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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.

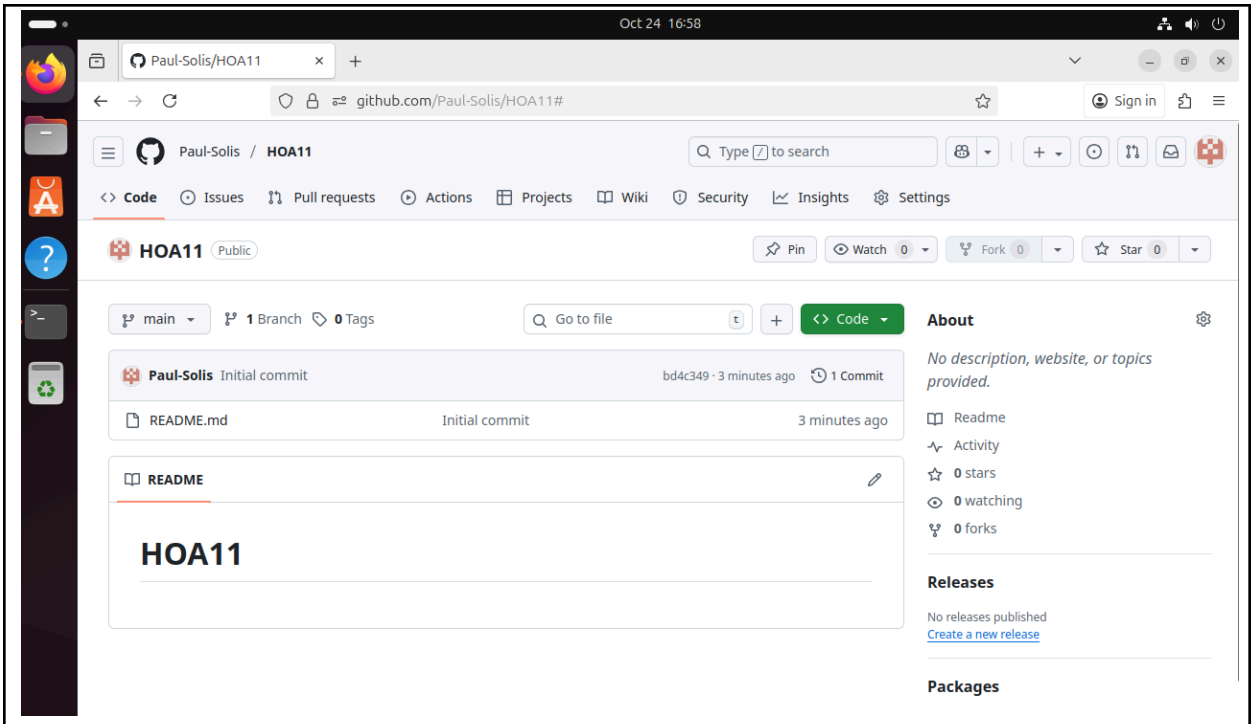
Source: https://docs.microsoft.com/en-us/virtualization/windowscontainers/about/containers-vs-vm

3. Tasks

1. Create a new repository for this activity.
2. Install Docker and enable the docker socket.
3. Add to Docker group to your current user.
4. Create a Dockerfile to install web and DB server.
5. Install and build the Dockerfile using Ansible.
6. Add, commit and push it to your repository.

4. Output (screenshots and explanations)

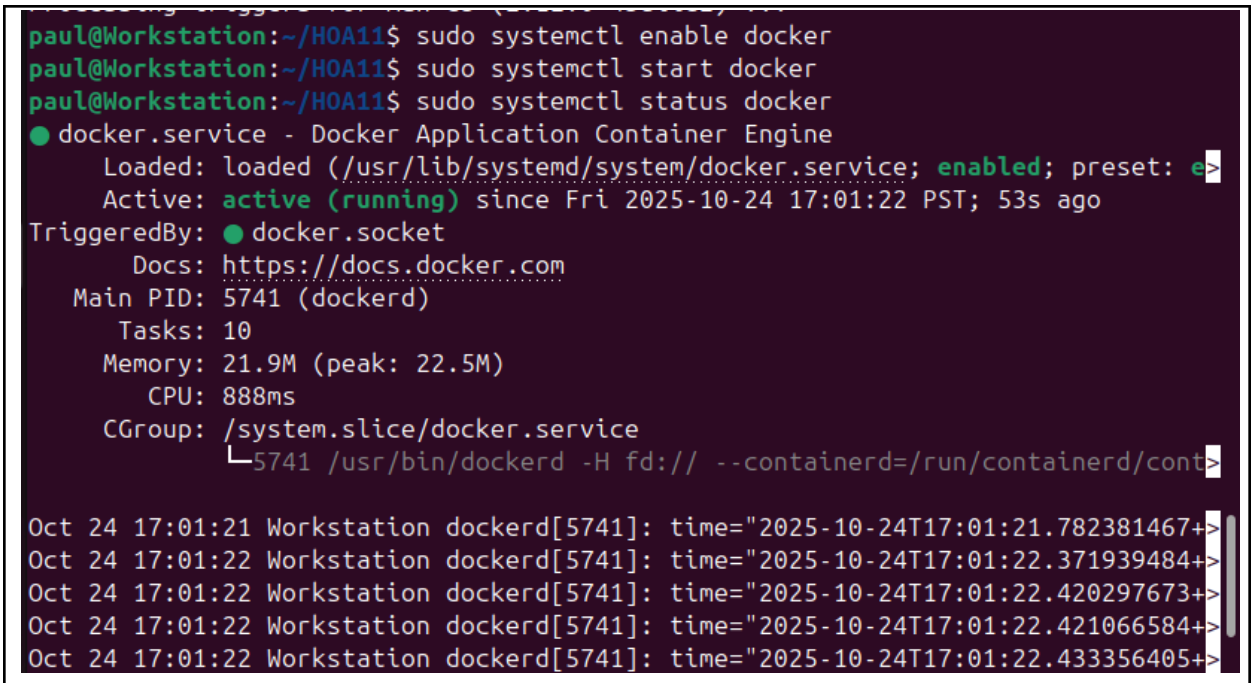
1.



In this number 1. The task is to create a repository for the docker file so i created one for the docker file.

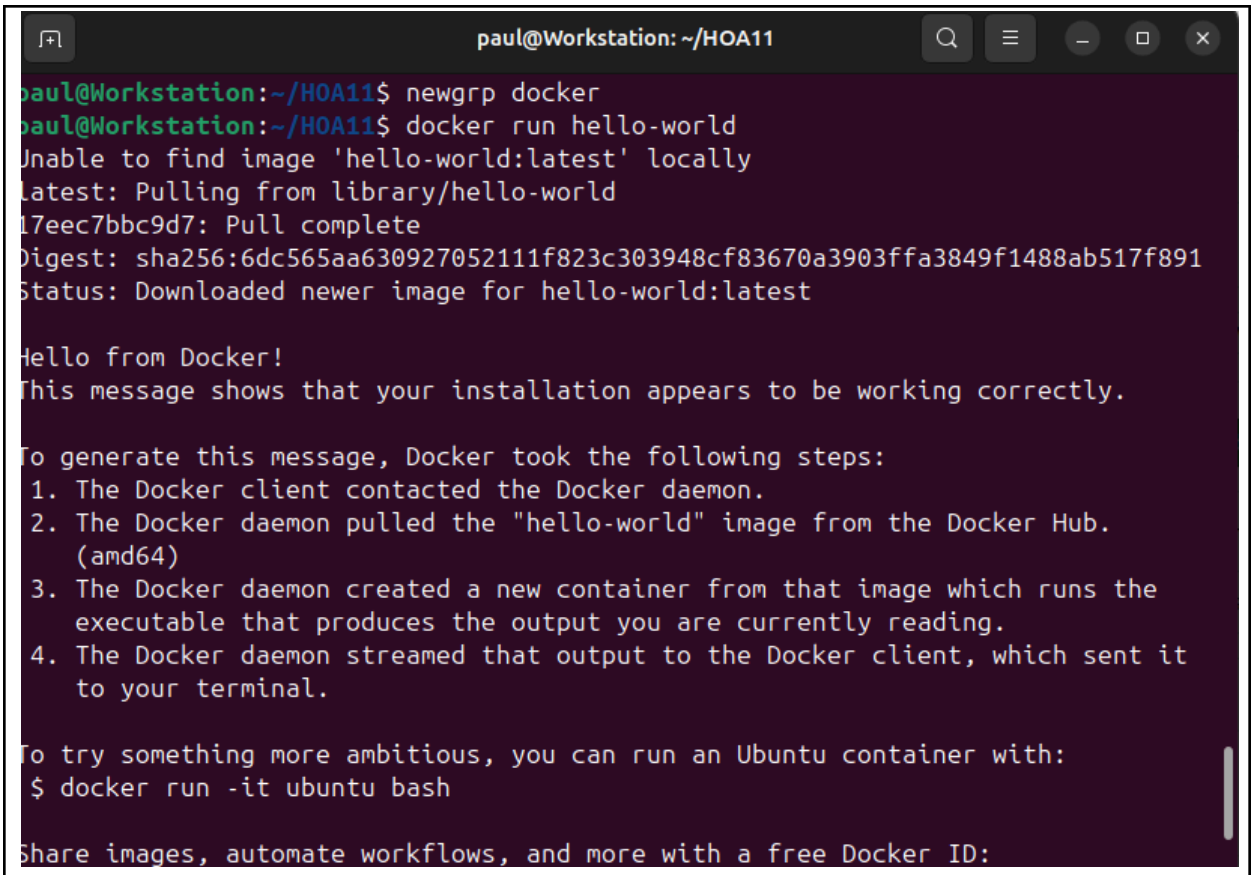
2.

```
paul@Workstation:~/HOA11$ sudo apt install docker.io
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libgl1-amber-dri libglapi-amber libllvm17t64 libllvm19
  linux-headers-6.14.0-27-generic linux-hwe-6.14-headers-6.14.0-27
  linux-hwe-6.14-tools-6.14.0-27 linux-image-6.14.0-27-generic
  linux-modules-6.14.0-27-generic linux-modules-extra-6.14.0-27-generic
  linux-tools-6.14.0-27-generic python3-netifaces
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  bridge-utils containerd pigz runc ubuntu-fan
Suggested packages:
  ifupdown aufs-tools btrfs-progs cgroupfs-mount | cgroup-lite debootstrap
  docker-buildx docker-compose-v2 docker-doc rinse zfs-fuse | zfsutils
The following NEW packages will be installed:
  bridge-utils containerd docker.io pigz runc ubuntu-fan
0 upgraded, 6 newly installed, 0 to remove and 2 not upgraded.
Need to get 75.6 MB of archives.
After this operation, 287 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://ph.archive.ubuntu.com/ubuntu noble/universe amd64 pigz amd64 2.8-1
```



In this number 2 the task is to install docker and enable and start is so i did the installing of docker and enable it and start it

3.



In this task, I was able to add the docker into my current user.

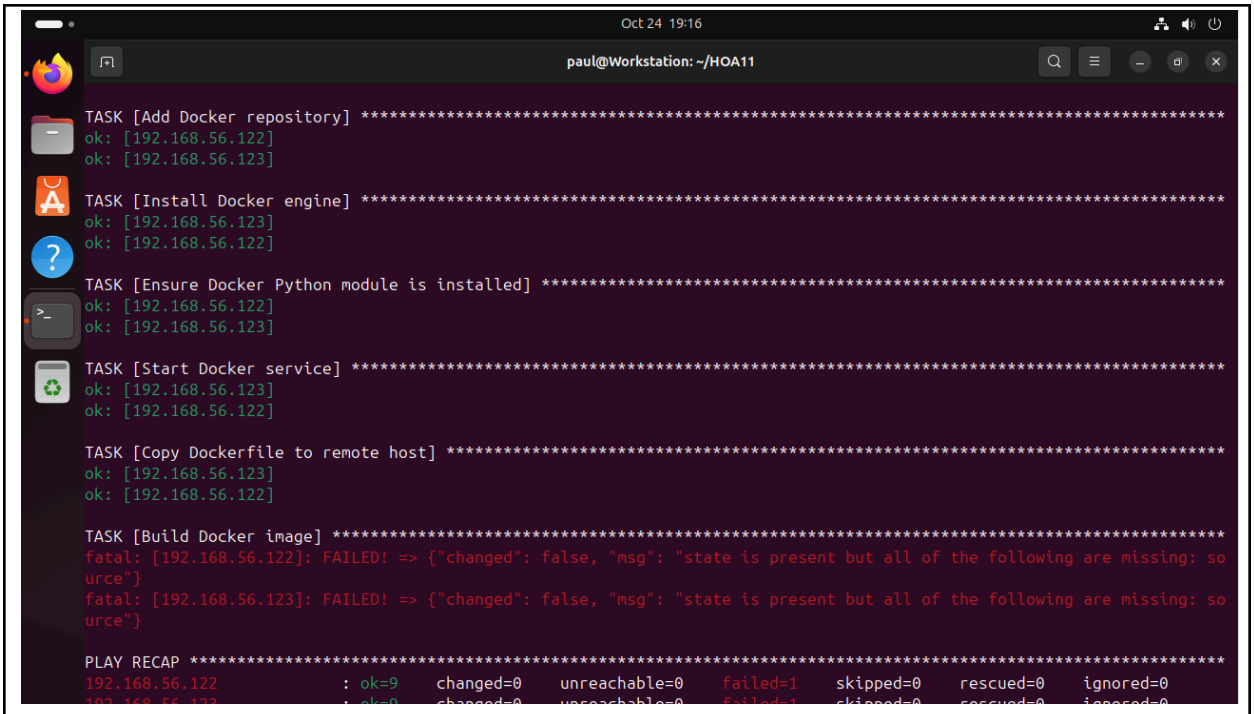
4.

```
paul@Workstation:~/HOA11$ docker images
REPOSITORY      TAG       IMAGE ID       CREATED          SIZE
web_db_server   latest    dbcfc995a5ee   23 minutes ago   564MB
<none>          <none>    b4212f22dd84   38 minutes ago   564MB
ubuntu          latest    97bed23a3497   3 weeks ago      78.1MB
hello-world     latest    1b44b5a3e06a   2 months ago     10.1kB
paul@Workstation:~/HOA11$ sudo docker tag b4212f22dd84 webdb-server:latest
paul@Workstation:~/HOA11$ docker images
REPOSITORY      TAG       IMAGE ID       CREATED          SIZE
web_db_server   latest    dbcfc995a5ee   24 minutes ago   564MB
webdb-server    latest    b4212f22dd84   39 minutes ago   564MB
ubuntu          latest    97bed23a3497   3 weeks ago      78.1MB
hello-world     latest    1b44b5a3e06a   2 months ago     10.1kB
paul@Workstation:~/HOA11$ sudo docker run -it webdb-server
 * Starting Apache httpd web server apache2
AH00558: apache2: Could not reliably determine the server's fully qualified doma
in name, using 172.17.0.5. Set the 'ServerName' directive globally to suppress t
his message
 *
 * Starting MariaDB database server mariadbd                              [ OK ]
root@8cc3b83713a1:/#
```

In this i was able to create for web server and db server i use the command docker run to run it

5.

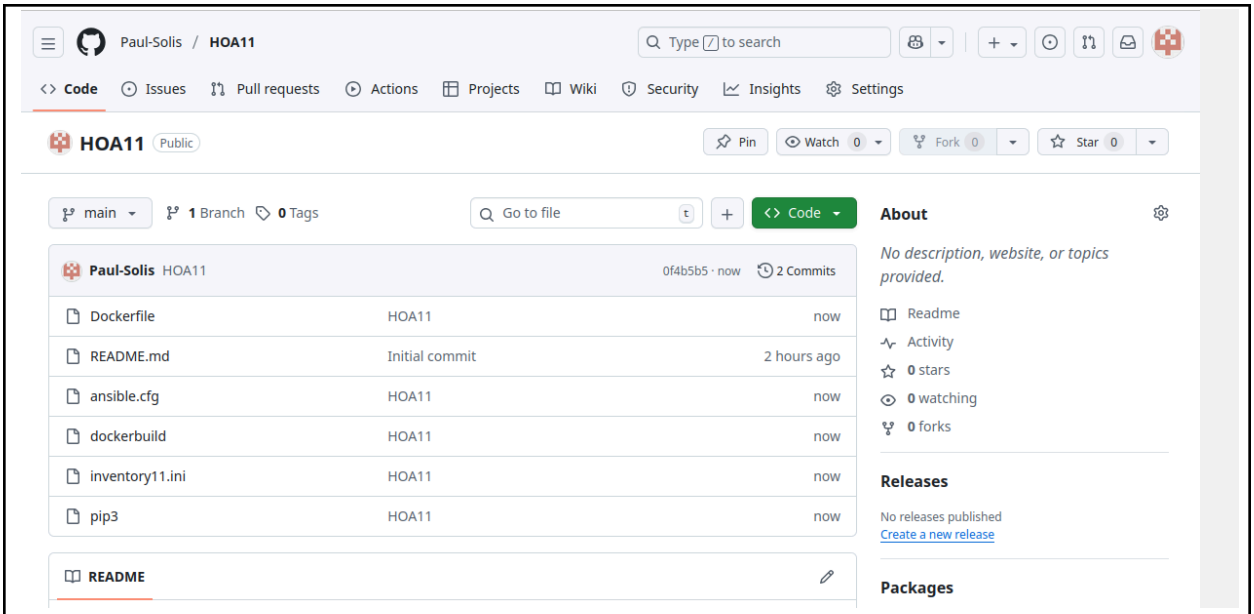
```
paul@Workstation:~/HOA11$ sudo nano dockerbuild
paul@Workstation:~/HOA11$ ansible-playbook dockerbuild -i inventory11.ini -K
BECOME password:

PLAY [Install Docker and build Docker image] ***********************************************************

TASK [Gathering Facts] *********************************************************************************
ok: [192.168.56.123]
ok: [192.168.56.122]

TASK [Install required packages for Docker] ************************************************************
ok: [192.168.56.122]
ok: [192.168.56.123]

TASK [Remove PEP 668 restriction file] *****************************************************************
ok: [192.168.56.122]
ok: [192.168.56.123]

TASK [Add Docker GPG key] ******************************************************************************
ok: [192.168.56.122]
ok: [192.168.56.123]

TASK [Add Docker repository] ***************************************************************************
ok: [192.168.56.122]
ok: [192.168.56.123]

TASK [Install Docker engine] ***************************************************************************
ok: [192.168.56.123]
ok: [192.168.56.122]
```



in here i was able to download and build the docker but the problem s that the build docker image is error and i dont know what was the problem

6.

```
paul@Workstation:~/HOA11$ git add .
paul@Workstation:~/HOA11$ git commit -m "HOA11"
[main 0f4b5b5] HOA11
 5 files changed, 91 insertions(+)
 create mode 100644 Dockerfile
 create mode 100644 ansible.cfg
 create mode 100644 dockerbuild
 create mode 100644 inventory11.ini
 create mode 100644 pip3
paul@Workstation:~/HOA11$ git push origin main
Enumerating objects: 8, done.
Counting objects: 100% (8/8), done.
Delta compression using up to 4 threads
Compressing objects: 100% (6/6), done.
Writing objects: 100% (7/7), 1.49 KiB | 509.00 KiB/s, done.
Total 7 (delta 0), reused 0 (delta 0), pack-reused 0
To github.com:Paul-Solis/HOA11.git
   bd4c349..0f4b5b5  main -> main
```



i uploaded it into my github

Reflections:

Answer the following:

1. What are the benefits of implementing containerizations?

Containerization ensures applications run consistently across different environments by isolating them in lightweight, portable containers.

Conclusions:

In this laboratory activity, we explored the process of containerizing applications using Docker, focusing on setting up both a web server and a database server within a single container. By doing so, we demonstrated the benefits of containerization, such as consistency, portability, and efficient resource usage. Ultimately, this exercise highlighted how containerization streamlines development, testing, and deployment workflows.