Practical - 8
Implementation of Openstack with user and private network creation.

THEORY: OpenStack is a cloud OS that is used to control the large pools of computing, storage, and networking resources within a data center. Open Stack is open-source and free software. This is basically used for cloud computing and deployed as an IaaS.

Components of OpenStack

Major components of OpenStack are given below:

Compute (Nova): Compute is a controller that is used to manage resources in virtualized environments. It handles several virtual machines and other instances that perform computing tasks.

Object Storage (Swift): To store and retrieve arbitrary data in the cloud, object storage is used. In Swift, it is possible to store the files, objects, backups, images, videos, virtual machines, and other unstructured data. Developers may use a special identifier for referring the file and objects in place of the path, which directly points to a file and allows OpenStack to manage where to store the files.

Block Storage (Cinder): This works in the traditional way of attaching and detaching an external hard drive to the OS for its local use. Cinder manages to add, remove, create new disk space in the server. This component provides the virtual storage for the virtual machines in the system.

Networking (Neutron): This component is used for networking in OpenStack. Neutron manages all the network-related queries, such as IP address management, routers, subnets, firewalls, VPNs, etc. It confirms that all the other components are well connected with OpenStack.

Dashboard (Horizon): This is the first component that the user sees in the OpenStack. Horizon is the web UI (user interface) component used to access the other back-end services.

Through individual API (Application programming interface), developers can access the OpenStack's components, but through the dashboard, system administrators can look at what is going on in the cloud and manage it as per their need.

Identity Service (Keystone): It is the central repository of all the users and their permissions for the OpenStack services they use. This component is used to manage identity services like authorization, authentication, AWS Styles (Amazon Web Services) logins, token-based systems, and checking the other credentials (username & password).

Image Service (Glance): The glance component is used to provide the image services to OpenStack. Here, image service means the images or virtual copies of hard disks. When we plan to deploy a new virtual machine instance, then glance allows us to use these images as templates. Glance allows virtual box (VDI), VMware (VMDK, OVF), Raw, Hyper-V (VHD) and KVM (qcow2) virtual images.

STEPS:

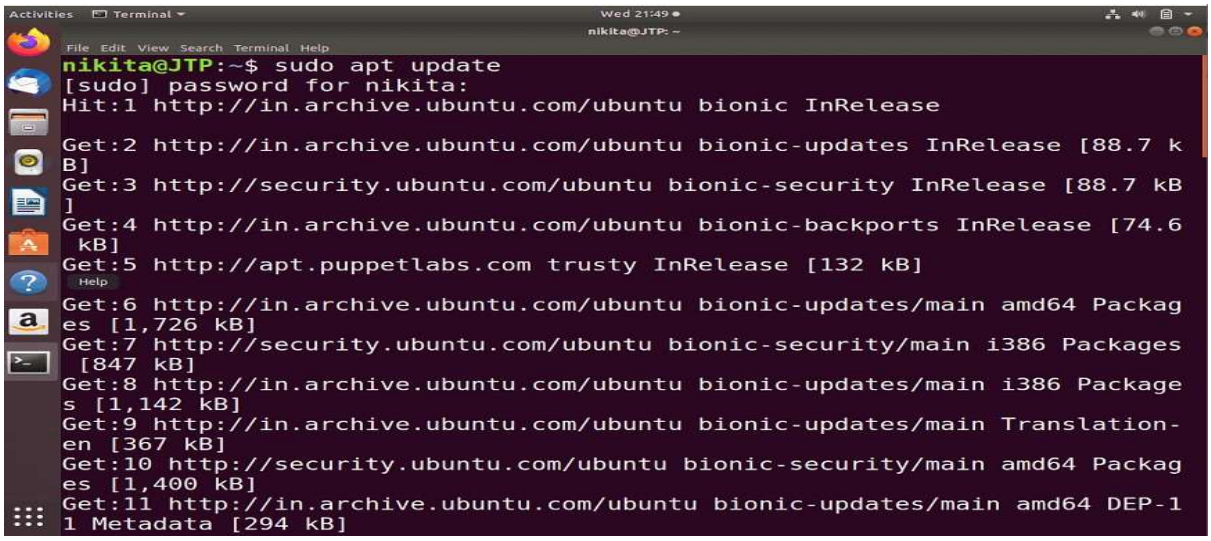
Step 1: Update Ubuntu System

Open the terminal and run the following command to ensure that the system is up to date :

$ sudo apt update **OR**

$ sudo apt -y upgrade **Sample**

Output :



Reboot the system after running the above command. To reboot the system, run the following command :

$ sudo reboot or

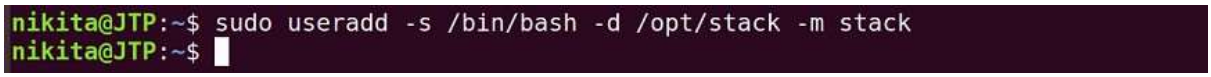
$ init 6

Step 2: Create Stack User

It is important that the devstack must run as a regular user (non-root user) with the sudo enabled.

To keep this note in mind, let's create a new user with the name "stack" and assign the sudo permissions or privileges. To create a stack user, run the following command in your terminal:

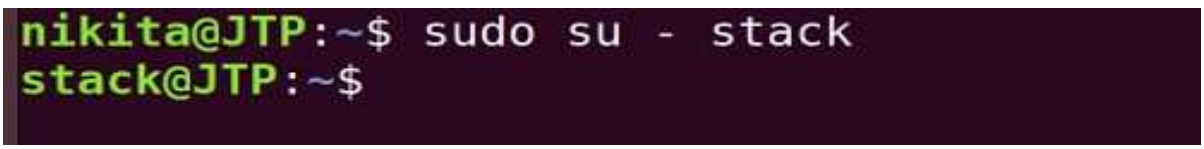
$ sudo useradd -s /bin/bash -d /opt/stack -m stack Output :



Now, to assign the sudo privileges to the stack user, run the following command :

$ echo "stack ALL=(ALL) NOPASSWD: ALL" | sudo tee /etc/sudoers.d/stack Output :

You can switch to the 'stack' user by running the following command: $ sudo su - stack Output :



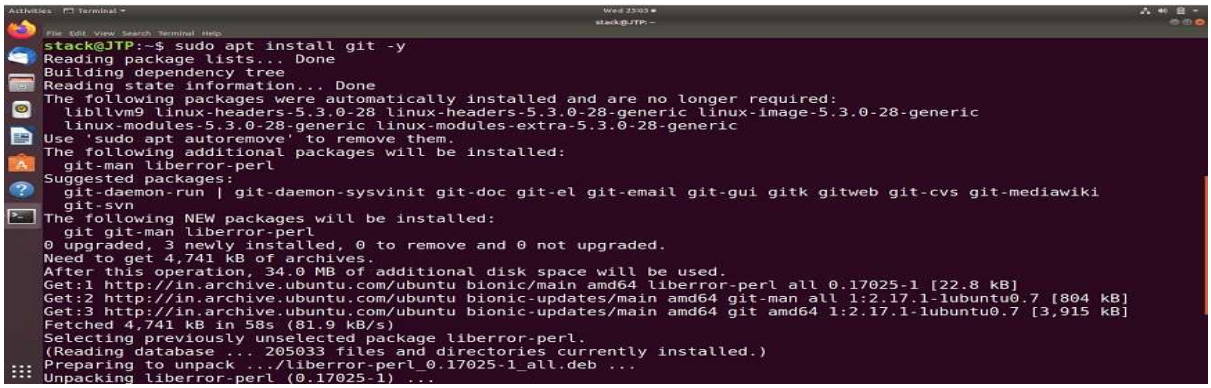
```
nmfc@nmfc-virtual-machine:~/Desktop$ echo "stack1 AL=(ALL) NOPASSWD:ALL" | sudo
 tee /etc/sudoers.d/stack
[sudo] password for nmfc:
stack1 AL=(ALL) NOPASSWD:ALL
nmfc@nmfc-virtual-machine:~/Desktop$ sudo apt install git -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  git-man liberror-perl
Suggested packages:
  git-daemon-run | git-daemon-sysvinit git-doc git-email git-gui gitk gitweb
  git-cvs git-mediawiki git-svn
The following NEW packages will be installed:
  git git-man liberror-perl
0 upgraded, 3 newly installed, 0 to remove and 563 not upgraded.
```

Step 3: Install the Git

In Most of the Ubuntu systems, git comes by default. But if git is missing on your system, then install it by running the following command:

$ sudo apt install git -y Sample

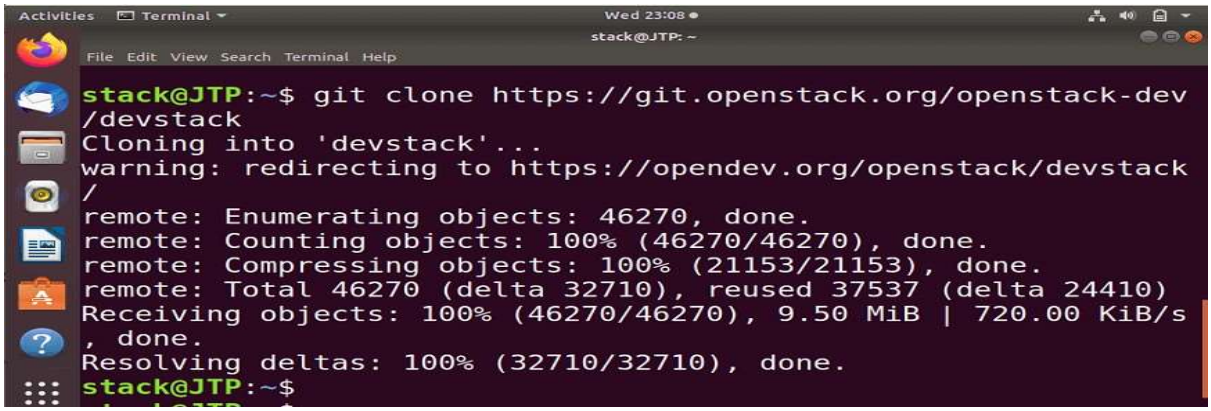
Output :



Step 4: Download OpenStack

Once you install the git, use the git command to download the DevStack from Github.

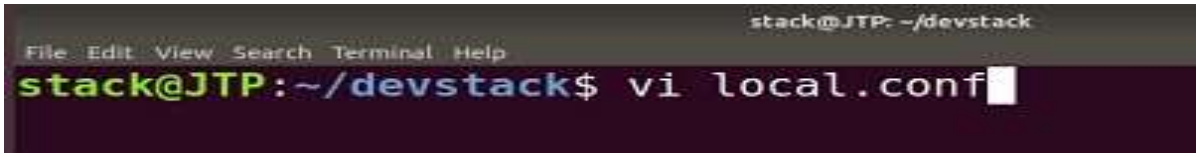
$ git clone https://git.openstack.org/openstack-dev/devstack Output :



Step 5: Create a DevStack Configuration File

First of all, go to the devstack directory by running the following command : $ cd devstack Output :

Now, create a local.conf file in which you have to enter the four passwords and the host IP address : Output :



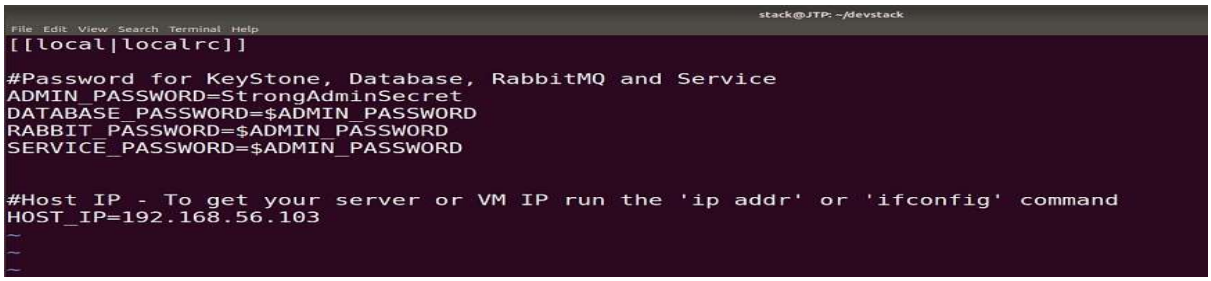
Copy the following line of content in the file :

```
[[local|localrc]]

# Password for KeyStone, Database, RabbitMQ and Service
ADMIN_PASSWORD=StrongAdminSecret
DATABASE_PASSWORD=$ADMIN_PASSWORD
RABBIT_PASSWORD=$ADMIN_PASSWORD
SERVICE_PASSWORD=$ADMIN_PASSWORD

# Host IP - To get your Server or VM IP, run the 'ip addr' or 'ifconfig' command
HOST_IP=192.168.56.103
```

Output :



Press the ESC, then wq to save and then exit from the local.conf file. Here, ADMIN_PASSWORD is the password that we will use to log into the OpenStack login page. The default username for an OpenStack is 'admin'.

And HOST_IP is the IP address of your system. To get your Server or VM IP, run the 'ifconfig' or 'ip addr' command.

Step 6 : Install OpenStack with DevStack

To install and run the openstack, execute the following command : $

```
./stack.sh
```

DevStack will install the following components:

- Compute Service (Nova)
- Image Service- Glance
- Identity Service-Keystone,
- Block Storage Service - Cinder
- OpenStack Dashboard - Horizon
- Network Service - Neutron
- Placement API - Placement
- Object Storage - Swift

The installation will take about 10-20 minutes, mostly depends on your internet speed.

At the very end of the installation, you will get the host's IP address, URL for managing it and the username and password to handle the administrative task.

Step 7: Accessing OpenStack on a browser

Copy the horizon URL given in the installation output and paste it into your browser :

http://<IP Address>/dashboard

```
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 tee /etc/sudoers.d/stack
[sudo] password for nmfc:
stack1 AL=(ALL) NOPASSWD:ALL
nmfc@nmfc-virtual-machine:~/Desktop$ sudo apt install git -y
Reading package lists... Done
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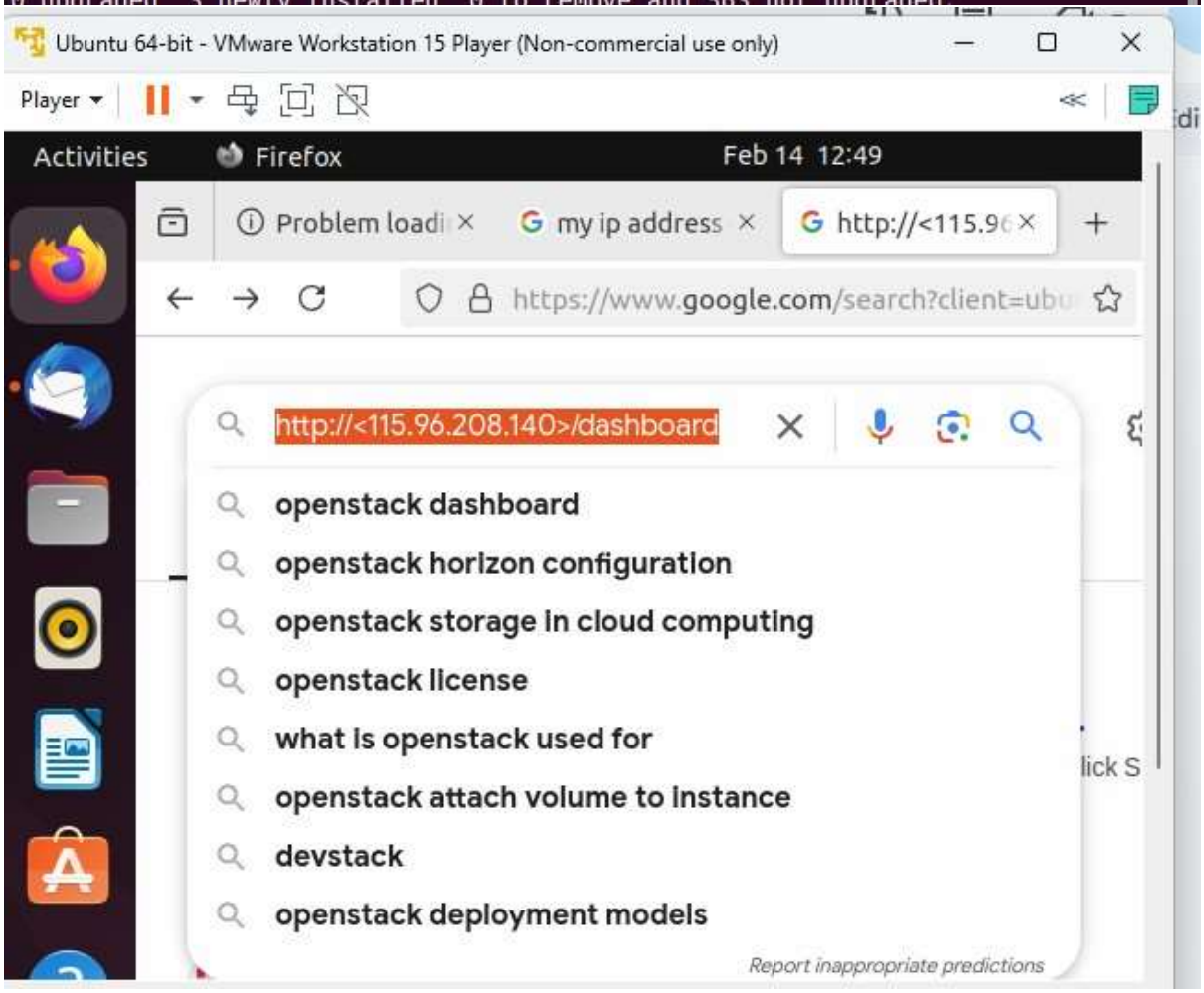

Conclusion: Hence we have successfully implemented Openstack with user and private network creation.