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Course/Section:CPE 212-CPE31S2	Date Submitted:11/13/2024
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Activity 11: Containerization

1. Objectives

Create a Dockerfile and form a workflow using Ansible as Infrastructure as Code (IaC) to enable Continuous Delivery process

2. Discussion

Docker is an open platform for developing, shipping, and running applications. Docker enables you to separate your applications from your infrastructure so you can deliver software quickly. With Docker, you can manage your infrastructure in the same ways you manage your applications. By taking advantage of Docker's methodologies for shipping, testing, and deploying code quickly, you can significantly reduce the delay between writing code and running it in production.

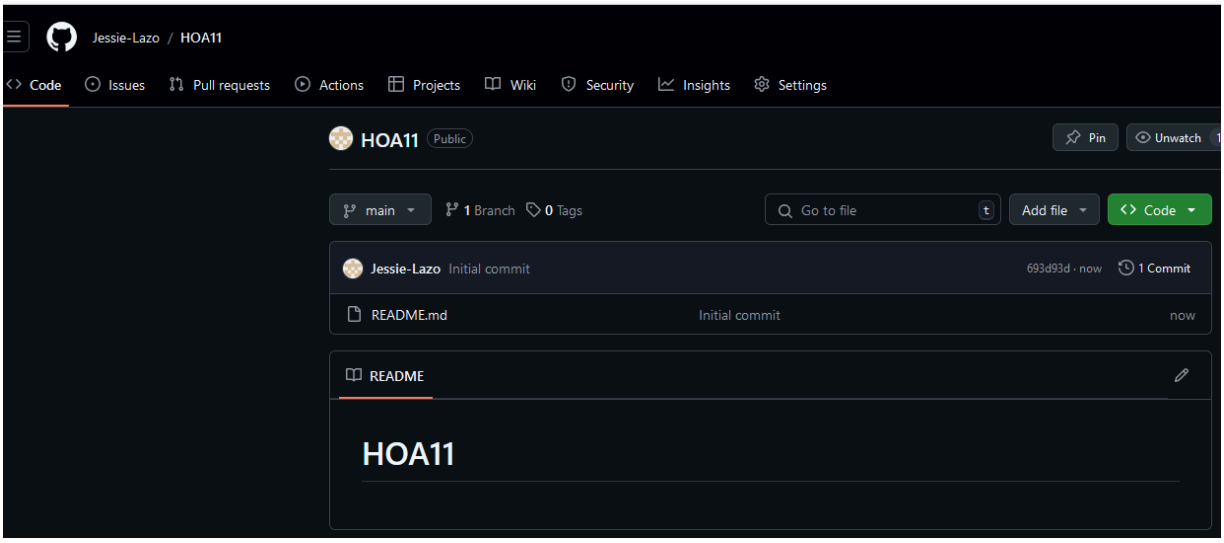
Source: https://docs.docker.com/get-started/overview/

You may also check the difference between containers and virtual machines. Click the link given below.

Source: https://docs.microsoft.com/en-us/virtualization/windowscontainers/about/containers-vs-vm

3. Tasks

1. Create a new repository for this activity.



```
jessielazo@Desktop:~$ git clone https://github.com/Jessie-Lazo/HOA11.git
Cloning into 'HOA11'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
Unpacking objects: 100% (3/3), done.
jessielazo@Desktop:~$
```

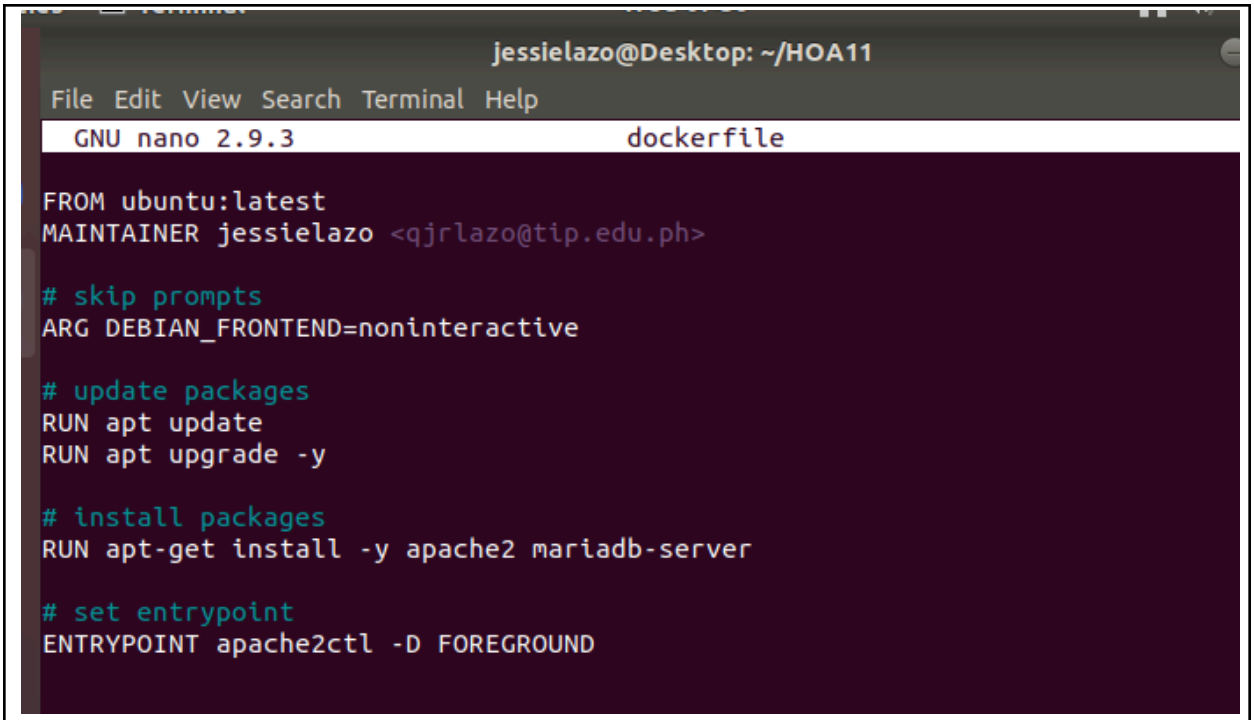
2. Install Docker and enable the docker socket.

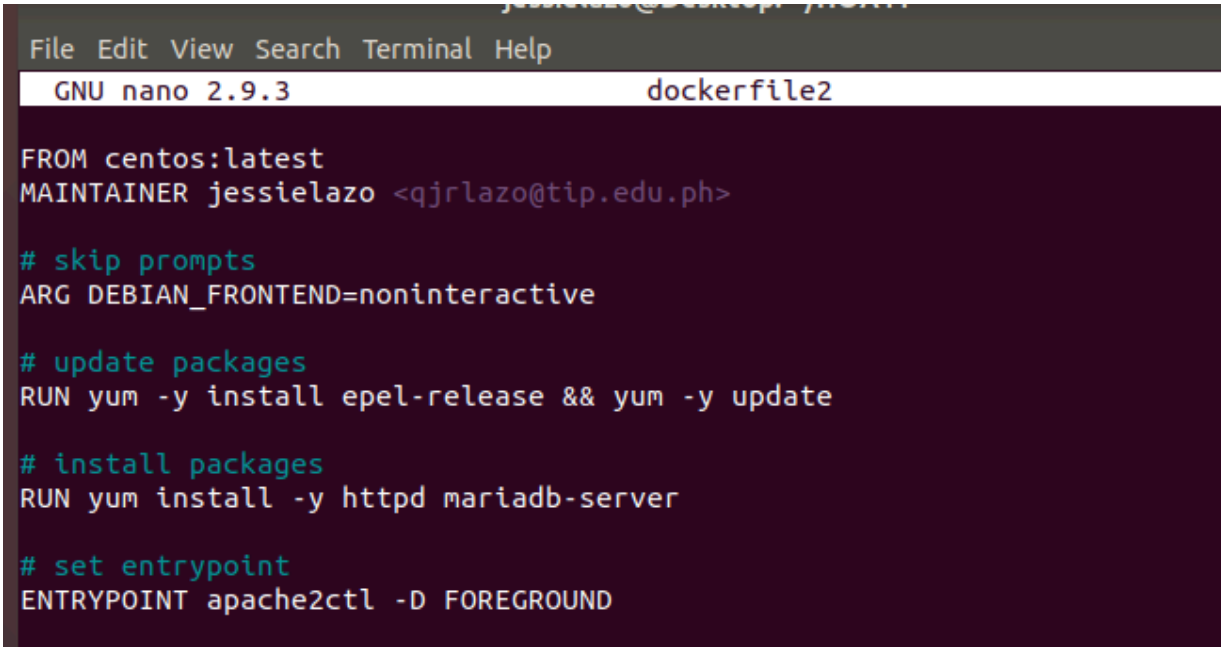
```
jessielazo@Desktop:~$ sudo apt install docker.io
Reading package lists... Done
Building dependency tree
Reading state information... Done
Some packages could not be installed. This may mean that you have
requested an impossible situation or if you are using the unstable
distribution that some required packages have not yet been created
or been moved out of Incoming.
The following information may help to resolve the situation:

The following packages have unmet dependencies:
 docker.io : Depends: containerd (>= 1.2.6-0ubuntu1~)
E: Unable to correct problems, you have held broken packages.
jessielazo@Desktop:~$ sudo systemctl enable docker
Synchronizing state of docker.service with SysV service script with /lib/system
d/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable docker
jessielazo@Desktop:~$ sudo systemctl restart docker
jessielazo@Desktop:~$
```

3. Add to Docker group to your current user.

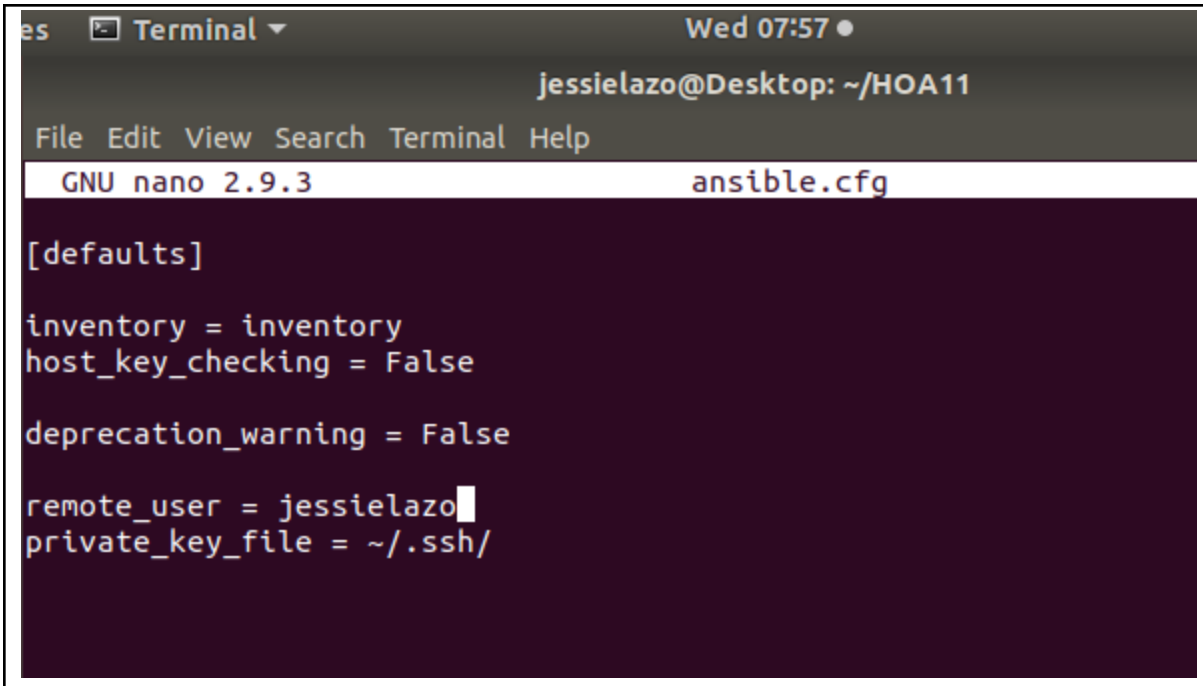
```
jessielazo@Desktop:~$ sudo usermod -aG docker jessielazo
jessielazo@Desktop:~$ sudo systemctl restart docker
jessielazo@Desktop:~$
```

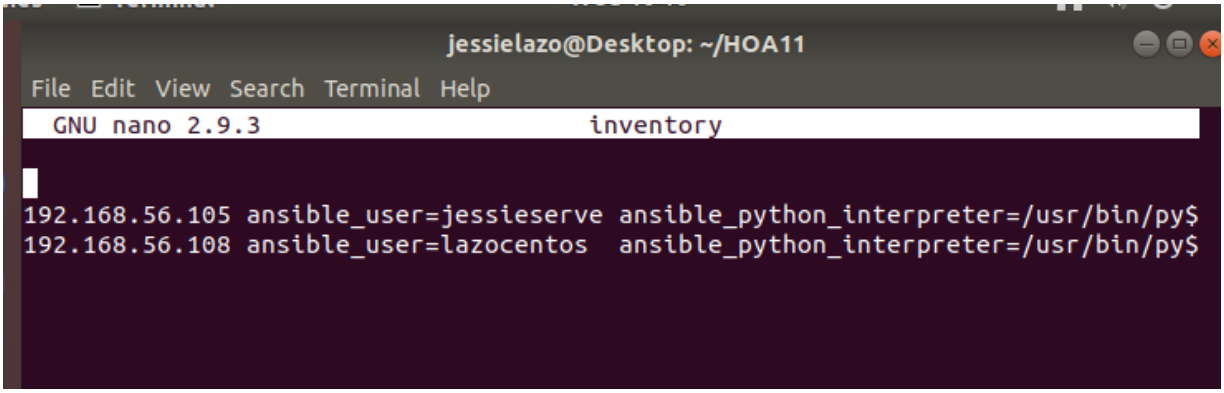
4. Create a Dockerfile to install web and DB server.

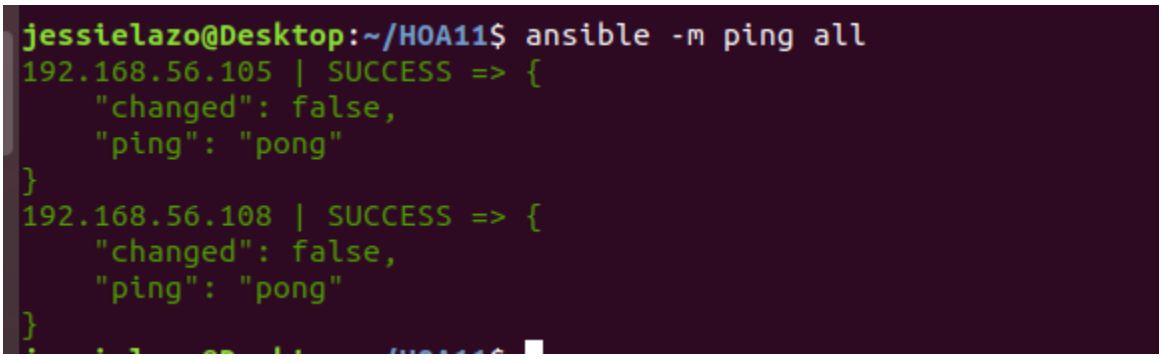


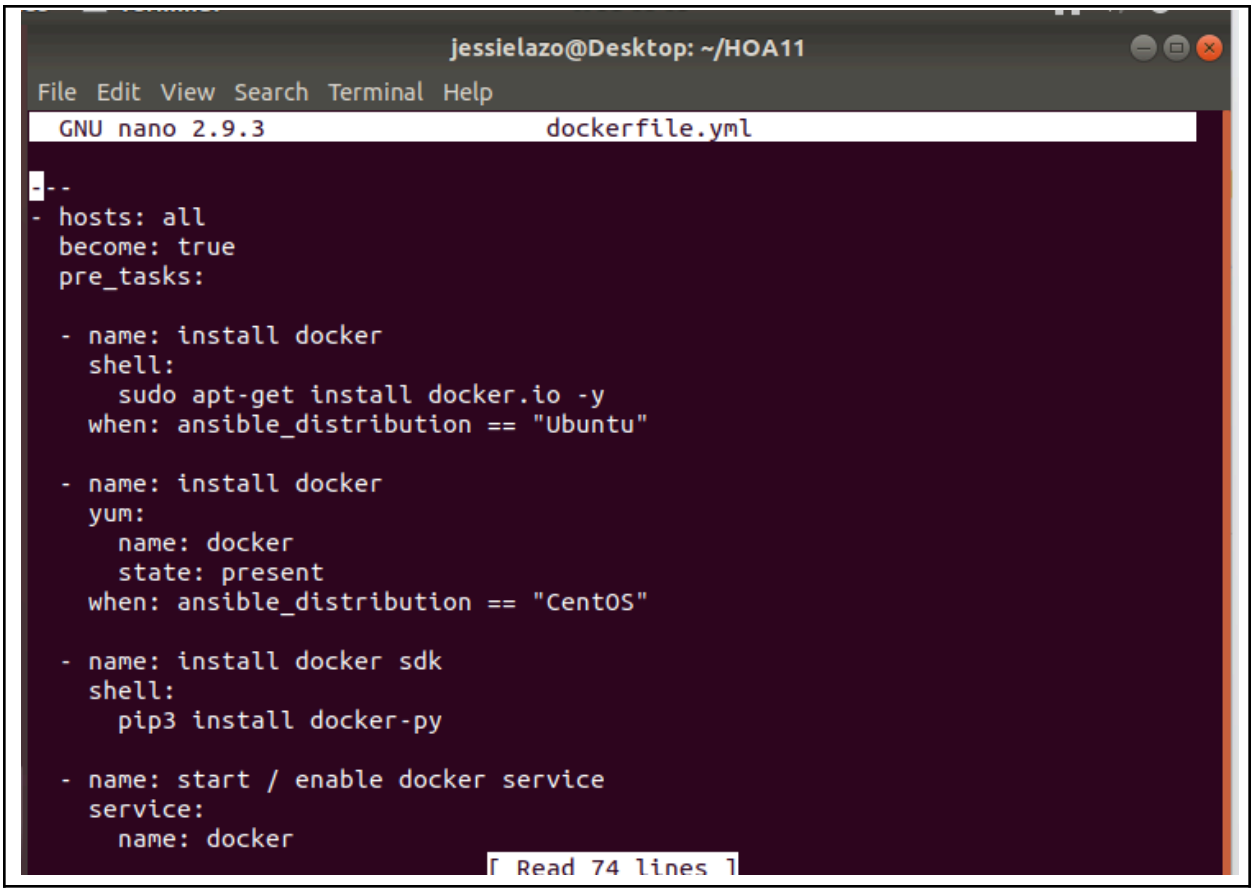


5. Install and build the Dockerfile using Ansible.

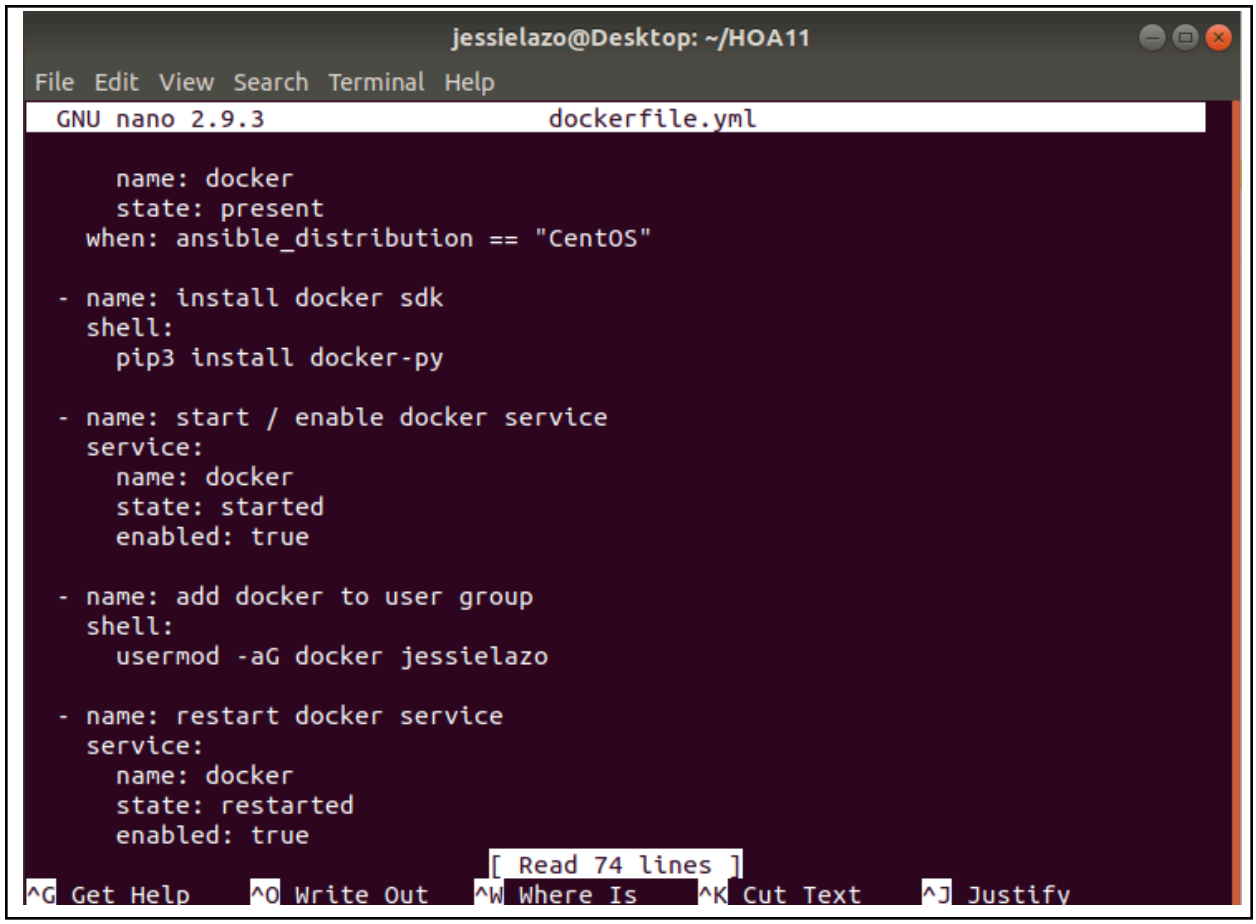

es
Terminal
Wed 07:57
jessielazo@Desktop: ~/HOA11
File Edit View Search Terminal Help
GNU nano 2.9.3 ansible.cfg
[defaults]
inventory = inventory
host_key_checking = False
deprecation_warning = False
remote_user = jessielazo
private_key_file = ~/.ssh/

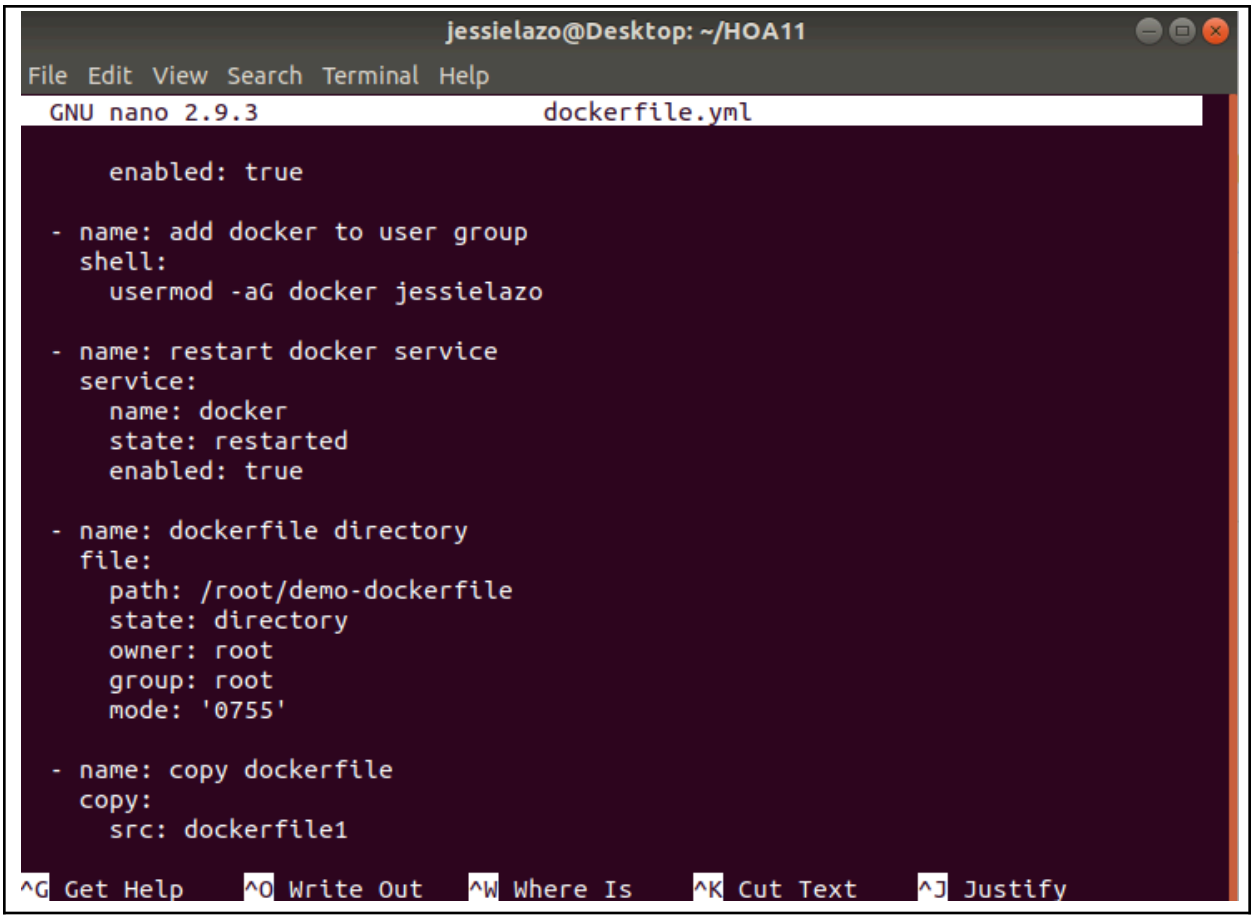

jessielazo@Desktop: ~/HOA11
File Edit View Search Terminal Help
GNU nano 2.9.3 inventory
192.168.56.105 ansible_user=jessieserve ansible_python_interpreter=/usr/bin/py$
192.168.56.108 ansible_user=lazocentos ansible_python_interpreter=/usr/bin/py$

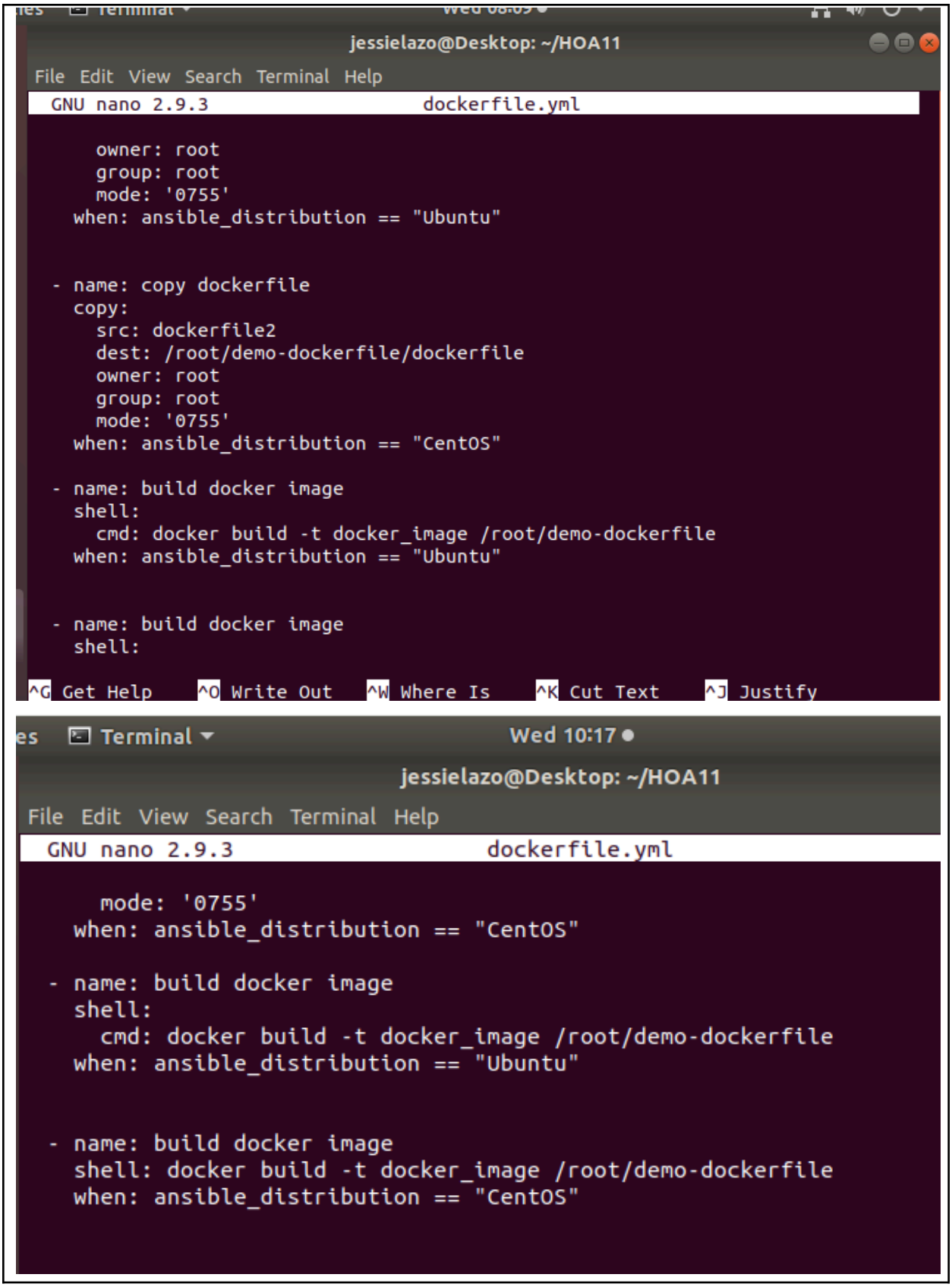

jessielazo@Desktop:~/HOA11$ ansible -m ping all
192.168.56.105 | SUCCESS => {
"changed": false,
"ping": "pong"
}
192.168.56.108 | SUCCESS => {
"changed": false,
"ping": "pong"
}


jessielazo@Desktop: ~/HOA11
File Edit View Search Terminal Help
GNU nano 2.9.3 dockerfile.yml

- hosts: all
become: true
pre_tasks:
- name: install docker
shell:
sudo apt-get install docker.io -y
when: ansible_distribution == "Ubuntu"
- name: install docker
yum:
name: docker
state: present
when: ansible_distribution == "CentOS"
- name: install docker sdk
shell:
pip3 install docker-py
- name: start / enable docker service
service:
name: docker
[Read 74 lines]


jessielazo@Desktop: ~/HOA11
File Edit View Search Terminal Help
GNU nano 2.9.3 dockerfile.yml
name: docker
state: present
when: ansible_distribution == "CentOS"
- name: install docker sdk
shell:
pip3 install docker-py
- name: start / enable docker service
service:
name: docker
state: started
enabled: true
- name: add docker to user group
shell:
usermod -aG docker jessielazo
- name: restart docker service
service:
name: docker
state: restarted
enabled: true
[Read 74 lines]
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify

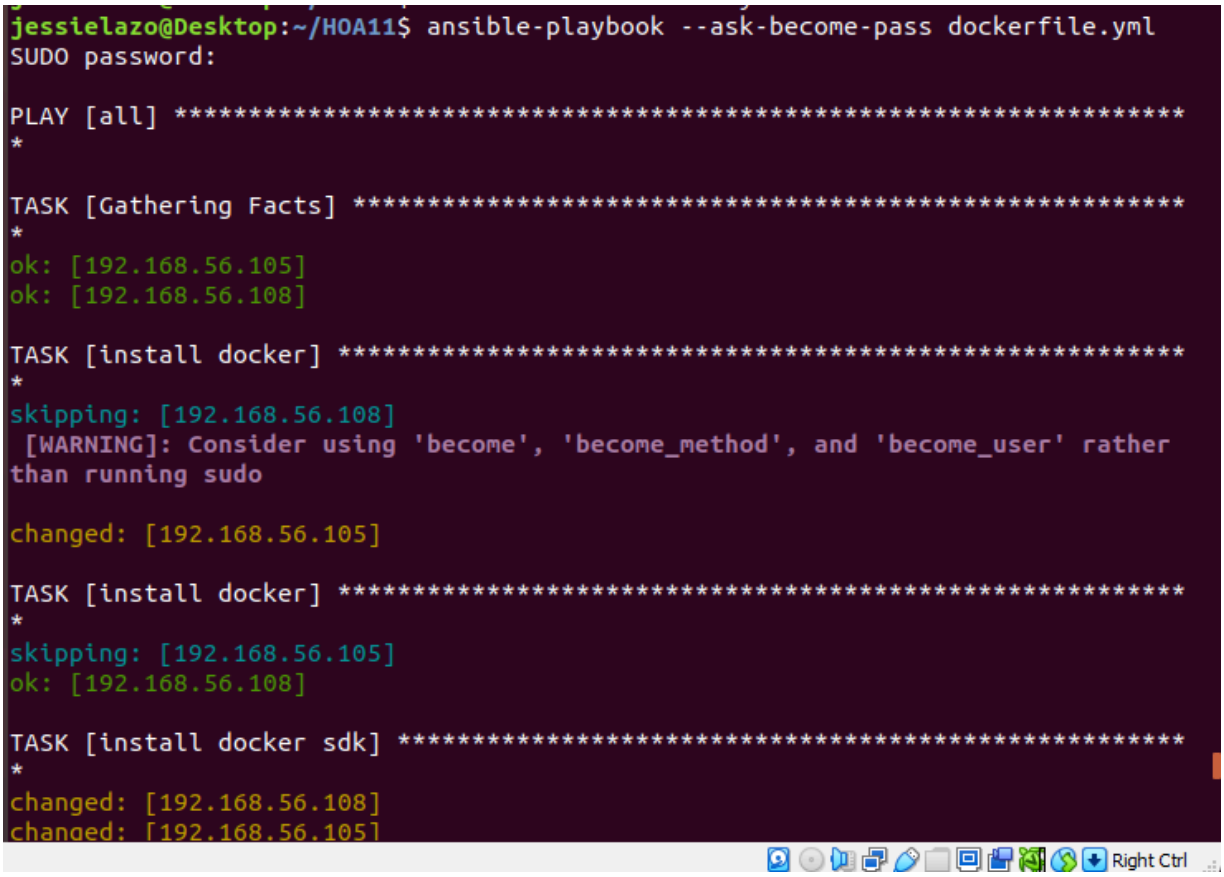

jessielazo@Desktop: ~/HOA11
File Edit View Search Terminal Help
GNU nano 2.9.3 dockerfile.yml
enabled: true
- name: add docker to user group
shell:
usermod -aG docker jessielazo
- name: restart docker service
service:
name: docker
state: restarted
enabled: true
- name: dockerfile directory
file:
path: /root/demo-dockerfile
state: directory
owner: root
group: root
mode: '0755'
- name: copy dockerfile
copy:
src: dockerfile1
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify

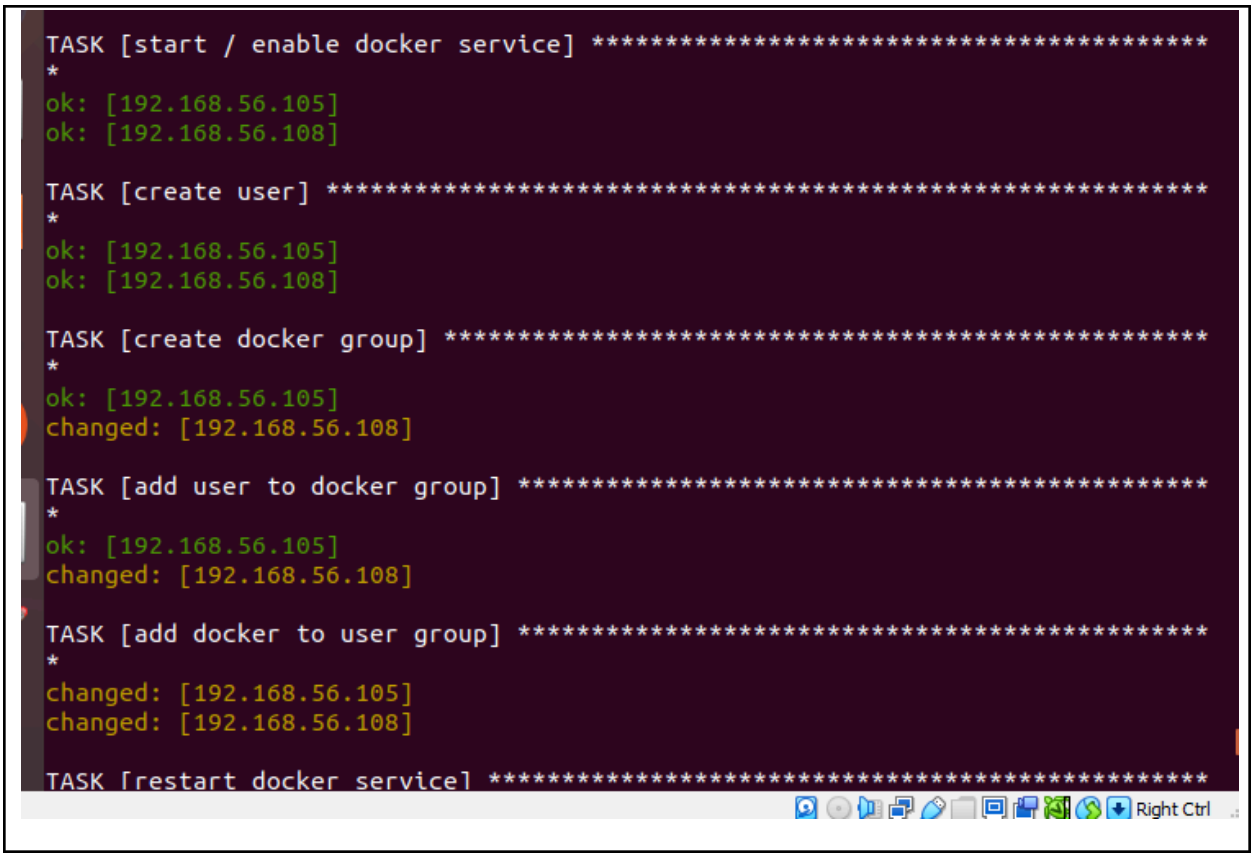

jessielazo@Desktop: ~/HOA11
File Edit View Search Terminal Help
GNU nano 2.9.3 dockerfile.yml
owner: root
group: root
mode: '0755'
when: ansible_distribution == "Ubuntu"
- name: copy dockerfile
copy:
src: dockerfile2
dest: /root/demo-dockerfile/dockerfile
owner: root
group: root
mode: '0755'
when: ansible_distribution == "CentOS"
- name: build docker image
shell:
cmd: docker build -t docker_image /root/demo-dockerfile
when: ansible_distribution == "Ubuntu"
- name: build docker image
shell:
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify
Terminal
Wed 10:17
jessielazo@Desktop: ~/HOA11
File Edit View Search Terminal Help
GNU nano 2.9.3 dockerfile.yml
mode: '0755'
when: ansible_distribution == "CentOS"
- name: build docker image
shell:
cmd: docker build -t docker_image /root/demo-dockerfile
when: ansible_distribution == "Ubuntu"
- name: build docker image
shell: docker build -t docker_image /root/demo-dockerfile
when: ansible_distribution == "CentOS"

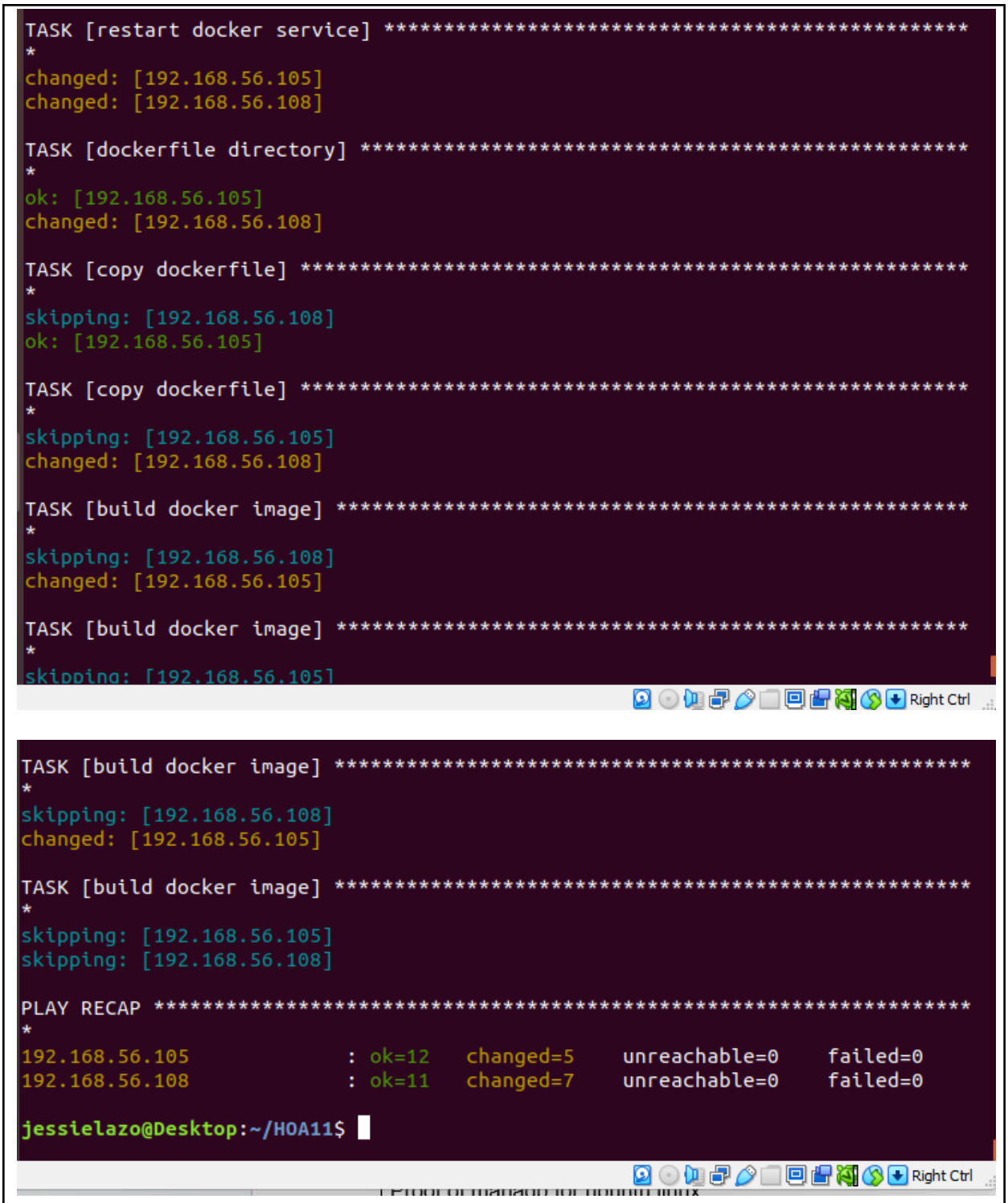
6. Add, commit and push it to your repository.

4. **Output** (screenshots and explanations)

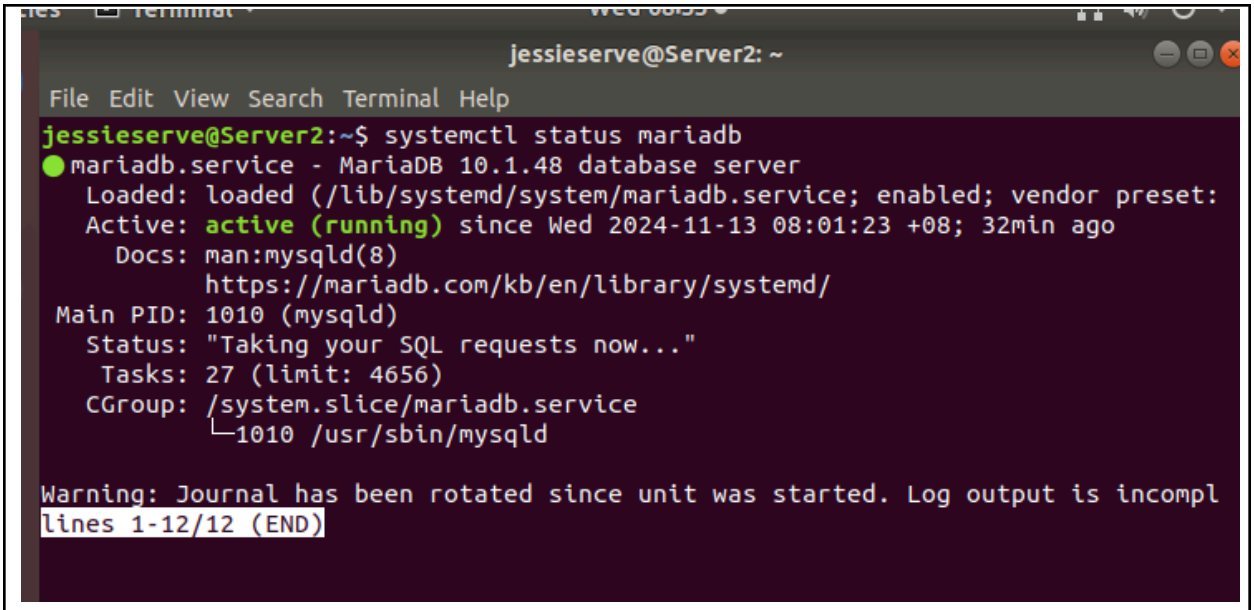
Ansible playbook run:



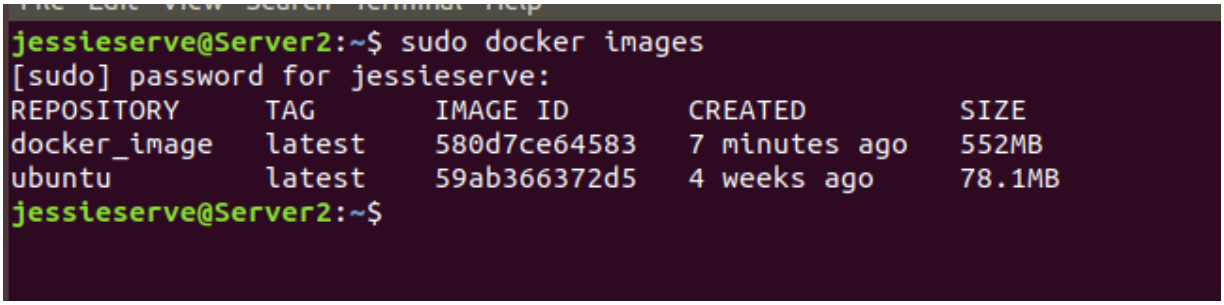

TASK [start / enable docker service] ***********************************
*
ok: [192.168.56.105]
ok: [192.168.56.108]
TASK [create user] ***
*
ok: [192.168.56.105]
ok: [192.168.56.108]
TASK [create docker group] ***
*
ok: [192.168.56.105]
changed: [192.168.56.108]
TASK [add user to docker group] **
*
ok: [192.168.56.105]
changed: [192.168.56.108]
TASK [add docker to user group] **
*
changed: [192.168.56.105]
changed: [192.168.56.108]
TASK [restart docker service] **
Right Ctrl



Proof of mariadb for ubuntu linux



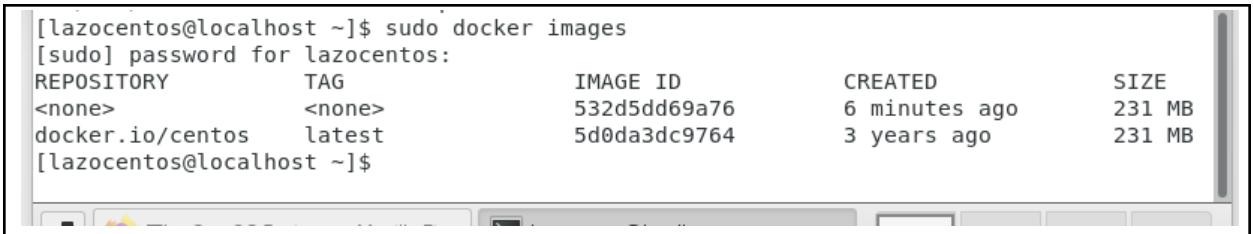
Proof of docker images and status in ubuntu:



```
jessieserve@Server2: ~
File  Edit  View  Search  Terminal  Help
jessieserve@Server2:~$ sudo systemctl status docker
[sudo] password for jessieserve:
● docker.service - Docker Application Container Engine
   Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset:
   Active: active (running) since Wed 2024-11-13 09:34:55 +08; 2s ago
     Docs: https://docs.docker.com
 Main PID: 5900 (dockerd)
    Tasks: 9
   CGroup: /system.slice/docker.service
           └─5900 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/contai

Nov 13 09:34:54 Server2 dockerd[5900]: time="2024-11-13T09:34:54.079063426+08:0
Nov 13 09:34:54 Server2 dockerd[5900]: time="2024-11-13T09:34:54.079113610+08:0
Nov 13 09:34:54 Server2 dockerd[5900]: time="2024-11-13T09:34:54.079264867+08:0
Nov 13 09:34:54 Server2 dockerd[5900]: time="2024-11-13T09:34:54.079458856+08:0
Nov 13 09:34:54 Server2 dockerd[5900]: time="2024-11-13T09:34:54.749524892+08:0
Nov 13 09:34:54 Server2 dockerd[5900]: time="2024-11-13T09:34:54.812362631+08:0
Nov 13 09:34:55 Server2 dockerd[5900]: time="2024-11-13T09:34:55.393005260+08:0
Nov 13 09:34:55 Server2 dockerd[5900]: time="2024-11-13T09:34:55.550986782+08:0
Nov 13 09:34:55 Server2 systemd[1]: Started Docker Application Container Engine
Nov 13 09:34:55 Server2 dockerd[5900]: time="2024-11-13T09:34:55.675774848+08:0
lines 1-19/19 (END)
```

Proof of docker images and status in centos:

```
[lazocentos@localhost ~]$ systemctl status docker
● docker.service - Docker Application Container Engine
   Loaded: loaded (/usr/lib/systemd/system/docker.service; enabled; vendor preset: disa
bled)
   Active: active (running) since Tue 2024-11-05 21:46:26 EST; 4min 14s ago
     Docs: http://docs.docker.com
 Main PID: 18231 (dockerd-current)
    Tasks: 17
   CGroup: /system.slice/docker.service
           ├─18231 /usr/bin/dockerd-current --add-runtime docker-runc=/usr/libexec/d...
           └─18236 /usr/bin/docker-containerd-current -l unix:///var/run/docker/libc...

Nov 05 21:46:25 localhost.localdomain dockerd-current[18231]: time="2024-11-05T21:46...
Nov 05 21:46:26 localhost.localdomain dockerd-current[18231]: time="2024-11-05T21:46...
Nov 05 21:46:26 localhost.localdomain dockerd-current[18231]: time="2024-11-05T21:46...
Nov 05 21:46:26 localhost.localdomain dockerd-current[18231]: time="2024-11-05T21:46...
Nov 05 21:46:26 localhost.localdomain dockerd-current[18231]: time="2024-11-05T21:46...
Nov 05 21:46:26 localhost.localdomain dockerd-current[18231]: time="2024-11-05T21:46...
Nov 05 21:46:26 localhost.localdomain dockerd-current[18231]: time="2024-11-05T21:46...
Nov 05 21:46:26 localhost.localdomain dockerd-current[18231]: time="2024-11-05T21:46...
Nov 05 21:46:26 localhost.localdomain systemd[1]: Started Docker Application Contai....
Nov 05 21:46:26 localhost.localdomain dockerd-current[18231]: time="2024-11-05T21:46...
Hint: Some lines were ellipsized, use -l to show in full.
[lazocentos@localhost ~]$ 
```



Reflections:

Answer the following:

1. What are the benefits of implementing containerizations?

   The benefits of containerization is that it makes work between the different remote machines more efficient.

Conclusions:

In this activity, our objective is to build a Dockerfile and formulate a workflow using Ansible as IaC that allows a Continuous Delivery process.

I have experienced many errors when performing the activity, but at the end of
I could debug errors and know how docker works in the remote
Machines. I achieved what I aimed to learn.