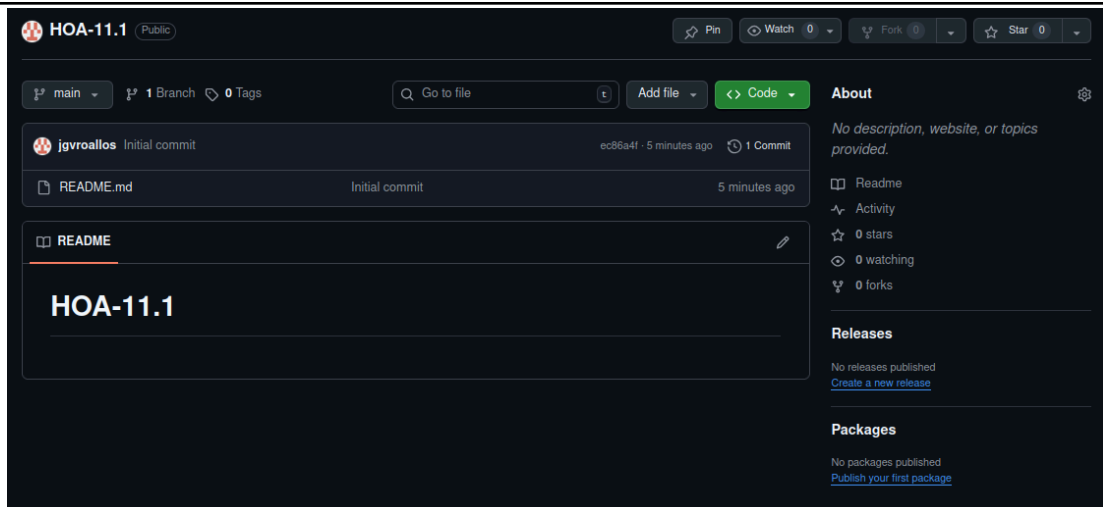


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<b>Course/Section:</b> CPE212 - CPE31S2	<b>Date Submitted:</b> 10 / 24 / 2025
<b>Instructor:</b> Engr. Robin Valenzuela	<b>Semester and SY:</b> 1st, 2025-2026
<b>Activity 11: Containerization</b>	
<b>1. Objectives</b>	
Create a Dockerfile and form a workflow using Ansible as Infrastructure as Code (IaC) to enable Continuous Delivery process	
<b>2. Discussion</b>	
<p>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.</p> <p>Source: <a href="https://docs.docker.com/get-started/overview/">https://docs.docker.com/get-started/overview/</a></p> <p>You may also check the difference between containers and virtual machines. Click the link given below.</p> <p>Source: <a href="https://docs.microsoft.com/en-us/virtualization/windowscontainers/about/containers-vs-vm">https://docs.microsoft.com/en-us/virtualization/windowscontainers/about/containers-vs-vm</a></p>	
<b>3. Tasks</b>	
<ol style="list-style-type: none"> <li>1. Create a new repository for this activity.</li> <li>2. Install Docker and enable the docker socket.</li> <li>3. Add to Docker group to your current user.</li> <li>4. Create a Dockerfile to install web and DB server.</li> <li>5. Install and build the Dockerfile using Ansible.</li> <li>6. Add, commit and push it to your repository.</li> </ol>	
<b>4. Output</b> (screenshots and explanations)	
<ol style="list-style-type: none"> <li>1. Create a new repository for this activity.</li> </ol>	



2. Install Docker and enable the docker socket.

```

roallos-ubuntu@workstation:~/HOA-11.1$ ansible-playbook installdocker.yml -l ubuntu -K
TASK [Gathering Facts] *****
[DEPRECATION WARNING]: Distribution Ubuntu 20.04 on host 192.168.56.112 should use /usr/bin/python3, but is using /
future Ansible release will default to using the discovered platform python for this host. See https://docs.ansible
information. This feature will be removed in version 2.12. Deprecation warnings can be disabled by setting deprecate
ok: [192.168.56.112]
[DEPRECATION WARNING]: Distribution Ubuntu 20.04 on host 192.168.56.110 should use /usr/bin/python3, but is using /
future Ansible release will default to using the discovered platform python for this host. See https://docs.ansible
information. This feature will be removed in version 2.12. Deprecation warnings can be disabled by setting deprecate
ok: [192.168.56.110]

TASK [Update APT package cache] *****
[WARNING]: Updating cache and auto-installing missing dependency: python-apt
changed: [192.168.56.110]
changed: [192.168.56.112]

TASK [Install prerequisite packages] *****
changed: [192.168.56.112]
changed: [192.168.56.110]

TASK [Add Docker's official GPG key] *****
changed: [192.168.56.112]
changed: [192.168.56.110]

TASK [Add Docker repository] *****
changed: [192.168.56.112]
changed: [192.168.56.110]

TASK [Install Docker Engine] *****
changed: [192.168.56.110]
changed: [192.168.56.112]

TASK [Install Docker SDK for Python] *****
changed: [192.168.56.112]
changed: [192.168.56.110]

TASK [Ensure Docker service is started and enabled on boot] *****
ok: [192.168.56.110]
ok: [192.168.56.112]

PLAY RECAP *****
192.168.56.110      : ok=8    changed=6    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
192.168.56.112      : ok=8    changed=6    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

```

```

roallos-ubuntu@workstation:~/HOA-11.1$ pip --version
pip 20.0.2 from /usr/lib/python3/dist-packages/pip (python 3.8)
roallos-ubuntu@workstation:~/HOA-11.1$ docker --version
Docker version 28.1.1, build 4eba377
roallos-ubuntu@workstation:~/HOA-11.1$

```

```

roallos-ubuntu@workstation:~/HOA-11.1$ systemctl status docker
● docker.service - Docker Application Container Engine
   Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2025-10-24 17:02:04 +08; 26min ago
 TriggeredBy: ● docker.socket
           Docs: https://docs.docker.com
    Main PID: 12096 (dockerd)
       Tasks: 10
      Memory: 23.0M
         CGroup: /system.slice/docker.service
                 └─12096 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock

```

```
roallos-ubuntu@server1:~$ pip3 --version
pip 20.0.2 from /usr/lib/python3/dist-packages/pip (python 3.8)
roallos-ubuntu@server1:~$ docker --version
Docker version 28.1.1, build 4eba377
roallos-ubuntu@server1:~$
```

```
roallos-ubuntu@server1:~$ systemctl status docker
● docker.service - Docker Application Container Engine
   Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2025-10-24 17:02:37 +08; 26min ago
 TriggeredBy: ● docker.socket
     Docs: https://docs.docker.com
    Main PID: 9546 (dockerd)
       Tasks: 9
      Memory: 22.9M
      CGroup: /system.slice/docker.service
              └─9546 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock
```

### 3. Add to Docker group to your current user.

```
roallos-ubuntu@workstation:~/H0A-11.1$ sudo usermod -aG docker $USER
[sudo] password for roallos-ubuntu:
roallos-ubuntu@workstation:~/H0A-11.1$ newgrp docker
roallos-ubuntu@workstation:~/H0A-11.1$ docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
17eec7bbc9d7: Pull complete
Digest: sha256:6dc565aa630927052111f823c303948cf83670a3903ffa3849f1488ab517f891
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
    (amd64)
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which sent it
    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
https://hub.docker.com/

For more examples and ideas, visit:
https://docs.docker.com/get-started/
```

```
roallos-ubuntu@server1:~$ sudo usermod -aG docker $USER
[sudo] password for roallos-ubuntu:
roallos-ubuntu@server1:~$ newgrp docker
roallos-ubuntu@server1:~$ docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
17eec7bbc9d7: Pull complete
Digest: sha256:6dc565aa63092705211f823c303948cf83670a3903ffa3849f1488ab517f891
Status: Downloaded newer image for hello-world:latest

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https://docs.docker.com/get-started/
```

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

```
dockerfile > ... Close (Ctrl+W)
1 FROM ubuntu:latest
2
3 WORKDIR /app
4
5 RUN apt update && apt install -y apache2 mariadb-server
6
7 COPY index.html .
8
9 EXPOSE 80 3306
10
11 CMD service apache2 start && service mariadb start && tail -f /dev/null
```

## 5. Install and build the Dockerfile using Ansible.

```
roallos-ubuntu@workstation:~/HOA-11.1$ ansible-playbook bulddocker.yml -i ubuntu -K
BECOME password:

PLAY [Build and run Docker container for web + DB] *****

TASK [Gathering Facts] *****
[DEPRECATION WARNING]: Distribution Ubuntu 20.04 on host 192.168.56.110 should use /usr/bin/python3, but is using /usr/bin/python for backward compatibility with prior Ansible releases. A future
Ansible release will default to using the discovered platform python for this host. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
This feature will be removed in version 2.12. Deprecation warnings can be disabled by setting deprecation warnings=False in ansible.cfg.
ok: [192.168.56.110]
[DEPRECATION WARNING]: Distribution Ubuntu 20.04 on host 192.168.56.112 should use /usr/bin/python3, but is using /usr/bin/python for backward compatibility with prior Ansible releases. A future
Ansible release will default to using the discovered platform python for this host. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
This feature will be removed in version 2.12. Deprecation warnings can be disabled by setting deprecation warnings=False in ansible.cfg.
ok: [192.168.56.112]

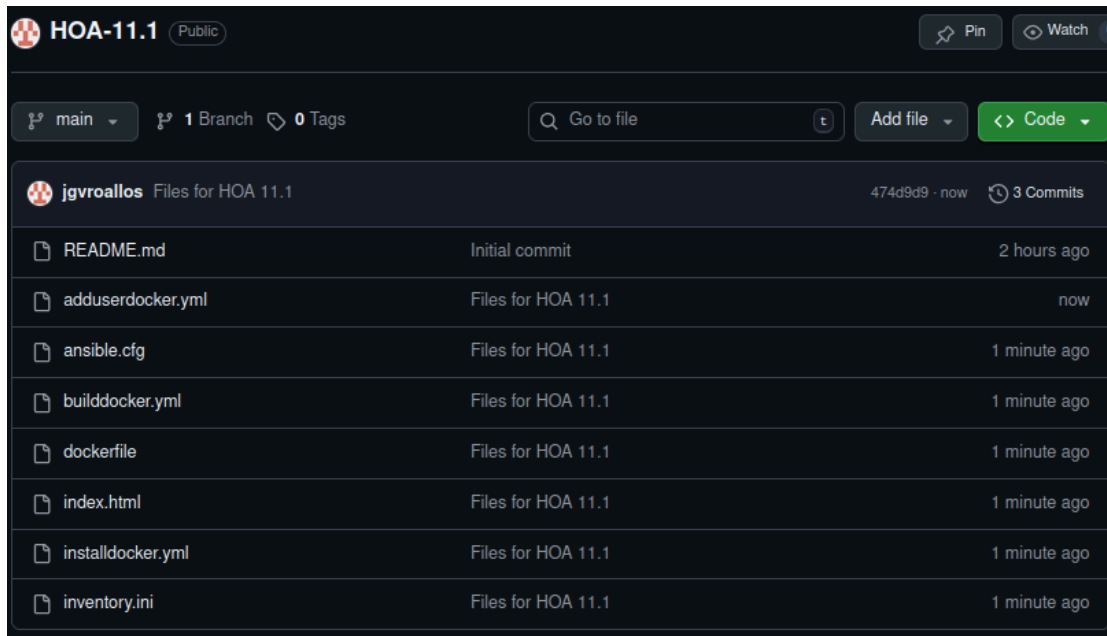
TASK [Ensure Docker service is running] *****
ok: [192.168.56.112]
ok: [192.168.56.110]

TASK [Build Docker image from the Dockerfile] *****
An exception occurred during task execution. To see the full traceback, use -vvv. The error was: ValueError: ansible_collections.community.docker.plugins.module_utils.common_api._spec_ is None
fatal: [192.168.56.112]: FAILED! => {"msg": "Unexpected failure during module execution.", "stdout": ""}
An exception occurred during task execution. To see the full traceback, use -vvv. The error was: ValueError: ansible_collections.community.docker.plugins.module_utils.common_api._spec_ is None
fatal: [192.168.56.110]: FAILED! => {"msg": "Unexpected failure during module execution.", "stdout": ""}

PLAY RECAP *****
192.168.56.110 : ok=2 changed=0 unreachable=0 failed=1 skipped=0 rescued=0 ignored=0
192.168.56.112 : ok=2 changed=0 unreachable=0 failed=1 skipped=0 rescued=0 ignored=0
```

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

```
● roallos-ubuntu@workstation:~/HOA-11.1$ git add .
● roallos-ubuntu@workstation:~/HOA-11.1$ git commit -m "Files for HOA 11.1"
[main 0c4698a] Files for HOA 11.1
7 files changed, 128 insertions(+)
create mode 100644 adduserdocker.yml
create mode 100644 ansible.cfg
create mode 100644 bulddocker.yml
create mode 100644 dockerfile
create mode 100644 index.html
create mode 100644 installdocker.yml
create mode 100644 inventory.ini
● roallos-ubuntu@workstation:~/HOA-11.1$ git push origin main
Enumerating objects: 10, done.
Counting objects: 100% (10/10), done.
Delta compression using up to 2 threads
Compressing objects: 100% (9/9), done.
Writing objects: 100% (9/9), 1.78 KiB | 1.78 MiB/s, done.
Total 9 (delta 0), reused 0 (delta 0)
To github.com:jgvrroallos/HOA-11.1.git
ec86a4f..0c4698a main -> main
● roallos-ubuntu@workstation:~/HOA-11.1$ git add .
● roallos-ubuntu@workstation:~/HOA-11.1$ git commit -m "Files for HOA 11.1"
[main 474d9d9] Files for HOA 11.1
1 file changed, 36 insertions(+), 6 deletions(-)
● roallos-ubuntu@workstation:~/HOA-11.1$ git push origin main
Enumerating objects: 3, done.
Counting objects: 100% (3/3), done.
Delta compression using up to 2 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (2/2), 244 bytes | 244.00 KiB/s, done.
Total 2 (delta 1), reused 0 (delta 0)
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
To github.com:jgvrroallos/HOA-11.1.git
0c4698a..474d9d9 main -> main
```



### Reflections:

Answer the following:

1. What are the benefits of implementing containerizations?

Implementing containerizations can implement a consistent setup of services throughout different machines. It also offers a scalability option to the services run within the container.

### Conclusions:

*In this hands-on activity, I was only able to install Docker on Ubuntu systems using Ansible. Although this was successful, I was not able to create an Ansible playbook that builds a web and DB image from the supplied dockerfile.*