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Course/Section: CPE232-CPE31S22	**Date Submitted:** 12/11/2022
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Activity 15: OpenStack Installation (Neutron, Horizon, Cinder)

1. Objectives

Create a workflow to install OpenStack using Ansible as your Infrastructure as Code (IaC).

2. Intended Learning Outcomes

1. Analyze the advantages and disadvantages of cloud services
2. Evaluate different Cloud deployment and service models
3. Create a workflow to install and configure OpenStack base services using Ansible as documentation and execution.

3. Resources

Oracle VirtualBox (Hypervisor)

1x Ubuntu VM or Centos VM

4. Tasks

1. Create a new repository for this activity.
2. Create a playbook that converts the steps in the following items in https://docs.openstack.org/install-guide/
    a. Neutron
    b. Horizon
    c. Cinder
    d. Create different plays in installing per server type (controller, compute etc.) and identify it as a group in the Inventory file.
    e. Add, commit and push it to your GitHub repo.

5. Output (screenshots and explanations)

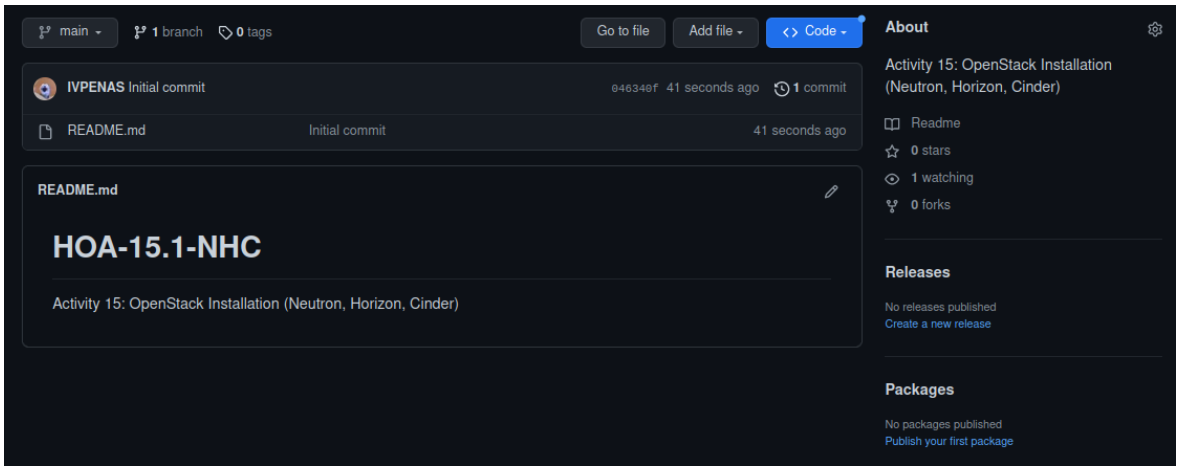


Figure 1.1. Creating a new repository entitled HOA-15.1-NHC

```
penas@penas-VirtualBox:~$ git clone git@github.com:IVPENAS/HOA-15.1-NHC.git
Cloning into 'HOA-15.1-NHC'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Compressing objects: 100% (2/2), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
Receiving objects: 100% (3/3), done.
penas@penas-VirtualBox:~$ cd HOA-15.1-NHC
penas@penas-VirtualBox:~/HOA-15.1-NHC$ pwd
/home/penas/HOA-15.1-NHC
penas@penas-VirtualBox:~/HOA-15.1-NHC$ ls
ansible.cfg  install_os.yml  inventory  README.md
penas@penas-VirtualBox:~/HOA-15.1-NHC$ mkdir roles
penas@penas-VirtualBox:~/HOA-15.1-NHC$ cd roles
penas@penas-VirtualBox:~/HOA-15.1-NHC/roles$ mkdir Cinder Horizon Neutron
penas@penas-VirtualBox:~/HOA-15.1-NHC/roles$ ls
Cinder  Horizon  Neutron
```

```
penas@penas-VirtualBox:~/HOA-14.1-KGN$ ls
admin-openrc.sh  ansible.cfg  install_os.yml  inventory  README.md  roles
penas@penas-VirtualBox:~/HOA-14.1-KGN$ cp ansible.cfg install_os.yml inventory /home/penas/HOA-15.1-NHC
```

Figure 1.2. Cloning the created repository to the Local Machine; copying the pre-used configurations from the previous hands-on activity

Codes:

[Main console] ***install_os.yml:***

```
---

- hosts: all
  become: true
  pre_tasks:

  - name: Updating and Upgrading the OS
    apt:
      name: "*"
      state: latest
      update_cache: true
    when: ansible_distribution == "Ubuntu"

- hosts: controller_node
  become: true
  roles:
    - Neutron
    - Horizon
    - Cinder
```

***[Roles] Neutron*:**

Prerequisites

```
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 31
Server version: 10.6.11-MariaDB-0ubuntu0.22.04.1 Ubuntu 22.04

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> CREATE DATABASE neutron;
Query OK, 1 row affected (0.005 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON neutron.* TO 'neutron'@'localhost' IDE
NTIFIED BY 'NEUTRON_DBPASS';
Query OK, 0 rows affected (0.025 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON neutron.* TO 'neutron'@'%' IDENTIFIED
BY 'NEUTRON_DBPASS';
Query OK, 0 rows affected (0.003 sec)

MariaDB [(none)]> EXIT
Bye
```

Ansible Codes:

```
- name: Installing Neutron
  apt:
    name: neutron-linuxbridge-agent
    state: latest
  when: ansible_distribution == "Ubuntu"

- name: Configuring the configuration file of neutron.conf
  tags: neutron, ubuntu, edit
  lineinfile:
    path: /etc/neutron/neutron.conf
    regexp: "transport_url = rabbit://"
    line: "transport_url = rabbit://openstack:kimchi31@controller

- name: Line Verification of neutron.conf
  tags: neutron, ubuntu, edit
  lineinfile:
    path: /etc/neutron/neutron.conf
    line: "auth_strategy = keystone"
    state: present
  check_mode: yes

- name: Configuring the configuration file of neutron.conf pt. 2
  tags: neutron, ubuntu, edit
  lineinfile:
    path: /etc/neutron/neutron.conf
    regexp: "www_authenticate_uri = <None>"
    line: "www_authenticate_uri = http://controller:5000"
    state: present

- name: Configuring the configuration file of neutron.conf pt. 3
  tags: neutron, ubuntu, edit
  lineinfile:
    path: /etc/neutron/neutron.conf
    regexp: "memcached_servers = <None>"
    line: "memcached_servers = controller:11211"
    state: present

- name: Configuring the configuration file of neutron.conf pt. 4
  tags: neutron, ubuntu, edit
  lineinfile:
    path: /etc/neutron/neutron.conf
    regexp: "auth_type = <None>"
    line: "auth_type = password"
    state: present
```

```
- name: Configuring the configuration file of neutron.conf (oslo_concurrency)
  tags: neutron, ubuntu, edit
  lineinfile:
    path: /etc/neutron/neutron.conf
    regexp: "lock_path = <None>"
    line: "lock_path = /var/lib/neutron/tmp"
    state: present

- name: Restarting the Nova service
  service:
    name: nova-compute
    state: restarted

- name: Restarting Linux Bridge Agent
  service:
    name: neutron-linuxbridge-agent
    state: restarted
```

Ansible-Playrun:

```
PLAY [all] *********************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************
ok: [workstation]

TASK [Updating and Upgrading the OS] *******************************************************************************
ok: [workstation]

PLAY [controller_node] *********************************************************************************************

TASK [Gathering Facts] *********************************************************************************************
ok: [workstation]

TASK [Neutron : Installing Neutron] ********************************************************************************
ok: [workstation]

TASK [Neutron : Configuring the configuration file of neutron.conf] ************************************************
ok: [workstation]

TASK [Neutron : Line Verification of neutron.conf] *****************************************************************
changed: [workstation]

TASK [Neutron : Configuring the configuration file of neutron.conf pt. 2] ******************************************
ok: [workstation]

TASK [Neutron : Configuring the configuration file of neutron.conf pt. 3] ******************************************
ok: [workstation]

TASK [Neutron : Configuring the configuration file of neutron.conf pt. 4] ******************************************
changed: [workstation]

TASK [Neutron : Configuring the configuration file of neutron.conf (oslo_concurrency)] ****************************
ok: [workstation]

TASK [Neutron : Restarting the Nova service] ***********************************************************************
changed: [workstation]

TASK [Neutron : Restarting Linux Bridge Agent] *********************************************************************
changed: [workstation]

PLAY RECAP *********************************************************************************************************
workstation                : ok=12   changed=4    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

Horizon:

Ansible Codes:

```yaml
- name: Installing Horizon
  tags: horizon, ubuntu
  apt:
    name: openstack-dashboard
    state: latest
  when: ansible_distribution == "Ubuntu"

- name: Configuring the python file of local_settings.py
  tags: horizon, ubuntu, edit
  lineinfile:
    path: /etc/openstack-dashboard/local_settings.py
    regexp: 'OPENSTACK_HOST = "127.0.0.1"'
    line: 'OPENSTACK_HOST = "controller"'

- name: Varification in the python file of local_settings.py
  tags: horizon, ubuntu, edit
  lineinfile:
    path: /etc/openstack-dashboard/local_settings.py
    line: "'OPENSTACK_HOST = '*'"
    state: present
  check_mode: yes

- name: Configuring the python file of local_settings.py (SESSION_ENGINE) pt. 2
  tags: horizon, ubuntu, edit
  lineinfile:
    path: /etc/openstack-dashboard/local_settings.py
    regexp: "SESSION_ENGINE = 'django.contrib.sessions.backends.signed_cookies'"
    line: "SESSION_ENGINE = 'django.contrib.sessions.backends.cache'"

- name: Configuring the python file of local_settings.py (OS_K URL) pt. 3
  tags: horizon, ubuntu, edit
  lineinfile:
    path: /etc/openstack-dashboard/local_settings.py
    regexp: 'OPENSTACK_KEYSTONE_URL = "http://%s/identity/v3" % OPENSTACK_HOST'
    line: 'OPENSTACK_KEYSTONE_URL = "http://%s:5000/identity/v3" % OPENSTACK_HOST'
    state: present
  check_mode: yes

- name: Enable support for domains
  tags: neutron, ubuntu, edit
  lineinfile:
    path: /etc/openstack-dashboard/local_settings.py
    line: "OPENSTACK_KEYSTONE_MULTIDOMAIN_SUPPORT = True"
    state: present
```

```yaml
- name: Enabling Default Domain for users
  tags: neutron, ubuntu, edit
  lineinfile:
    path: /etc/openstack-dashboard/local_settings.py
    line: 'OPENSTACK_KEYSTONE_DEFAULT_DOMAIN = "Default"'
    state: present

- name: Enabling user as the default role
  tags: neutron, ubuntu, edit
  lineinfile:
    path: /etc/openstack-dashboard/local_settings.py
    line: 'OPENSTACK_KEYSTONE_DEFAULT_ROLE = "user"'
    state: present

- name: Restating the apache2.service
  service:
    name: apache2.service
    state: restarted
```

Ansible-Playrun:

```
PLAY [all] *********************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************
ok: [workstation]

TASK [Updating and Upgrading the OS] *******************************************************************************
ok: [workstation]

PLAY [controller_node] *********************************************************************************************

TASK [Gathering Facts] *********************************************************************************************
ok: [workstation]

TASK [Horizon : Installing Horizon] ********************************************************************************
ok: [workstation]

TASK [Horizon : Configuring the python file of local_settings.py] **************************************************
ok: [workstation]

TASK [Horizon : Varification in the python file of local_settings.py] **********************************************
changed: [workstation]

TASK [Horizon : Configuring the python file of local_settings.py (SESSION_ENGINE) pt. 2] **************************
ok: [workstation]

TASK [Horizon : Configuring the python file of local_settings.py (OS_K URL) pt. 3] *********************************
changed: [workstation]

TASK [Horizon : Enable support for domains] ************************************************************************
ok: [workstation]

TASK [Horizon : Enabling Default Domain for users] *****************************************************************
ok: [workstation]

TASK [Horizon : Enabling user as the default role] *****************************************************************
ok: [workstation]

TASK [Horizon : Restating the apache2.service] *********************************************************************
changed: [workstation]

PLAY RECAP *********************************************************************************************************
workstation                : ok=12   changed=3    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

Cinder:

Prerequisites

```
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 32
Server version: 10.6.11-MariaDB-0ubuntu0.22.04.1 Ubuntu 22.04

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> CREATE DATABASE cinder;
Query OK, 1 row affected (0.008 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON cinder.* TO 'cinder'@'localhost' INDENMariaDB [(none)]> GRANT ALL
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB
MariaDB [(none)]> GRANT ALL PRIVILEGES ON cinder.* TO 'cinder'@'localhost' IDENTIFIED BY 'CINDER_DBPASS';
Query OK, 0 rows affected (0.019 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON cinder.* TO 'cinder'@'%' IDENTIFIED BY 'CINDER_DBPASS';
Query OK, 0 rows affected (0.003 sec)
```

Ansible Codes:

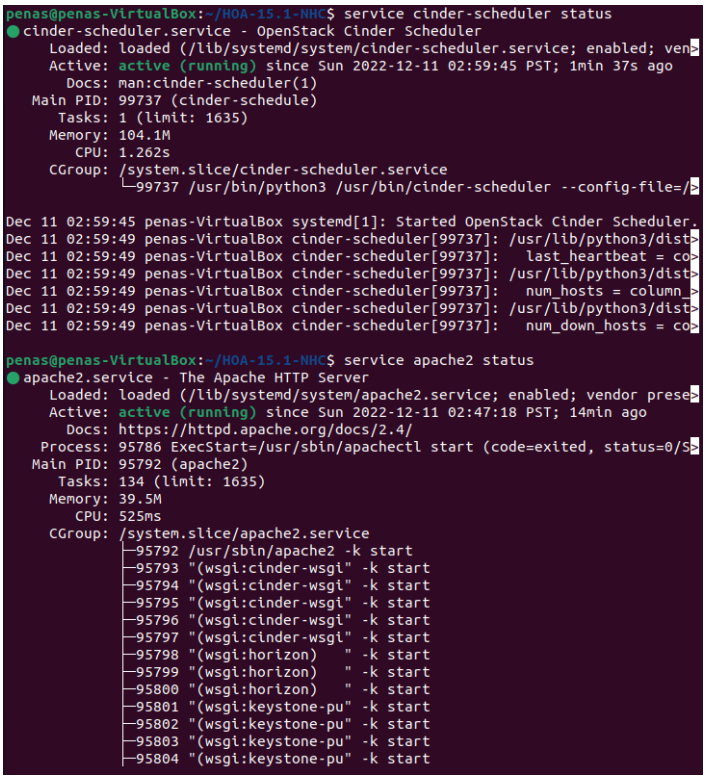
```
- name: Installing the Cinder Packages
  apt:
    name:
      - cinder-api
      - cinder-scheduler
    state: latest
  when: ansible_distribution == "Ubuntu"

- name: Configuring the cinder.conf file (database)
  tags: cinder, ubuntu, edit
  lineinfile:
    path: /etc/cinder/cinder.conf
    regexp: "connection = sqlite:////var/lib/cinder/cinder.sqlite"
    line: "connection = mysql+pymysql://cinder:0uma999@controller/cinder"

- name: Line Verification of cinder.conf
  tags: neutron, ubuntu, edit
  lineinfile:
    path: /etc/cinder/cinder.conf
    line: "auth_strategy = keystone"
    state: present
  check_mode: yes

- name: Configuring the configuration file of cinder.conf pt. 2
  tags: neutron, ubuntu, edit
  lineinfile:
    path: /etc/cinder/cinder.conf
    regexp: "www_authenticate_uri = <None>"
    line: "www_authenticate_uri = http://controller:5000"
    state: present

- name: Configuring the configuration file of cinder.conf pt. 3
  tags: neutron, ubuntu, edit
  lineinfile:
    path: /etc/cinder/cinder.conf
    regexp: "memcached_servers = <None>"
    line: "memcached_servers = controller:11211"
    state: present
```

```
- name: Configuring the configuration file of cinder.conf pt. 4
  tags: neutron, ubuntu, edit
  lineinfile:
    path: /etc/cinder/cinder.conf
    regexp: "auth_type = <None>"
    line: "auth_type = password"
    state: present

- name: Restarting the Nova service (compute service)
  service:
    name: nova-compute
    state: restarted

- name: Restarting the cinder-scheduler service (Block Storage Services)
  service:
    name: cinder-scheduler
    state: restarted

- name: Restating the apache2 service (Block Storage Services)
  service:
    name: apache2
    state: restarted
```

Ansible-Playrun:

```
PLAY [all] *********************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************
ok: [workstation]

TASK [Updating and Upgrading the OS] *******************************************************************************
ok: [workstation]

PLAY [controller_node] *********************************************************************************************

TASK [Gathering Facts] *********************************************************************************************
ok: [workstation]

TASK [Cinder : Installing the Cinder Packages] *********************************************************************
ok: [workstation]

TASK [Cinder : Configuring the cinder.conf file (database)] ********************************************************
ok: [workstation]

TASK [Cinder : Line Verification of cinder.conf] *******************************************************************
ok: [workstation]

TASK [Cinder : Configuring the configuration file of cinder.conf pt. 2] ********************************************
ok: [workstation]

TASK [Cinder : Configuring the configuration file of cinder.conf pt. 3] ********************************************
ok: [workstation]

TASK [Cinder : Configuring the configuration file of cinder.conf pt. 4] ********************************************
ok: [workstation]

TASK [Cinder : Restarting the Nova service (compute service)] ******************************************************
changed: [workstation]

TASK [Cinder : Restarting the cinder-scheduler service (Block Storage Services)] ***********************************
changed: [workstation]

TASK [Cinder : Restating the apache2 service (Block Storage Services)] *********************************************
changed: [workstation]

PLAY RECAP *********************************************************************************************************
workstation              : ok=12   changed=3    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

***Verification*:**



GitHub Link: https://github.com/IVPENAS/HOA-15.1-NHC.git

Reflections:

Answer the following:

1. Describe Neutron, Horizon and Cinder services

   In this activity the student was tasked to install other Openstack Services which are dependent to the previous services installed on the last activities, specifically these Services are: [1] **Neutron Service** which is a Networking Service between interface devices and virtual network interfaces, whereas its features are to *plug virtual and physical networking services* to their own respective cloud environments while *providing Layer 2 and Layer 3 networking services* such as regulating API to manage IP Addresses, DHCP, Firewall, and other tradition networking services. [2] In this Activity the student also installed **Cinder a Block Storage *Service*** *implemented in Python programing language* which provides volumes to Nova and dependent to Keystone Service, as Cinder allows *to create, attach, manage and virtualize Block Storage devices* that are being used upon management of cloud while *catering users with API for request and consume resources given without locating or deploying*. The service grants users or administrator *to snapshot or the ability to back up previous configuration*. And lastly [3] **Horizon** is one of components of OpenStack in which it *provides Graphical User Interface (GUI)* for the users and administrators to *configure and manage resources, creating Virtual Networks* and a key point to *executing applications or workloads to manage between virtual machine and storages*. It depends on services such as Keystone, Nova and Swift to provide efficient user interface along with the said services.

Conclusions:

Implementing other OpenStack services such as [1] Neutron a Networking Services which provides Layer 2 and Layer 3 networking services on cloud environments for users, [2] Horizon, that serves users efficient Graphical User Interface that eases executing application or workloads and efficient management to the cloud, lastly [3] The Block Storage Service which the Cinder application was accustomed to create, attach, manage and virtualize Block Storage devices to manage of cloud along catering users with API for request and consume resources given without locating or deploying. Throughout the Hands-On Activities 13 – 15 shows how OpenStack was efficient to administrators due to their numerous services and applications like Keystone, Nova, Glance, Horizon, Neutron, and Cinder that will aid their businesses, not only it serves features like other paid cloud management but also the efficiency that it was open-source and can be accessed by users by practicing and also implementing or customize their respective cloud management.