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Course/Section: CPE 232 - CPE31S4	**Date Submitted:** 12-05-2023
Instructor: Dr. Jonathan V. Taylar	**Semester and SY:** 1st Sem. 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)

1. Setup Github Repository and Clone to Local Repository or Workstation.

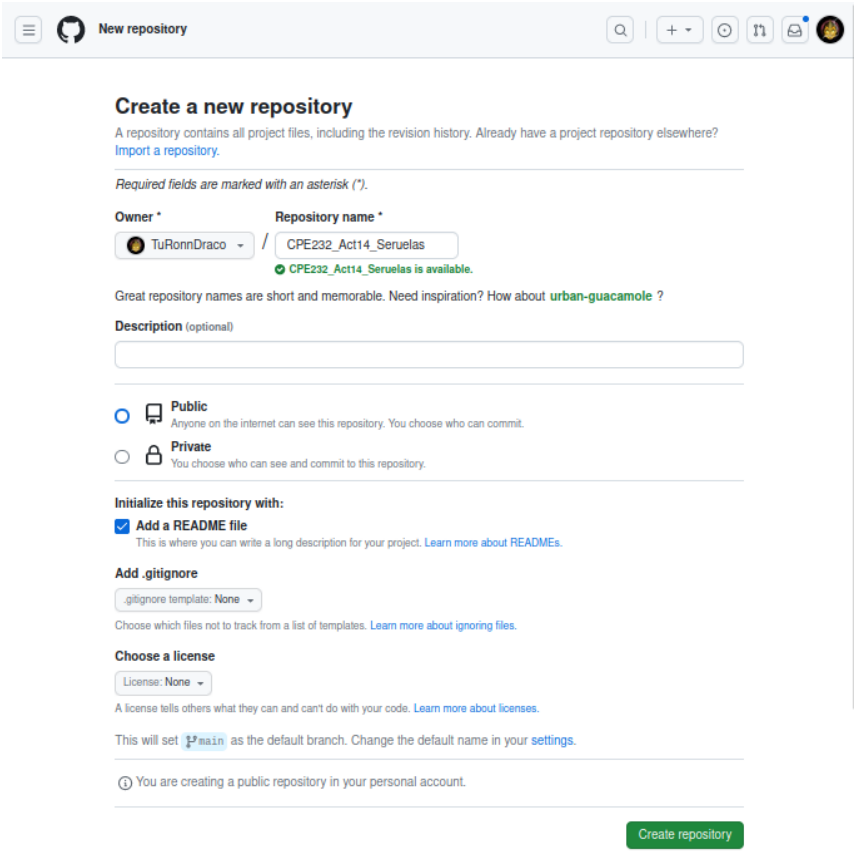


Figure 1.1 - Creation of Github Repository

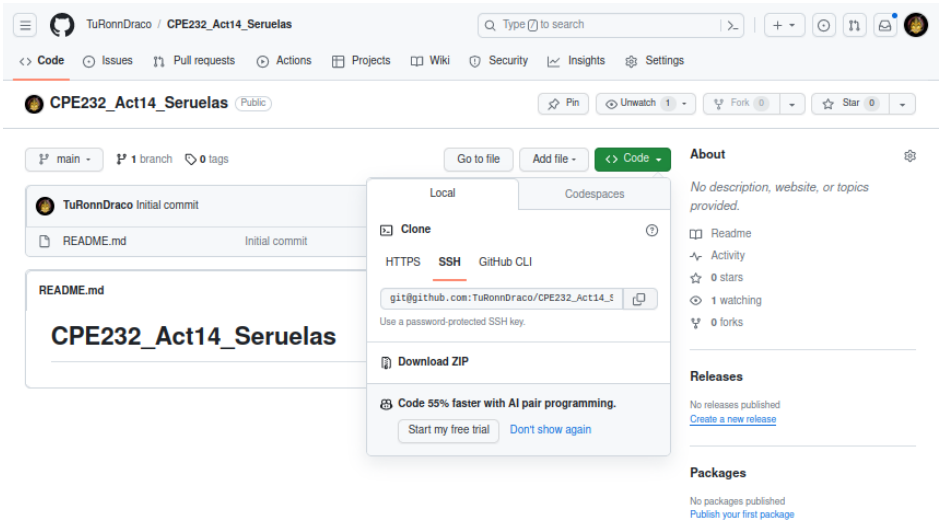


Figure 1.2 - Github Repository creation, with SSH KEY

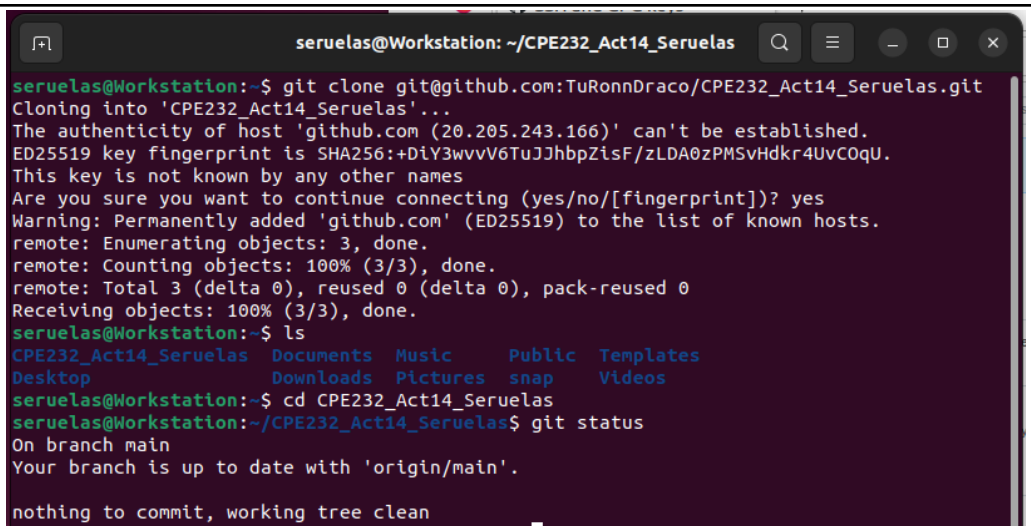


Figure 1.3 - Cloning of Github Repository to Local Workstation

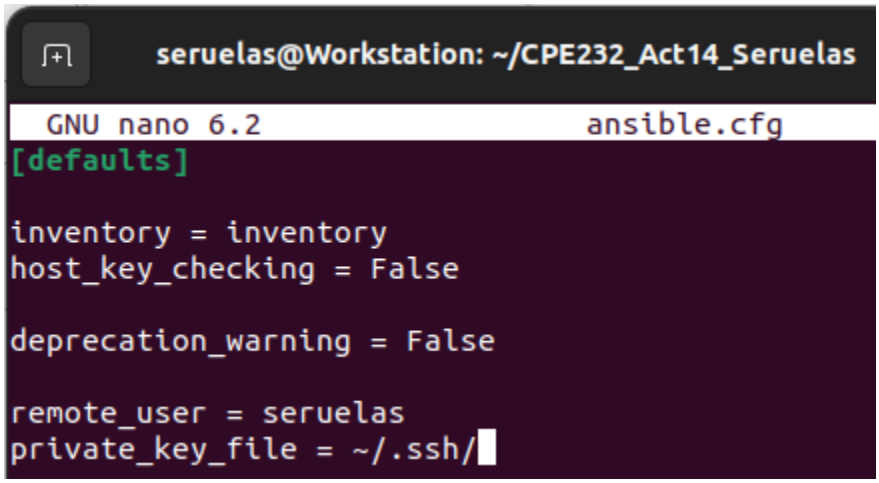


Figure 1.4 - Setting up of Ansible Configuration

2. Setup installation of Keystone, Glance, and Nova for Controller (Ubuntu)

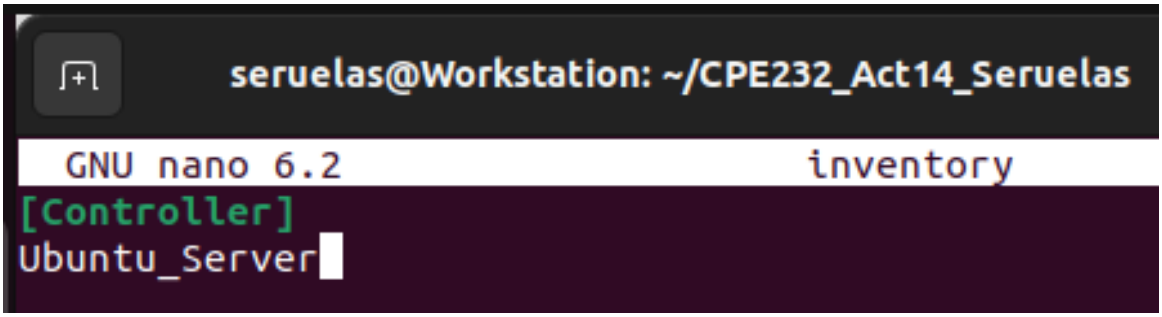


Figure 2.1 - Specification of Ubuntu_Server as Controller

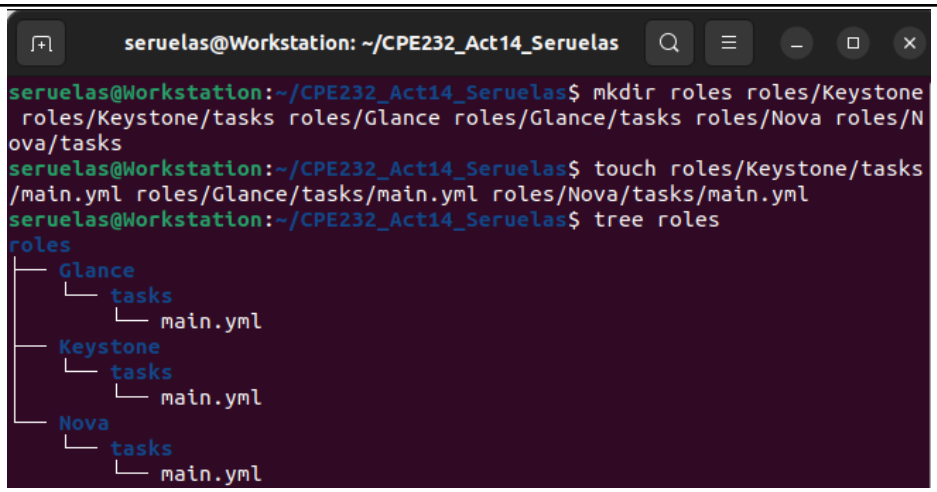


Figure 2.2 - Creation of roles for each installation of Controller

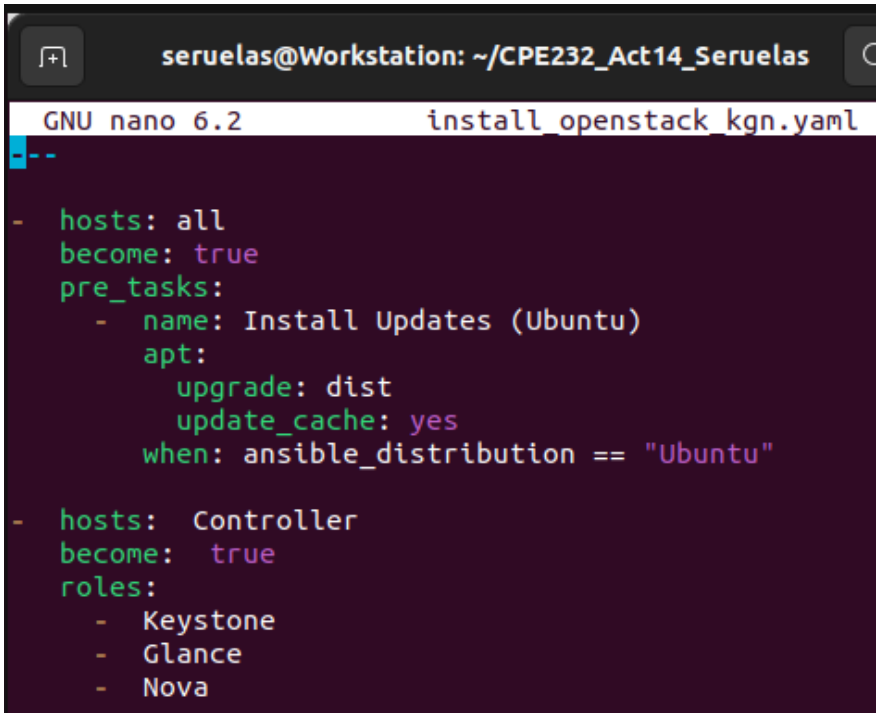


Figure 2.3 - Creation of Playbook with specified roles for Controller

3. Setup the roles for installation of KGN to Controller.

seruelas@Workstation: ~/CPE232_Act14_Seruelas

GNU nano 6.2 roles/Keystone/tasks/main.yml

```
- name: Install Keystone & Prerequisites
  apt:
    name:
      - keystone
      - apache2
      - libapache2-mod-wsgi-py3

- name: Configuring Keystone
  lineinfile:
    dest: /etc/keystone/keystone.conf
    insertafter: '\[database\]'
    regexp: 'connection = mysql+pymysql://keystone:KEYSTONE_DBPASS@controller/keystone'
    line: 'connection = mysql+pymysql://keystone:keystone_admin123@controller/keystone'

- name:  Populating the Keystone Database
  command:  sudo keystone-manage db_sync

- name:  Initialization of Fernet Key to Keystone
  shell:  |
    keystone-manage fernet_setup --keystone-user keystone --keystone-group keystone
    keystone-manage credential_setup --keystone-user keystone --keystone-group keystone

- name:  Configuring the Apache for Keystone Functionality
  lineinfile:
    dest: /etc/apache2/apache2.conf
    line: 'ServerName controller'
    state: present
    backup: yes

- name:  Configuration of Environmental Variables for an Administrative Account
  shell: |
    export OS_USERNAME=admin
    export OS_PASSWORD=ADMIN_PASS
    export OS_PROJECT_NAME=admin
    export OS_USER_DOMANI_NAME=Default
    export OS_PROJECT_DOMAIN_NAME=Default
    export OS_AUTH_URL=http://controller:5000/v3
    export OS_IDENTITY_API_VERSION=3
```

Figure 3.1 - Installation of Keystone

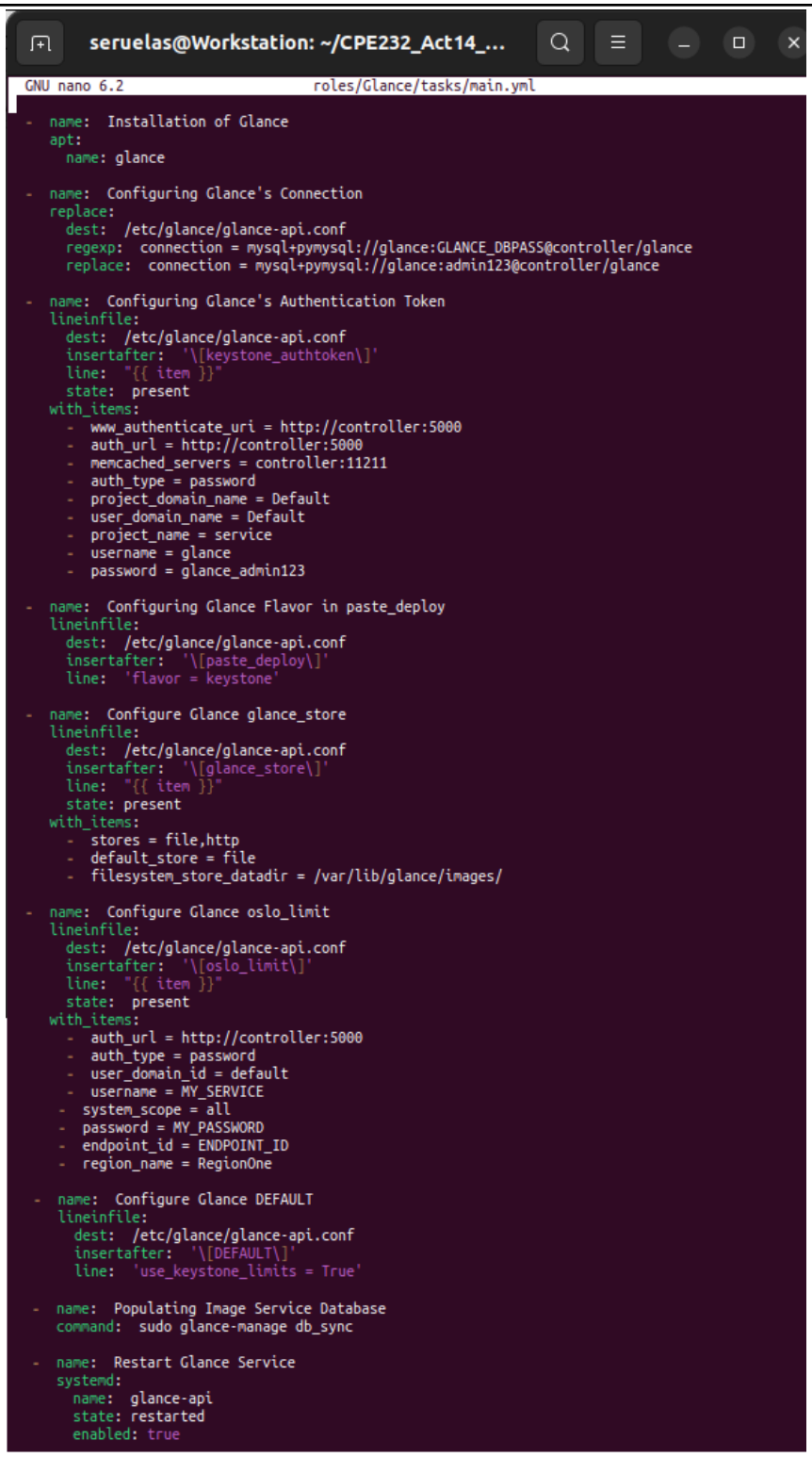
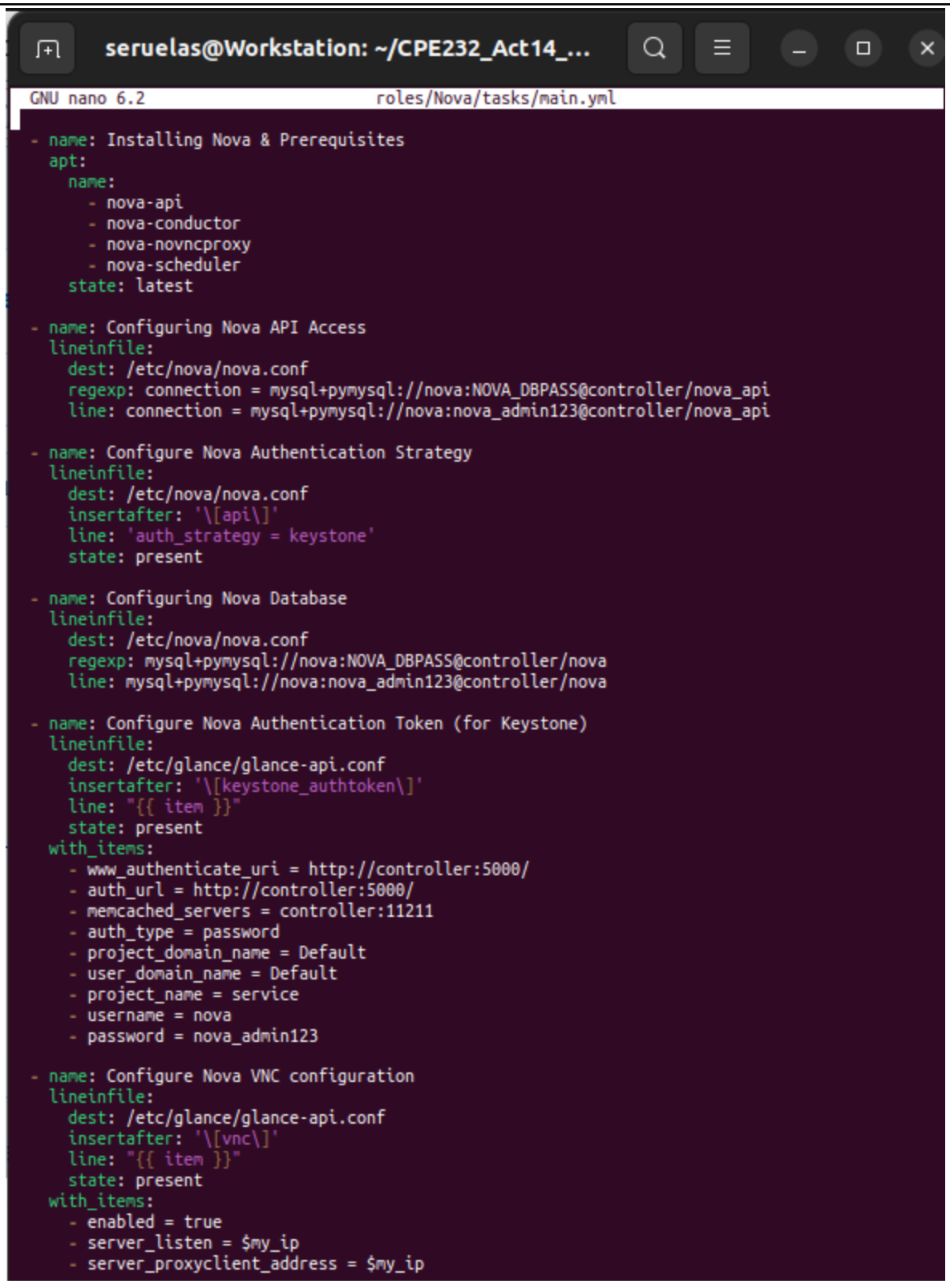


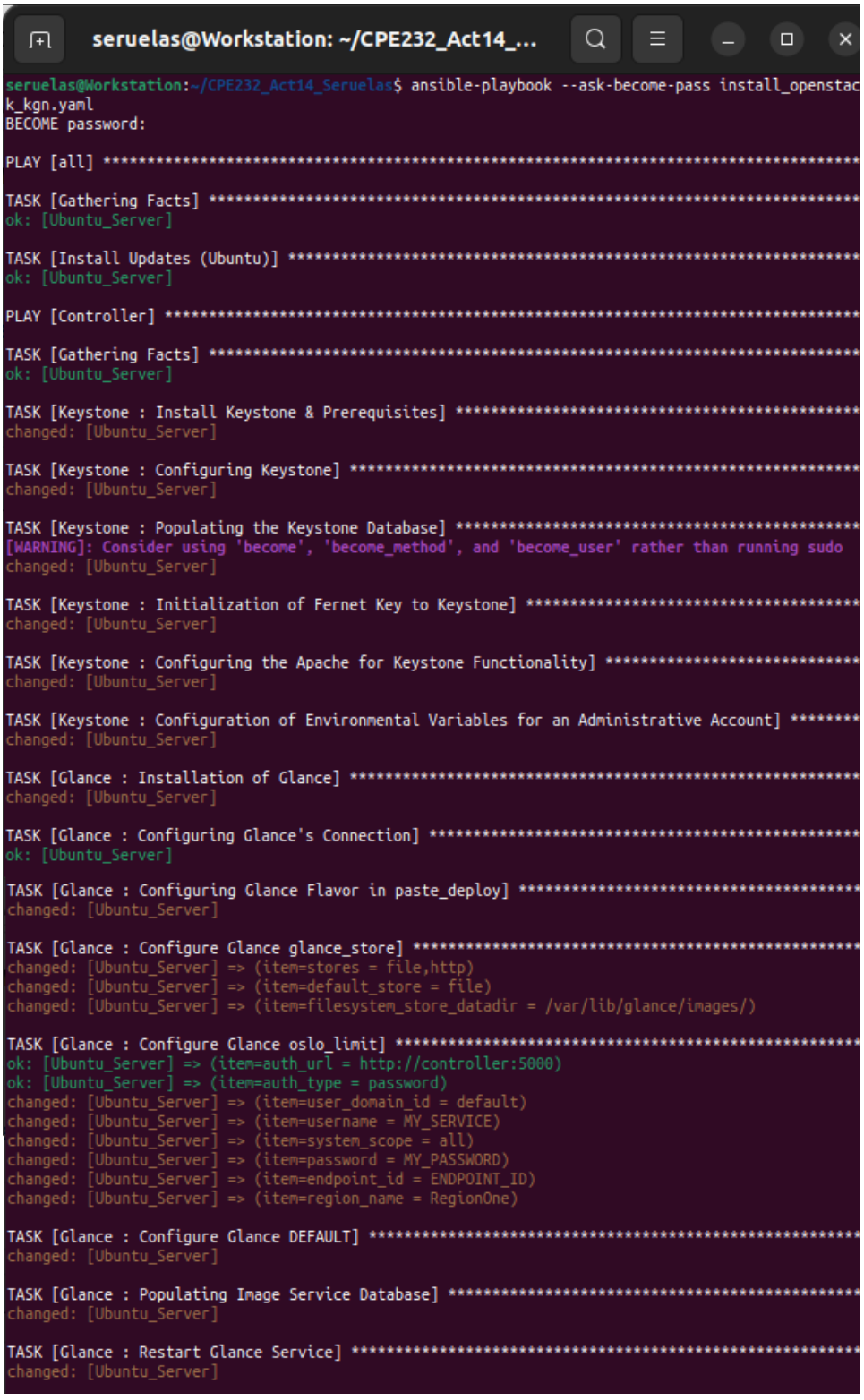
Figure 3.2 - Installation of Glance


seruelas@Workstation: ~/CPE232_Act14_...
GNU nano 6.2 roles/Nova/tasks/main.yml
- name: Installing Nova & Prerequisites
apt:
name:
- nova-api
- nova-conductor
- nova-novncproxy
- nova-scheduler
state: latest
- name: Configuring Nova API Access
lineinfile:
dest: /etc/nova/nova.conf
regexp: connection = mysql+pymysql://nova:NOVA_DBPASS@controller/nova_api
line: connection = mysql+pymysql://nova:nova_admin123@controller/nova_api
- name: Configure Nova Authentication Strategy
lineinfile:
dest: /etc/nova/nova.conf
insertafter: '\[api\]'
line: 'auth_strategy = keystone'
state: present
- name: Configuring Nova Database
lineinfile:
dest: /etc/nova/nova.conf
regexp: mysql+pymysql://nova:NOVA_DBPASS@controller/nova
line: mysql+pymysql://nova:nova_admin123@controller/nova
- name: Configure Nova Authentication Token (for Keystone)
lineinfile:
dest: /etc/glance/glance-api.conf
insertafter: '\[keystone_authtoken\]'
line: "{{ item }}"
state: present
with_items:
- www_authenticate_uri = http://controller:5000/
- auth_url = http://controller:5000/
- memcached_servers = controller:11211
- auth_type = password
- project_domain_name = Default
- user_domain_name = Default
- project_name = service
- username = nova
- password = nova_admin123
- name: Configure Nova VNC configuration
lineinfile:
dest: /etc/glance/glance-api.conf
insertafter: '\[vnc\]'
line: "{{ item }}"
state: present
with_items:
- enabled = true
- server_listen = $my_ip
- server_proxyclient_address = $my_ip

```
- name: Configure Nova placement configuration
  lineinfile:
    dest: /etc/glance/glance-api.conf
    insertafter: '\[placement\]'
    line: "{{ item }}"
    state: present
  with_items:
    - region_name = RegionOne
    - project_domain_name = Default
    - project_name = service
    - auth_type = password
    - user_domain_name = Default
    - auth_url = http://controller:5000/v3
    - username = placement
    - password = placement_admin123

- name: Configure DEFAULT configuration
  lineinfile:
    dest: /etc/nova/nova.conf
    line: 'my_ip = 10.0.0.11'
    state: present

- name: Configure Nova Glance
  lineinfile:
    dest: /etc/nova/nova.conf
    line: 'api_server = http://controller:9292'
    state: present

- name: Configure Nova olso_concurrency
  lineinfile:
    dest: /etc/nova/nova.conf
    line: 'lock_path = /var/lib/nova/tmp'
    state: present

- name: Population of Nova-API Database
  shell: sudo nova-manage api_db sync

- name: Registration of cell0 Database
  shell: sudo nova-manage cell_v2 map_cell0

- name: Repopulating Nova-API Database
  shell: sudo nova-manage db sync

- name: Verification of Nova-API
  shell: sudo nova-manage cell_v2 list_cells

- name: Restart Nova Services
  systemd:
    name: "{{ item }}"
    state: restarted
    enabled: true
  loop:
    - nova-api
    - nova-scheduler
    - nova-conductor
    - nova-novncproxy
```

Figure 3.3-4 - Installation of Nova

4. Install and Verify the Installations.



```
TASK [Nova : Installing Nova & Prerequisites] ***********************************************
changed: [Ubuntu_Server]

TASK [Nova : Configuring Nova API Access] ***************************************************
changed: [Ubuntu_Server]

TASK [Nova : Configure Nova Authentication Strategy] ****************************************
changed: [Ubuntu_Server]

TASK [Nova : Configuring Nova Database] *****************************************************
changed: [Ubuntu_Server]

TASK [Nova : Configure Nova Authentication Token (for Keystone)] ****************************
changed: [Ubuntu_Server] => (item=www_authenticate_uri = http://controller:5000/)
changed: [Ubuntu_Server] => (item=auth_url = http://controller:5000/)
ok: [Ubuntu_Server] => (item=memcached_servers = controller:11211)
ok: [Ubuntu_Server] => (item=auth_type = password)
ok: [Ubuntu_Server] => (item=project_domain_name = Default)
ok: [Ubuntu_Server] => (item=user_domain_name = Default)
ok: [Ubuntu_Server] => (item=project_name = service)
changed: [Ubuntu_Server] => (item=username = nova)
changed: [Ubuntu_Server] => (item=password = nova_admin123)

TASK [Nova : Configure Nova VNC configuration] **********************************************
changed: [Ubuntu_Server] => (item=enabled = true)
changed: [Ubuntu_Server] => (item=server_listen = $my_ip)
changed: [Ubuntu_Server] => (item=server_proxyclient_address = $my_ip)

TASK [Nova : Configure Nova placement configuration] ****************************************
ok: [Ubuntu_Server] => (item=region_name = RegionOne)
ok: [Ubuntu_Server] => (item=project_domain_name = Default)
ok: [Ubuntu_Server] => (item=project_name = service)
ok: [Ubuntu_Server] => (item=auth_type = password)
ok: [Ubuntu_Server] => (item=user_domain_name = Default)
changed: [Ubuntu_Server] => (item=auth_url = http://controller:5000/v3)
changed: [Ubuntu_Server] => (item=username = placement)
changed: [Ubuntu_Server] => (item=password = placement_admin123)

TASK [Nova : Configure DEFAULT configuration] ***********************************************
changed: [Ubuntu_Server]

TASK [Nova : Configure Nova Glance] *********************************************************
changed: [Ubuntu_Server]

TASK [Nova : Configure Nova olso_concurrency] ***********************************************
changed: [Ubuntu_Server]

TASK [Nova : Population of Nova-API Database] ***********************************************
changed: [Ubuntu_Server]

TASK [Nova : Registration of cell0 Database] ************************************************
changed: [Ubuntu_Server]

TASK [Nova : Repopulating Nova-API Database] ************************************************
changed: [Ubuntu_Server]

TASK [Nova : Verification of Nova-API] ******************************************************
changed: [Ubuntu_Server]

TASK [Nova : Restart Nova Services] *********************************************************
changed: [Ubuntu_Server] => (item=nova-api)
changed: [Ubuntu_Server] => (item=nova-scheduler)
changed: [Ubuntu_Server] => (item=nova-conductor)
changed: [Ubuntu_Server] => (item=nova-novncproxy)

PLAY RECAP **********************************************************************************
Ubuntu_Server              : ok=33   changed=29   unreachable=0    failed=0    skipped=0    rescu
ed=0    ignored=0
```

Figure 4.1-2 - Play Recap of Playbook

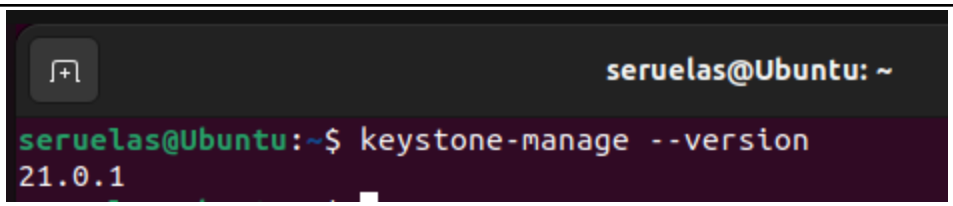


Figure 4.3 - Verification of Keystone through Version

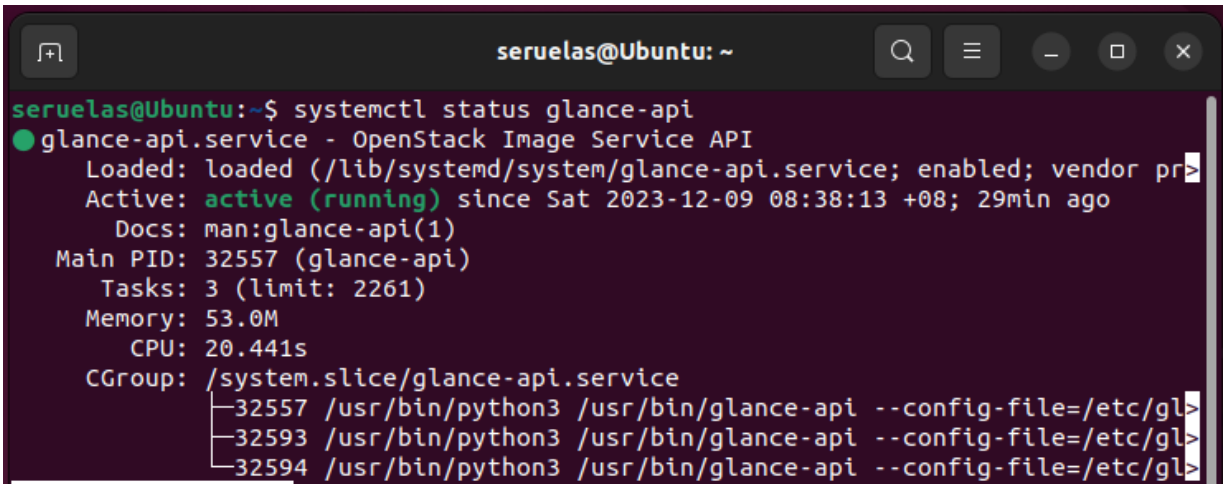
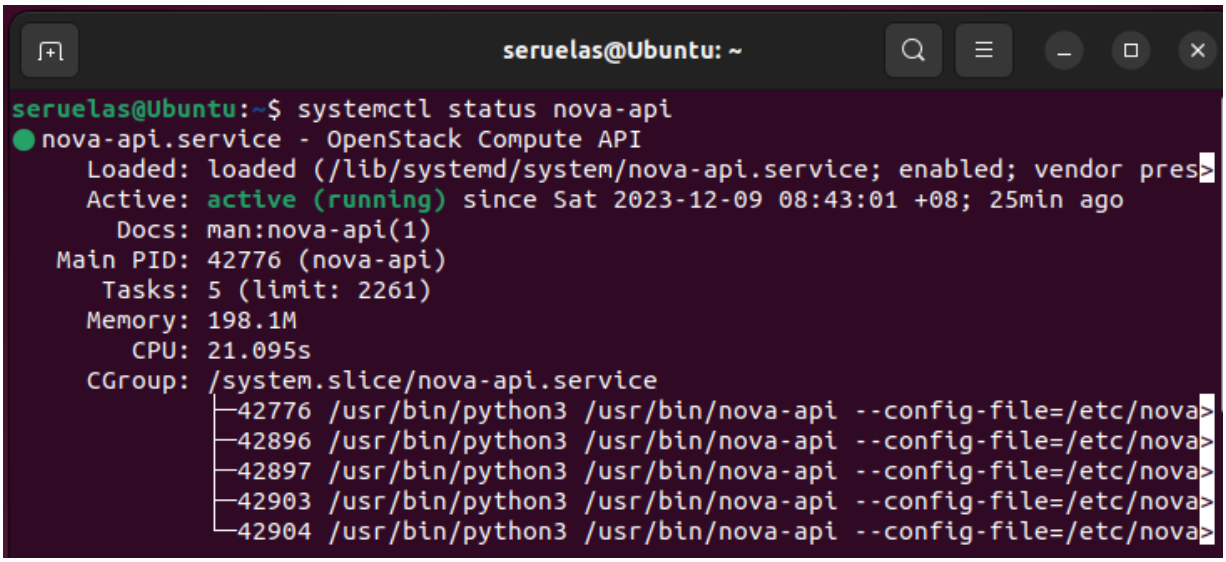


Figure 4.4 - Verification of Glance through SystemCTL



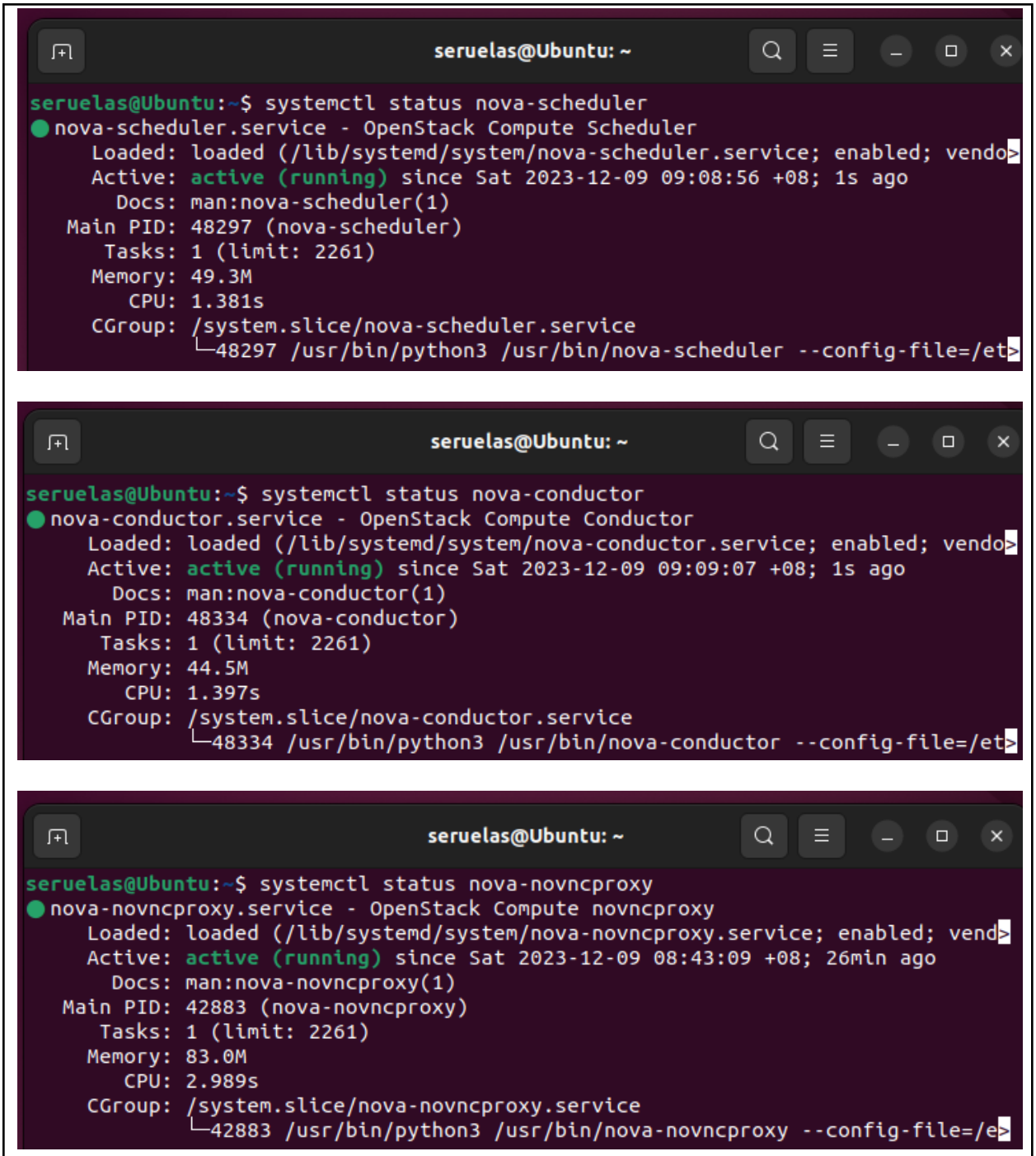


Figure 4.5-8 - Verification of Nova through SystemCTL

5. Push and Save all to the GitHub Repository.

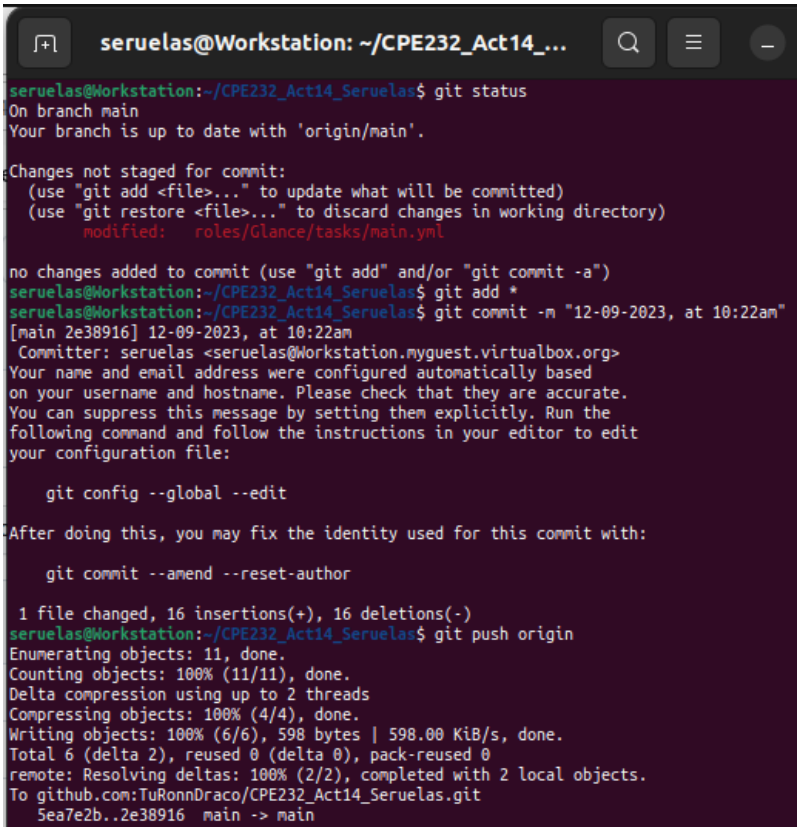


Figure 5.1 - Pushing the Local Repository to the GitHub Repository.

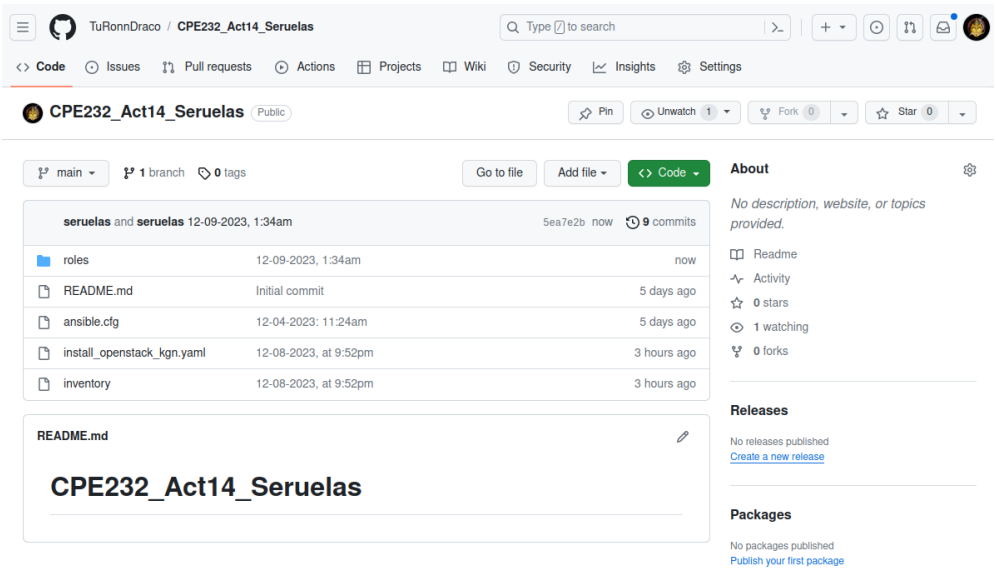


Figure 5.2 - GitHub Repository after Saving

https://github.com/TuRonnDraco/CPE232_Act14_Seruelas

Reflections:

Answer the following:

1. Describe Keystone, Glance and Nova services.
    - Keystone offers the administrators an API client authentication and service discovery, while Glance is a storage backend that uses an image service to contain and to host containerization, and Nova is a virtual server service allowing to contain and support different daemons, hosted by Openstack. Keystone, Glance, and Nova require the usage of MariaDB and configuration in order for it to properly work.

Conclusions:

In this activity, we were able to learn the importance of OpenStack and the services that OpenStack offers to an administrator. We learned that Keystone allows authentication, while Glance and Nova is used as a service to hold containerization or virtual services via image. To conclude this activity, we were able to install and to utilize the OpenStack Keystone, Glance and Nova in our Controller node.