Name: Victor B. Ortega	**Date Performed: 11/23/23**
Course/Section: CPE232 S5	**Date Submitted: 11/23/23**
Instructor: Engr. Roman Richard	**Semester and SY: 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.

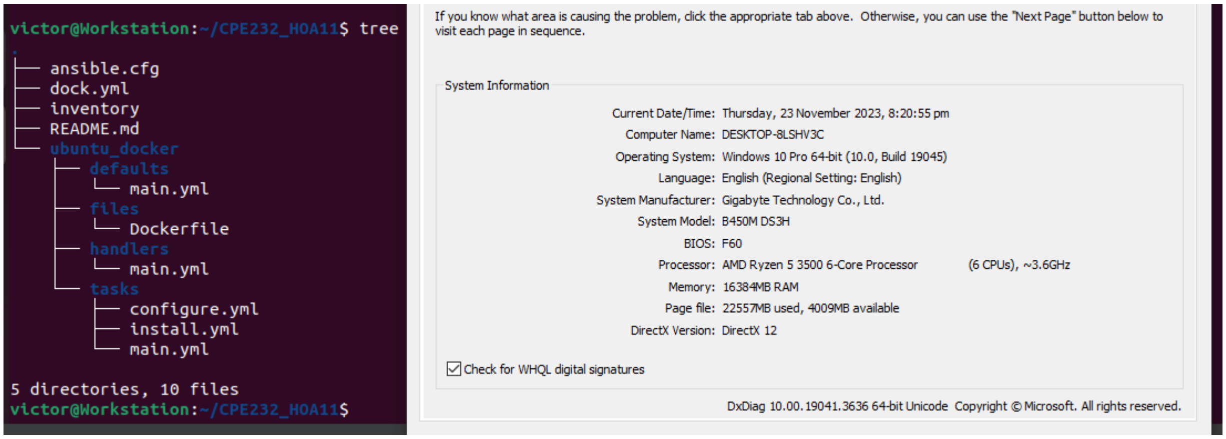
Source: https://docs.microsoft.com/en-us/virtualization/windowscontainers/about/containers-vs-vm

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. Preparation of the playbook.



```
victor@Workstation:~/CPE232_HOA11$ tree
.
├── ansible.cfg
├── dock.yml
├── inventory
├── README.md
└── ubuntu_docker
    ├── defaults
    │   └── main.yml
    ├── files
    │   └── Dockerfile
    ├── handlers
    │   └── main.yml
    └── tasks
        ├── configure.yml
        ├── install.yml
        └── main.yml

5 directories, 10 files
victor@Workstation:~/CPE232_HOA11$
```

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, 8:20:55 pm
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     Operating System: Windows 10 Pro 64-bit (10.0, Build 19045)
             Language: English (Regional Setting: English)
  System Manufacturer: Gigabyte Technology Co., Ltd.
         System Model: B450M DS3H
                 BIOS: F60
            Processor: AMD Ryzen 5 3500 6-Core Processor          (6 CPUs), ~3.6GHz
               Memory: 16384MB RAM
            Page file: 22557MB used, 4009MB available
      DirectX Version: DirectX 12
```

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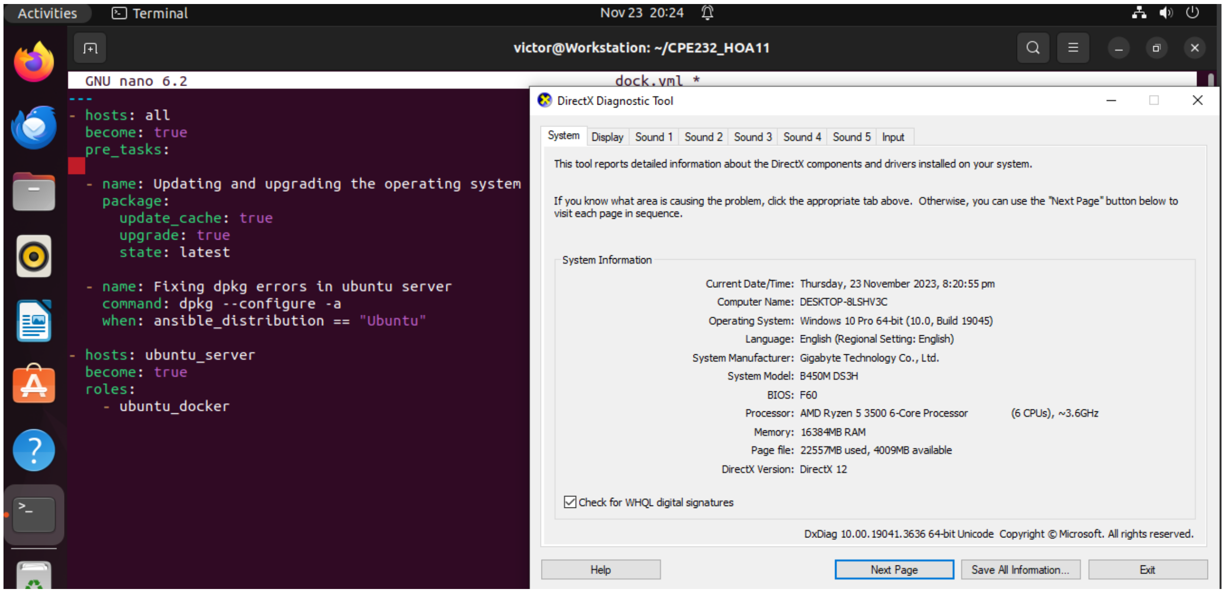
2. dock.yml, for calling other ymls



```
---
- 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
```

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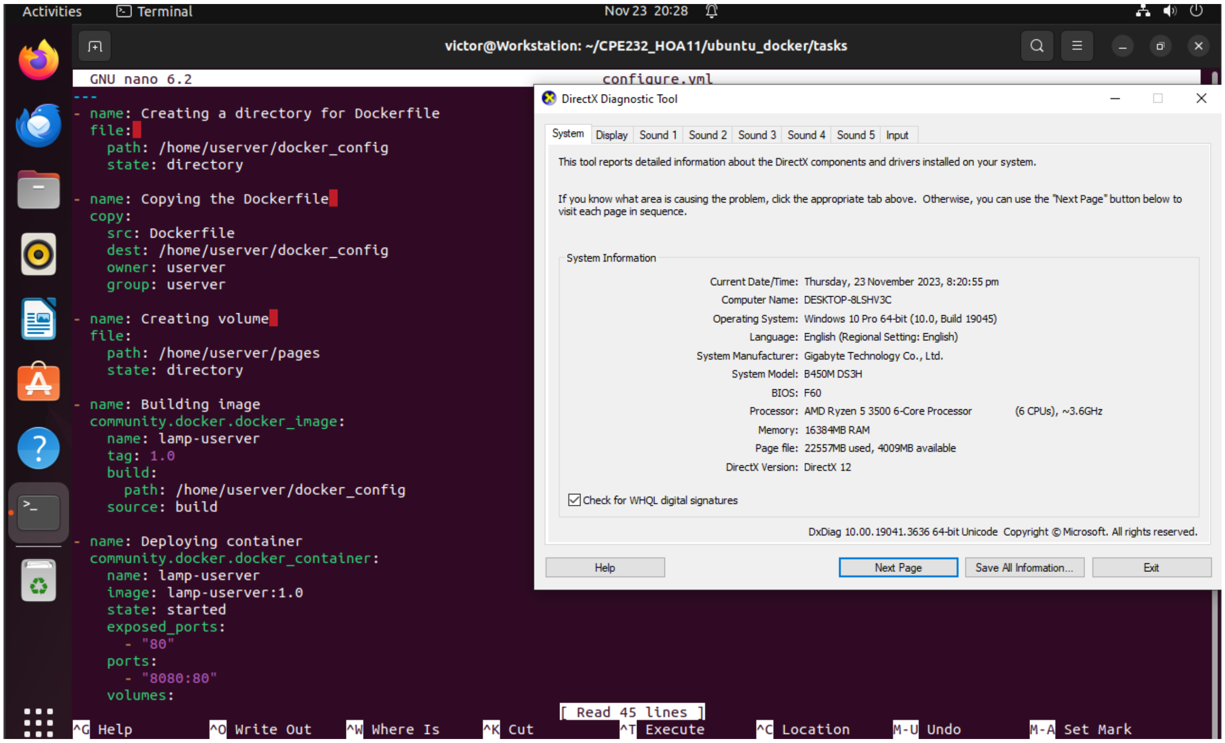
3. Configure.yml



Activities Terminal Nov 23 20:28

victor@Workstation: ~/CPE232_HOA11/ubuntu_docker/tasks

```
  GNU nano 6.2                                  configure.yml
---
- name: Creating a directory for Dockerfile
  file:
    path: /home/userver/docker_config
    state: directory

- name: Copying the Dockerfile
  copy:
    src: Dockerfile
    dest: /home/userver/docker_config
    owner: userver
    group: userver

- name: Creating volume
  file:
    path: /home/userver/pages
    state: directory

- name: Building image
  community.docker.docker_image:
    name: lamp-userver
    tag: 1.0
    build:
      path: /home/userver/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"
    volumes:
                                              [ Read 45 lines ]
^G Help         ^O Write Out    ^W Where Is     ^K Cut          ^T Execute      ^C Location     M-U Undo        M-A Set Mark
```

DirectX Diagnostic Tool

This tool reports detailed information about the DirectX components and drivers installed on your system.

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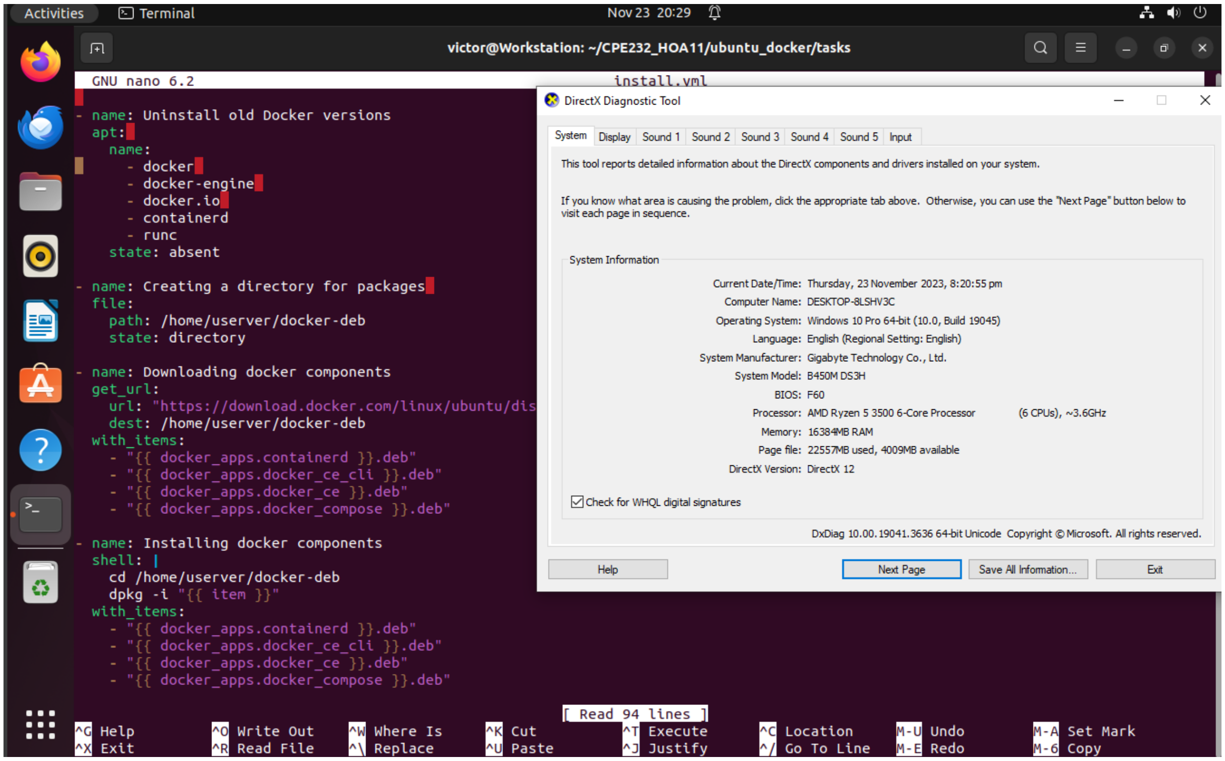
4. install.yml



Activities Terminal Nov 23 20:29

victor@Workstation: ~/CPE232_HOA11/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/userver/docker-deb
    state: directory

- name: Downloading docker components
  get_url:
    url: "https://download.docker.com/linux/ubuntu/dis
    dest: /home/userver/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/userver/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 94 lines ]
^G Help         ^O Write Out    ^W Where Is     ^K Cut          ^T Execute      ^C Location     M-U Undo        M-A Set Mark
^X Exit         ^R Read File    ^\ Replace      ^U Paste        ^J Justify      ^/ Go To Line   M-E Redo        M-6 Copy
```

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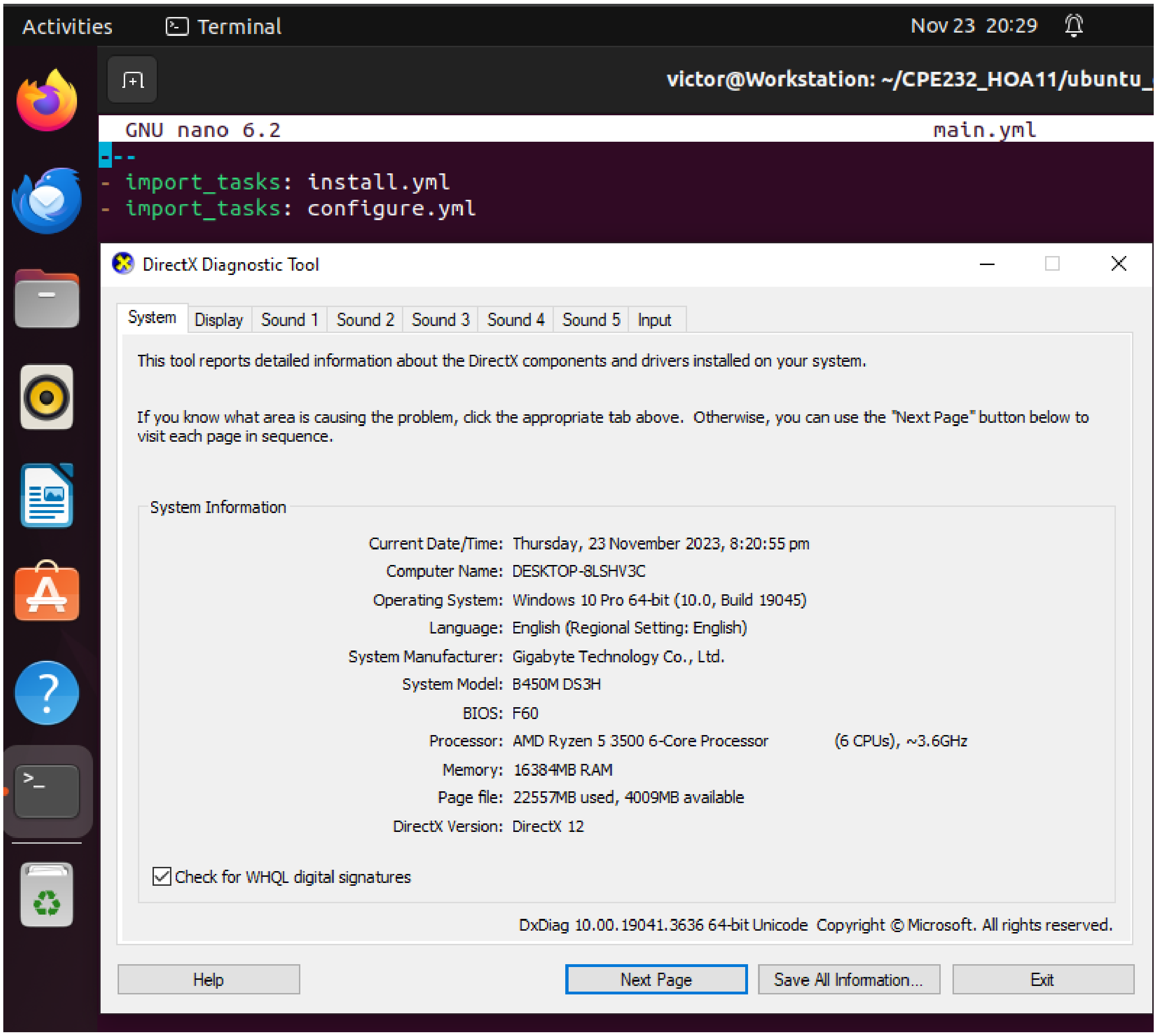
5. main.yml



```
---
- import_tasks: install.yml
- import_tasks: configure.yml
```

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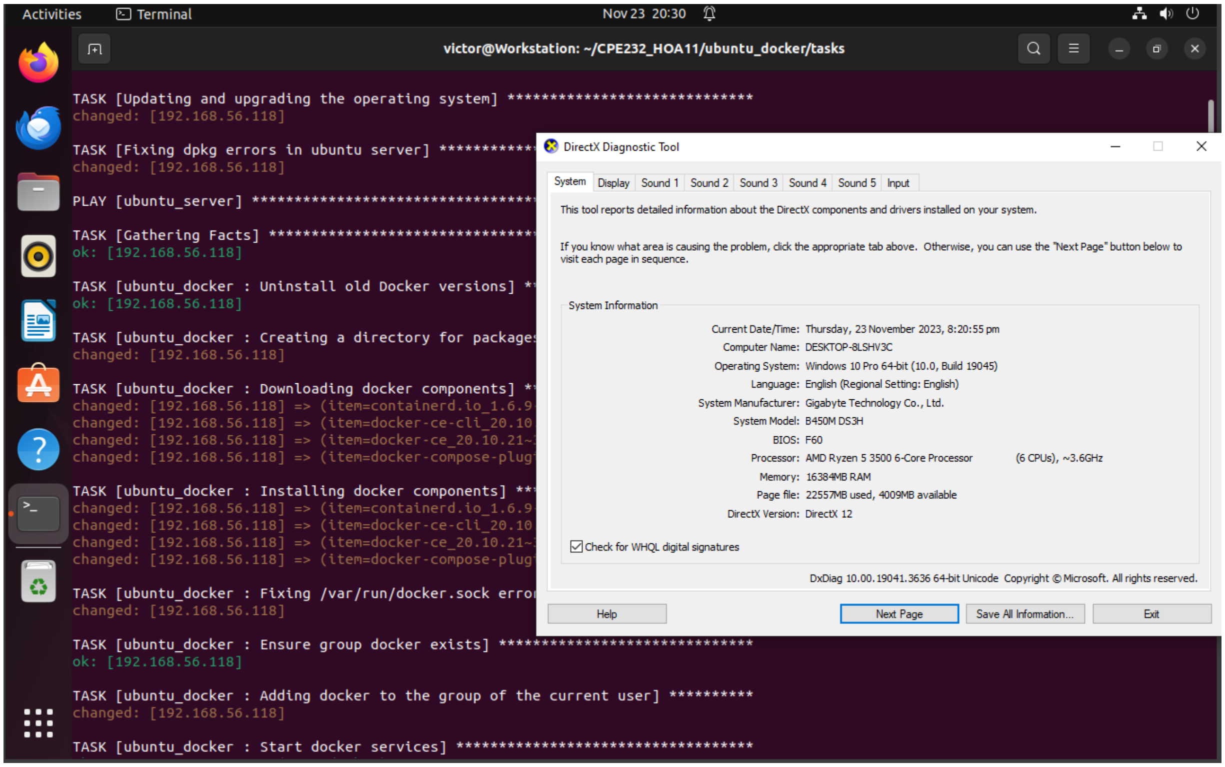
6. Running the playbook



```
TASK [Updating and upgrading the operating system] *****************************
changed: [192.168.56.118]

TASK [Fixing dpkg errors in ubuntu server] ***********
changed: [192.168.56.118]

PLAY [ubuntu_server] ***********************************

TASK [Gathering Facts] *********************************
ok: [192.168.56.118]

TASK [ubuntu_docker : Uninstall old Docker versions] **
ok: [192.168.56.118]

TASK [ubuntu_docker : Creating a directory for package
changed: [192.168.56.118]

TASK [ubuntu_docker : Downloading docker components] **
changed: [192.168.56.118] => (item=containerd.io_1.6.9
changed: [192.168.56.118] => (item=docker-ce-cli_20.10
changed: [192.168.56.118] => (item=docker-ce_20.10.21~
changed: [192.168.56.118] => (item=docker-compose-plug

TASK [ubuntu_docker : Installing docker components] **
changed: [192.168.56.118] => (item=containerd.io_1.6.9
changed: [192.168.56.118] => (item=docker-ce-cli_20.10
changed: [192.168.56.118] => (item=docker-ce_20.10.21~
changed: [192.168.56.118] => (item=docker-compose-plug

TASK [ubuntu_docker : Fixing /var/run/docker.sock erro
changed: [192.168.56.118]

TASK [ubuntu_docker : Ensure group docker exists] *****************************
ok: [192.168.56.118]

TASK [ubuntu_docker : Adding docker to the group of the current user] **********
changed: [192.168.56.118]

TASK [ubuntu_docker : Start docker services] ***********************************
```

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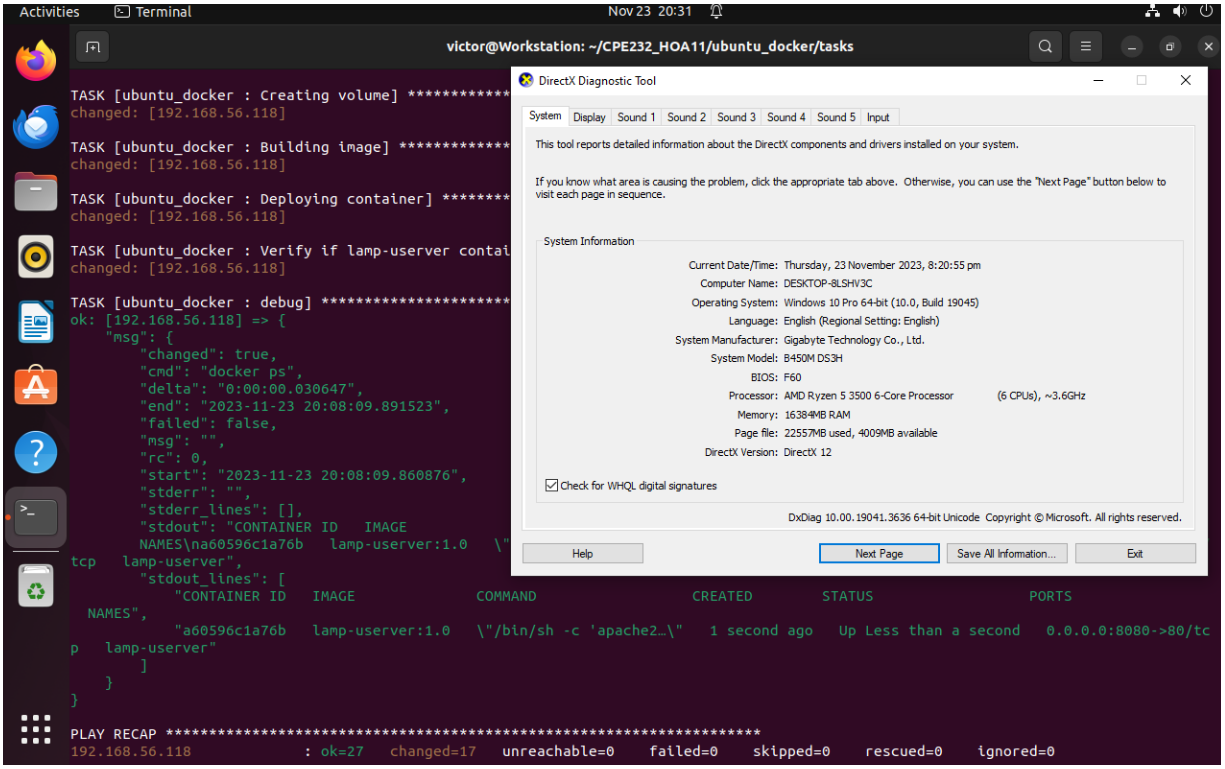

```
TASK [ubuntu_docker : Creating volume] ************
changed: [192.168.56.118]

TASK [ubuntu_docker : Building image] *************
changed: [192.168.56.118]

TASK [ubuntu_docker : Deploying container] ********
changed: [192.168.56.118]

TASK [ubuntu_docker : Verify if lamp-userver contai
changed: [192.168.56.118]

TASK [ubuntu_docker : debug] **********************
ok: [192.168.56.118] => {
    "msg": {
        "changed": true,
        "cmd": "docker ps",
        "delta": "0:00:00.030647",
        "end": "2023-11-23 20:08:09.891523",
        "failed": false,
        "msg": "",
        "rc": 0,
        "start": "2023-11-23 20:08:09.860876",
        "stderr": "",
        "stderr_lines": [],
        "stdout": "CONTAINER ID   IMAGE
        NAMES\na60596c1a76b   lamp-userver:1.0   \"
tcp   lamp-userver",
        "stdout_lines": [
            "CONTAINER ID   IMAGE              COMMAND                  CREATED          STATUS                 PORTS
  NAMES",
            "a60596c1a76b   lamp-userver:1.0   \"/bin/sh -c 'apache2…\"   1 second ago   Up Less than a second   0.0.0.0:8080->80/tc
p   lamp-userver"
        ]
    }
}

PLAY RECAP *********************************************************************
192.168.56.118             : ok=27   changed=17   unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

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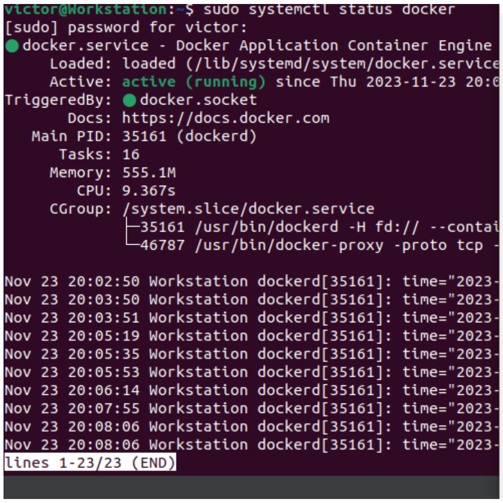
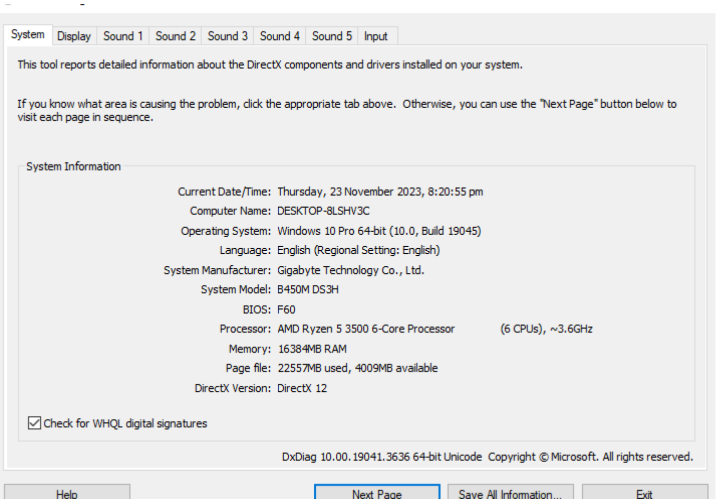
7. Checking if the docker is installed in server.



```
victor@Workstation:~$ sudo systemctl status docker
[sudo] password for victor:
● docker.service - Docker Application Container Engine
     Loaded: loaded (/lib/systemd/system/docker.service
     Active: active (running) since Thu 2023-11-23 20:0
TriggeredBy: ● docker.socket
       Docs: https://docs.docker.com
   Main PID: 35161 (dockerd)
      Tasks: 16
     Memory: 555.1M
        CPU: 9.367s
     CGroup: /system.slice/docker.service
             ├─35161 /usr/bin/dockerd -H fd:// --contai
             └─46787 /usr/bin/docker-proxy -proto tcp -

Nov 23 20:02:50 Workstation dockerd[35161]: time="2023-
Nov 23 20:03:50 Workstation dockerd[35161]: time="2023-
Nov 23 20:03:51 Workstation dockerd[35161]: time="2023-
Nov 23 20:05:19 Workstation dockerd[35161]: time="2023-
Nov 23 20:05:35 Workstation dockerd[35161]: time="2023-
Nov 23 20:05:53 Workstation dockerd[35161]: time="2023-
Nov 23 20:06:14 Workstation dockerd[35161]: time="2023-
Nov 23 20:07:55 Workstation dockerd[35161]: time="2023-
Nov 23 20:08:06 Workstation dockerd[35161]: time="2023-
Nov 23 20:08:06 Workstation dockerd[35161]: time="2023-
lines 1-23/23 (END)
```



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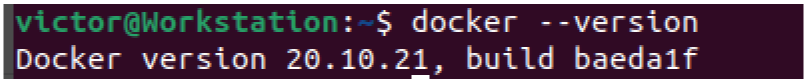
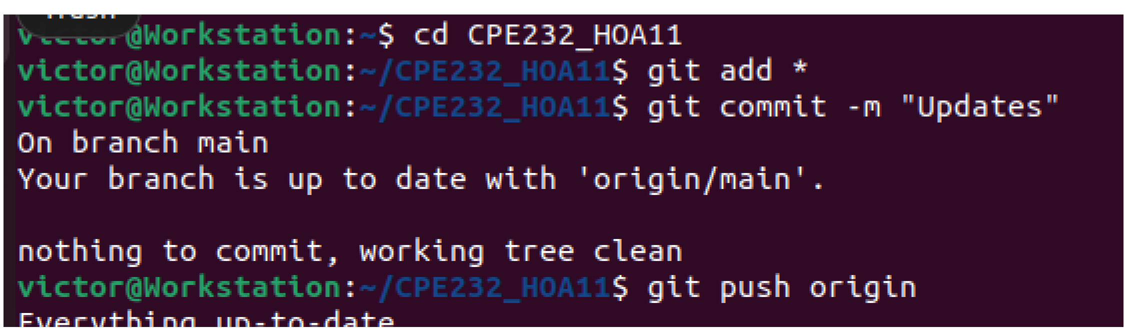


```
victor@Workstation:~$ docker --version
Docker version 20.10.21, build baeda1f
```

8. Pushing in GitHub



```
victor@Workstation:~$ cd CPE232_HOA11
victor@Workstation:~/CPE232_HOA11$ git add *
victor@Workstation:~/CPE232_HOA11$ git commit -m "Updates"
On branch main
Your branch is up to date with 'origin/main'.

nothing to commit, working tree clean
victor@Workstation:~/CPE232_HOA11$ git push origin
Everything up-to-date
```

Reflections:

Answer the following:

1. What are the benefits of implementing containerizations?

Containerization, exemplified by Docker, ensures consistent and portable application deployment. It provides resource efficiency, swift scalability, and maintains consistency across environments. DevOps integration is seamless, with versioning for easy rollbacks. Containerization supports microservices and enhances security. Optimized resource utilization and orchestration tools streamline management tasks.

Conclusions:

In conclusion, Docker in Ubuntu facilitates streamlined and consistent application deployment through containerization. This technology optimizes resource efficiency, supports seamless scalability, and ensures uniformity across environments. Implementing containerization with Docker on Ubuntu offers a robust solution for efficient, portable, and secure software development and deployment workflows.