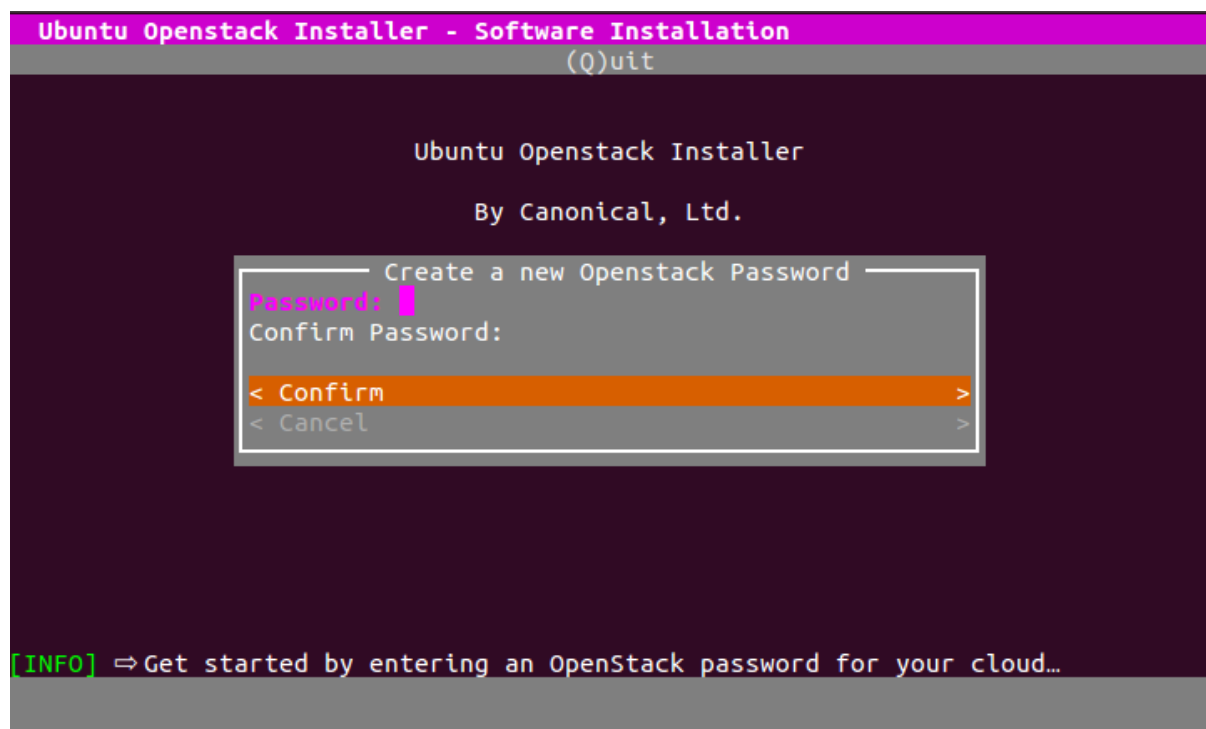
✓ Cost Savings

You The OpenStack platform allows for cost savings since it doesn't require any licenses to purchase or any kind of cost associated with cloud systems like Google Cloud or Amazon AWS. It requires setup of Openstack on a VM or a system of choice, which is free.

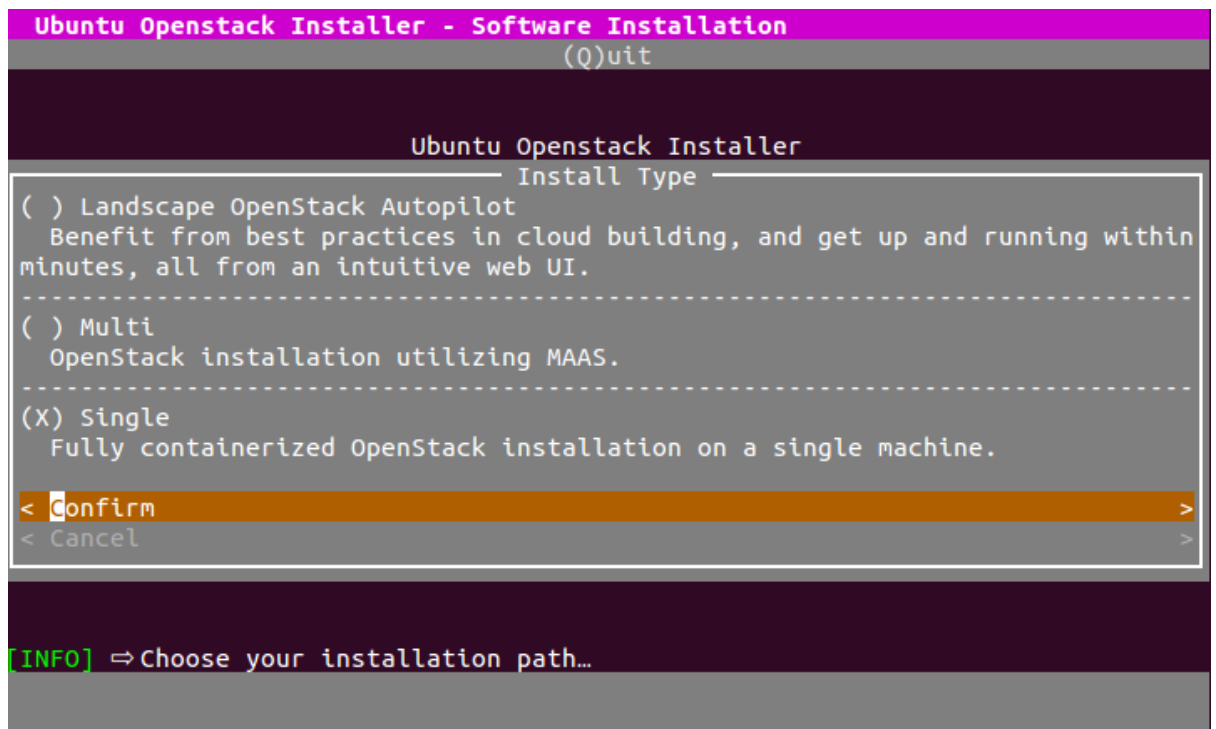
CODE AND OUTPUT:

Steps with output:

1. Download Install necessary packages to create compute nodes in Ubuntu using command- **"sudo apt-get install nova-api nova-cert nova-compute nova-compute-kvm nova-doc nova-network novaobjectstore nova-scheduler nova-volume rabbitmqserver novnc nova-consoleauth"**
2. After successful installation of Compute node packages, we need to install control node packages using command- **"sudo apt-get install glance glance-api glance-client glance-common glance-registry python-glance"** . The command will ensure that glance API and Nova registry are working as expected.
3. Next, we need to install keystone packages using the command-**"sudo apt-get install keystone python-keystone pythonkeystoneclient"**.
4. Next, we want to install the Openstack dashboard using the following command- **"sudo apt-get install openstack-dashboard"**. On running the command, the command line prompt will show which would look like this-

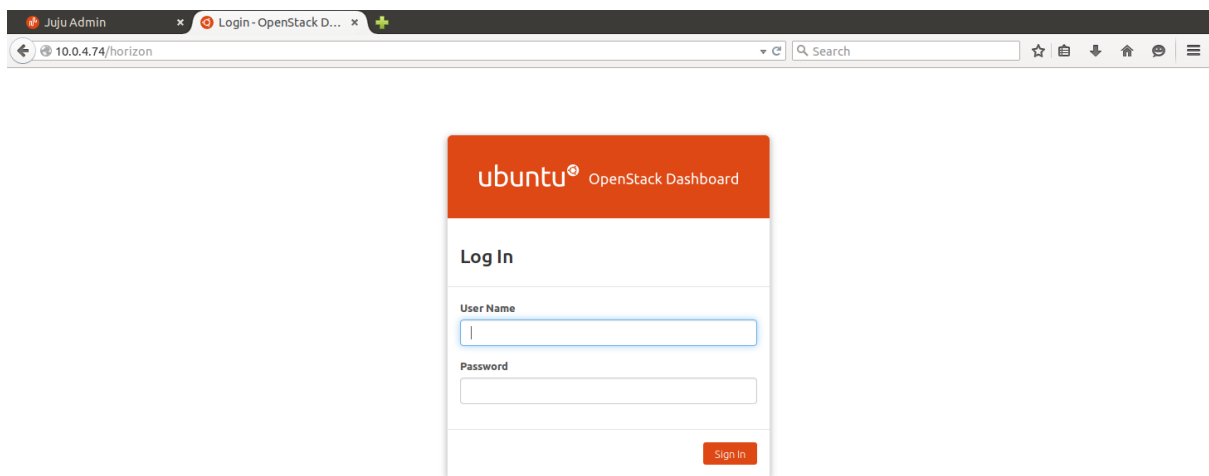


Here you have to create a password for OpenStack. In the next step, you have to specify the installation type-



Here, choose a single machine installation.

5. Once installation completes, you will be greeted with a dashboard that opens through a browser-:



6. Install From here, one can access the Flavors page, which lists the currently available flavors which can be used to launch an instance:

The screenshot shows the Ubuntu OpenStack Dashboard interface. The top navigation bar is orange and contains the 'ubuntu' logo, 'OpenStack Dashboard', a user dropdown for 'admin', and a 'Sign Out' button. On the left, a sidebar menu is visible with categories: Project, Admin, and System. Under 'System', the following options are listed: Overview, Hypervisors, Host Aggregates, Instances, Volumes, Flavors (which is currently selected and highlighted in red), and Images. The main content area is titled 'Flavors' and features a search filter box, a '+ Create Flavor' button, and a 'Delete Flavors' button. Below this is a table listing available flavors.

<input type="checkbox"/>	Flavor Name	VCPUs	RAM	Root Disk	Ephemeral Disk	Swap Disk	ID	Public	Metadata	Actions
<input type="checkbox"/>	m1.tiny	1	512MB	1GB	0GB	0MB	1	Yes	No	Edit Flavor
<input type="checkbox"/>	m1.small	1	2048MB	20GB	0GB	0MB	2	Yes	No	Edit Flavor
<input type="checkbox"/>	vSRX1.0	2	2048MB	2GB	0GB	0MB	c3f24e6f-25df-4014-bfd8-5d42b56adbab	Yes	No	Edit Flavor
<input type="checkbox"/>	vsrxf2	2	4096MB	20GB	0GB	0MB	ede2ecd6-99d2-4a19-870a-49298e2726ac	Yes	No	Edit Flavor

7. Openstack access and security page shows the access level for the private cloud and one can create new access levels from here-

The screenshot shows the OpenStack 'Access & Security' page in a web browser. The browser's address bar shows the URL '192.168.29.136/project/access_and_security/'. The page has a top navigation bar with 'Access & Security - OpenStack ...' and a user dropdown for 'admin'. On the left, a sidebar menu is visible with categories: Project, Admin, and Manage Compute. Under 'Manage Compute', the following options are listed: Overview, Instances, Volumes, Images & Snapshots, and Access & Security (which is currently selected and highlighted in blue). The main content area is titled 'Access & Security' and features tabs for 'Security Groups', 'Keypairs', 'Floating IPs', and 'API Access'. The 'Security Groups' tab is active, showing a table with columns: Name, Description, and Actions. The table contains one entry: 'default' with description 'default'. There are buttons for '+ Create Security Group', 'Delete Security Groups', and 'Edit Rules'.

8. Change to the One can also access the list of hypervisors running currently in the OpenStack through the HyperVisors tab-

The screenshot shows the OpenStack Dashboard interface. The left sidebar contains a navigation menu with the following items: Project, Admin, System, Overview, Hypervisors (highlighted), Host Aggregates, Instances, Flavors, Images, Networks, Routers, Defaults, System Information, and Identity. The main content area is titled "All Hypervisors" and includes a "Hypervisor Summary" section with three circular progress indicators: VCPU Usage (Used 0 of 1), Memory Usage (Used 512MB of 3.9GB), and Disk Usage (Used 0Bytes of 39GB). Below this is a "Hypervisors" table with columns: Hostname, Type, VCPUs (used), VCPUs (total), RAM (used), RAM (total), Storage (used), Storage (total), and Instances. The table contains one entry for the 'ubuntu' host, which is a QEMU hypervisor with 0 VCPUs used, 1 VCPU total, 512MB RAM used, 3.9GB RAM total, 0Bytes storage used, 39GB storage total, and 0 instances. A "Compute Host" tab is also visible above the table.

Hostname	Type	VCPUs (used)	VCPUs (total)	RAM (used)	RAM (total)	Storage (used)	Storage (total)	Instances
ubuntu	QEMU	0	1	512MB	3.9GB	0Bytes	39GB	0

CONCLUSION:

Students were able to configure and create a private cloud using Openstack on a local machine.