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Course/Section: CPE232/CPE31S1	**Date Submitted: May 07, 2024**
Instructor: Dr. Jonathan Taylar	**Semester and SY: 2023-2024**

Activity 14: OpenStack Installation (Keystone, Glance, Nova)

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. Keystone (Identity Service)
    b. Glance (Imaging Service)
    c. Nova (Compute Service)
    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)

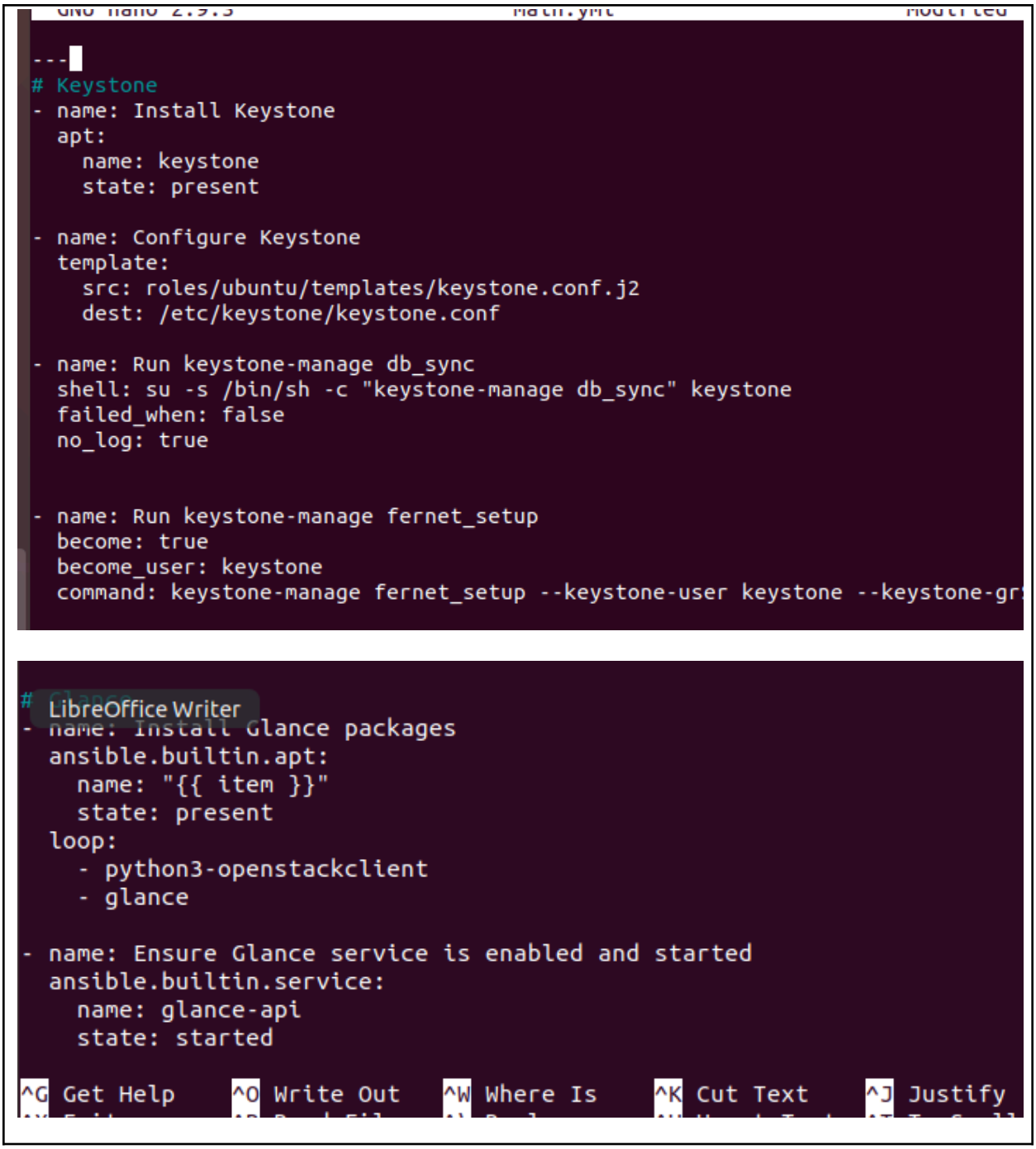
- First thing first, we have to make a new repository for this activity and clone it to the machine.

```
reponte@workstation:~$ git clone git@github.com:meyreponte/HOA14.git
Cloning into 'HOA14'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
Receiving objects: 100% (3/3), done.
reponte@workstation:~$ cd HOA14
```

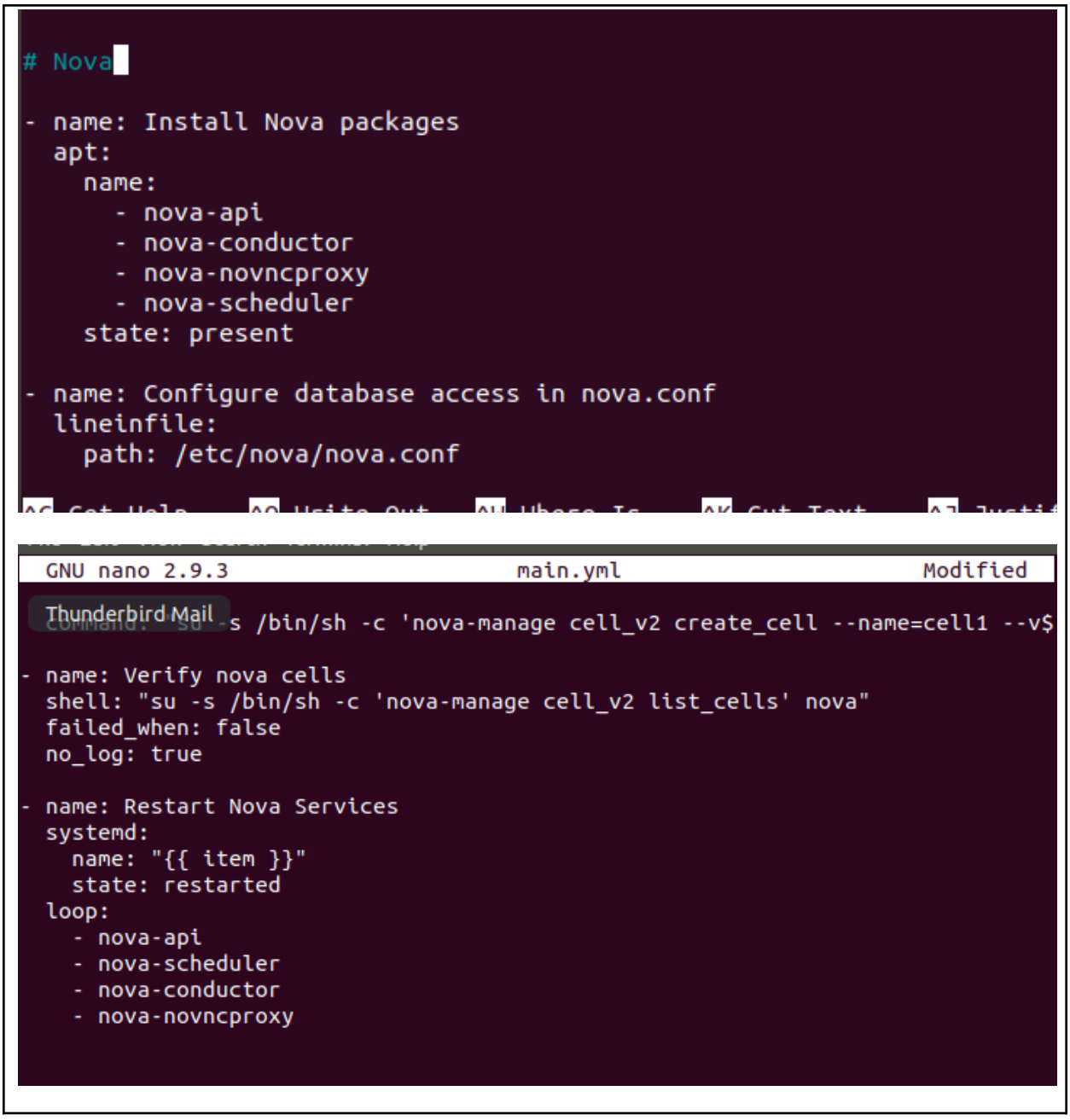
- Create the responsible directories for the OpenStack package: (Keystone, Glance, Nova) installation

```
reponte@workstation:~/HOA14/roles$ find .
.
./ubuntu
./ubuntu/tasks
./ubuntu/tasks/templates
./ubuntu/tasks/templates/keystone.conf.j2
./ubuntu/tasks/templates/glance-api.conf.j2
./ubuntu/tasks/main.yml
./centos
./centos/tasks
./centos/tasks/main.yml
reponte@workstation:~/HOA14/roles$
```

Ubuntu


GNU nano 2.9.3 Main.yml Modified

Keystone
- name: Install Keystone
apt:
name: keystone
state: present
- name: Configure Keystone
template:
src: roles/ubuntu/templates/keystone.conf.j2
dest: /etc/keystone/keystone.conf
- name: Run keystone-manage db_sync
shell: su -s /bin/sh -c "keystone-manage db_sync" keystone
failed_when: false
no_log: true
- name: Run keystone-manage fernet_setup
become: true
become_user: keystone
command: keystone-manage fernet_setup --keystone-user keystone --keystone-gr
LibreOffice Writer
- name: Install Glance packages
ansible.builtin.apt:
name: "{{ item }}"
state: present
loop:
- python3-openstackclient
- glance
- name: Ensure Glance service is enabled and started
ansible.builtin.service:
name: glance-api
state: started
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify



Nova
- name: Install Nova packages
apt:
name:
- nova-api
- nova-conductor
- nova-novncproxy
- nova-scheduler
state: present
- name: Configure database access in nova.conf
lineinfile:
path: /etc/nova/nova.conf
GNU nano 2.9.3
main.yml
Modified
Thunderbird Mail
s /bin/sh -c 'nova-manage cell_v2 create_cell --name=cell1 --v$
- name: Verify nova cells
shell: "su -s /bin/sh -c 'nova-manage cell_v2 list_cells' nova"
failed_when: false
no_log: true
- name: Restart Nova Services
systemd:
name: "{{ item }}"
state: restarted
loop:
- nova-api
- nova-scheduler
- nova-conductor
- nova-novncproxy


GNU nano 2.9.3 glance-api.conf.j2 Mo
[database]
connection = mysql+pymysql://glance:reponte13@192.168.56.104/glance
[keystone_authtoken]
www_authenticate_uri = http://192.168.56.104:5000
auth_url = http://192.168.56.104:5000
memcached_servers = 192.168.56.104:11211
auth_type = password
project_domain_name = Default
user_domain_name = Default
project_name = service
username = glance
password = reponte13
[paste_deploy]
flavor = keystone
[glance_store]
stores = file,http
default_store = file
filesystem_store_datadir = /var/lib/glance/images/
[oslo_limit]


GNU nano 2.9.3 keystone.conf.j2 Modifie
[DEFAULT]
admin_token = ADMIN_TOKEN
log_dir = /var/log/keystone
[database]
connection = mysql+pymysql://keystone:KEYSTONE_DBPASS@controller/keystone
[token]
provider = fernet

CentOS

```
GNU nano 2.9.3                          main.yml

---
- name: Install required packages
  yum:
    name: "{{ item }}"
    state: present
  loop:
    - openstack-keystone
    - httpd
    - mod_wsgi

- name: Configure Keystone database access
  blockinfile:
    path: /etc/keystone/keystone.conf
    block: |
      [database]
      connection = mysql+pymysql://keystone:KEYSTONE_DBPASS@controller/keystone

- name: Configure Fernet token provider
  blockinfile:
    path: /etc/keystone/keystone.conf
    block: |
      [token]
      provider = fernet
```

```
- name: Populate Keystone database
  shell: "su -s /bin/sh -c 'keystone-manage db_sync' keystone"
  failed_when: false


- name: Initialize Fernet key repositories
  shell: "keystone-manage fernet_setup --keystone-user keystone --keystone-gro$
  failed_when: false
  no_log: true


- name: Bootstrap Keystone
  command: >
    keystone-manage bootstrap
    --bootstrap-password ADMIN_PASS
    --bootstrap-admin-url http://controller:5000/v3/
    --bootstrap-internal-url http://controller:5000/v3/
    --bootstrap-public-url http://controller:5000/v3/
    --bootstrap-region-id RegionOne
  failed_when: false

- name: Configure Apache HTTP server
  blockinfile:
```

```
    block: |
      ServerName controller

- name: Create symlink for Keystone WSGI configuration
  file:
    src: /usr/share/keystone/wsgi-keystone.conf
    dest: /etc/httpd/conf.d/wsgi-keystone.conf
    state: link
    force: yes
  become: yes

- name: Start and enable Apache HTTP service
  systemd:
    name: httpd
    state: started
    enabled: true

- name: Set environmental variables for administrative account
  lineinfile:
    path: /etc/environment
    line: "{{ item }}"
  loop:
    - "export OS_USERNAME=admin"
```

```
# Glance
- name: Install OpenStack Glance packages
  yum:
    name: openstack-glance
    state: present

- name: Configure glance-api.conf
  blockinfile:
    path: /etc/glance/glance-api.conf
    block: |
      [database]
      connection = mysql+pymysql://glance:GLANCE_DBPASS@controller/glance

      [keystone_authtoken]
      www_authenticate_uri  = http://controller:5000
      auth_url = http://controller:5000
      memcached_servers = controller:11211
```

```
# Nova
- name: Install OpenStack Nova packages
  yum:
    name: "openstack-nova-api,openstack-nova-conductor,openstack-nova-novncpro$
    state: present

- name: Configure nova.conf
  blockinfile:
    path: /etc/nova/nova.conf
    block: |
      [DEFAULT]
      enabled_apis = osapi_compute,metadata
      my_ip = 10.0.0.11
      use_neutron = true
      firewall_driver = nova.virt.firewall.NoopFirewallDriver

      [api_database]
      connection = mysql+pymysql://nova:NOVA_DBPASS@controller/nova_api
```

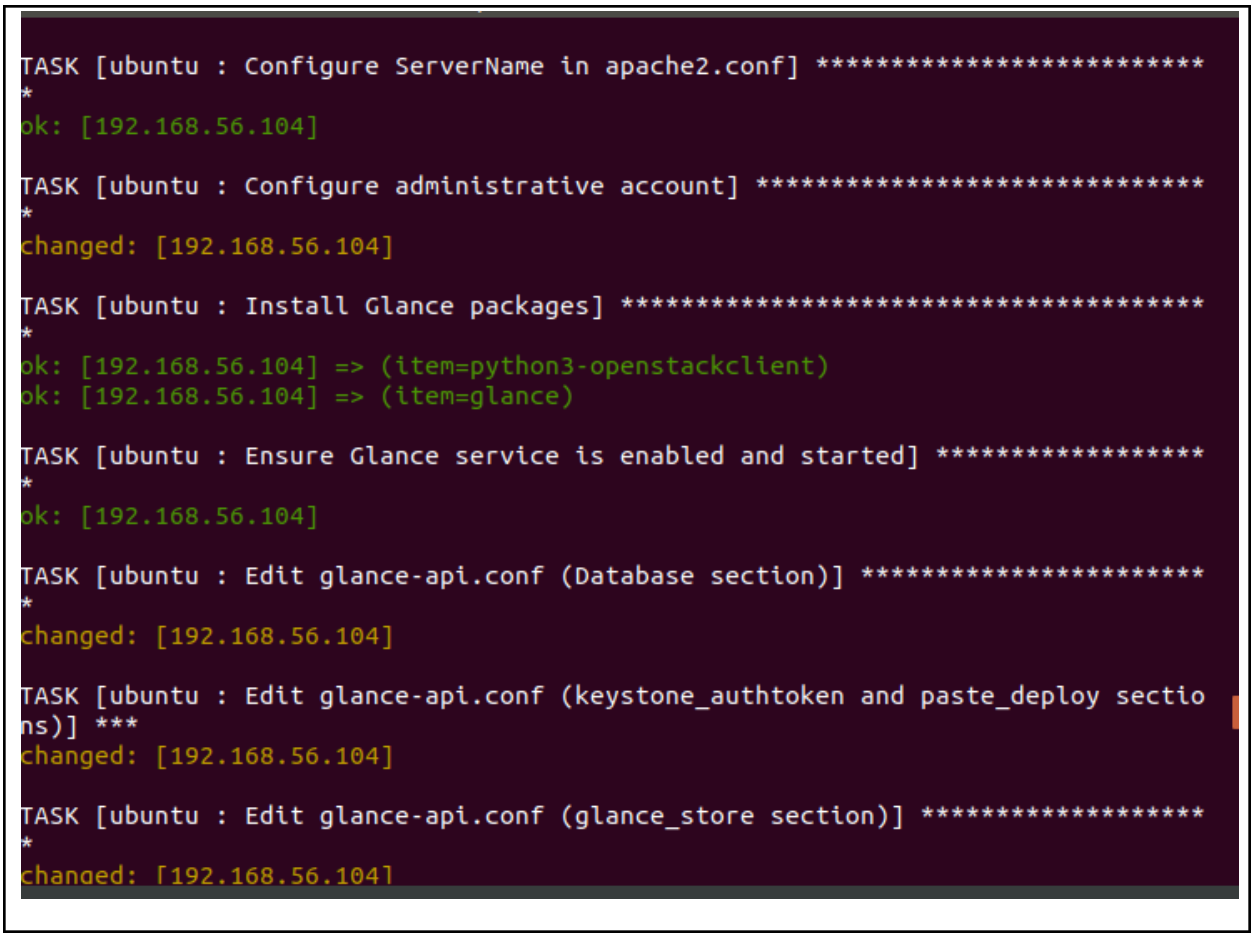
Recap of Installation

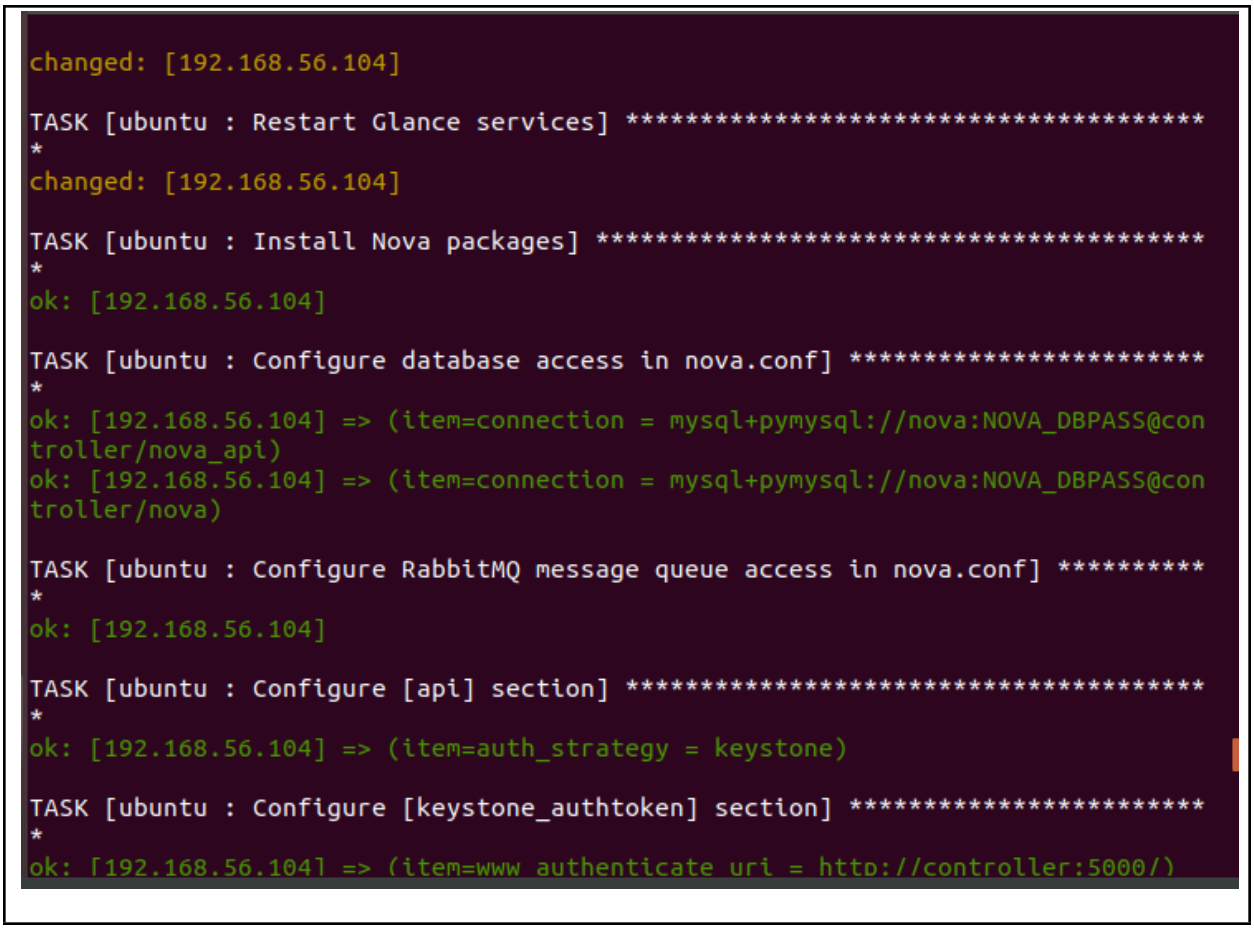
- Here's the recap installation/the processes when installing the Keystone, Glance, and Nova packages.

Ubuntu

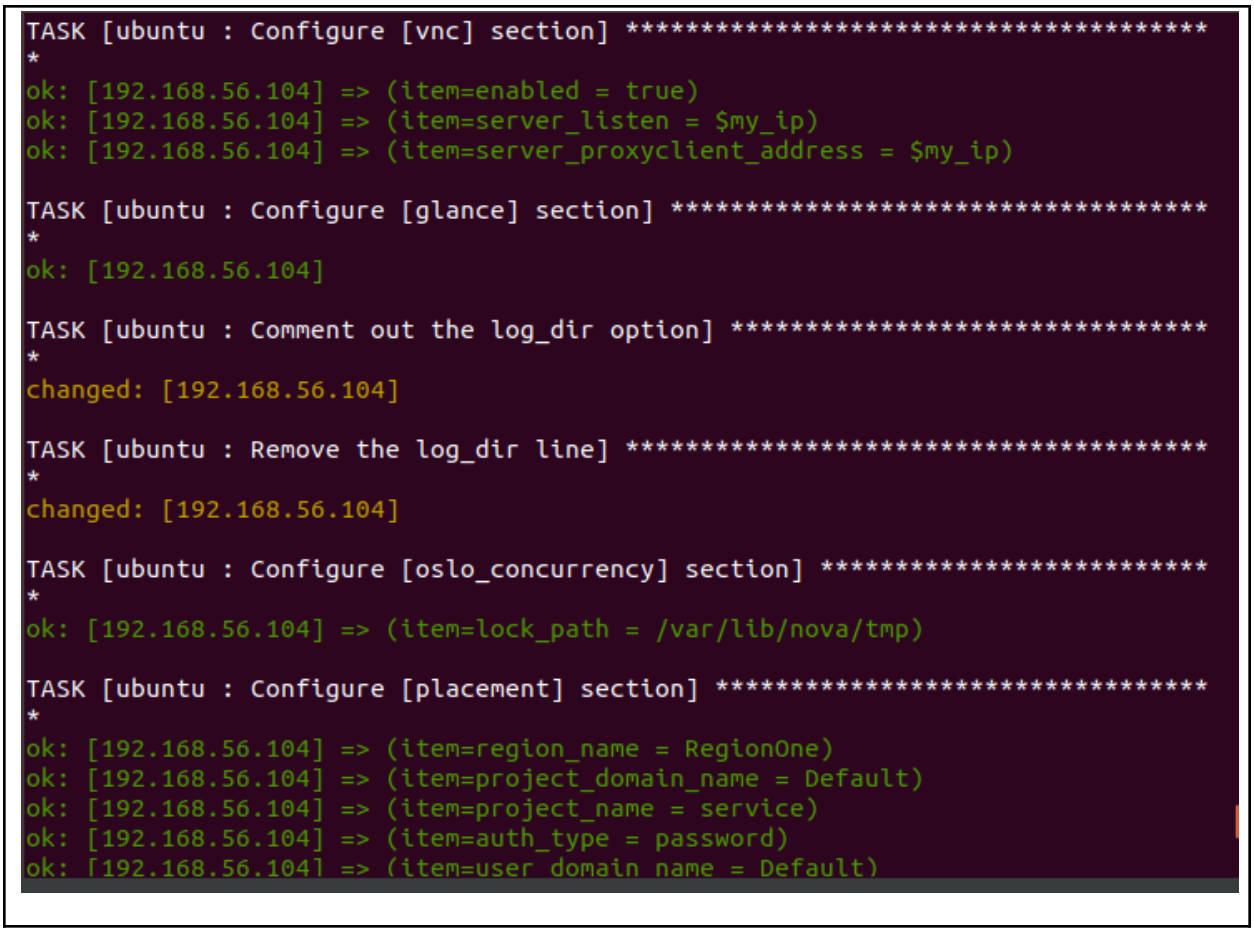
```
reponte@workstation:~/HOA14$ ansible-playbook --ask-become-pass openstack1.yml
SUDO password:

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

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.104]

PLAY [ubuntu] ******************************************************************
*

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.104]

TASK [ubuntu : Install Keystone] ***********************************************
*
ok: [192.168.56.104]

TASK [ubuntu : Configure Keystone] *********************************************
*
ok: [192.168.56.104]

TASK [ubuntu : Run keystone-manage db_sync] ************************************
*
```

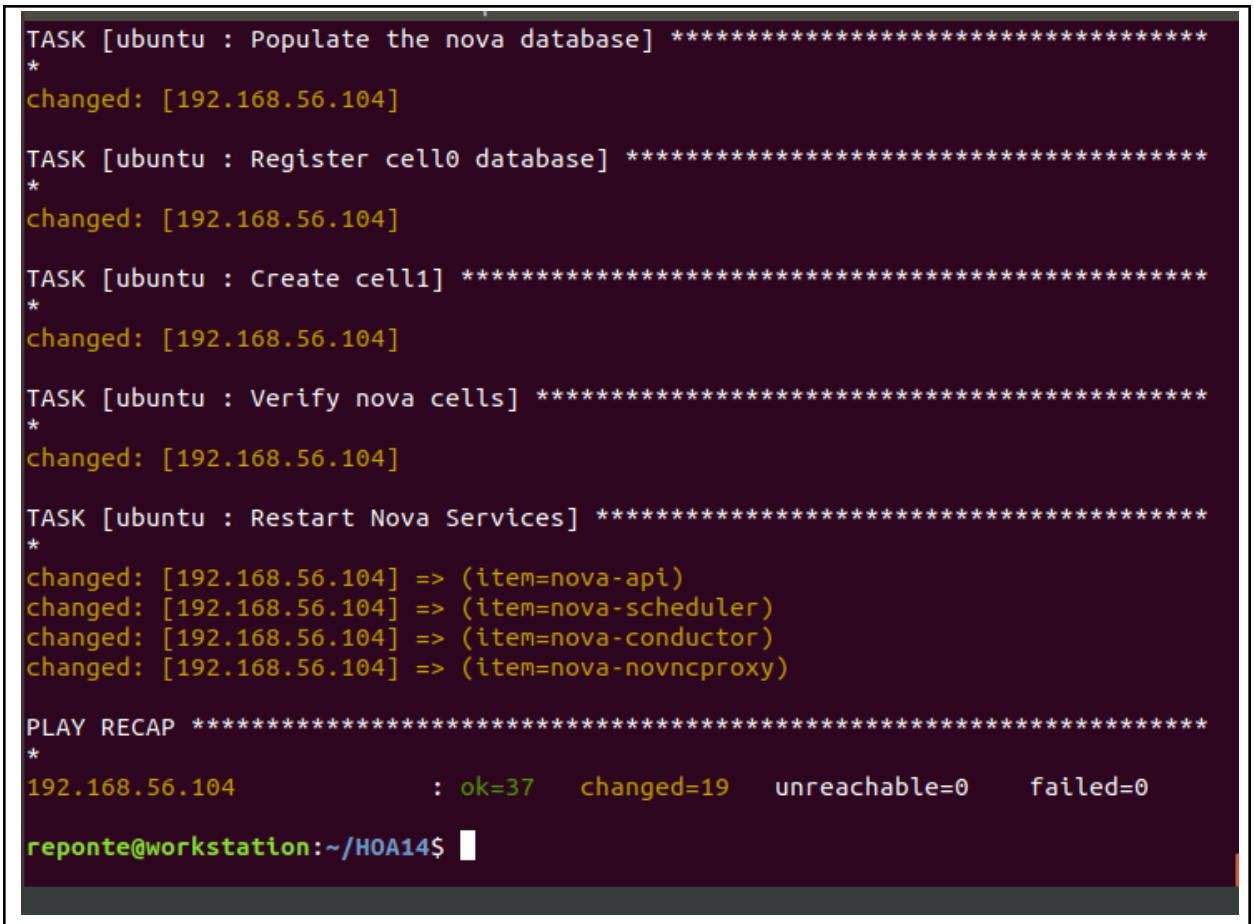
```
TASK [ubuntu : Install Keystone] ***********************************************
*
ok: [192.168.56.104]

TASK [ubuntu : Configure Keystone] *********************************************
*
ok: [192.168.56.104]

TASK [ubuntu : Run keystone-manage db_sync] ************************************
*
changed: [192.168.56.104]

TASK [ubuntu : Run keystone-manage fernet_setup] *******************************
*
changed: [192.168.56.104]

TASK [ubuntu : Run keystone-manage credential_setup] ***************************
*
changed: [192.168.56.104]

TASK [ubuntu : Run keystone-manage bootstrap] **********************************
*
changed: [192.168.56.104]

TASK [ubuntu : Configure ServerName in apache2.conf] ***************************
*
ok: [192.168.56.104]
```


TASK [ubuntu : Configure ServerName in apache2.conf] ***********************
*
ok: [192.168.56.104]
TASK [ubuntu : Configure administrative account] ****************************
*
changed: [192.168.56.104]
TASK [ubuntu : Install Glance packages] *************************************
*
ok: [192.168.56.104] => (item=python3-openstackclient)
ok: [192.168.56.104] => (item=glance)
TASK [ubuntu : Ensure Glance service is enabled and started] ****************
*
ok: [192.168.56.104]
TASK [ubuntu : Edit glance-api.conf (Database section)] *********************
*
changed: [192.168.56.104]
TASK [ubuntu : Edit glance-api.conf (keystone_authtoken and paste_deploy sectio
ns)] ***
changed: [192.168.56.104]
TASK [ubuntu : Edit glance-api.conf (glance_store section)] ******************
*
changed: [192.168.56.104]


changed: [192.168.56.104]
TASK [ubuntu : Restart Glance services] ************************************
*
changed: [192.168.56.104]
TASK [ubuntu : Install Nova packages] **************************************
*
ok: [192.168.56.104]
TASK [ubuntu : Configure database access in nova.conf] *********************
*
ok: [192.168.56.104] => (item=connection = mysql+pymysql://nova:NOVA_DBPASS@con
troller/nova_api)
ok: [192.168.56.104] => (item=connection = mysql+pymysql://nova:NOVA_DBPASS@con
troller/nova)
TASK [ubuntu : Configure RabbitMQ message queue access in nova.conf] **********
*
ok: [192.168.56.104]
TASK [ubuntu : Configure [api] section] ************************************
*
ok: [192.168.56.104] => (item=auth_strategy = keystone)
TASK [ubuntu : Configure [keystone_authtoken] section] *********************
*
ok: [192.168.56.104] => (item=www authenticate uri = http://controller:5000/)

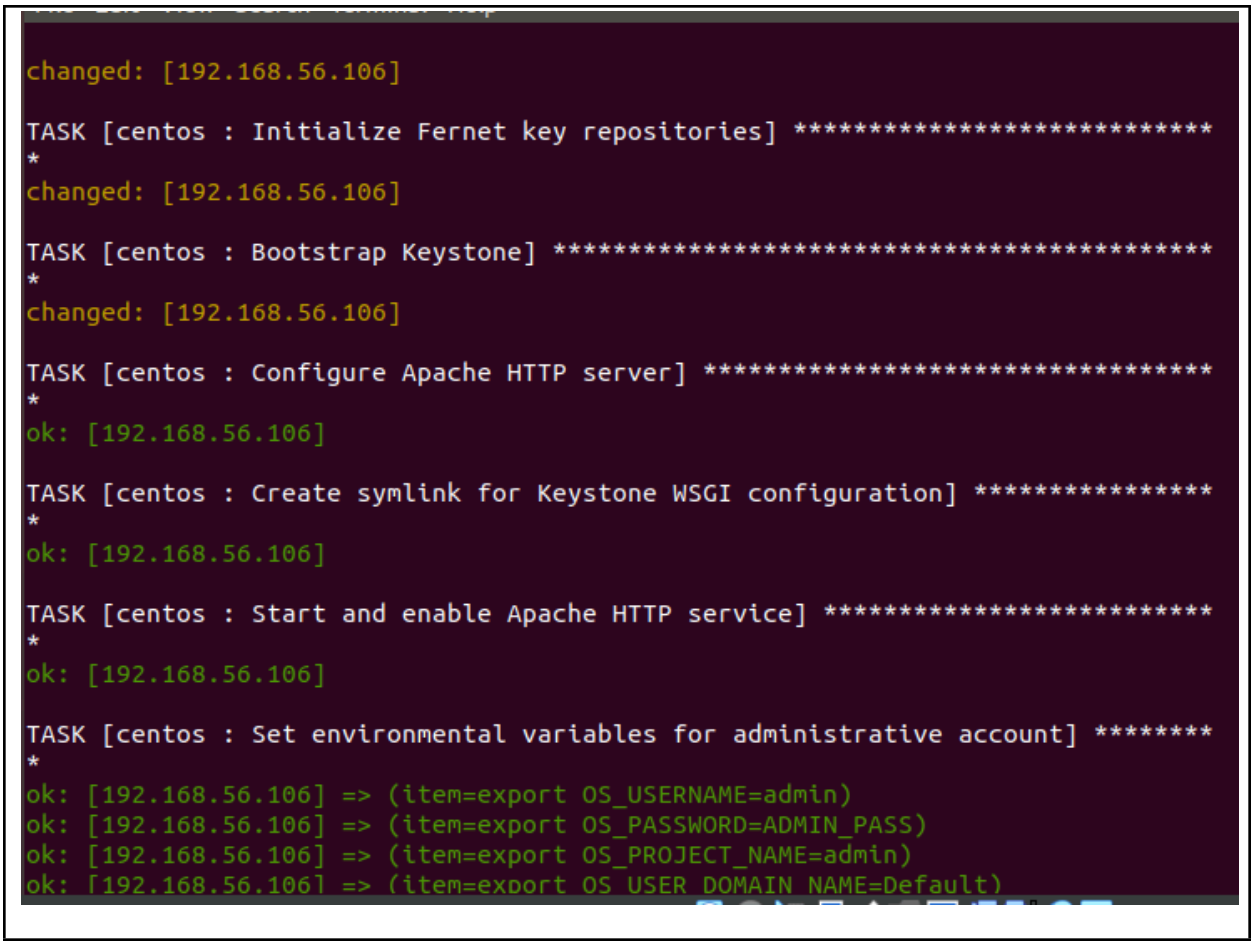
```
ok: [192.168.56.104] => (item=auth_strategy = keystone)

TASK [ubuntu : Configure [keystone_authtoken] section] ************************
*
ok: [192.168.56.104] => (item=www_authenticate_uri = http://controller:5000/)
ok: [192.168.56.104] => (item=auth_url = http://controller:5000/)
ok: [192.168.56.104] => (item=memcached_servers = controller:11211)
ok: [192.168.56.104] => (item=auth_type = password)
ok: [192.168.56.104] => (item=project_domain_name = Default)
ok: [192.168.56.104] => (item=user_domain_name = Default)
ok: [192.168.56.104] => (item=project_name = service)
ok: [192.168.56.104] => (item=username = nova)
ok: [192.168.56.104] => (item=password = NOVA_PASS)

TASK [ubuntu : Configure [service_user] section] ******************************
*
ok: [192.168.56.104] => (item=send_service_user_token = true)
ok: [192.168.56.104] => (item=auth_url = https://controller/identity)
ok: [192.168.56.104] => (item=auth_strategy = keystone)
ok: [192.168.56.104] => (item=auth_type = password)
ok: [192.168.56.104] => (item=project_domain_name = Default)
ok: [192.168.56.104] => (item=project_name = service)
ok: [192.168.56.104] => (item=user_domain_name = Default)
ok: [192.168.56.104] => (item=username = nova)
ok: [192.168.56.104] => (item=password = NOVA_PASS)

TASK [ubuntu : Configure [DEFAULT] section for my_ip] *************************
*
ok: [192.168.56.104]
```

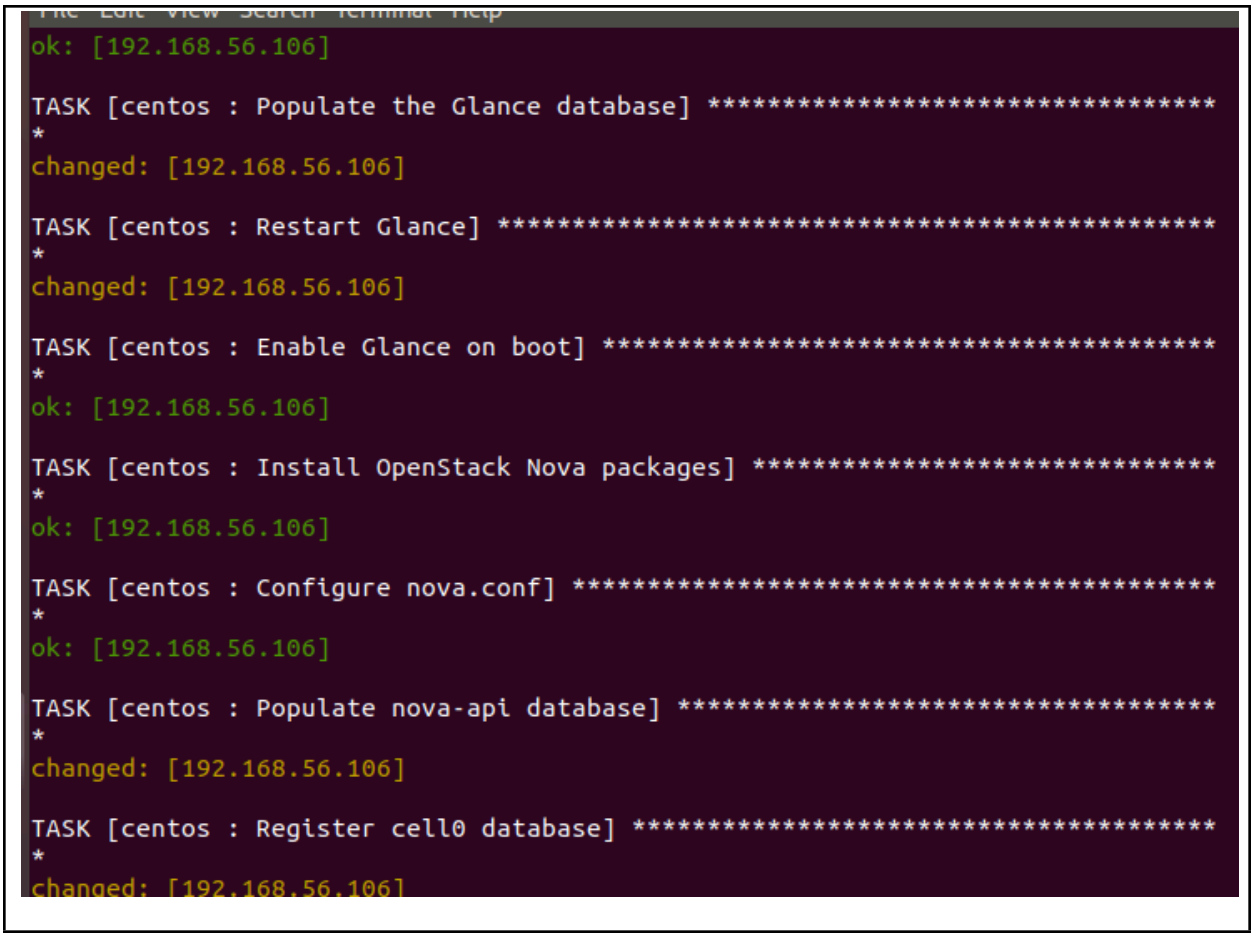

TASK [ubuntu : Configure [vnc] section] ************************************
*
ok: [192.168.56.104] => (item=enabled = true)
ok: [192.168.56.104] => (item=server_listen = $my_ip)
ok: [192.168.56.104] => (item=server_proxyclient_address = $my_ip)
TASK [ubuntu : Configure [glance] section] *********************************
*
ok: [192.168.56.104]
TASK [ubuntu : Comment out the log_dir option] *****************************
*
changed: [192.168.56.104]
TASK [ubuntu : Remove the log_dir line] ************************************
*
changed: [192.168.56.104]
TASK [ubuntu : Configure [oslo_concurrency] section] ***********************
*
ok: [192.168.56.104] => (item=lock_path = /var/lib/nova/tmp)
TASK [ubuntu : Configure [placement] section] ******************************
*
ok: [192.168.56.104] => (item=region_name = RegionOne)
ok: [192.168.56.104] => (item=project_domain_name = Default)
ok: [192.168.56.104] => (item=project_name = service)
ok: [192.168.56.104] => (item=auth_type = password)
ok: [192.168.56.104] => (item=user_domain_name = Default)

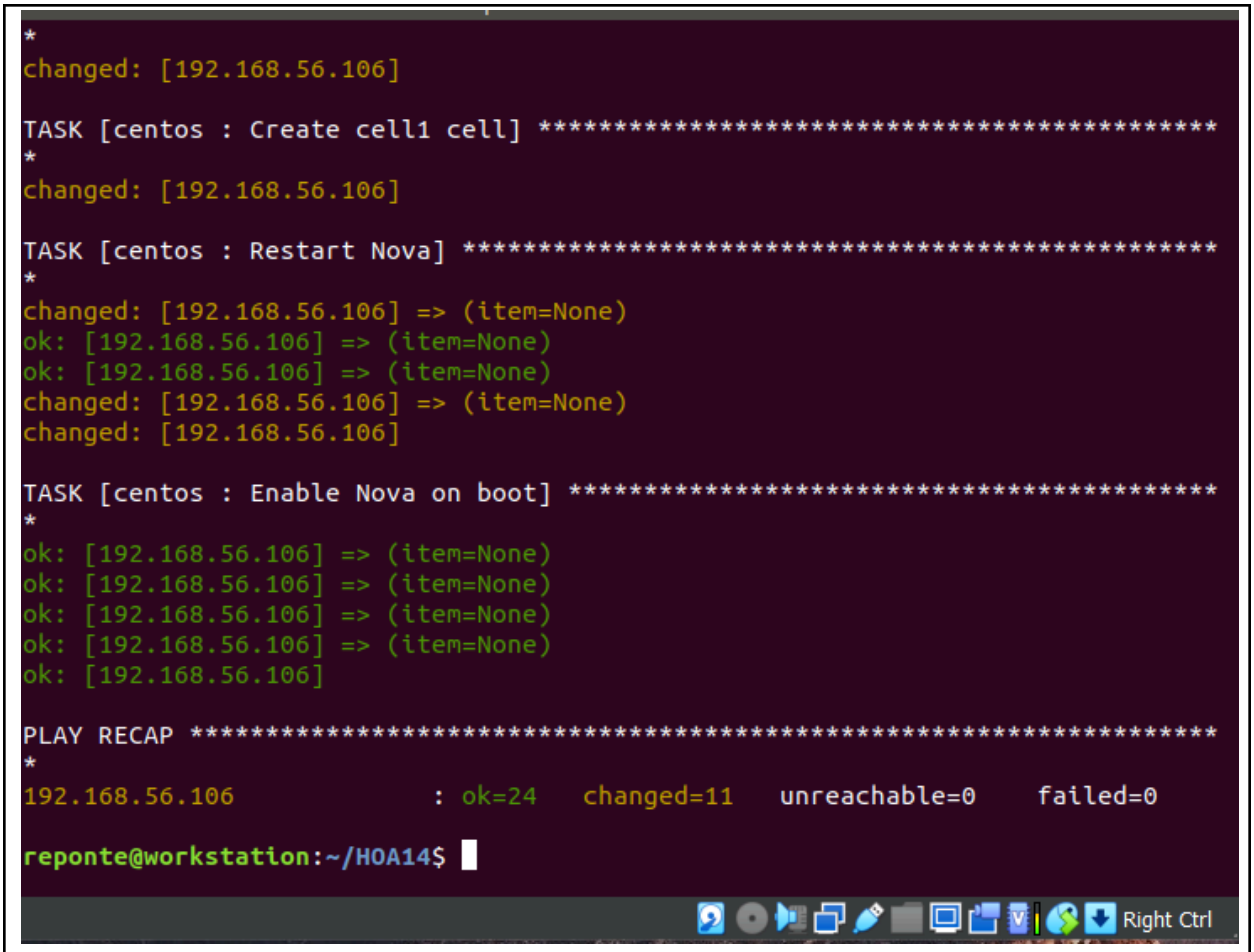

TASK [ubuntu : Populate the nova database] ************************************
*
changed: [192.168.56.104]
TASK [ubuntu : Register cell0 database] ************************************
*
changed: [192.168.56.104]
TASK [ubuntu : Create cell1] **
*
changed: [192.168.56.104]
TASK [ubuntu : Verify nova cells] ***
*
changed: [192.168.56.104]
TASK [ubuntu : Restart Nova Services] ***************************************
*
changed: [192.168.56.104] => (item=nova-api)
changed: [192.168.56.104] => (item=nova-scheduler)
changed: [192.168.56.104] => (item=nova-conductor)
changed: [192.168.56.104] => (item=nova-novncproxy)
PLAY RECAP **
*
192.168.56.104 : ok=37 changed=19 unreachable=0 failed=0
reponte@workstation:~/HOA14$

CentOS

```
reponte@workstation:~/HOA14$ ansible-playbook --ask-become-pass openstack1.yml
SUDO password:

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

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.106]

PLAY [centos] ******************************************************************
*

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.106]

TASK [centos : Install required packages] **************************************
*
ok: [192.168.56.106] => (item=openstack-keystone)
ok: [192.168.56.106] => (item=httpd)
ok: [192.168.56.106] => (item=mod_wsgi)

TASK [centos : Configure Keystone database access] *****************************
*
changed: [192.168.56.106]

TASK [centos : Configure Fernet token provider] ********************************
```


changed: [192.168.56.106]
TASK [centos : Initialize Fernet key repositories] ****************************
*
changed: [192.168.56.106]
TASK [centos : Bootstrap Keystone] **
*
changed: [192.168.56.106]
TASK [centos : Configure Apache HTTP server] **********************************
*
ok: [192.168.56.106]
TASK [centos : Create symlink for Keystone WSGI configuration] ****************
*
ok: [192.168.56.106]
TASK [centos : Start and enable Apache HTTP service] **************************
*
ok: [192.168.56.106]
TASK [centos : Set environmental variables for administrative account] ********
*
ok: [192.168.56.106] => (item=export OS_USERNAME=admin)
ok: [192.168.56.106] => (item=export OS_PASSWORD=ADMIN_PASS)
ok: [192.168.56.106] => (item=export OS_PROJECT_NAME=admin)
ok: [192.168.56.106] => (item=export OS_USER_DOMAIN_NAME=Default)


ok: [192.168.56.106]
TASK [centos : Populate the Glance database] ***********************************
*
changed: [192.168.56.106]
TASK [centos : Restart Glance] ***
*
changed: [192.168.56.106]
TASK [centos : Enable Glance on boot] **
*
ok: [192.168.56.106]
TASK [centos : Install OpenStack Nova packages] ********************************
*
ok: [192.168.56.106]
TASK [centos : Configure nova.conf] **
*
ok: [192.168.56.106]
TASK [centos : Populate nova-api database] *************************************
*
changed: [192.168.56.106]
TASK [centos : Register cell0 database] **
*
changed: [192.168.56.106]

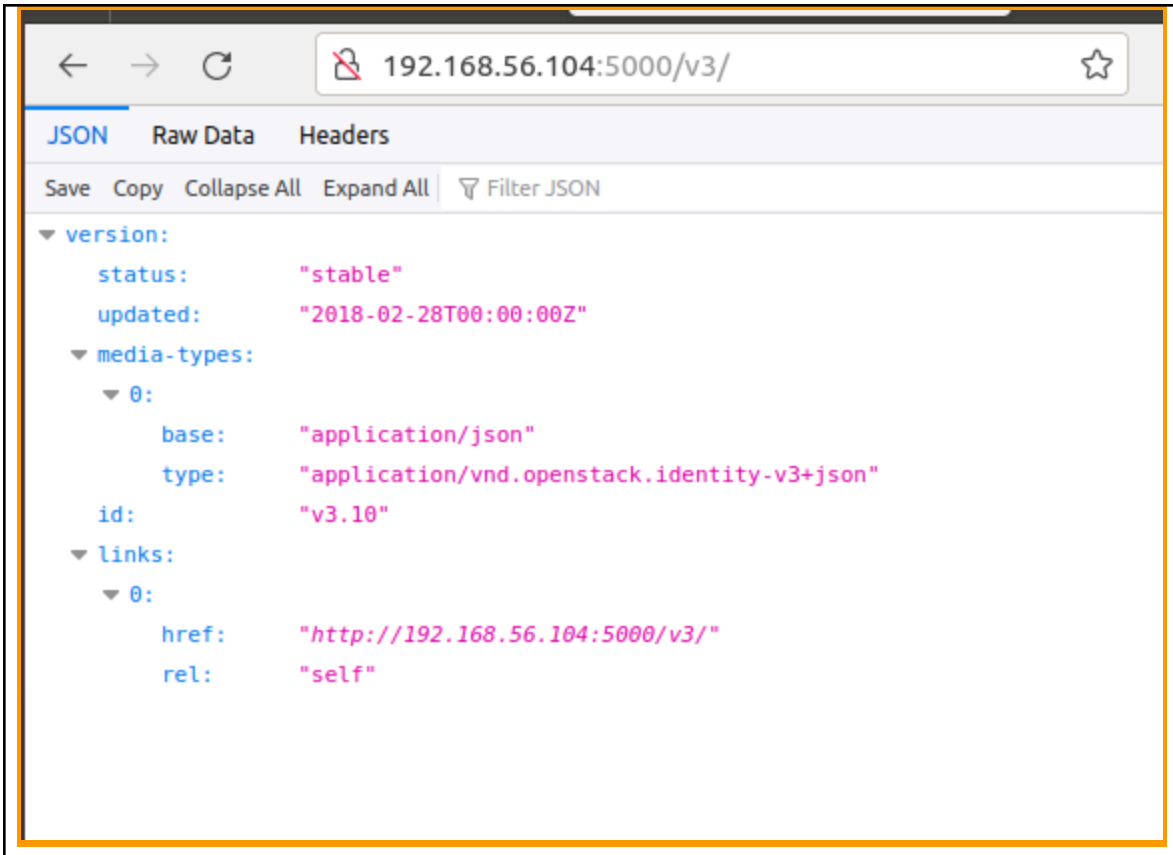


Verifications

- In this stage, we have to verify the installation of the said packages.

Ubuntu

Keystone (Identity Service)



Glance (Imaging Service)

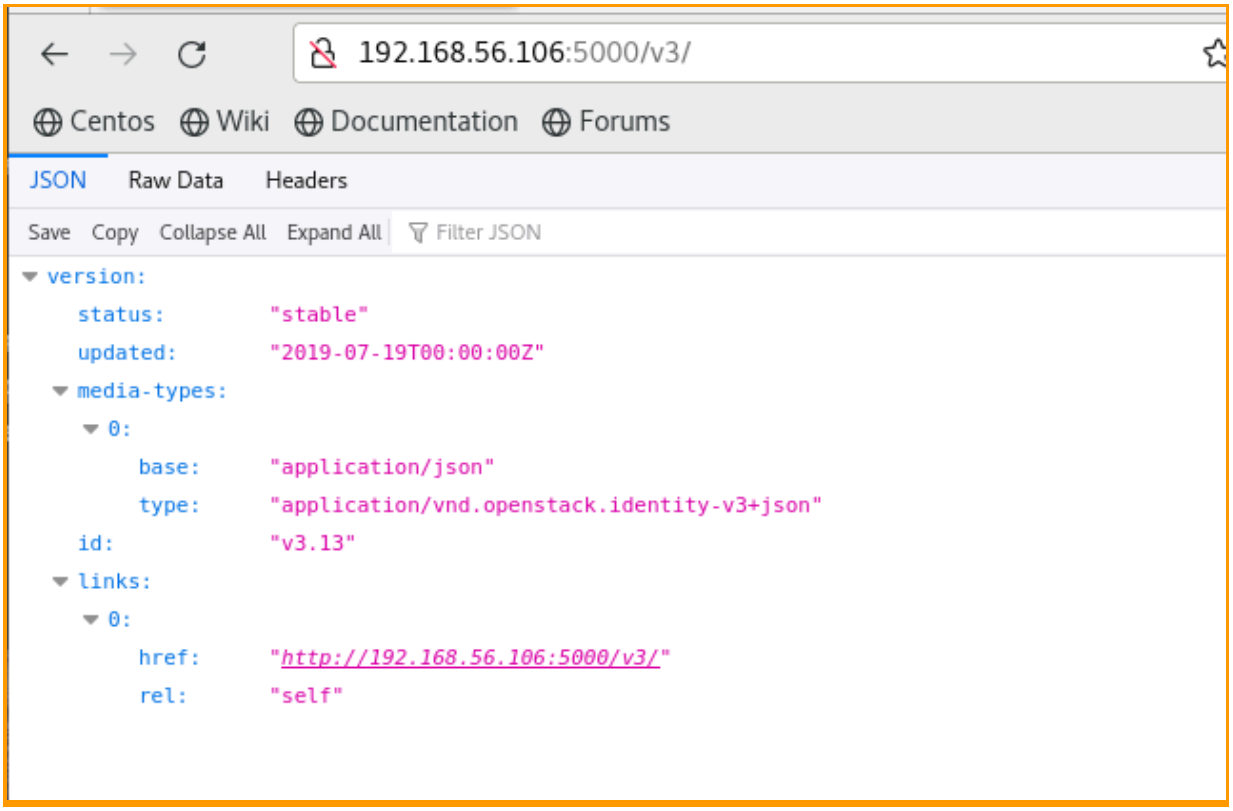
```
reponte@server1:~$ systemctl status glance-api
● glance-api.service - OpenStack Image Service API
   Loaded: loaded (/lib/systemd/system/glance-api.service; enabled; vendor pres
   Active: active (running) since Tue 2024-04-30 19:11:17 PST; 18min ago
 Main PID: 28197 (glance-api)
    Tasks: 3 (limit: 2318)
   CGroup: /system.slice/glance-api.service
           ├─28197 /usr/bin/python2 /usr/bin/glance-api --config-file=/etc/glan
           ├─28488 /usr/bin/python2 /usr/bin/glance-api --config-file=/etc/glan
           └─28489 /usr/bin/python2 /usr/bin/glance-api --config-file=/etc/glan

Apr 30 19:11:19 server1 glance-api[28197]: /usr/lib/python2.7/dist-packages/pas
Apr 30 19:11:19 server1 glance-api[28197]:   return pkg_resources.EntryPoint.pa
Apr 30 19:11:19 server1 glance-api[28197]: /usr/lib/python2.7/dist-packages/pas
Apr 30 19:11:19 server1 glance-api[28197]:   return pkg_resources.EntryPoint.pa
Apr 30 19:11:21 server1 glance-api[28197]: /usr/lib/python2.7/dist-packages/pas
Apr 30 19:11:21 server1 glance-api[28197]:   return pkg_resources.EntryPoint.pa
```

Nova (Compute Service)

```
reponte@server1:~$ systemctl status nova-api
● nova-api.service - OpenStack Compute API
   Loaded: loaded (/lib/systemd/system/nova-api.service; enabled; vendor preset
   Active: active (running) since Tue 2024-04-30 19:12:17 PST; 21min ago
 Main PID: 29740 (nova-api)
    Tasks: 5 (limit: 2318)
   CGroup: /system.slice/nova-api.service
           ├─29740 /usr/bin/python2 /usr/bin/nova-api --config-file=/etc/nova/n
           ├─30006 /usr/bin/python2 /usr/bin/nova-api --config-file=/etc/nova/n
           ├─30007 /usr/bin/python2 /usr/bin/nova-api --config-file=/etc/nova/n
           ├─30029 /usr/bin/python2 /usr/bin/nova-api --config-file=/etc/nova/n
           └─30030 /usr/bin/python2 /usr/bin/nova-api --config-file=/etc/nova/n

Apr 30 19:12:17 server1 systemd[1]: nova-api.service: Main process exited, code
Apr 30 19:12:17 server1 systemd[1]: nova-api.service: Failed with result 'timeo
Apr 30 19:12:17 server1 systemd[1]: Stopped OpenStack Compute API.
Apr 30 19:12:17 server1 systemd[1]: Started OpenStack Compute API.
lines 1-16/16 (END)
```

CentOS

Keystone (Identity Service)



Glance (Imaging Service) [RIFE]

Nova (Compute Service)

```
[reponte@server3 ~]$ sudo systemctl status openstack-nova-api.service
● openstack-nova-api.service - OpenStack Nova API Server
   Loaded: loaded (/usr/lib/systemd/system/openstack-nova-api.service; enabled; vendor
preset: disabled)
   Active: active (running) since Thu 2024-05-02 05:30:23 PST; 13min ago
 Main PID: 18277 (nova-api)
    Tasks: 5
   CGroup: /system.slice/openstack-nova-api.service
           ├─18277 /usr/bin/python2 /usr/bin/nova-api
           ├─18391 /usr/bin/python2 /usr/bin/nova-api
           ├─18392 /usr/bin/python2 /usr/bin/nova-api
           ├─18393 /usr/bin/python2 /usr/bin/nova-api
           └─18394 /usr/bin/python2 /usr/bin/nova-api

May 02 05:30:07 server3 systemd[1]: openstack-nova-api.service: main process exit...LRM
May 02 05:30:07 server3 systemd[1]: Stopped OpenStack Nova API Server.
May 02 05:30:07 server3 systemd[1]: Unit openstack-nova-api.service entered faile...te.
May 02 05:30:07 server3 systemd[1]: openstack-nova-api.service failed.
May 02 05:30:07 server3 systemd[1]: Starting OpenStack Nova API Server...
May 02 05:30:14 server3 nova-api[18277]: /usr/lib/python2.7/site-packages/paste/de...y.
May 02 05:30:14 server3 nova-api[18277]: return pkg_resources.EntryPoint.parse("x=...e)
```

GIT PUSH

- After installing the packages, we need to save the changes to our GitHub repository using **git push origin/main**.

Reponte:

```
reponte@workstation:~/HOA14$ git add *
reponte@workstation:~/HOA14$ git commit -m "HOA14"
[main 88730c1] HOA14
 6 files changed, 30 insertions(+), 19 deletions(-)
reponte@workstation:~/HOA14$ git push origin
Counting objects: 13, done.
Delta compression using up to 2 threads.
Compressing objects: 100% (9/9), done.
Writing objects: 100% (13/13), 2.81 KiB | 2.81 MiB/s, done.
Total 13 (delta 3), reused 0 (delta 0)
remote: Resolving deltas: 100% (3/3), completed with 3 local objects.
To github.com:meyreponte/HOA14.git
   7dafa02..88730c1  main -> main
reponte@workstation:~/HOA14$
```

Sales:

```
aj@workstations:~/hoa13$ git add roles
aj@workstations:~/hoa13$ git commit -m "Activity 14"
[main a257ee6] Activity 14
 4 files changed, 75 insertions(+)
 create mode 100644 roles/db_servers/glance.yml
 create mode 100644 roles/db_servers/task/glance.yml
 create mode 100644 roles/web_servers/task/nova.yml
 create mode 100644 roles/workstation/task/keystone.yml
aj@workstations:~/hoa13$ git push origin main
Enumerating objects: 21, done.
Counting objects: 100% (21/21), done.
Compressing objects: 100% (10/10), done.
Writing objects: 100% (13/13), 1.25 KiB | 142.00 KiB/s, done.
Total 13 (delta 3), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (3/3), completed with 1 local object
To github.com:Angelo001/hoa13.git
   8073aa1..a257ee6  main -> main
aj@workstations:~/hoa13$
```

Rife:

Yu:

```
yu@Workstation:~/HOA14_YU$ git commit -m "Activity 14"
[main 4ffa6c1] Activity 14
 Committer: Yu <yu@Workstation.myguest.virtualbox.org>
Your name and email address were configured automatically based
on your username and hostname. Please check that they are accurate.
You can suppress this message by setting them explicitly. Run the
following command and follow the instructions in your editor to edit
your configuration file:

    git config --global --edit

After doing this, you may fix the identity used for this commit with:

    git commit --amend --reset-author

 6 files changed, 56 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 installer.yml
 create mode 100644 inventory
 create mode 100644 roles/glance/tasks/main.yml
 create mode 100644 roles/keystone/tasks/main.yml
 create mode 100644 roles/nova/tasks/main.yml
yu@Workstation:~/HOA14_YU$ git push origin main
Enumerating objects: 16, done.
Counting objects: 100% (16/16), done.
Compressing objects: 100% (8/8), done.
Writing objects: 100% (15/15), 1.42 KiB | 485.00 KiB/s, done.
Total 15 (delta 0), reused 0 (delta 0), pack-reused 0
To github.com:qkccyu/HOA14_YU.git
   616fdd2..4ffa6c1  main -> main
yu@Workstation:~/HOA14_YU$
```

Reflections:

Answer the following:

1. Describe Keystone, Glance and Nova services
    - Keystone, Glance, and Nova are core OpenStack services crucial for managing cloud infrastructure. Keystone oversees authentication and authorization, securing access across the platform while managing user identities and service endpoints. Glance handles virtual machine images, enabling users to discover, store, and retrieve VM templates for deployment. Nova is the compute engine that manages the lifecycle of virtual machines, leveraging images from Glance and network configurations from Neutron for efficient provisioning and scaling. Together, these services facilitate a secure, scalable cloud environment, supporting both private and public deployments efficiently.

Conclusions:

Reponte:
Managing an OpenStack deployment involves understanding and troubleshooting services like Keystone for identity, Glance for image storage, and Nova for compute operations. Encountering issues such as service start-up failures and package dependencies highlights the complexity of cloud system administration. This activity emphasizes the importance of accurate configuration, understanding dependencies, and monitoring system logs for effective troubleshooting. Using automation tools like Ansible can aid efficiency but demands precision and deep infrastructure knowledge. This process not only improves technical capabilities but also reinforces the need for resilience and adaptability in cloud management, which is crucial for maintaining robust and scalable cloud environments.

Rife:

Sales:
I get the conclusion that I was successful in installing keystone, glance, and nova, some of the OpenStack components, during this exercise. These three are employed in cloud computing: Identity service, which locates databases that cannot be found by other systems, and Image Services, which are utilized for visualization and monitoring. I've also discovered that there are drawbacks and benefits to
cloud technology. Some of its benefits include lower costs, greater security, and
is dependable. While the drawback is that there is so much downtime and it is challenging to find the ideal store

Yu:
Using the OpenStack installation involves interacting with services such as Keystone, Glance, and Nova. When problems like services not beginning or package issues arise, it demonstrates how complex cloud system management can be. To efficiently solve problems, it is critical to correctly configure, understand dependencies, and check system logs. Using technologies like Ansible can help, but it requires a thorough understanding of the infrastructure. This method not only improves technical skills, but also emphasizes the significance of resilience and adaptability in cloud management in order to maintain strong and scalable cloud installations.