Name: Quizon, Nowell Gabriel C.	**Date Performed:** 11/16/2023
Course/Section: CPE31S5	**Date Submitted:**
Instructor: Engr. Roman Richard	**Semester and SY:** 1st semester - 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/

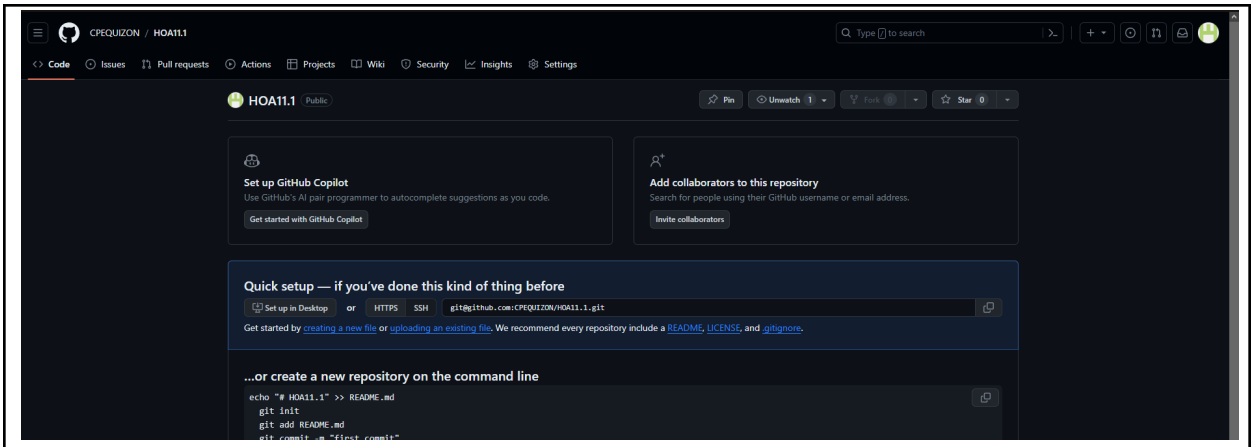
You may also check the difference between containers and virtual machines. Click the link given below.

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)



- Created a new repository.

```
nowellgabriel@workstation:~$ git clone git@github.com:CPEQUIZON/HOA11.1.git
Cloning into 'HOA11.1'...
warning: You appear to have cloned an empty repository.
nowellgabriel@workstation:~$ ls
CPE232_Quizon        Documents  HOA11.1  Music     Quizon_PrelimExam  Templates
CPE_MIDEXAM_QUIZON   Downloads  HOA8.1   Pictures  site.yml           Videos
Desktop              HOA10.1    HOA9.1   Public    snap
```

- Cloned the repository into my VM.

```
nowellgabriel@workstation: ~/HOA11.1
  GNU nano 6.2                                inventory *
[ubuntu_server]
192.168.56.110
```

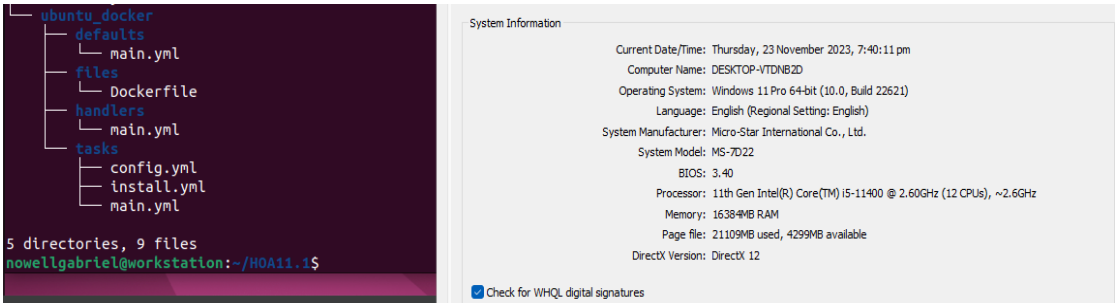
- Created the inventory file.

```
nowellgabriel@workstation: ~/HOA11.1
  GNU nano 6.2                                ansible.cfg
[defaults]

inventory = inventory
host_key_checking = False

deprecation_warnings = False

remote_user = nowellgabriel
private_key_file = ~/.ssh/
```

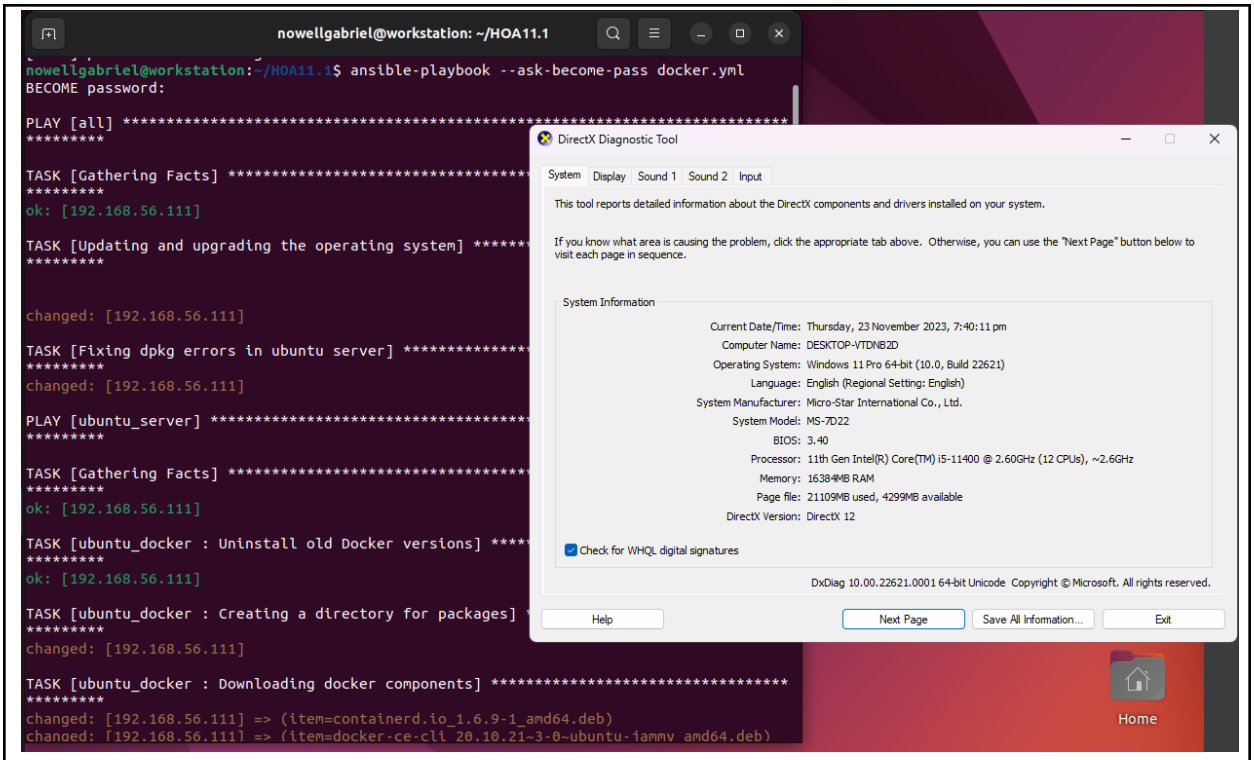
- Created the ansible.cfg file.

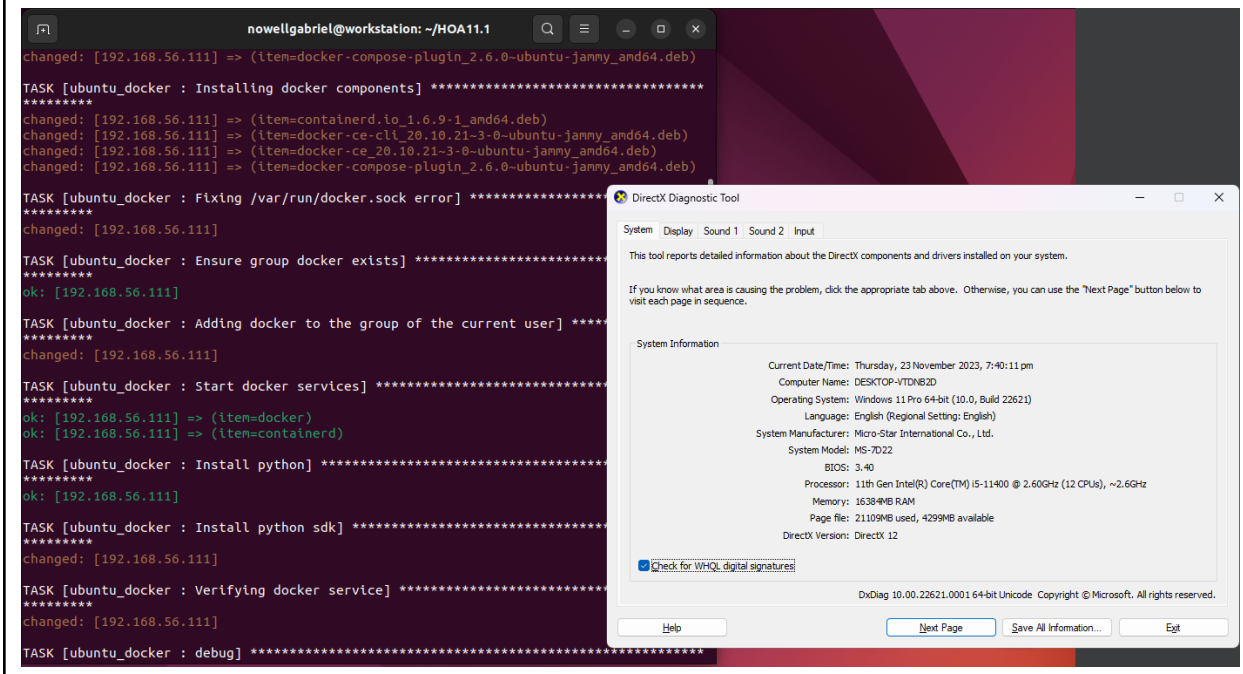
```
nowellgabriel@workstation: ~/HOA11.1
  GNU nano 6.2                                  docker.yml
---
- hosts: all
  become: true
  pre_tasks:

  - name: Updating and upgrading the operating system
    package:
      update_cache: true
      upgrade: true
      state: latest

  - name: Fixing dpkg errors in ubuntu server
    command: dpkg --configure -a
    when: ansible_distribution == "Ubuntu"

- hosts: ubuntu_server
  become: true
  roles:
    - ubuntu_docker
```

- Created the yml file.



- Created the necessary files that belongs to the ubuntu_docker directory, which are the *defaults, files, handlers and tasks.*


nowellgabriel@workstation: ~/HOA11.1
nowellgabriel@workstation:~/HOA11.1$ ansible-playbook --ask-become-pass docker.yml
BECOME password:
PLAY [all] *********
TASK [Gathering Facts] *********
ok: [192.168.56.111]
TASK [Updating and upgrading the operating system] *********
changed: [192.168.56.111]
TASK [Fixing dpkg errors in ubuntu server] *********
changed: [192.168.56.111]
PLAY [ubuntu_server] *********
TASK [Gathering Facts] *********
ok: [192.168.56.111]
TASK [ubuntu_docker : Uninstall old Docker versions] *********
ok: [192.168.56.111]
TASK [ubuntu_docker : Creating a directory for packages] *********
changed: [192.168.56.111]
TASK [ubuntu_docker : Downloading docker components] *********
changed: [192.168.56.111] => (item=containerd.io_1.6.9-1_amd64.deb)
changed: [192.168.56.111] => (item=docker-ce-cli_20.10.21~3-0~ubuntu-jammy_amd64.deb)
DirectX Diagnostic Tool
System Display Sound 1 Sound 2 Input
This tool reports detailed information about the DirectX components and drivers installed on your system.
If you know what area is causing the problem, click the appropriate tab above. Otherwise, you can use the "Next Page" button below to visit each page in sequence.
System Information
Current Date/Time: Thursday, 23 November 2023, 7:40:11 pm
Computer Name: DESKTOP-VTDNB2D
Operating System: Windows 11 Pro 64-bit (10.0, Build 22621)
Language: English (Regional Setting: English)
System Manufacturer: Micro-Star International Co., Ltd.
System Model: MS-7D22
BIOS: 3.40
Processor: 11th Gen Intel(R) Core(TM) i5-11400 @ 2.60GHz (12 CPUs), ~2.6GHz
Memory: 16384MB RAM
Page file: 21109MB used, 4299MB available
DirectX Version: DirectX 12
Check for WHQL digital signatures
DxDiag 10.00.22621.0001 64-bit Unicode Copyright © Microsoft. All rights reserved.
Help
Next Page
Save All Information...
Exit
Home


nowellgabriel@workstation: ~/HOA11.1
changed: [192.168.56.111] => (item=docker-compose-plugin_2.6.0~ubuntu-jammy_amd64.deb)
TASK [ubuntu_docker : Installing docker components] *********
changed: [192.168.56.111] => (item=containerd.io_1.6.9-1_amd64.deb)
changed: [192.168.56.111] => (item=docker-ce-cli_20.10.21~3-0~ubuntu-jammy_amd64.deb)
changed: [192.168.56.111] => (item=docker-ce_20.10.21~3-0~ubuntu-jammy_amd64.deb)
changed: [192.168.56.111] => (item=docker-compose-plugin_2.6.0~ubuntu-jammy_amd64.deb)
TASK [ubuntu_docker : Fixing /var/run/docker.sock error] *********
changed: [192.168.56.111]
TASK [ubuntu_docker : Ensure group docker exists] *********
ok: [192.168.56.111]
TASK [ubuntu_docker : Adding docker to the group of the current user] *********
changed: [192.168.56.111]
TASK [ubuntu_docker : Start docker services] *********
ok: [192.168.56.111] => (item=docker)
ok: [192.168.56.111] => (item=containerd)
TASK [ubuntu_docker : Install python] *********
ok: [192.168.56.111]
TASK [ubuntu_docker : Install python sdk] *********
changed: [192.168.56.111]
TASK [ubuntu_docker : Verifying docker service] *********
changed: [192.168.56.111]
TASK [ubuntu_docker : debug] *********
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DirectX Version: DirectX 12
Check for WHQL digital signatures
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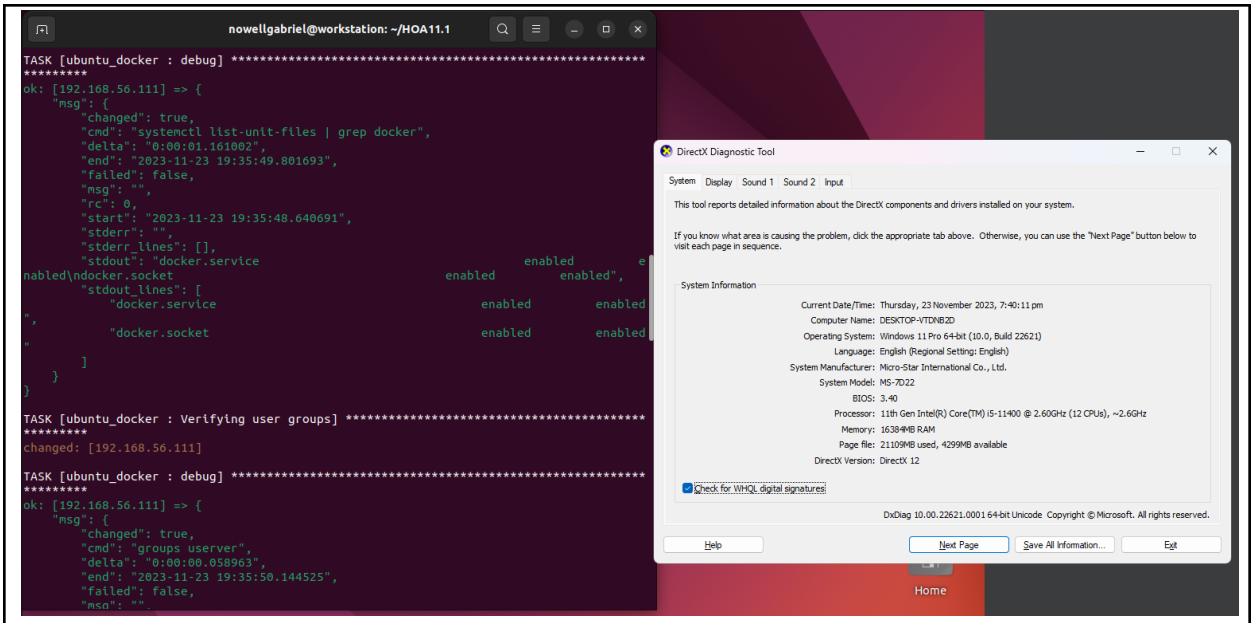
Help
Next Page
Save All Information...
Exit


nowellgabriel@workstation: ~/HOA11.1
TASK [ubuntu_docker : debug] ***
****
ok: [192.168.56.111] => {
"msg": {
"changed": true,
"cmd": "systemctl list-unit-files | grep docker",
"delta": "0:00:01.161002",
"end": "2023-11-23 19:35:49.801693",
"failed": false,
"msg": "",
"rc": 0,
"start": "2023-11-23 19:35:48.640691",
"stderr": "",
"stderr_lines": [],
"stdout": "docker.service enabled e
nabled\ndocker.socket enabled enabled",
"stdout_lines": [
"docker.service enabled enabled
",
"docker.socket enabled enabled
"
]
}
}
TASK [ubuntu_docker : Verifying user groups] **
****
changed: [192.168.56.111]
TASK [ubuntu_docker : debug] ***
****
ok: [192.168.56.111] => {
"msg": {
"changed": true,
"cmd": "groups userver",
"delta": "0:00:00.058963",
"end": "2023-11-23 19:35:50.144525",
"failed": false,
"msg": "",
DirectX Diagnostic Tool
System Display Sound 1 Sound 2 Input
This tool reports detailed information about the DirectX components and drivers installed on your system.
If you know what area is causing the problem, click the appropriate tab above. Otherwise, you can use the "Next Page" button below to visit each page in sequence.
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Check for WHQL digital signatures
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Exit
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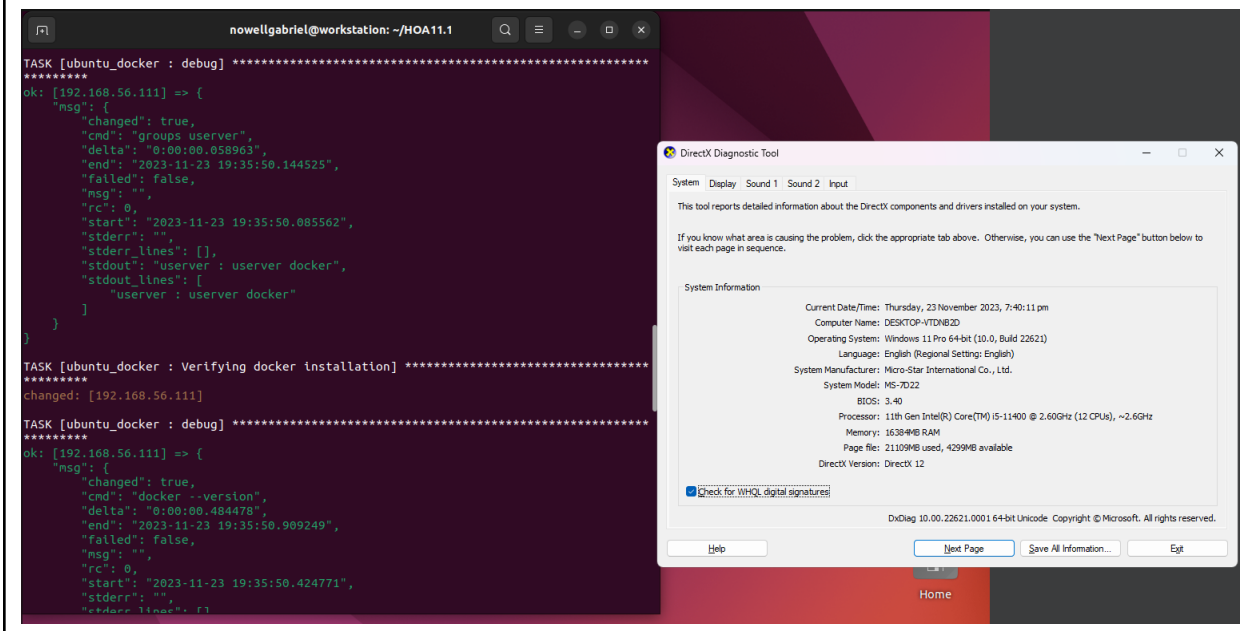
nowellgabriel@workstation: ~/HOA11.1
TASK [ubuntu_docker : debug] ***
****
ok: [192.168.56.111] => {
"msg": {
"changed": true,
"cmd": "groups userver",
"delta": "0:00:00.058963",
"end": "2023-11-23 19:35:50.144525",
"failed": false,
"msg": "",
"rc": 0,
"start": "2023-11-23 19:35:50.085562",
"stderr": "",
"stderr_lines": [],
"stdout": "userver : userver docker",
"stdout_lines": [
"userver : userver docker"
]
}
}
TASK [ubuntu_docker : Verifying docker installation] ************************************
****
changed: [192.168.56.111]
TASK [ubuntu_docker : debug] ***
****
ok: [192.168.56.111] => {
"msg": {
"changed": true,
"cmd": "docker --version",
"delta": "0:00:00.484478",
"end": "2023-11-23 19:35:50.909249",
"failed": false,
"msg": "",
"rc": 0,
"start": "2023-11-23 19:35:50.424771",
"stderr": "",
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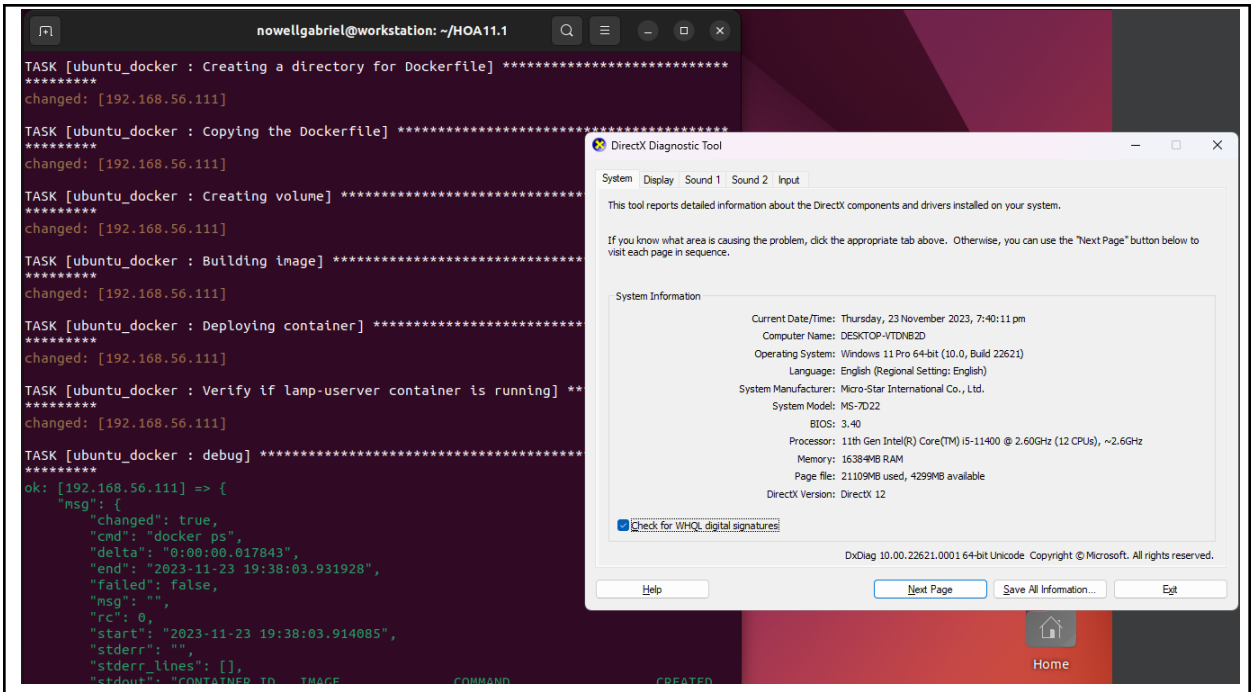
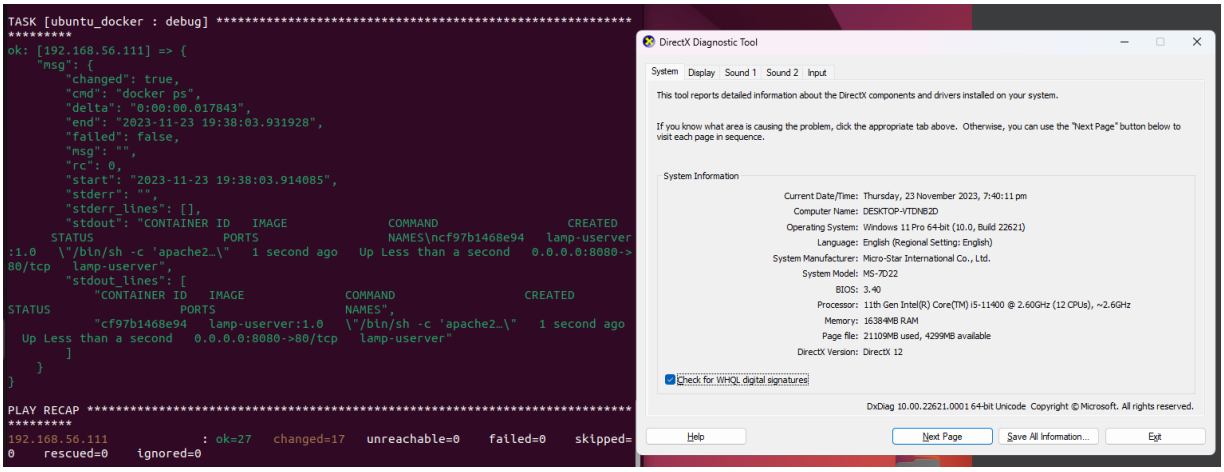




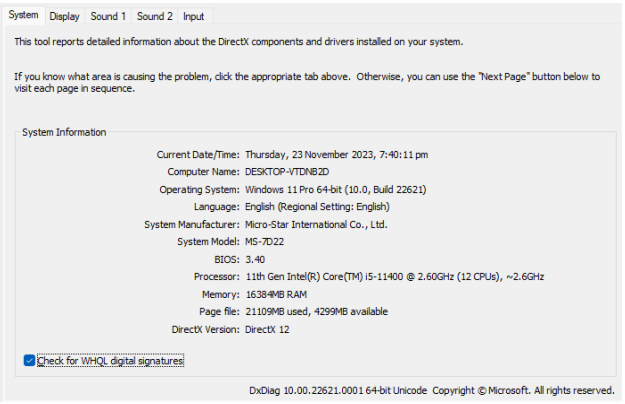
- I played the playbook and it did all of the tasks and installations successfully.

```
nowellgabriel@workstation:~$ docker --version
Docker version 20.10.21, build baeda1f
nowellgabriel@workstation:~$ sudo systemctl status docker
[sudo] password for nowellgabriel:
● docker.service - Docker Application Container Engine
     Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset>
     Active: active (running) since Thu 2023-11-23 19:35:25 +08; 2h 55min ago
TriggeredBy: ● docker.socket
       Docs: https://docs.docker.com
   Main PID: 37248 (dockerd)
      Tasks: 19
     Memory: 223.2M
        CPU: 7.193s
     CGroup: /system.slice/docker.service
             ├─37248 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/con>
             └─48959 /usr/bin/docker-proxy -proto tcp -host-ip 0.0.0.0 -host-po>

Nov 23 19:35:25 workstation dockerd[37248]: time="2023-11-23T19:35:25.703434041>
Nov 23 19:36:20 workstation dockerd[37248]: time="2023-11-23T19:36:19.612028986>
Nov 23 19:36:20 workstation dockerd[37248]: time="2023-11-23T19:36:20.324173656>
Nov 23 19:36:33 workstation dockerd[37248]: time="2023-11-23T19:36:33.235415680>
Nov 23 19:36:42 workstation dockerd[37248]: time="2023-11-23T19:36:42.873877245>
Nov 23 19:36:58 workstation dockerd[37248]: time="2023-11-23T19:36:58.789825917>
Nov 23 19:37:25 workstation dockerd[37248]: time="2023-11-23T19:37:25.600861153>
Nov 23 19:37:52 workstation dockerd[37248]: time="2023-11-23T19:37:52.823363798>
Nov 23 19:38:00 workstation dockerd[37248]: time="2023-11-23T19:38:00.685869435>
Nov 23 19:38:01 workstation dockerd[37248]: time="2023-11-23T19:38:01.118143692>
lines 1-23/23 (END)
```

- Proof of installation

```
nowellgabriel@workstation:~/HOA11.1$ git add *
nowellgabriel@workstation:~/HOA11.1$ git commit -m "HOA11.1 DONE"
[main (root-commit) d256531] HOA11.1 DONE
 9 files changed, 200 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 docker.yml
 create mode 100644 inventory
 create mode 100644 ubuntu_docker/defaults/main.yml
 create mode 100644 ubuntu_docker/files/Dockerfile
 create mode 100644 ubuntu_docker/handlers/main.yml
 create mode 100644 ubuntu_docker/tasks/config.yml
 create mode 100644 ubuntu_docker/tasks/install.yml
 create mode 100644 ubuntu_docker/tasks/main.yml
nowellgabriel@workstation:~/HOA11.1$ git push origin
Enumerating objects: 16, done.
Counting objects: 100% (16/16), done.
Delta compression using up to 4 threads
Compressing objects: 100% (12/12), done.
Writing objects: 100% (16/16), 2.57 KiB | 2.57 MiB/s, done.
Total 16 (delta 0), reused 0 (delta 0), pack-reused 0
To github.com:CPEQUIZON/HOA11.1.git
 * [new branch]      main -> main
nowellgabriel@workstation:~/HOA11.1$
```



Reflections:

Answer the following:

1. What are the benefits of implementing containerizations?

   Applications and their associated components can be packaged into lightweight, portable containers that can be installed and used on any computing environment that is suitable. Compared to more traditional

software deployment techniques, this method has benefits including flexibility, resource efficiency, scalability, quickness, security, and lower costs. Additionally, by giving apps an identical environment, containers may improve reliability and stability.

Conclusions:

A Continuous Delivery (CD) pipeline that makes use of Docker and Ansible may speed up the development and deployment of applications, resulting in shorter delivery cycles, less downtime, and improved software quality. Docker's lightweight and portable containers make application packaging and deployment easier, and Ansible's Infrastructure as Code (IaC) philosophy promotes consistent and repeatable infrastructure provisioning. Due to these technologies' mutual support, a smooth continuous development and deployment (CI/CD) pathway that automates the build, test, and deployment stages may be set up, ensuring the prompt and dependable delivery of changes to production.