Name: Denzel Dinglasan	Date Performed: 16/11/2023
Course/Section:CPE 232 - CPE31S6	Date Submitted: 16/11/2023
Instructor: Dr. Jonathan Vidal Taylar	Semester and SY: 1st Sem 2023-2024

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.

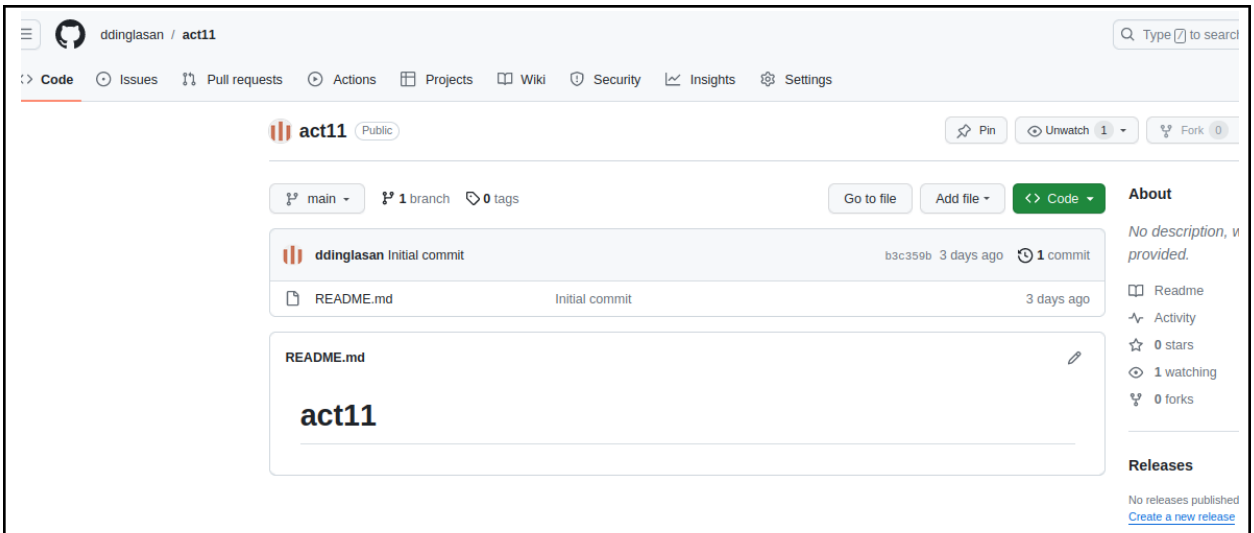
Source: https://docs.microsoft.com/en-us/virtualization/windowscontainers/about/containers-vs-vm

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. Create a new repository for this activity.



2. Install Docker and enable the docker socket.

```
- name: Install Docker in Ubuntu
  apt:
    name: docker.io

- name: Start and Enable Docker in Ubuntu
  systemd:
    name: docker
    state: restarted
    enabled: true
```

```
- name: Install Docker in CentOS
  yum:
    name: docker

- name: Start and Enable Docker in CentOS
  systemd:
    name: docker
    state: restarted
    enabled: true
```

3. Add to Docker group to your current user.

```
- name: Add User to Docker Group
  user:
    name: "{{ ansible_user }}"
    groups: docker

- name: Create directory for Docker in Ubuntu
  file:
    path: ~/docker
    state: directory
```

```
- name: Add User to Docker Group
  user:
    name: "{{ ansible_user }}"
    groups: dockerroot

- name: Create directory for Docker
  file:
    path: ~/docker
    state: directory
```

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

```
- name: Modify dockerfile with Content in Ubuntu
  copy:
    dest: ~/docker/dockerfile
    content: |
      FROM ubuntu
      MAINTAINER dnzl <qddinglasan@tip.edu.ph>
      # Skip Prompts
      ARG DEBIAN_FRONTEND=noninteractive
      # Update Packages
      RUN apt update; apt dist-upgrade -y
      # Install MariaDB and Apache2
      RUN apt install -y apache2
      RUN apt install -y mariadb-client-core-10.6
      # Set entrypoint
      ENTRYPOINT apache2ctl -D FOREGROUND

- name: Create container for apache2-mariadb in Ubuntu
  shell: |
    cd ~/docker
    docker build -t apache2-mariadb .

- name: Run container, apache2-mariadb in Ubuntu
  shell: |
    docker run -d -it -p 8080:80 apache2-mariadb
```

```
- name: Modify dockerfile with Content
  copy:
    dest: "~/docker/dockerfile"
    content: |
      FROM centos
      MAINTAINER dnzl <qddinglasan@tip.edu.ph>
      # Skip Prompts
      ARG DEBIAN_FRONTEND=noninteractive
      # Update Packages
      RUN yum update; yum dist-upgrade -y
      # Install MariaDB and Php
      RUN yum install -y mariadb-server php
      # Set entrypoint
      ENTRYPOINT php -D FOREGROUND
      ENTRYPOINT mariadb-server -D FOREGROUND
```

5. Install and build the Dockerfile using Ansible.

```
- name: Create dockerfile in Docker Directory in Ubuntu
  file:
    path: ~/docker/dockerfile
    state: touch
```

```
- name: Create dockerfile in Docker Directory
  file:
    path: "~/docker/dockerfile"
    state: touch
```

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

```
dnzl@workstation:~/act11$ git add *
dnzl@workstation:~/act11$ git commit -m "finished"
[main 30ffb3b] finished
 5 files changed, 137 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 inventory
 create mode 100644 roles/CentOS/tasks/main.yml
 create mode 100644 roles/Ubuntu/tasks/main.yml
 create mode 100644 tasks.yml
dnzl@workstation:~/act11$ git push origin
Username for 'https://github.com': ddinglasan
Password for 'https://ddinglasan@github.com':
Counting objects: 12, done.
Delta compression using up to 2 threads.
Compressing objects: 100% (8/8), done.
Writing objects: 100% (12/12), 1.71 KiB | 1.71 MiB/s, done.
Total 12 (delta 1), reused 0 (delta 0)
remote: Resolving deltas: 100% (1/1), done.
To https://github.com/ddinglasan/act11.git
   b3c359b..30ffb3b  main -> main
```

https://github.com/ddinglasan/act11.git

```
dnzl@workstation:~/act11$ ansible-playbook --ask-become-pass tasks.yml
BECOME password:

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

TASK [Gathering Facts] *********************************************************************************************************************************
ok: [192.168.56.102]
ok: [192.168.56.105]

TASK [Install Updates (Ubuntu)] ************************************************************************************************************************
skipping: [192.168.56.105]
ok: [192.168.56.102]

TASK [Install Updates (CentOS)] ************************************************************************************************************************
skipping: [192.168.56.102]
ok: [192.168.56.105]

PLAY [Ubuntu] ******************************************************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************************************************
ok: [192.168.56.102]

TASK [Ubuntu : Install Docker in Ubuntu] ***************************************************************************************************************
ok: [192.168.56.102]

TASK [Ubuntu : Start and Enable Docker in Ubuntu] ******************************************************************************************************
changed: [192.168.56.102]

TASK [Ubuntu : Add User to Docker Group] ***************************************************************************************************************
ok: [192.168.56.102]

TASK [Ubuntu : Create directory for Docker in Ubuntu] **************************************************************************************************
ok: [192.168.56.102]

TASK [Ubuntu : Create dockerfile in Docker Directory in Ubuntu] ****************************************************************************************
changed: [192.168.56.102]

TASK [Ubuntu : Modify dockerfile with Content in Ubuntu] ***********************************************************************************************
ok: [192.168.56.102]

TASK [Ubuntu : Create container for apache2-mariadb in Ubuntu] *****************************************************************************************
changed: [192.168.56.102]

TASK [Ubuntu : Run container, apache2-mariadb in Ubuntu] ***********************************************************************************************
```

```
changed: [192.168.56.102]

PLAY [CentOS] ******************************************************************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************************************************************
ok: [192.168.56.105]

TASK [CentOS : Install Docker in CentOS] ***************************************************************************************************************************
ok: [192.168.56.105]

TASK [CentOS : Start and Enable Docker in CentOS] ******************************************************************************************************************
changed: [192.168.56.105]

TASK [CentOS : Add User to Docker Group] ***************************************************************************************************************************
ok: [192.168.56.105]

TASK [CentOS : Create directory for Docker] ************************************************************************************************************************
ok: [192.168.56.105]

TASK [CentOS : Create dockerfile in Docker Directory] **************************************************************************************************************
changed: [192.168.56.105]

TASK [CentOS : Modify dockerfile with Content] *********************************************************************************************************************
ok: [192.168.56.105]

PLAY RECAP *********************************************************************************************************************************************************
192.168.56.102             : ok=11   changed=4    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0
192.168.56.105             : ok=9    changed=2    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0
```

```
dnzl@Server1: ~
File  Edit  View  Search  Terminal  Help
dnzl@Server1:~$ sudo docker images
[sudo] password for dnzl:
REPOSITORY          TAG       IMAGE ID       CREATED          SIZE
apache2-mariadb     latest    2243c5295791   41 minutes ago   260MB
ubuntu              latest    e4c58958181a   6 weeks ago      77.8MB
dnzl@Server1:~$ sudo docker ps
CONTAINER ID   IMAGE              COMMAND                  CREATED          STAT
US          PORTS                                    NAMES
719c48d72118   apache2-mariadb    "/bin/sh -c 'apache2…"   34 minutes ago   Up 3
4 minutes   0.0.0.0:8080->80/tcp, :::8080->80/tcp    charming_elgamal
dnzl@Server1:~$
```

```
[dnzl@localhost ~]$ systemctl status docker
● docker.service - Docker Application Container Engine
   Loaded: loaded (/usr/lib/systemd/system/docker.service; enabled; vendor prese
t: disabled)
   Active: active (running) since Thu 2023-11-16 04:51:42 EST; 18min ago
     Docs: http://docs.docker.com
 Main PID: 27456 (dockerd-current)
    Tasks: 21
   CGroup: /system.slice/docker.service
           ├─27456 /usr/bin/dockerd-current --add-runtime docker-runc=/usr/li...
           └─27462 /usr/bin/docker-containerd-current -l unix:///var/run/dock...

Nov 16 04:51:40 localhost.localdomain dockerd-current[27456]: time="2023-11-1...
Nov 16 04:51:41 localhost.localdomain dockerd-current[27456]: time="2023-11-1...
Nov 16 04:51:41 localhost.localdomain dockerd-current[27456]: time="2023-11-1...
Nov 16 04:51:41 localhost.localdomain dockerd-current[27456]: time="2023-11-1...
```

Reflections:

Answer the following:

1. What are the benefits of implementing containerizations?

Containerization plays an important role in software development and deployment. Developers can make the applications and their dependencies into lightweight, portable containers that work consistently from development to production in different environments. Containers are a way to effectively use resources by sharing the host OS kernel but maintain isolation. This increases the rate of deployment and scaling, as well as more flexibility in controlling complex applications. The container orchestration tools, such as Kubernetes, promote automation, resilience, and scalability of the large scale containerized applications. In short, containerization simplifies the development process, speeds up deployment cycles, and promotes a more flexible and adaptable infrastructure.

Conclusions:

In this activity, we explored the topic of containerization through the usage of Docker. I used ansible to create a dockerfile that will be installed and run in 2 systems. I learned a lot in this activity.