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Course/Section: CPE31S24	**Date Submitted: 12/02/2022**
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Activity 13: OpenStack Prerequisite Installation

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. NTP
    b. OpenStack packages
    c. SQL Database
    d. Message Queue
    e. Memcached
    f. Etcd
    g. Create different plays in installing per server type (controller, compute etc.) and identify it as a group in Inventory file.
    h. Add, commit and push it to your GitHub repo.

5. Output (screenshots and explanations)

Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere?
Import a repository.

Owner * **Repository name** *

Bencitoo / Bencito_OpenStack

Great repository names are short and memorable. Need inspiration? How about **fluffy-octo-couscous**?

Description (optional)

Public
Anyone on the internet can see this repository. You choose who can commit.

Private
You choose who can see and commit to this repository.

Initialize this repository with:
Skip this step if you're importing an existing repository.

Add a README file
This is where you can write a long description for your project. Learn more.

Add .gitignore
Choose which files not to track from a list of templates. Learn more.

.gitignore template: None

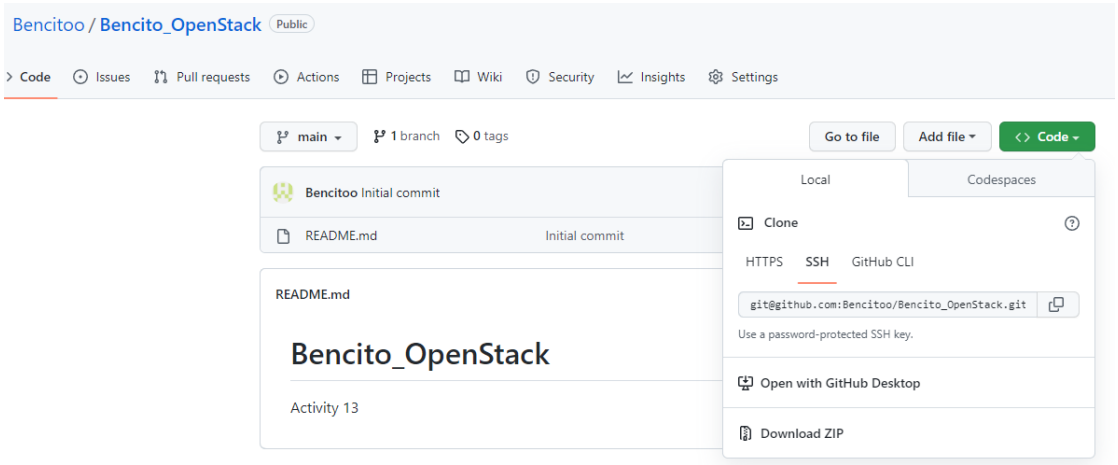
Choose a license
A license tells others what they can and can't do with your code. Learn more.

License: None

This will set `main` as the default branch. Change the default name in your settings.

You are creating a public repository in your personal account.

Create repository



```
bencito@workstation:~$ git clone git@github.com:Bencitoo/Bencito_Openstack.git
Cloning into 'Bencito_Openstack'...
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.
bencito@workstation:~$ cd Bencito_Openstack
bencito@workstation:~/Bencito_Openstack$
```

```
bencito@workstation:~/Bencito_Openstack$ nano inventory
bencito@workstation:~/Bencito_Openstack$ nano ansible.cfg
bencito@workstation:~/Bencito_Openstack$
```

```
  GNU nano 6.2                          inventory *
[controller]
192.168.56.101

[compute]
192.168.56.101
```

```
  GNU nano 6.2                          ansible.cfg *
[defaults]

inventory = inventory
Host_key_checking = False

deprecation_warnings = False
command_warnings = False

remote_user = bencito
private_key_file = /.ssh/
```

```
bencito@workstation:~/Bencito_Openstack$ ansible -m ping all
192.168.56.101 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "changed": false,
    "ping": "pong"
}
bencito@workstation:~/Bencito_Openstack$
```

It was successfully pinging the Control node and I make inside the repository the inventory and ansible.cfg

```
bencito@workstation:~/Bencito_Openstack$ mkdir roles
bencito@workstation:~/Bencito_Openstack$ cd roles
bencito@workstation:~/Bencito_Openstack/roles$ mkdir -p {NTP,OpenStack,SQL,Mess
ageQ,Memcached,etcd}/tasks
bencito@workstation:~/Bencito_Openstack/roles$ tree
.
├── etcd
│   └── tasks
├── Memcached
│   └── tasks
├── MessageQ
│   └── tasks
├── NTP
│   └── tasks
├── OpenStack
│   └── tasks
└── SQL
    └── tasks

12 directories, 0 files
bencito@workstation:~/Bencito_Openstack/roles$
```

It was successfully making the directories and have task inside per directory.

Main playbook Site.yml

```
  GNU nano 6.2                          site.yml *
---

- hosts: all
  become: true
  pre_tasks:

  -  name: Update Repository (Ubuntu)
     apt:
       upgrade: dist
       update_cache: yes
     changed_when: false
     when: ansible_distribution == "Ubuntu"

  -  name: Install Updates on Ubuntu
     tags: always
     apt:
       upgrade: dist
       update_cache: yes
     changed_when: false
     when: ansible_distriution == "Ubuntu"

- hosts: controller
  become: true
  roles:
    - OpenStack
```

```
- hosts: controller
  become: true
  roles:
    - OpenStack
    - NTP
    - SQL

- hosts: compute
  become: true
  roles:
    - MessageQ
    - Memcached
    - etcd

^G Help        ^O Write Out   ^W Where Is    ^K Cut         ^T Execute
^X Exit        ^R Read File   ^\ Replace     ^U Paste       ^J Justify
```

This is the main playbook that I run later with all the roles

Creating roles and playbook inside of it

```
bencito@workstation:~/Bencito_Openstack/roles$ cd NTP
bencito@workstation:~/Bencito_Openstack/roles/NTP$ cd tasks
bencito@workstation:~/Bencito_Openstack/roles/NTP/tasks$ nano main.yml
bencito@workstation:~/Bencito_Openstack/roles/NTP/tasks$ cd ..
bencito@workstation:~/Bencito_Openstack/roles/NTP$ cd ..
bencito@workstation:~/Bencito_Openstack/roles$ cd OpenStack
bencito@workstation:~/Bencito_Openstack/roles/OpenStack$ cd tasks
bencito@workstation:~/Bencito_Openstack/roles/OpenStack/tasks$ nano main.yml
bencito@workstation:~/Bencito_Openstack/roles/OpenStack/tasks$ cd ..
bencito@workstation:~/Bencito_Openstack/roles/OpenStack$ cd ..
bencito@workstation:~/Bencito_Openstack/roles$ cd SQL
bencito@workstation:~/Bencito_Openstack/roles/SQL$ cd tasks
bencito@workstation:~/Bencito_Openstack/roles/SQL/tasks$ nano main.yml
bencito@workstation:~/Bencito_Openstack/roles/SQL/tasks$ cd ..
bencito@workstation:~/Bencito_Openstack/roles/SQL$ cd ..
bencito@workstation:~/Bencito_Openstack/roles$ cd MessageQ
bencito@workstation:~/Bencito_Openstack/roles/MessageQ$ cd tasks
bencito@workstation:~/Bencito_Openstack/roles/MessageQ/tasks$ nano main.yml
bencito@workstation:~/Bencito_Openstack/roles/MessageQ/tasks$ cd ..
bencito@workstation:~/Bencito_Openstack/roles/MessageQ$ cd ..
bencito@workstation:~/Bencito_Openstack/roles$ cd Memcached
bencito@workstation:~/Bencito_Openstack/roles/Memcached$ cd tasks
bencito@workstation:~/Bencito_Openstack/roles/Memcached/tasks$ nano main.yml
bencito@workstation:~/Bencito_Openstack/roles/Memcached/tasks$ cd ..
bencito@workstation:~/Bencito_Openstack/roles/Memcached$ cd ..
bencito@workstation:~/Bencito_Openstack/roles$ cd etcd
bencito@workstation:~/Bencito_Openstack/roles/etcd$ cd tasks
bencito@workstation:~/Bencito_Openstack/roles/etcd/tasks$ nano main.yml
bencito@workstation:~/Bencito_Openstack/roles/etcd/tasks$
```

Creating the roles with the playbook code inside of it

Etcd

```
GNU nano 6.2                                main.yml *
- name: Install etcd on Ubuntu
  apt:
    name: etcd
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"

- name: Enable etcd on Ubuntu
  systemd:
    name: etcd
    enabled: yes
```

Memcached

```
GNU nano 6.2                                main.yml *
- name: Install Memcached on Ubuntu
  apt:
    name:
      - memcached
      - python3-memcache
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"

- name: Restart Memcached
  systemd:
    name: memcached
    state: restarted
```

Message Queue

```
GNU nano 6.2                                main.yml *
- name: Install Message Queue on Ubuntu
  apt:
    name: rabbitmq-server
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"
```

SQL

```
 GNU nano 6.2                          main.yml *
- name: Install SQL on Ubuntu
  apt:
    name:
      - mariadb-server
      - python3-pymysql
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"

- name: Edit mariadb file
  copy:
    content:
      default-storage-engine = innodb
      innodb_file_per_table = on
      max_connections = 4096
      collation-server = utf_general_ci
      character-set-server = utf8
    dest: /etc/mysql/mariadb.conf.d/99-openstack.cnf
    mode: "0755"

- name: Enable mariadb on Ubuntu
  systemd:
     name: mariadb
     enabled: yes
```

```
- name: Restart mariadb on Ubuntu
  systemd:
    name: mariadb
    state: restarted


^G Help        ^O Write Out   ^W Where Is    ^K Cut         ^T Execute
^X Exit        ^R Read File   ^\ Replace     ^U Paste       ^J Justify
```

OpenStack

```
 GNU nano 6.2                          main.yml *
- name: Install Openstack
  apt:
    name:
      - nova-compute
      - python3-openstackclient
    state: latest
    update_cache: yes
  when: ansible_distribution == "Ubuntu"
```

NTP

```
 GNU nano 6.2                                main.yml *
- name: Install Chrony on Ubuntu
  apt:
    name: Chrony
    state: latest
    update_cache: yes

- name: Start Chrony on Ubuntu
  systemd:
    name: Chrony
    state: started

- name: Enable Chrony on Ubuntu
  systemd:
    name: Chrony
    enabled: yes
```

The code was from the given installation guide.

Running Playbook

```
bencito@workstation:~/Bencito_Openstack$ ansible-playbook --ask-become-pass sit
e.yml
BECOME password:

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

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.101]

TASK [Update Repository (Ubuntu)] **********************************************
*
ok: [192.168.56.101]

TASK [Install Updates on Ubuntu] ***********************************************
*
ok: [192.168.56.101]

PLAY [controller] **************************************************************
*

TASK [Gathering Facts] *********************************************************
*
ok: [192.168.56.101]

TASK [OpenStack : Install Openstack] *******************************************
*
changed: [192.168.56.101]
```

```
TASK [NTP : Install Chrony on Ubuntu] ***************************************
*
changed: [192.168.56.101]

TASK [NTP : Start Chrony on Ubuntu] *****************************************
*
ok: [192.168.56.101]

TASK [NTP : Enable Chrony on Ubuntu] ****************************************
*
ok: [192.168.56.101]

TASK [SQL : Install SQL on Ubuntu] ******************************************
*
changed: [192.168.56.101]

TASK [SQL : Edit mariadb file] **********************************************
*
changed: [192.168.56.101]

TASK [SQL : Enable mariadb on Ubuntu] ***************************************
*
ok: [192.168.56.101]

TASK [SQL : Restart mariadb on Ubuntu] **************************************
*
changed: [192.168.56.101]
```

```
PLAY [compute] **************************************************************
*

TASK [Gathering Facts] ******************************************************
*
ok: [192.168.56.101]

TASK [MessageQ : Install Message Queue on Ubuntu] ***************************
*
changed: [192.168.56.101]

TASK [Memcached : Install Memcached on Ubuntu] ******************************
*
changed: [192.168.56.101]

TASK [Memcached : Restart Memcached] ****************************************
*
changed: [192.168.56.101]

TASK [etcd : Install etcd on Ubuntu] ****************************************
*
changed: [192.168.56.101]

TASK [etcd : Enable etcd on Ubuntu] *****************************************
*
ok: [192.168.56.101]

PLAY RECAP ******************************************************************
*
```

```
PLAY RECAP ******************************************************************
*
192.168.56.101             : ok=18   changed=8    unreachable=0    failed=0
skipped=0    rescued=0    ignored=0

bencito@workstation:~/Bencito_Openstack$
```

It was successfully run without error.

OUTPUT

[Controller]

OpenStack

```
bencito@Server1:~$ systemctl status nova-compute.service
● nova-compute.service - OpenStack Compute
     Loaded: loaded (/lib/systemd/system/nova-compute.service; enabled; vendor>
     Active: active (running) since Fri 2022-12-02 14:25:07 PST; 15min ago
   Main PID: 20403 (nova-compute)
      Tasks: 2 (limit: 1640)
     Memory: 109.8M
        CPU: 7.225s
     CGroup: /system.slice/nova-compute.service
             └─20403 /usr/bin/python3 /usr/bin/nova-compute --config-file=/etc>

Dec 02 14:25:07 Server1 systemd[1]: Started OpenStack Compute.
Dec 02 14:25:25 Server1 nova-compute[20403]: Modules with known eventlet monke>
lines 1-12/12 (END)
```

NTP

```
bencito@Server1:~$ systemctl status chrony
● chrony.service - chrony, an NTP client/server
     Loaded: loaded (/lib/systemd/system/chrony.service; enabled; vendor prese>
     Active: active (running) since Fri 2022-12-02 14:29:27 PST; 9min ago
       Docs: man:chronyd(8)
             man:chronyc(1)
             man:chrony.conf(5)
   Main PID: 22561 (chronyd)
      Tasks: 2 (limit: 1640)
     Memory: 1.2M
        CPU: 188ms
     CGroup: /system.slice/chrony.service
             ├─22561 /usr/sbin/chronyd -F 1
             └─22562 /usr/sbin/chronyd -F 1

Dec 02 14:29:27 Server1 systemd[1]: Starting chrony, an NTP client/server...
Dec 02 14:29:27 Server1 chronyd[22561]: chronyd version 4.2 starting (+CMDMON >
Dec 02 14:29:27 Server1 chronyd[22561]: Initial frequency 1.153 ppm
Dec 02 14:29:27 Server1 chronyd[22561]: Using right/UTC timezone to obtain lea>
Dec 02 14:29:27 Server1 chronyd[22561]: Loaded seccomp filter (level 1)
Dec 02 14:29:27 Server1 systemd[1]: Started chrony, an NTP client/server.
Dec 02 14:29:34 Server1 chronyd[22561]: Selected source 185.125.190.56 (ntp.ub>
Dec 02 14:29:34 Server1 chronyd[22561]: System clock TAI offset set to 37 seco>
Dec 02 14:30:02 Server1 chronyd[22561]: Selected source 162.159.200.123 (1.ubu>
Dec 02 14:30:40 Server1 chronyd[22561]: Source 185.125.190.57 replaced with 91>
lines 1-24/24 (END)
```

SQL

```
bencito@Server1:~$ systemctl status  mariadb.service
● mariadb.service - MariaDB 10.6.11 database server
     Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pres>
     Active: active (running) since Fri 2022-12-02 14:30:32 PST; 12min ago
       Docs: man:mariadbd(8)
             https://mariadb.com/kb/en/library/systemd/
   Main PID: 23697 (mariadbd)
     Status: "Taking your SQL requests now..."
      Tasks: 7 (limit: 1640)
     Memory: 62.0M
        CPU: 1.007s
     CGroup: /system.slice/mariadb.service
             └─23697 /usr/sbin/mariadbd

Dec 02 14:30:32 Server1 systemd[1]: Started MariaDB 10.6.11 database server.
```

[Compute]

Message Queue

```
bencito@Server1:~$ systemctl status rabbitmq-server.service
● rabbitmq-server.service - RabbitMQ Messaging Server
     Loaded: loaded (/lib/systemd/system/rabbitmq-server.service; enabled; ven>
     Active: active (running) since Fri 2022-12-02 14:33:38 PST; 11min ago
   Main PID: 24497 (beam.smp)
      Tasks: 21 (limit: 1640)
     Memory: 79.0M
        CPU: 18.145s
     CGroup: /system.slice/rabbitmq-server.service
             ├─24497 /usr/lib/erlang/erts-12.2.1/bin/beam.smp -W w -MBas ageff>
             ├─24508 erl_child_setup 65536
             ├─24555 inet_gethost 4
             └─24556 inet_gethost 4

Dec 02 14:33:23 Server1 systemd[1]: Starting RabbitMQ Messaging Server...
Dec 02 14:33:38 Server1 systemd[1]: Started RabbitMQ Messaging Server.

[4]+  Stopped                 systemctl status rabbitmq-server.service
bencito@Server1:~$
```

Memcached

```
bencito@Server1:~$ systemctl status memcached.service
● memcached.service - memcached daemon
     Loaded: loaded (/lib/systemd/system/memcached.service; enabled; vendor pr>
     Active: active (running) since Fri 2022-12-02 14:34:14 PST; 12min ago
       Docs: man:memcached(1)
   Main PID: 25189 (memcached)
      Tasks: 10 (limit: 1640)
     Memory: 2.0M
        CPU: 394ms
     CGroup: /system.slice/memcached.service
             └─25189 /usr/bin/memcached -m 64 -p 11211 -u memcache -l 127.0.0.>

Dec 02 14:34:14 Server1 systemd[1]: memcached.service: Deactivated successfull>
Dec 02 14:34:14 Server1 systemd[1]: Stopped memcached daemon.
Dec 02 14:34:14 Server1 systemd[1]: Started memcached daemon.

[5]+  Stopped                 systemctl status memcached.service
bencito@Server1:~$
```

Etcd

```
bencito@Server1:~$ systemctl status etcd
● etcd.service - etcd - highly-available key value store
     Loaded: loaded (/lib/systemd/system/etcd.service; enabled; vendor preset:>
     Active: active (running) since Fri 2022-12-02 14:35:11 PST; 12min ago
       Docs: https://etcd.io/docs
             man:etcd
   Main PID: 25720 (etcd)
      Tasks: 8 (limit: 1640)
     Memory: 5.8M
        CPU: 3.374s
     CGroup: /system.slice/etcd.service
             └─25720 /usr/bin/etcd

Dec 02 14:35:11 Server1 etcd[25720]: 8e9e05c52164694d received MsgVoteResp fro>
Dec 02 14:35:11 Server1 etcd[25720]: 8e9e05c52164694d became leader at term 2
Dec 02 14:35:11 Server1 etcd[25720]: raft.node: 8e9e05c52164694d elected leade>
Dec 02 14:35:11 Server1 etcd[25720]: setting up the initial cluster version to>
Dec 02 14:35:11 Server1 etcd[25720]: published {Name:Server1 ClientURLs:[http:>
Dec 02 14:35:11 Server1 etcd[25720]: ready to serve client requests
Dec 02 14:35:11 Server1 etcd[25720]: serving insecure client requests on 127.0>
Dec 02 14:35:11 Server1 systemd[1]: Started etcd - highly-available key value >
Dec 02 14:35:11 Server1 etcd[25720]: set the initial cluster version to 3.3
Dec 02 14:35:11 Server1 etcd[25720]: enabled capabilities for version 3.3

[6]+  Stopped                 systemctl status etcd
bencito@Server1:~$
```

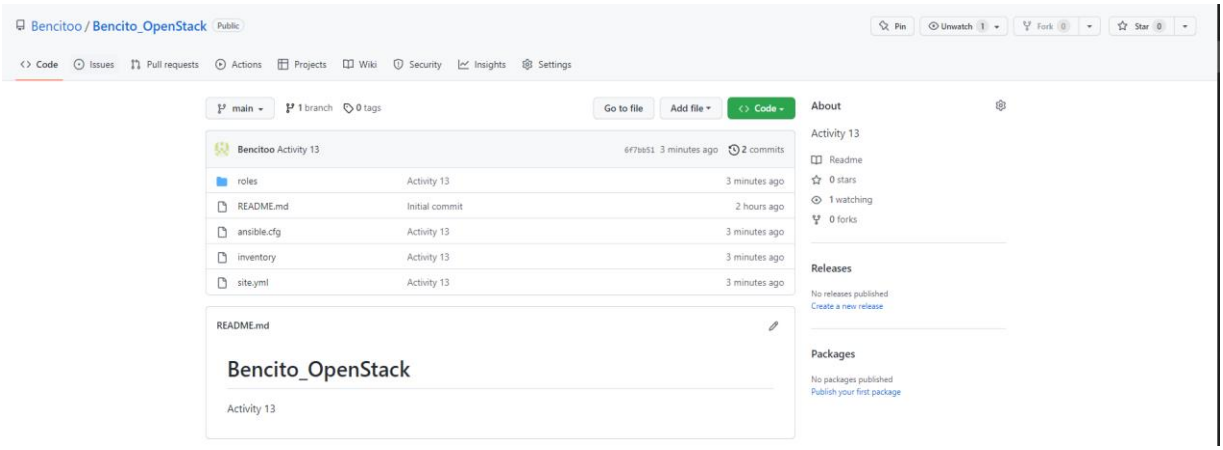
It was successfully installed on my control node.

Pushing to Github Repository

```
bencito@workstation:~/Bencito_Openstack$ git add inventory
bencito@workstation:~/Bencito_Openstack$ git add ansible.cfg
bencito@workstation:~/Bencito_Openstack$ git add site.yml
bencito@workstation:~/Bencito_Openstack$ git add /roles
fatal: /roles: '/roles' is outside repository at '/home/bencito/Bencito_Opensta
ck'
bencito@workstation:~/Bencito_Openstack$ git add roles/
bencito@workstation:~/Bencito_Openstack$ git commit -m "Activity 13"
[main 6f7bb51] Activity 13
 9 files changed, 131 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 inventory
 create mode 100644 roles/Memcached/tasks/main.yml
 create mode 100644 roles/MessageQ/tasks/main.yml
 create mode 100644 roles/NTP/tasks/main.yml
 create mode 100644 roles/OpenStack/tasks/main.yml
 create mode 100644 roles/SQL/tasks/main.yml
 create mode 100644 roles/etcd/tasks/main.yml
 create mode 100644 site.yml
bencito@workstation:~/Bencito_Openstack$ git push
Enumerating objects: 25, done.
Counting objects: 100% (25/25), done.
Compressing objects: 100% (12/12), done.
Writing objects: 100% (24/24), 2.36 KiB | 134.00 KiB/s, done.
Total 24 (delta 2), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (2/2), done.
remote: This repository moved. Please use the new location:
remote:   git@github.com:Bencitoo/Bencito_OpenStack.git
To github.com:Bencitoo/Bencito_Openstack.git
```

```
bencito@workstation:~/Bencito_Openstack$ git push
Enumerating objects: 25, done.
Counting objects: 100% (25/25), done.
Compressing objects: 100% (12/12), done.
Writing objects: 100% (24/24), 2.36 KiB | 134.00 KiB/s, done.
Total 24 (delta 2), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (2/2), done.
remote: This repository moved. Please use the new location:
remote:   git@github.com:Bencitoo/Bencito_OpenStack.git
To github.com:Bencitoo/Bencito_Openstack.git
   7362723..6f7bb51  main -> main
bencito@workstation:~/Bencito_Openstack$ git status
On branch main
Your branch is up to date with 'origin/main'.

nothing to commit, working tree clean
bencito@workstation:~/Bencito_Openstack$
```



Reflections:

Answer the following:

1. What are the benefits of implementing OpenStack?

   The benefits of having an OpenStack on a company, is you can easily scalability of clouding hosting, can easy automation and fast development. Also, OpenStack has a control panel that provides easy access to power management tools.

Conclusions:

In this activity, I learned that how to install the Open Stack and Packages using ansible playbook. I follow to given guide on how to install it and after that, I don't have encounter errors. You just need to update the ubuntu and have a higher storage to run it. When I finished, I check on my control node and it was successful.