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| **Name:** Mark Andrei Ponayo | **Date Performed:** Nov 21, 2023 |
| **Course/Section:** BSCPE31S5 | **Date Submitted:** Nov 23, 2023 |
| **Instructor:** Engr. Roman Richard | **Semester and SY:** 1st sem 2022 - 2023 |

**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.

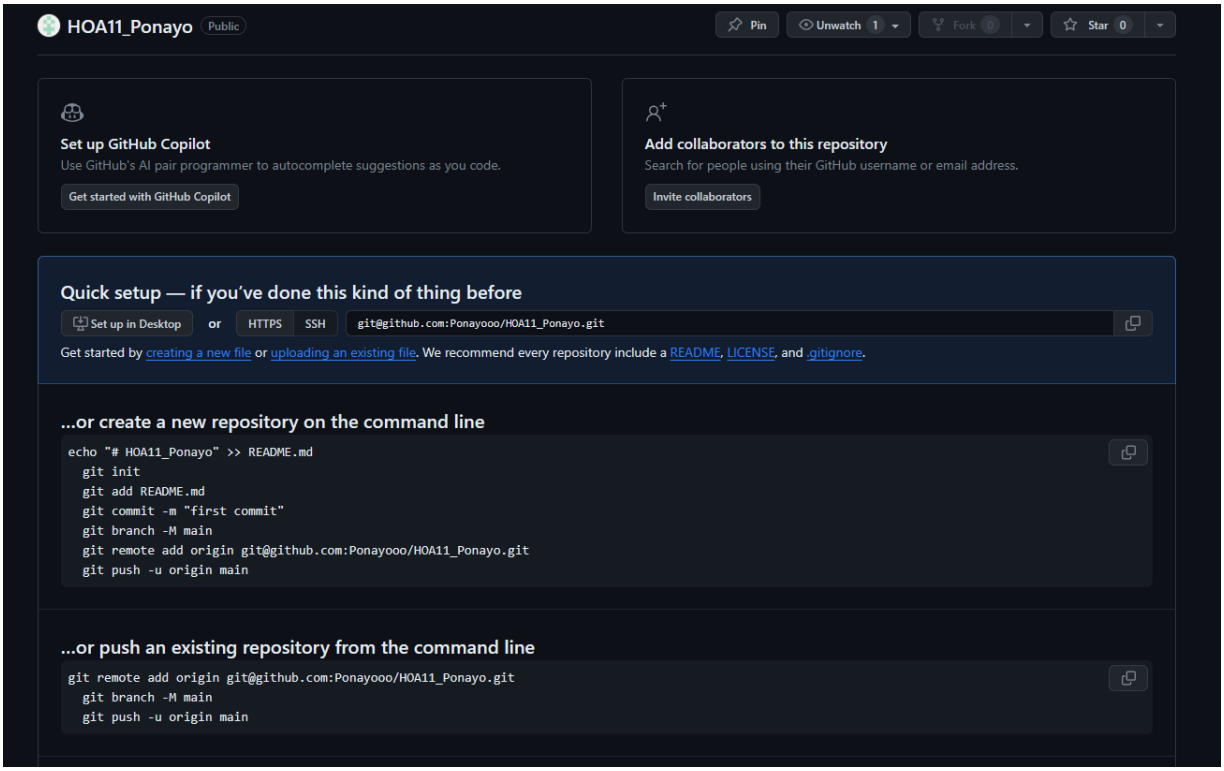
Source: https://docs.microsoft.com/en-us/virtualization/windowscontainers/about/containers-vs-vm

**3. Tasks**

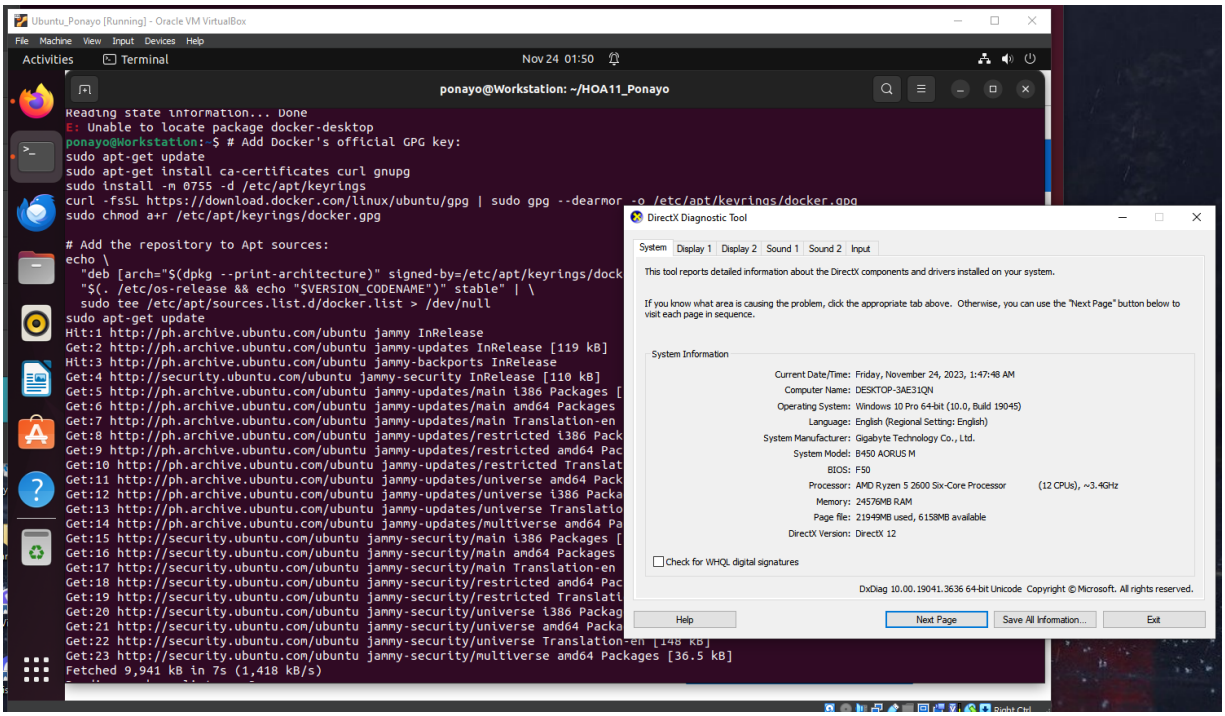
1. Create a new repository for this activity.
2. Install Docker and enable the docker socket.
3. Add to Docker group to your current user.
4. Create a Dockerfile to install web and DB server.
5. Install and build the Dockerfile using Ansible.
6. Add, commit and push it to your repository.

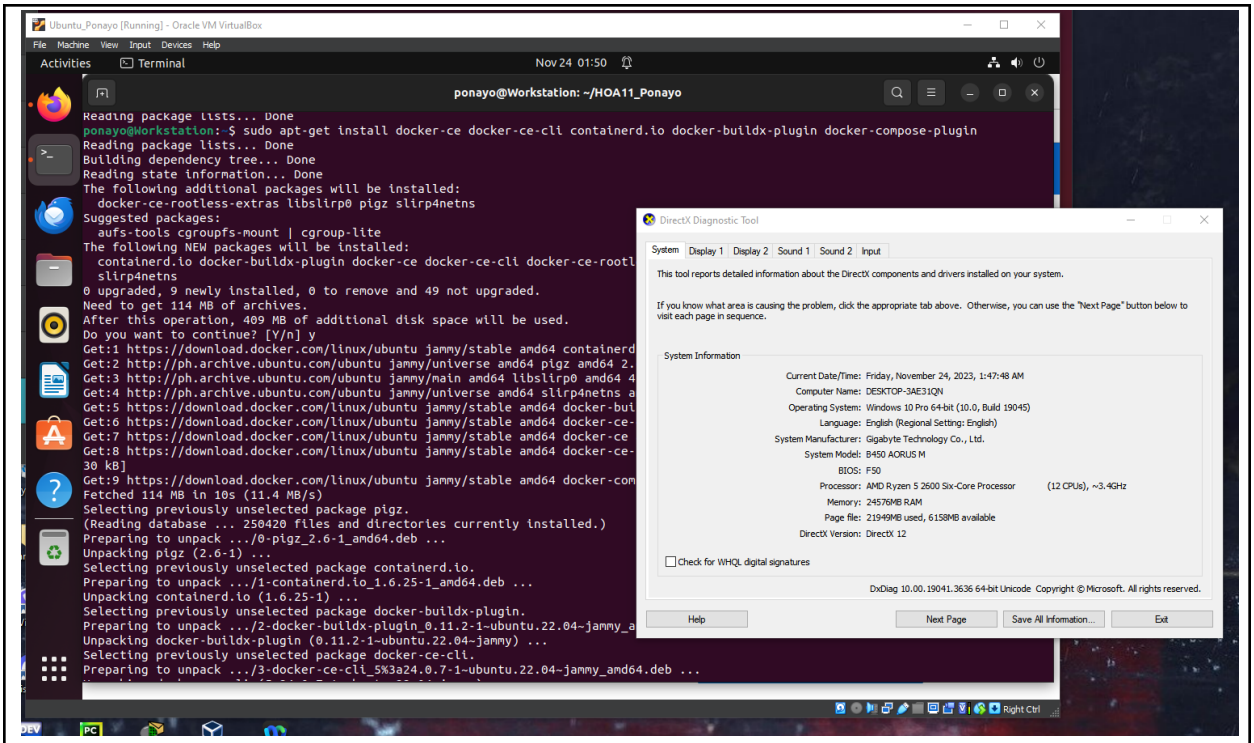
**4. Output** (screenshots and explanations)

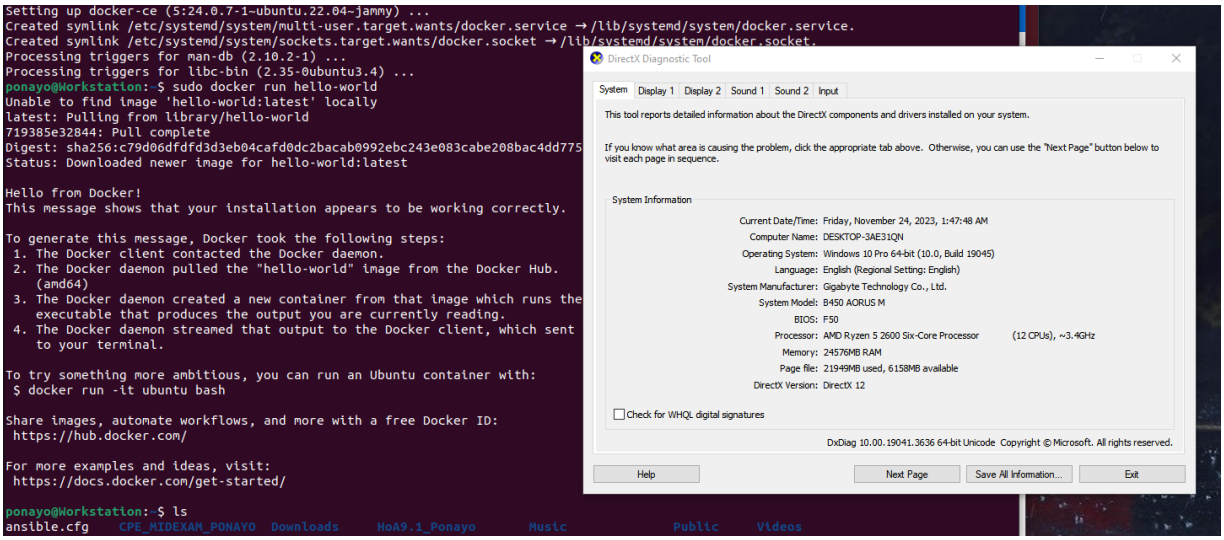
1. On this step, I created a new repository for this activity called “HOA11_Ponayo”.




2. On this step, I installed the docker and enabled the docker socket.




Ubuntu_Ponayo [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Nov 24 01:50
ponayo@Workstation: ~/HOA11_Ponayo
Reading package lists... Done
ponayo@Workstation:~$ sudo apt-get install docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
docker-ce-rootless-extras libslirp0 pigz slirp4netns
Suggested packages:
aufs-tools cgroupfs-mount | cgroup-lite
The following NEW packages will be installed:
containerd.io docker-buildx-plugin docker-ce docker-ce-cli docker-ce-rootl
slirp4netns
0 upgraded, 9 newly installed, 0 to remove and 49 not upgraded.
Need to get 114 MB of archives.
After this operation, 409 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 https://download.docker.com/linux/ubuntu jammy/stable amd64 containerd
Get:2 http://ph.archive.ubuntu.com/ubuntu jammy/universe amd64 pigz amd64 2.
Get:3 http://ph.archive.ubuntu.com/ubuntu jammy/main amd64 libslirp0 amd64 4
Get:4 http://ph.archive.ubuntu.com/ubuntu jammy/universe amd64 slirp4netns a
Get:5 https://download.docker.com/linux/ubuntu jammy/stable amd64 docker-bui
Get:6 https://download.docker.com/linux/ubuntu jammy/stable amd64 docker-ce-
Get:7 https://download.docker.com/linux/ubuntu jammy/stable amd64 docker-ce
Get:8 https://download.docker.com/linux/ubuntu jammy/stable amd64 docker-ce-
30 kB]
Get:9 https://download.docker.com/linux/ubuntu jammy/stable amd64 docker-com
Fetched 114 MB in 10s (11.4 MB/s)
Selecting previously unselected package pigz.
(Reading database ... 250420 files and directories currently installed.)
Preparing to unpack .../0-pigz_2.6-1_amd64.deb ...
Unpacking pigz (2.6-1) ...
Selecting previously unselected package containerd.io.
Preparing to unpack .../1-containerd.io_1.6.25-1_amd64.deb ...
Unpacking containerd.io (1.6.25-1) ...
Selecting previously unselected package docker-buildx-plugin.
Preparing to unpack .../2-docker-buildx-plugin_0.11.2-1~ubuntu.22.04~jammy_a
Unpacking docker-buildx-plugin (0.11.2-1~ubuntu.22.04~jammy) ...
Selecting previously unselected package docker-ce-cli.
Preparing to unpack .../3-docker-ce-cli_5%3a24.0.7-1~ubuntu.22.04~jammy_amd64.deb ...
DirectX Diagnostic Tool
System Display 1 Display 2 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: Friday, November 24, 2023, 1:47:48 AM
Computer Name: DESKTOP-3AE31QN
Operating System: Windows 10 Pro 64-bit (10.0, Build 19045)
Language: English (Regional Setting: English)
System Manufacturer: Gigabyte Technology Co., Ltd.
System Model: B450 AORUS M
BIOS: F50
Processor: AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
Memory: 24576MB RAM
Page file: 21949MB used, 6158MB available
DirectX Version: DirectX 12
Check for WHQL digital signatures
DxDiag 10.00.19041.3636 64-bit Unicode Copyright © Microsoft. All rights reserved.
Help
Next Page
Save All Information...
Exit
Right Ctrl


Setting up docker-ce (5:24.0.7-1~ubuntu.22.04~jammy) ...
Created symlink /etc/systemd/system/multi-user.target.wants/docker.service → /lib/systemd/system/docker.service.
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /lib/systemd/system/docker.socket.
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.4) ...
ponayo@Workstation:~$ sudo docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
719385e32844: Pull complete
Digest: sha256:c79d06dfdfd3d3eb04cafd0dc2bacab0992ebc243e083cabe208bac4dd775
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
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/
ponayo@Workstation:~$ ls
ansible.cfg CPE_MIDEXAM_PONAYO Downloads HoA9.1_Ponayo Music Public Videos
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System Manufacturer: Gigabyte Technology Co., Ltd.
System Model: B450 AORUS M
BIOS: F50
Processor: AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
Memory: 24576MB RAM
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DirectX Version: DirectX 12
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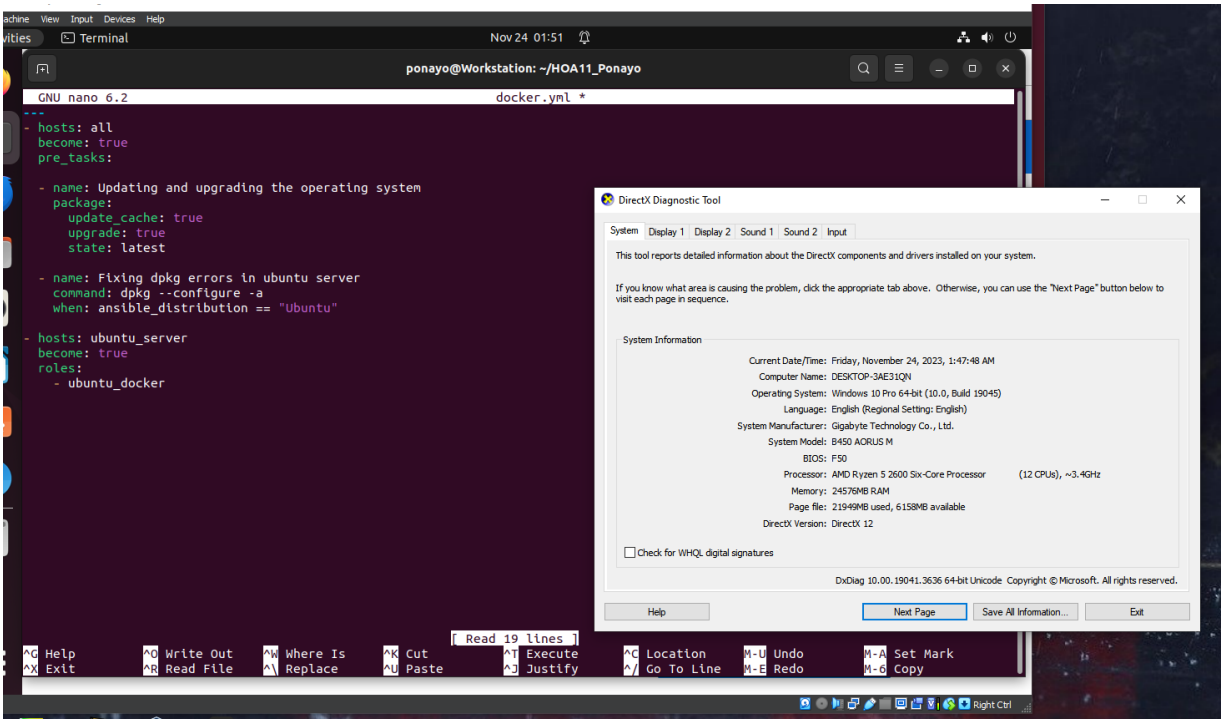
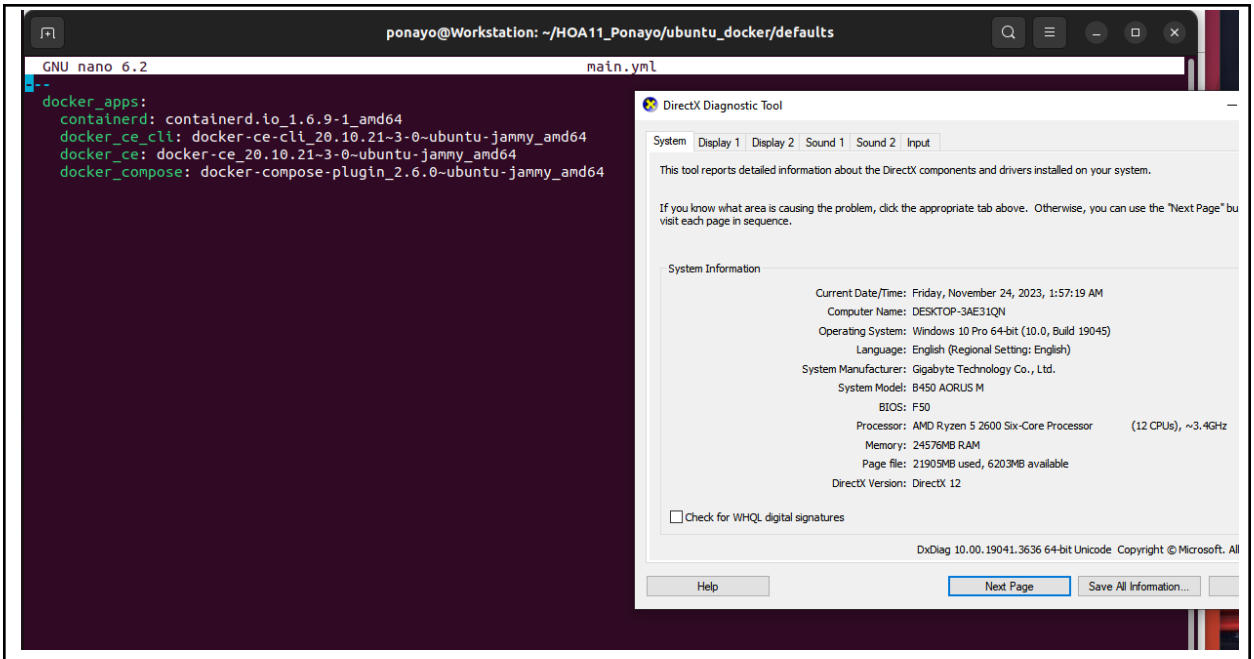
3. On this step, I created a file called docker.yml which is the main ansible playbook which describes the flow of the tasks. This file is connected to the directories and runs the contents of each file.




4. On this step, I created a directory ubuntu-docker where there are 4 directories called default, files, handlers, and tasks. The following directories are used to install docker on the remote server.


ponayo@Workstation: ~/HOA11_Ponayo/ubuntu_docker/defaults
GNU nano 6.2 main.yml
---
docker_apps:
containerd: containerd.io_1.6.9-1_amd64
docker_ce_cli: docker-ce-cli_20.10.21~3-0~ubuntu-jammy_amd64
docker_ce: docker-ce_20.10.21~3-0~ubuntu-jammy_amd64
docker_compose: docker-compose-plugin_2.6.0~ubuntu-jammy_amd64
DirectX Diagnostic Tool
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If you know what area is causing the problem, click the appropriate tab above. Otherwise, you can use the "Next Page" bu
visit each page in sequence.
System Information
Current Date/Time: Friday, November 24, 2023, 1:57:19 AM
Computer Name: DESKTOP-3AE31QN
Operating System: Windows 10 Pro 64-bit (10.0, Build 19045)
Language: English (Regional Setting: English)
System Manufacturer: Gigabyte Technology Co., Ltd.
System Model: B450 AORUS M
BIOS: F50
Processor: AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
Memory: 24576MB RAM
Page file: 21905MB used, 6203MB available
DirectX Version: DirectX 12
Check for WHQL digital signatures
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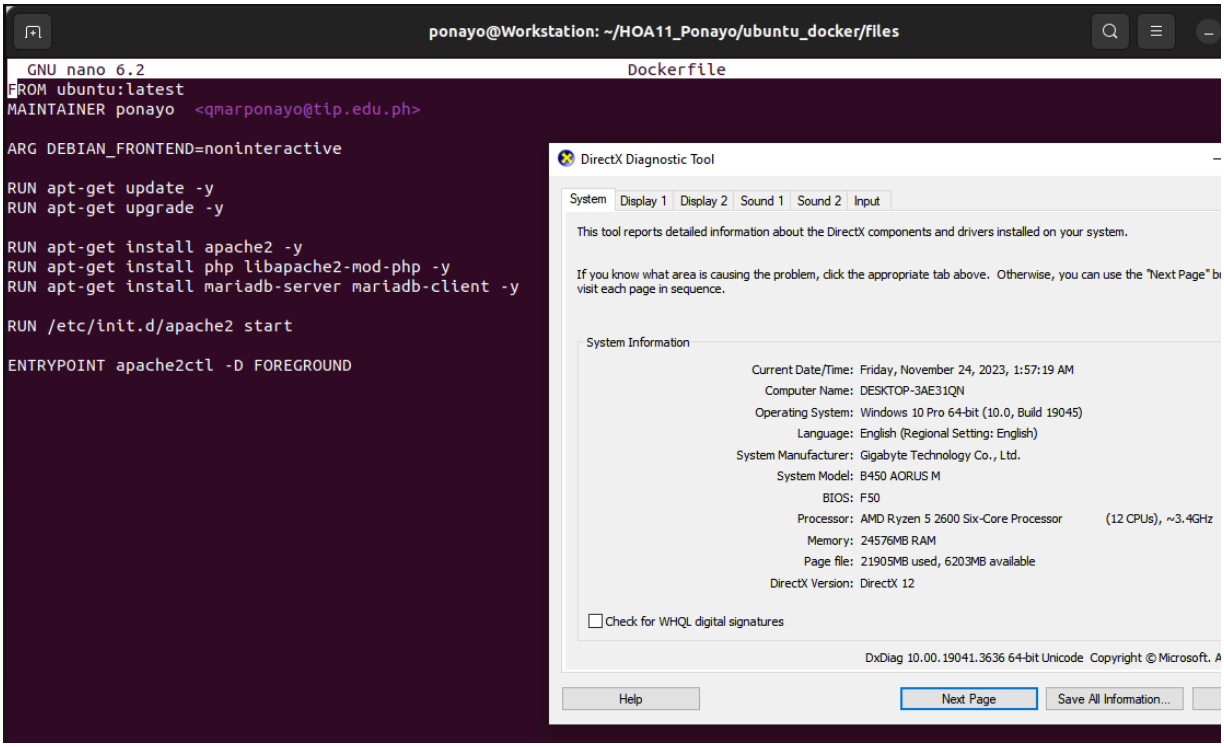
ponayo@Workstation: ~/HOA11_Ponayo/ubuntu_docker/files
GNU nano 6.2 Dockerfile
FROM ubuntu:latest
MAINTAINER ponayo <qmarponayo@tip.edu.ph>
ARG DEBIAN_FRONTEND=noninteractive
RUN apt-get update -y
RUN apt-get upgrade -y
RUN apt-get install apache2 -y
RUN apt-get install php libapache2-mod-php -y
RUN apt-get install mariadb-server mariadb-client -y
RUN /etc/init.d/apache2 start
ENTRYPOINT apache2ctl -D FOREGROUND
DirectX Diagnostic Tool
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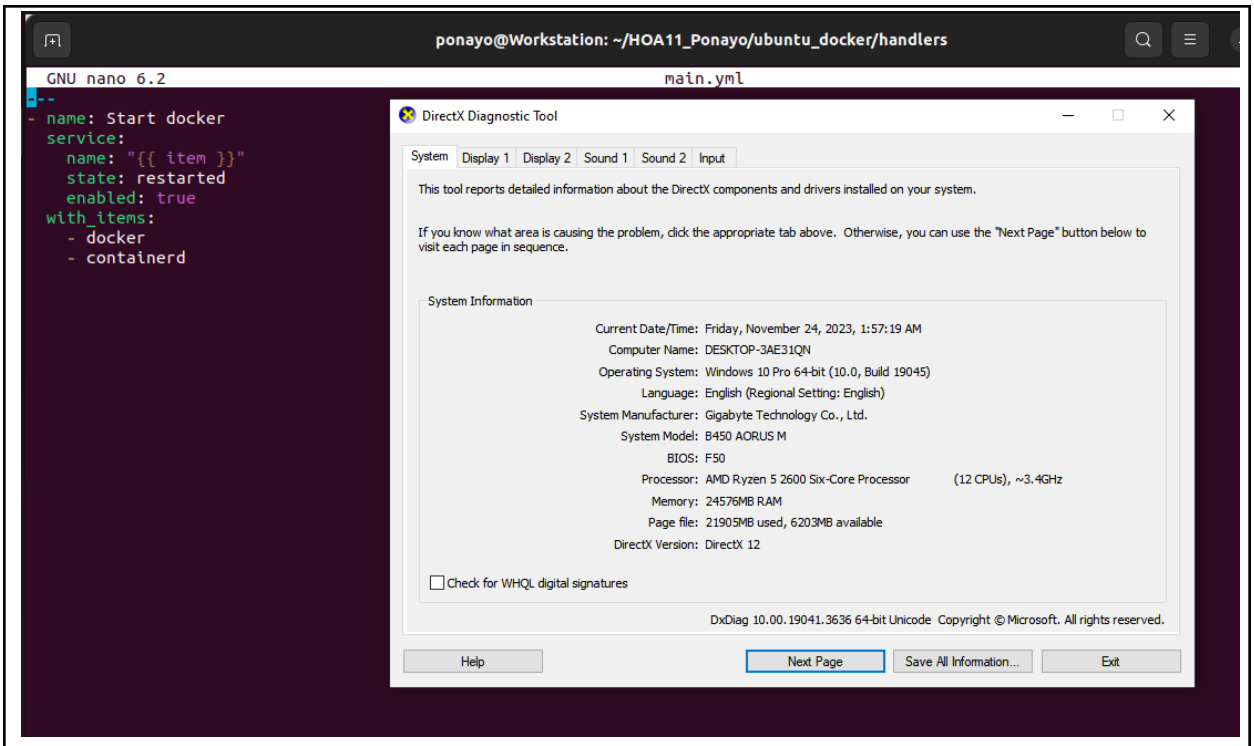
ponayo@Workstation: ~/HOA11_Ponayo/ubuntu_docker/handlers
GNU nano 6.2 main.yml
---
- name: Start docker
service:
name: "{{ item }}"
state: restarted
enabled: true
with_items:
- docker
- containerd
DirectX Diagnostic Tool
System Display 1 Display 2 Sound 1 Sound 2 Input
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System Model: B450 AORUS M
BIOS: F50
Processor: AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
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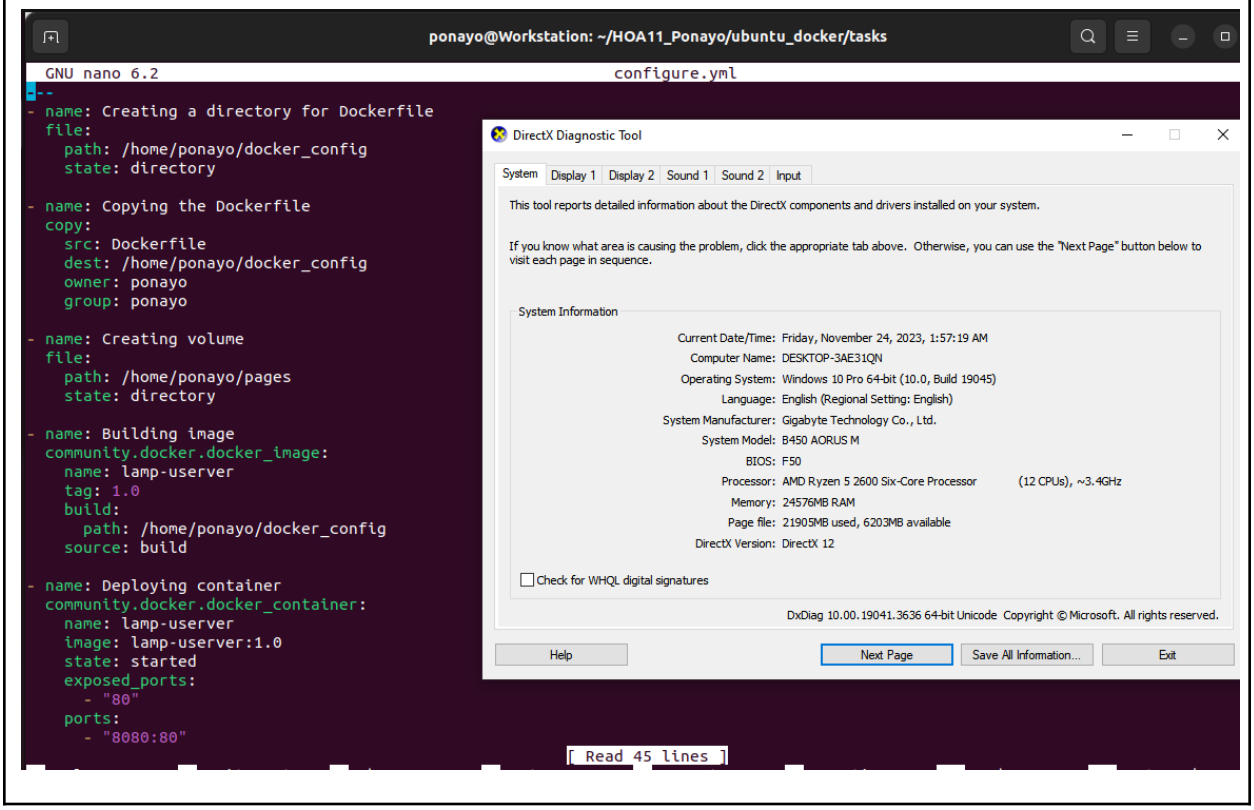
Exit


ponayo@Workstation: ~/HOA11_Ponayo/ubuntu_docker/tasks
GNU nano 6.2 configure.yml
---
- name: Creating a directory for Dockerfile
file:
path: /home/ponayo/docker_config
state: directory
- name: Copying the Dockerfile
copy:
src: Dockerfile
dest: /home/ponayo/docker_config
owner: ponayo
group: ponayo
- name: Creating volume
file:
path: /home/ponayo/pages
state: directory
- name: Building image
community.docker.docker_image:
name: lamp-userver
tag: 1.0
build:
path: /home/ponayo/docker_config
source: build
- name: Deploying container
community.docker.docker_container:
name: lamp-userver
image: lamp-userver:1.0
state: started
exposed_ports:
- "80"
ports:
- "8080:80"
[ Read 45 lines ]
DirectX Diagnostic Tool
System Display 1 Display 2 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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Language: English (Regional Setting: English)
System Manufacturer: Gigabyte Technology Co., Ltd.
System Model: B450 AORUS M
BIOS: F50
Processor: AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
Memory: 24576MB RAM
Page file: 21905MB used, 6203MB available
DirectX Version: DirectX 12
Check for WHQL digital signatures
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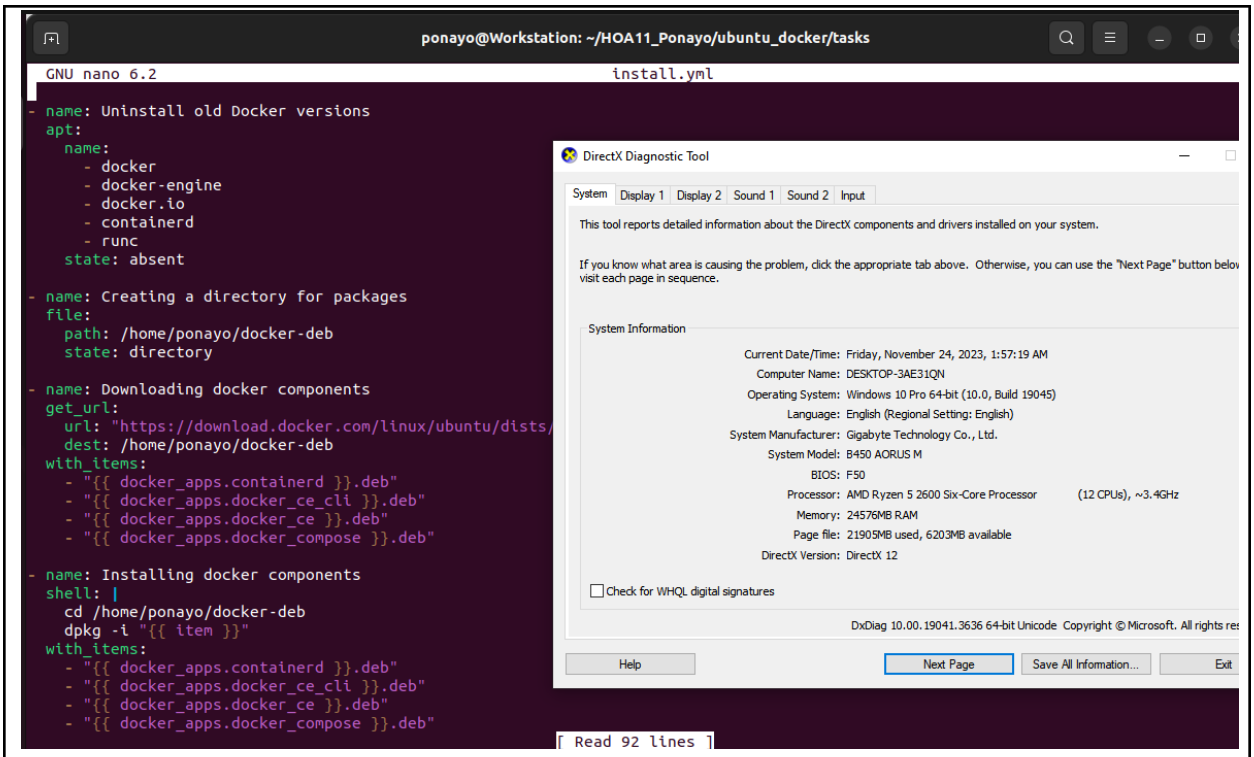
ponayo@Workstation: ~/HOA11_Ponayo/ubuntu_docker/tasks
GNU nano 6.2 install.yml
- name: Uninstall old Docker versions
apt:
name:
- docker
- docker-engine
- docker.io
- containerd
- runc
state: absent
- name: Creating a directory for packages
file:
path: /home/ponayo/docker-deb
state: directory
- name: Downloading docker components
get_url:
url: "https://download.docker.com/linux/ubuntu/dists/
dest: /home/ponayo/docker-deb
with_items:
- "{{ docker_apps.containerd }}.deb"
- "{{ docker_apps.docker_ce_cli }}.deb"
- "{{ docker_apps.docker_ce }}.deb"
- "{{ docker_apps.docker_compose }}.deb"
- name: Installing docker components
shell: |
cd /home/ponayo/docker-deb
dpkg -i "{{ item }}"
with_items:
- "{{ docker_apps.containerd }}.deb"
- "{{ docker_apps.docker_ce_cli }}.deb"
- "{{ docker_apps.docker_ce }}.deb"
- "{{ docker_apps.docker_compose }}.deb"
[ Read 92 lines ]
DirectX Diagnostic Tool
System Display 1 Display 2 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 belov
visit each page in sequence.
System Information
Current Date/Time: Friday, November 24, 2023, 1:57:19 AM
Computer Name: DESKTOP-3AE31QN
Operating System: Windows 10 Pro 64-bit (10.0, Build 19045)
Language: English (Regional Setting: English)
System Manufacturer: Gigabyte Technology Co., Ltd.
System Model: B450 AORUS M
BIOS: F50
Processor: AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
Memory: 24576MB RAM
Page file: 21905MB used, 6203MB available
DirectX Version: DirectX 12
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Help
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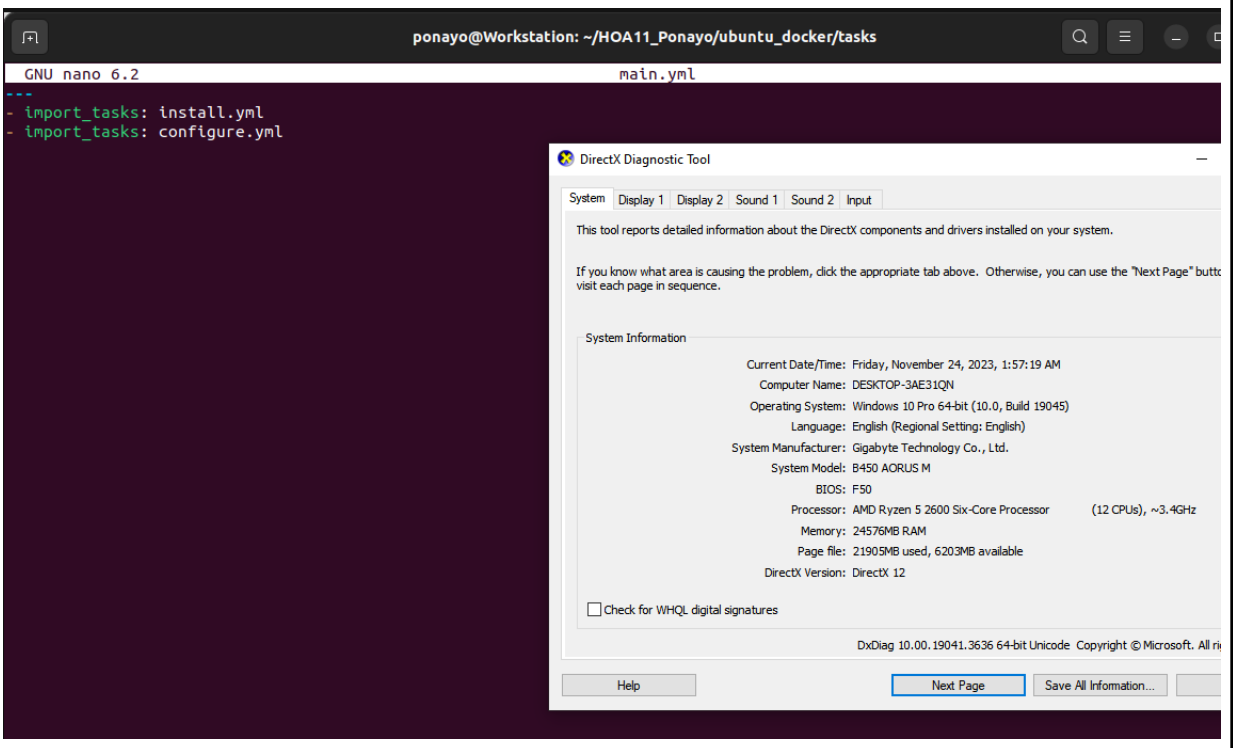
Save All Information...
Exit


ponayo@Workstation: ~/HOA11_Ponayo/ubuntu_docker/tasks
GNU nano 6.2 main.yml
---
- import_tasks: install.yml
- import_tasks: configure.yml
DirectX Diagnostic Tool
System Display 1 Display 2 Sound 1 Sound 2 Input
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If you know what area is causing the problem, click the appropriate tab above. Otherwise, you can use the "Next Page" buttc
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System Information
Current Date/Time: Friday, November 24, 2023, 1:57:19 AM
Computer Name: DESKTOP-3AE31QN
Operating System: Windows 10 Pro 64-bit (10.0, Build 19045)
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System Manufacturer: Gigabyte Technology Co., Ltd.
System Model: B450 AORUS M
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Processor: AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
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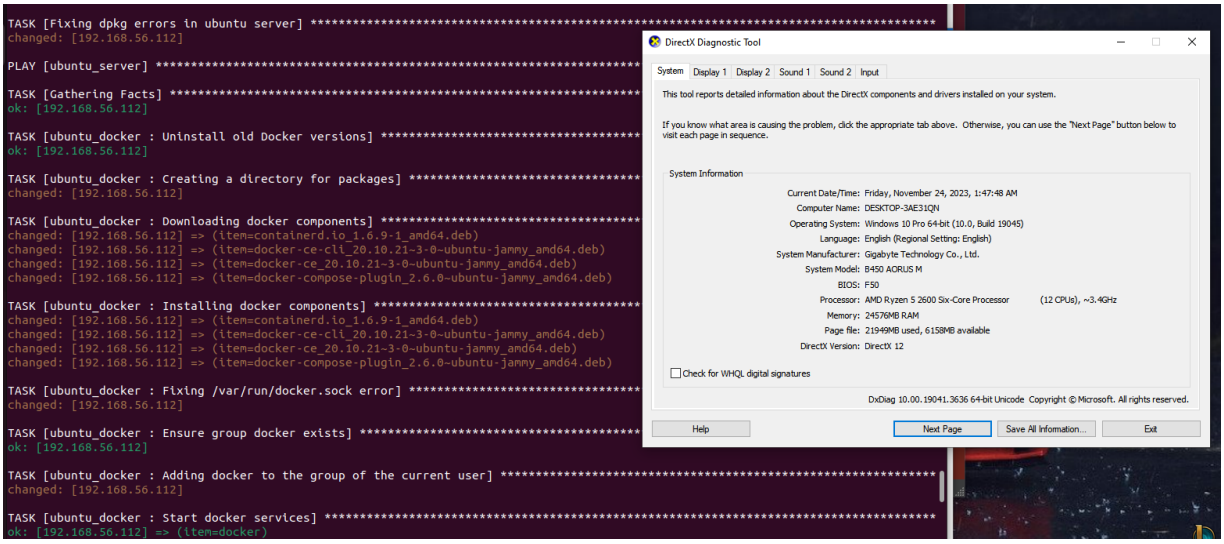
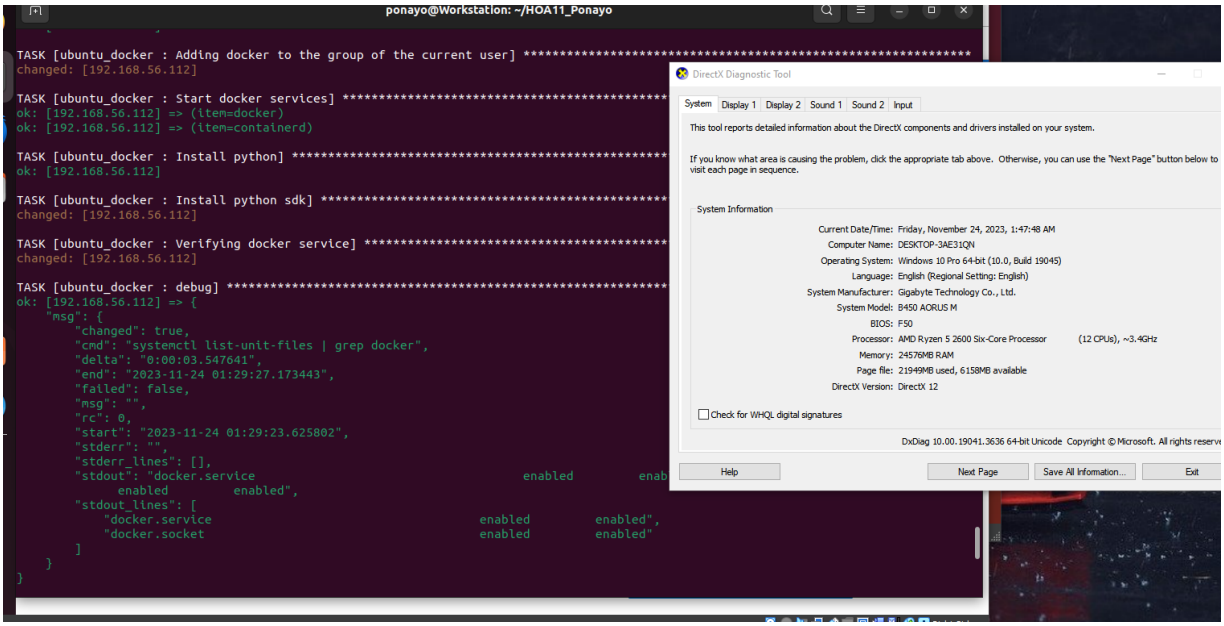
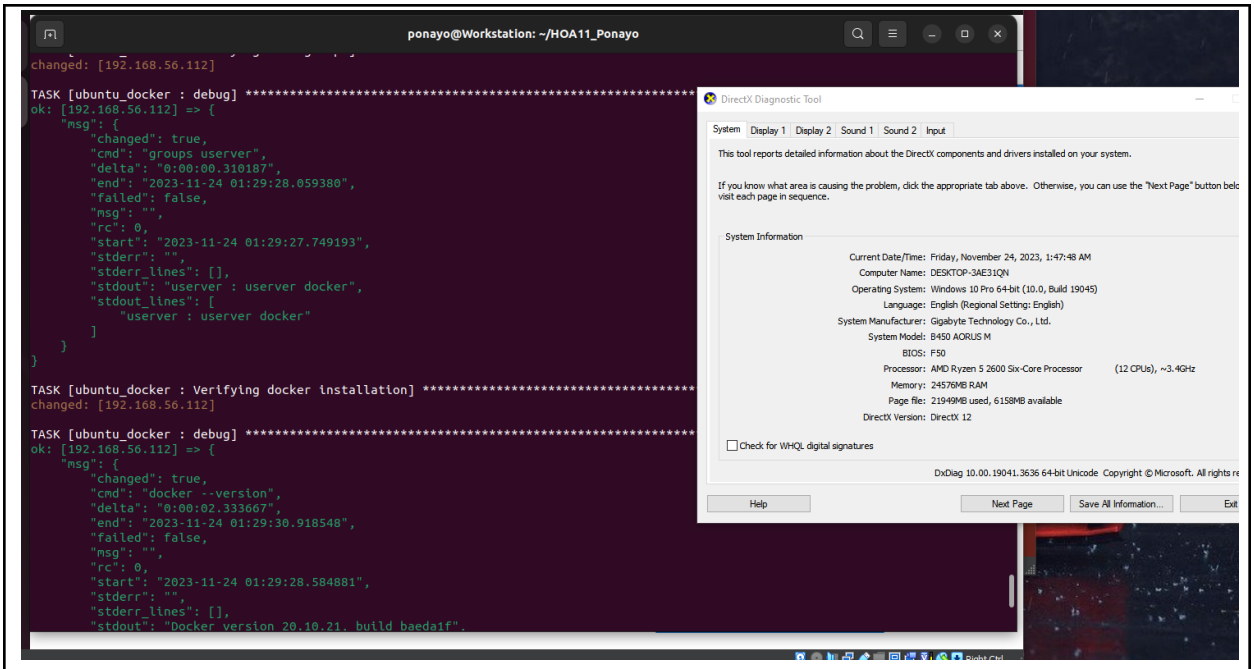
5. On this step, it will show the installation of docker in the remote server and the proof that it was successfully installed.




ponayo@Workstation: ~/HOA11_Ponayo
changed: [192.168.56.112]
TASK [ubuntu_docker : debug] ****************************************************
ok: [192.168.56.112] => {
"msg": {
"changed": true,
"cmd": "groups userver",
"delta": "0:00:00.310187",
"end": "2023-11-24 01:29:28.059380",
"failed": false,
"msg": "",
"rc": 0,
"start": "2023-11-24 01:29:27.749193",
"stderr": "",
"stderr_lines": [],
"stdout": "userver : userver docker",
"stdout_lines": [
"userver : userver docker"
]
}
}
TASK [ubuntu_docker : Verifying docker installation] ****************************
changed: [192.168.56.112]
TASK [ubuntu_docker : debug] ****************************************************
ok: [192.168.56.112] => {
"msg": {
"changed": true,
"cmd": "docker --version",
"delta": "0:00:02.333667",
"end": "2023-11-24 01:29:30.918548",
"failed": false,
"msg": "",
"rc": 0,
"start": "2023-11-24 01:29:28.584881",
"stderr": "",
"stderr_lines": [],
"stdout": "Docker version 20.10.21, build baeda1f",
DirectX Diagnostic Tool
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Language: English (Regional Setting: English)
System Manufacturer: Gigabyte Technology Co., Ltd.
System Model: B450 AORUS M
BIOS: F50
Processor: AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
Memory: 24576MB RAM
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DirectX Version: DirectX 12
Check for WHQL digital signatures
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Help
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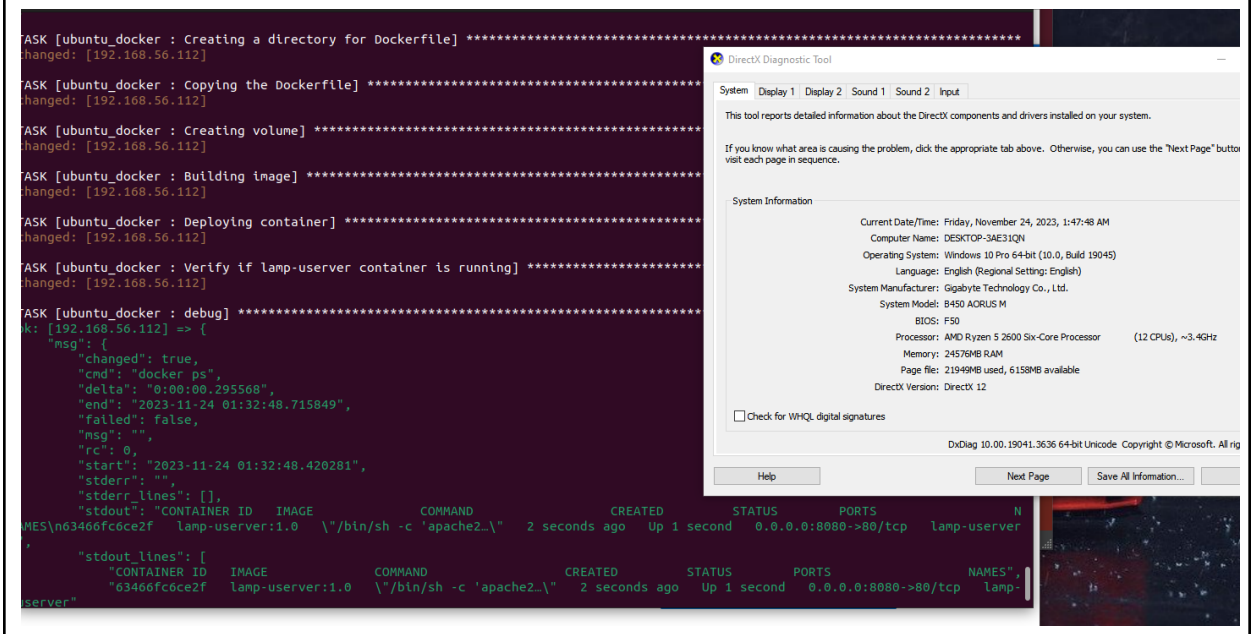
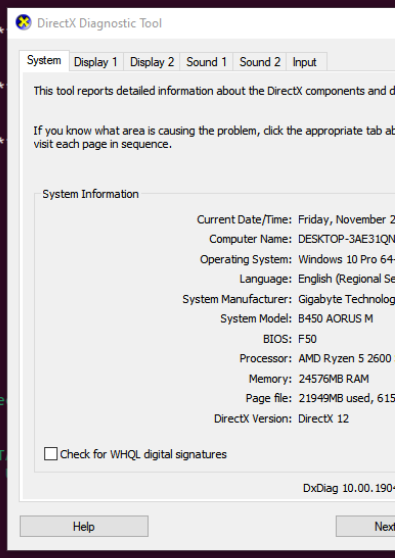
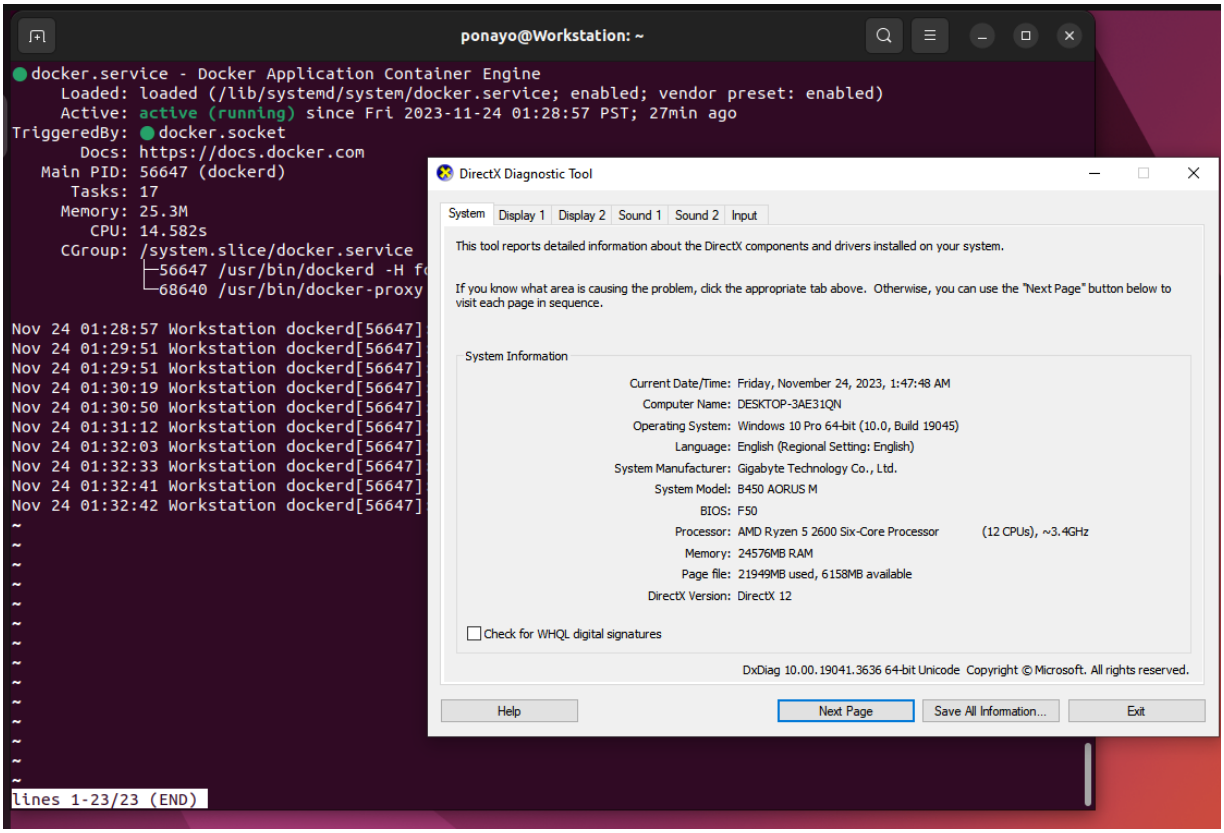
Save All Information...
Exit

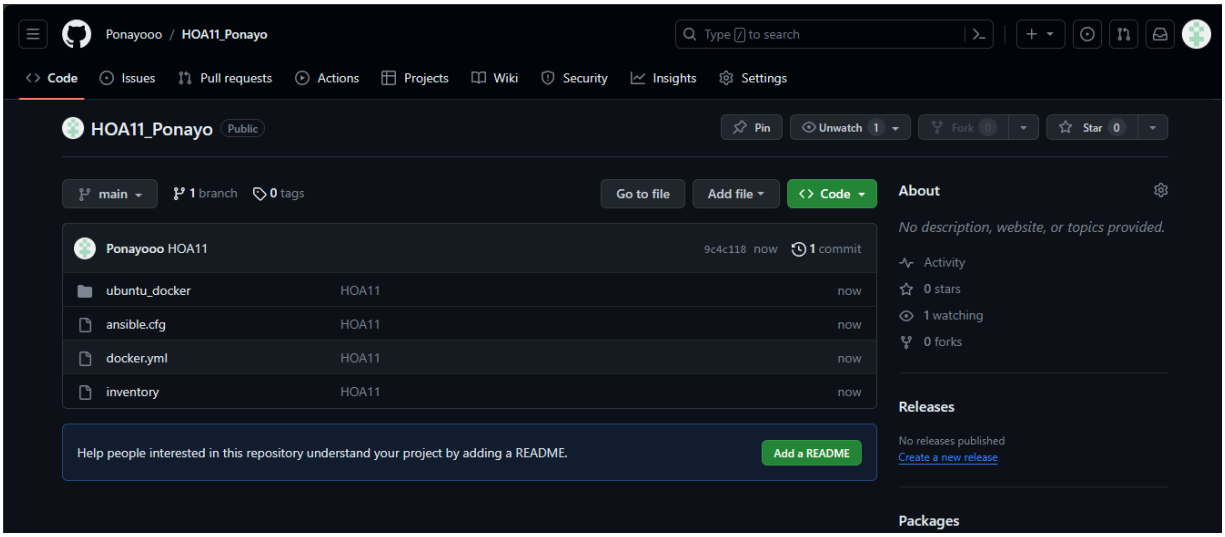

TASK [ubuntu_docker : Creating a directory for Dockerfile] ********************
changed: [192.168.56.112]
TASK [ubuntu_docker : Copying the Dockerfile] ***********************************
changed: [192.168.56.112]
TASK [ubuntu_docker : Creating volume] ******************************************
changed: [192.168.56.112]
TASK [ubuntu_docker : Building image] *******************************************
changed: [192.168.56.112]
TASK [ubuntu_docker : Deploying container] **************************************
changed: [192.168.56.112]
TASK [ubuntu_docker : Verify if lamp-userver container is running] **************
changed: [192.168.56.112]
TASK [ubuntu_docker : debug] ****************************************************
ok: [192.168.56.112] => {
"msg": {
"changed": true,
"cmd": "docker ps",
"delta": "0:00:00.295568",
"end": "2023-11-24 01:32:48.715849",
"failed": false,
"msg": "",
"rc": 0,
"start": "2023-11-24 01:32:48.420281",
"stderr": "",
"stderr_lines": [],
"stdout": "CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS N
AMES\n63466fc6ce2f lamp-userver:1.0 \"/bin/sh -c 'apache2…\" 2 seconds ago Up 1 second 0.0.0.0:8080->80/tcp lamp-userver
",
"stdout_lines": [
"CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES",
"63466fc6ce2f lamp-userver:1.0 \"/bin/sh -c 'apache2…\" 2 seconds ago Up 1 second 0.0.0.0:8080->80/tcp lamp-
userver"
DirectX Diagnostic Tool
System Display 1 Display 2 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" buttor
visit each page in sequence.
System Information
Current Date/Time: Friday, November 24, 2023, 1:47:48 AM
Computer Name: DESKTOP-3AE31QN
Operating System: Windows 10 Pro 64-bit (10.0, Build 19045)
Language: English (Regional Setting: English)
System Manufacturer: Gigabyte Technology Co., Ltd.
System Model: B450 AORUS M
BIOS: F50
Processor: AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
Memory: 24576MB RAM
Page file: 21949MB used, 6158MB available
DirectX Version: DirectX 12
Check for WHQL digital signatures
DxDiag 10.00.19041.3636 64-bit Unicode Copyright © Microsoft. All rig
Help
Next Page
Save All Information...

```
TASK [ubuntu_docker : Building image] ******************************************************************************************************
changed: [192.168.56.112]

TASK [ubuntu_docker : Deploying container] *************************************************
changed: [192.168.56.112]

TASK [ubuntu_docker : Verify if lamp-userver container is running] *************************
changed: [192.168.56.112]

TASK [ubuntu_docker : debug] ***************************************************************
ok: [192.168.56.112] => {
    "msg": {
        "changed": true,
        "cmd": "docker ps",
        "delta": "0:00:00.295568",
        "end": "2023-11-24 01:32:48.715849",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2023-11-24 01:32:48.420281",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "CONTAINER ID   IMAGE              COMMAND                  CREATED
AMES\n63466fc6ce2f   lamp-userver:1.0   \"/bin/sh -c 'apache2…\"   2 seconds ago   Up 1 se
",
        "stdout_lines": [
            "CONTAINER ID   IMAGE              COMMAND                  CREATED         ST
            "63466fc6ce2f   lamp-userver:1.0   \"/bin/sh -c 'apache2…\"   2 seconds ago
userver"
        ]
    }
}

PLAY RECAP *********************************************************************************************************************************
192.168.56.112             : ok=26   changed=16   unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```



6. Proof that i successfully upload the files in the github




https://github.com/Ponayooo/HOA11_Ponayo

**Reflections:**

Answer the following:

1. What are the benefits of implementing containerizations?

- Containers can be used in a lot of computing contexts, including cloud platforms, hybrid computing environments, and servers located on-site. It means that without modifying the code, applications can be created and tested in one setting before being deployed to another.

**Conclusions:**

In conclusion, the integration of Ansible with Docker gives a strong way for speeding the deployment and management of applications in a containerized environment. Creating a Dockerfile is the fundamental move towards encapsulating an application in a Docker container. It specifies the necessary parts and configurations. Version control of the containerized application is made easier and consistency across various contexts is made possible by this declarative approach. Through the integration of Docker and Ansible, development and deployment processes may be made more effective and flexible for enterprises. By implementing this it can help us to easily simply replicate environments, consistently provide applications, and manage infrastructure at scale due to this integration.