Name: John Renzo L. Mendoza	**Date Performed:** December 1, 2023
Course/Section: CPE31S5	**Date Submitted:** December 2, 2023
Instructor: Engr. Roman Richard	**Semester and SY:**

Activity 13: OpenStack Prerequisite Installation

1. Objectives

Create a workflow to install OpenStack using Ansible as your Infrastructure as Code (IaC).

2. Intended Learning Outcomes

1. Analyze the advantages and disadvantages of cloud services
2. Evaluate different Cloud deployment and service models
3. Create a workflow to install and configure OpenStack base services using Ansible as documentation and execution.

3. Resources

Oracle VirtualBox (Hypervisor)

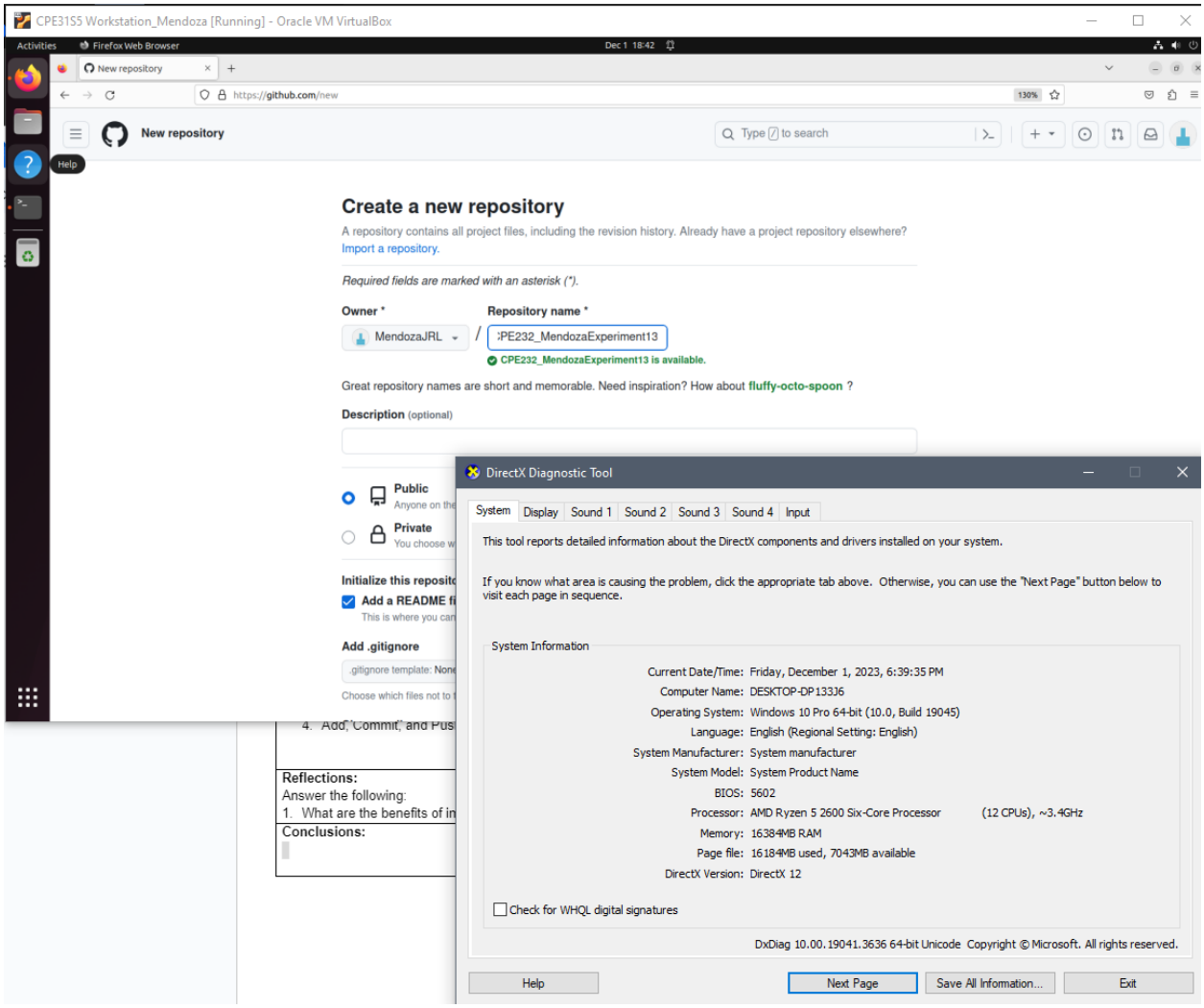
1x Ubuntu VM or Centos VM

4. Tasks

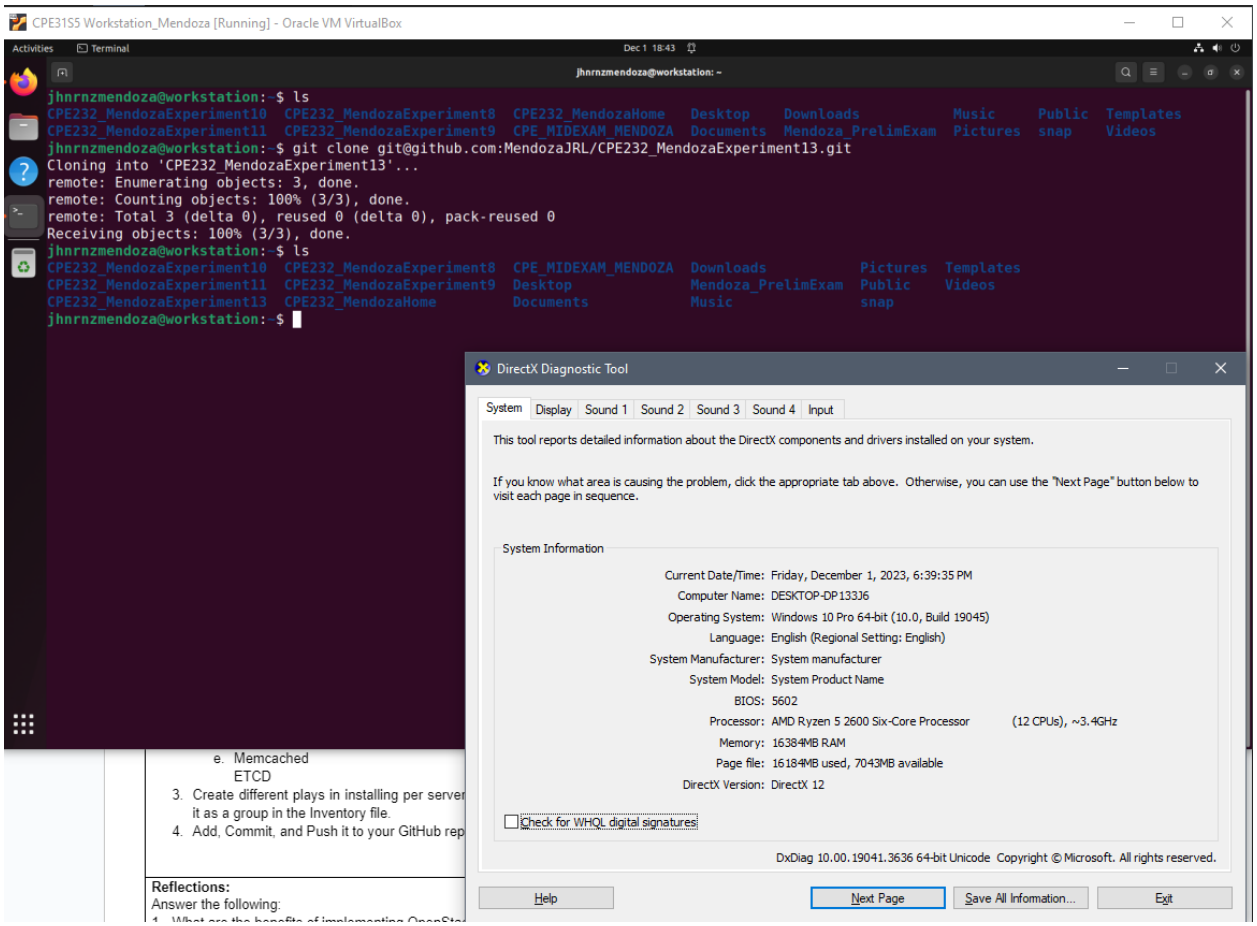
1. Create a new repository for this activity.
2. Create a playbook that converts the steps in the following items in [OpenStack Installation Guide]
   a. NTP
   b. OpenStack packages
   c. SQL Database
   d. Message Queue
   e. Memcached
   f. ETCD
   g. Create different plays in installing per server type (controller, compute etc.) and identify it as a group in the Inventory file.
   h. Add, commit and push it to your GitHub repo.

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

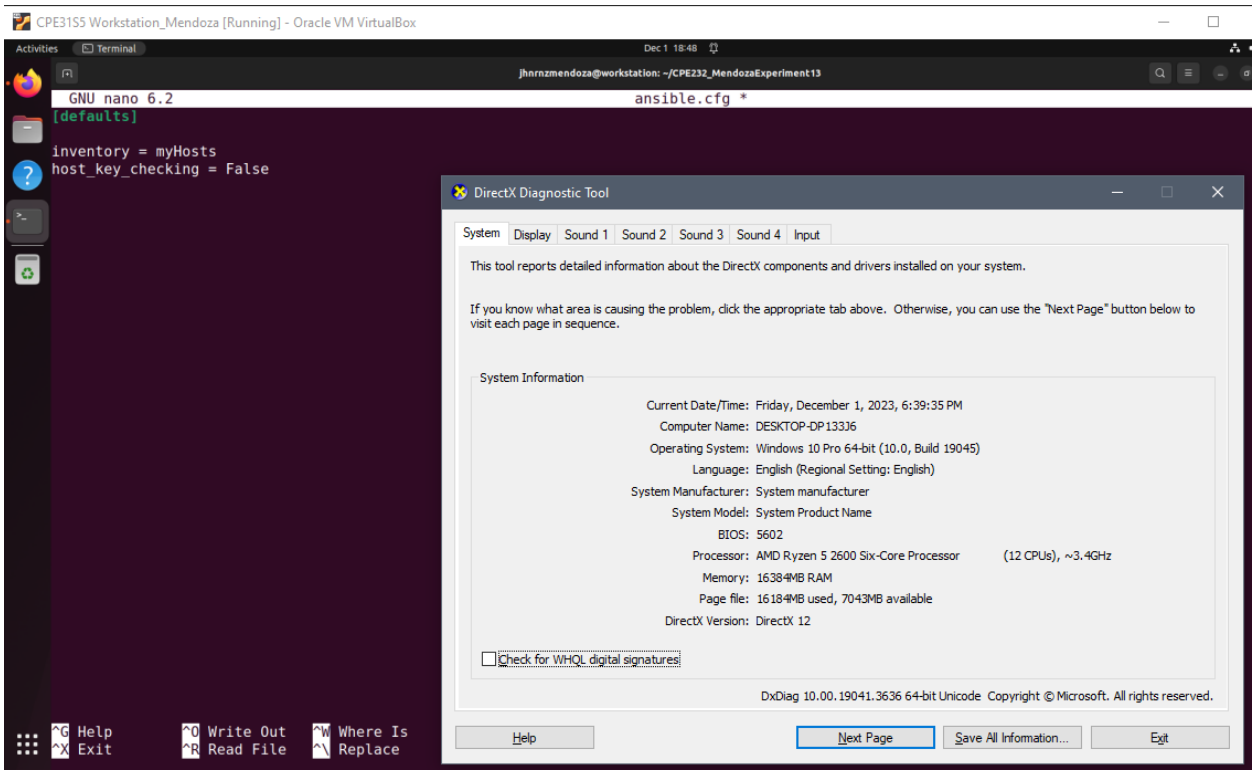
1. Create a new repository for this activity.



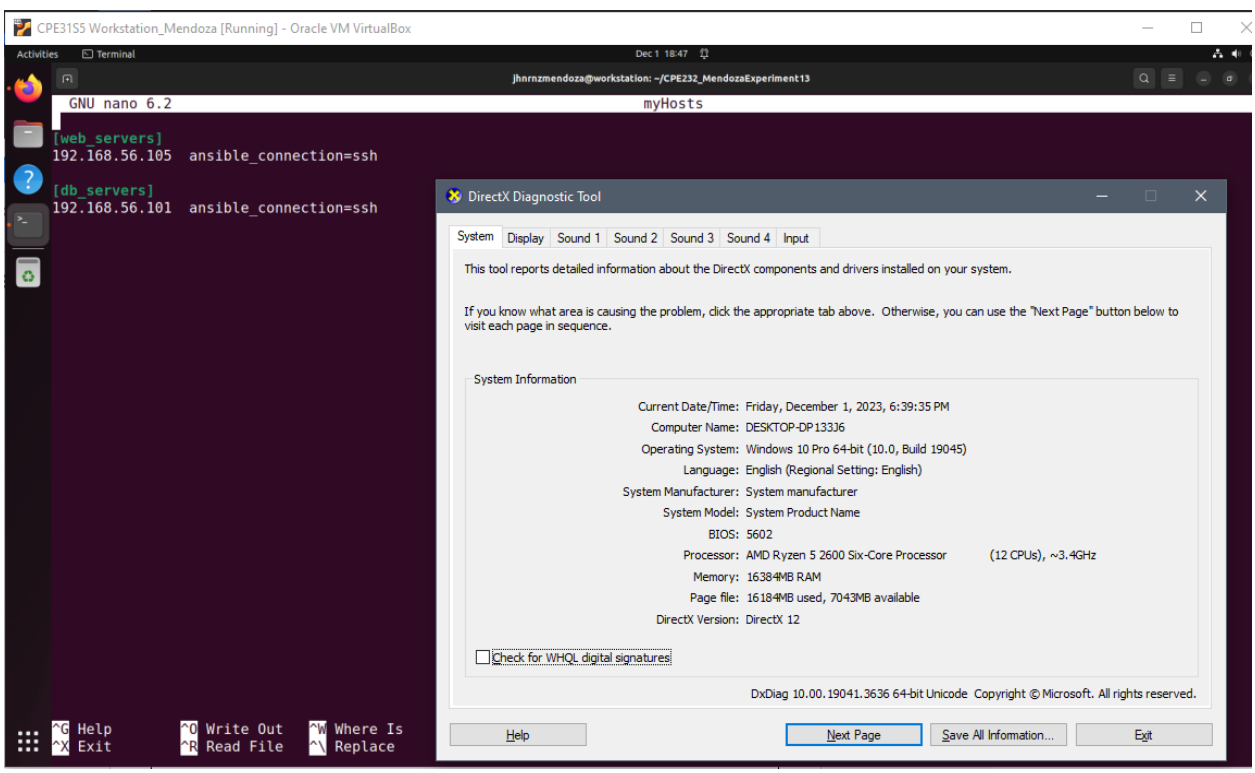
Cloning the Repository Locally



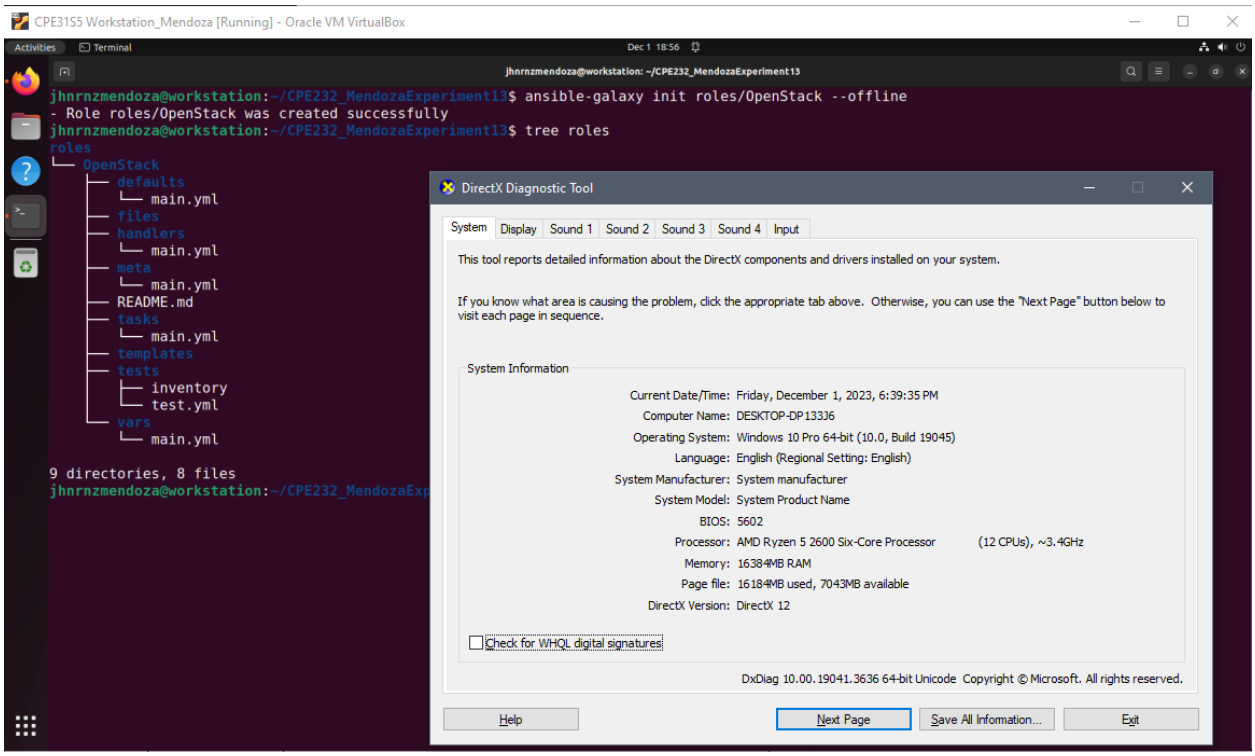
Creation of the ansible.cfg file



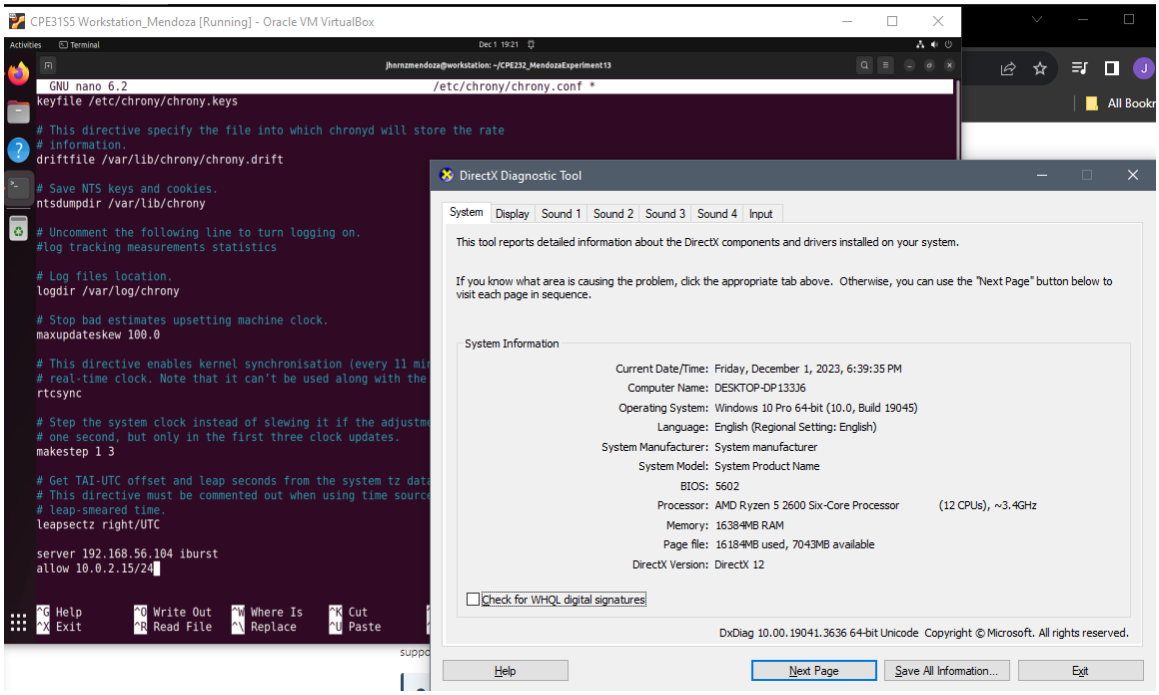
Creation of the Inventory file

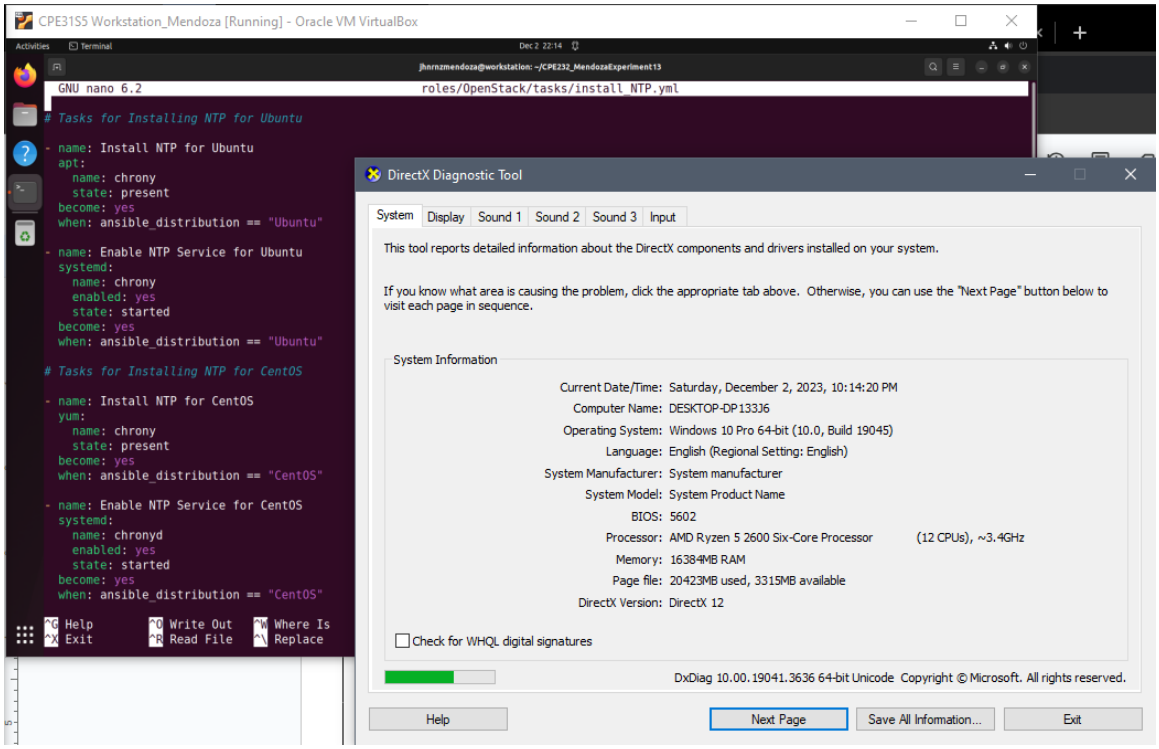


Creation of Ansible Role to organize the Repository

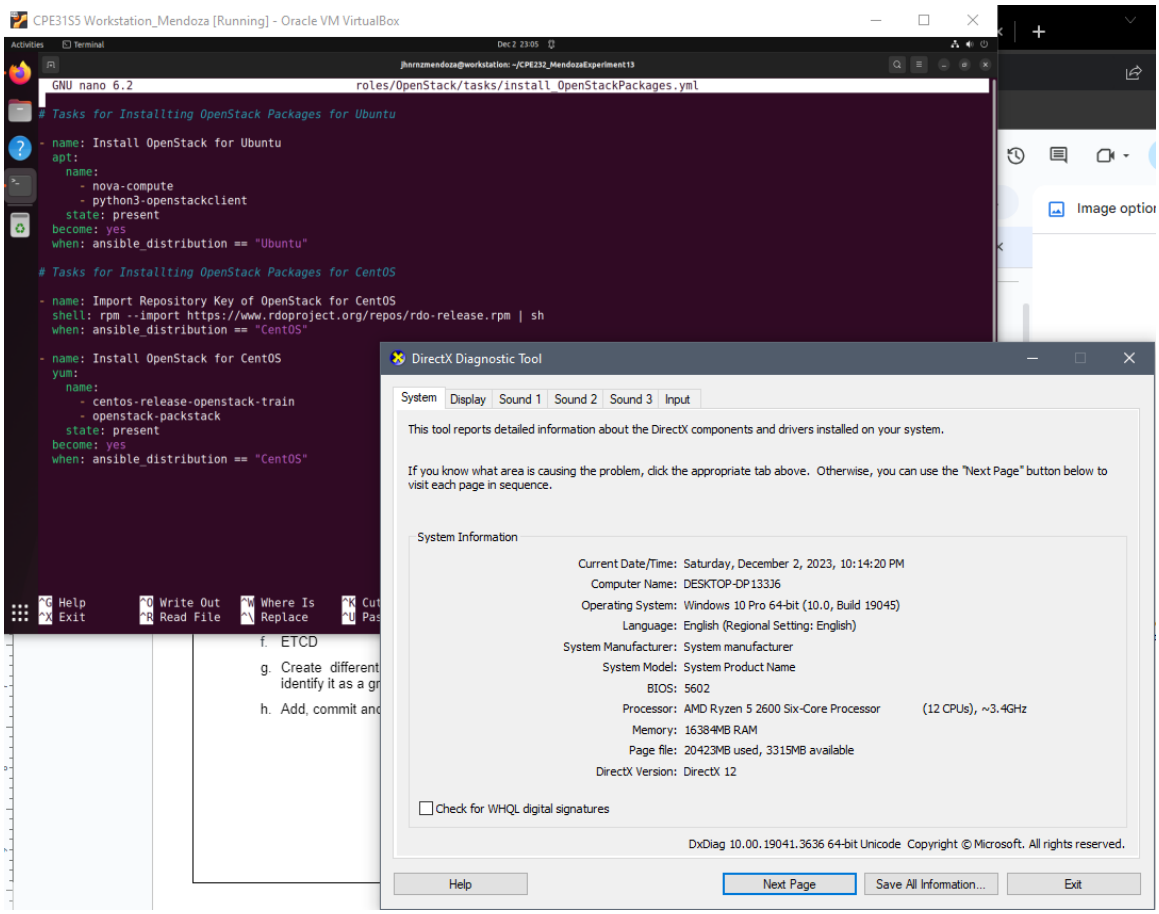


2. Create a playbook that converts the steps in the following items in OpenStack Installation Guide.
   a. NTP

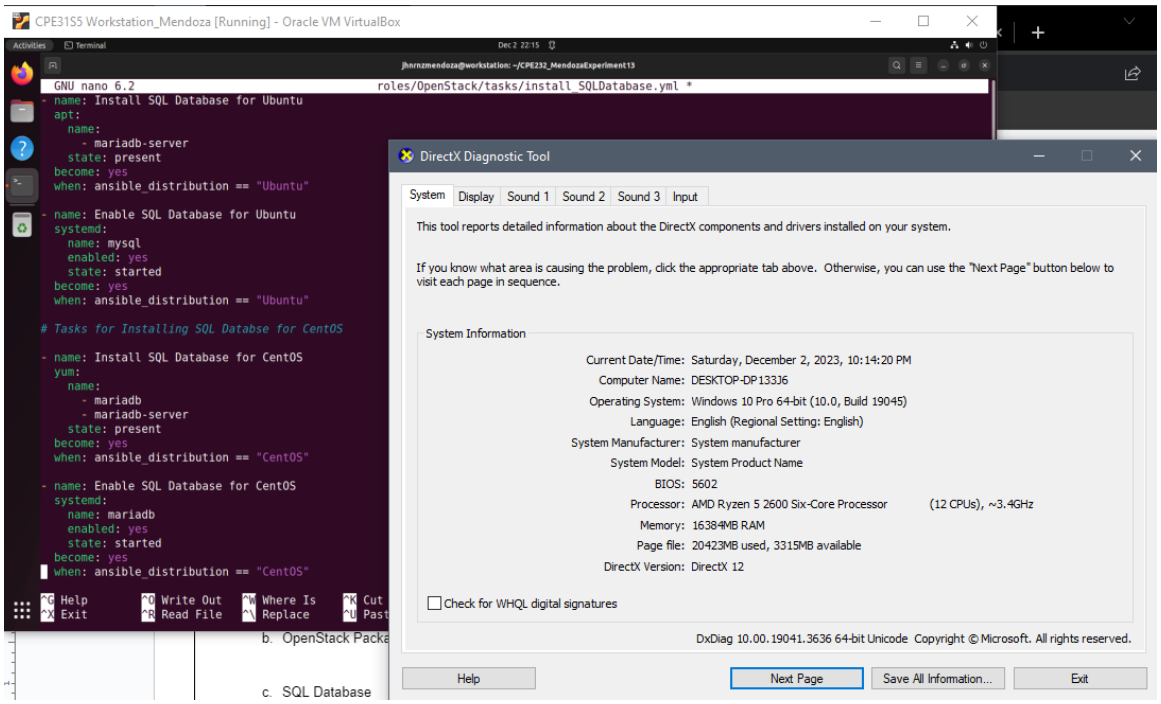




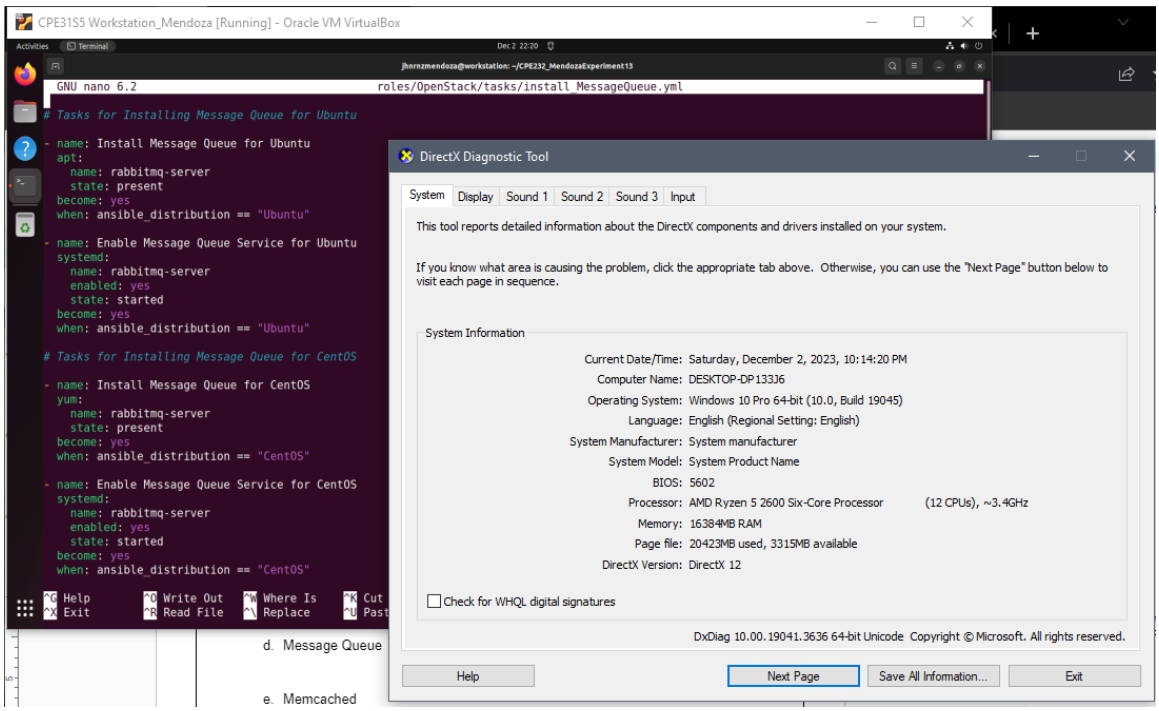
b. OpenStack Packages



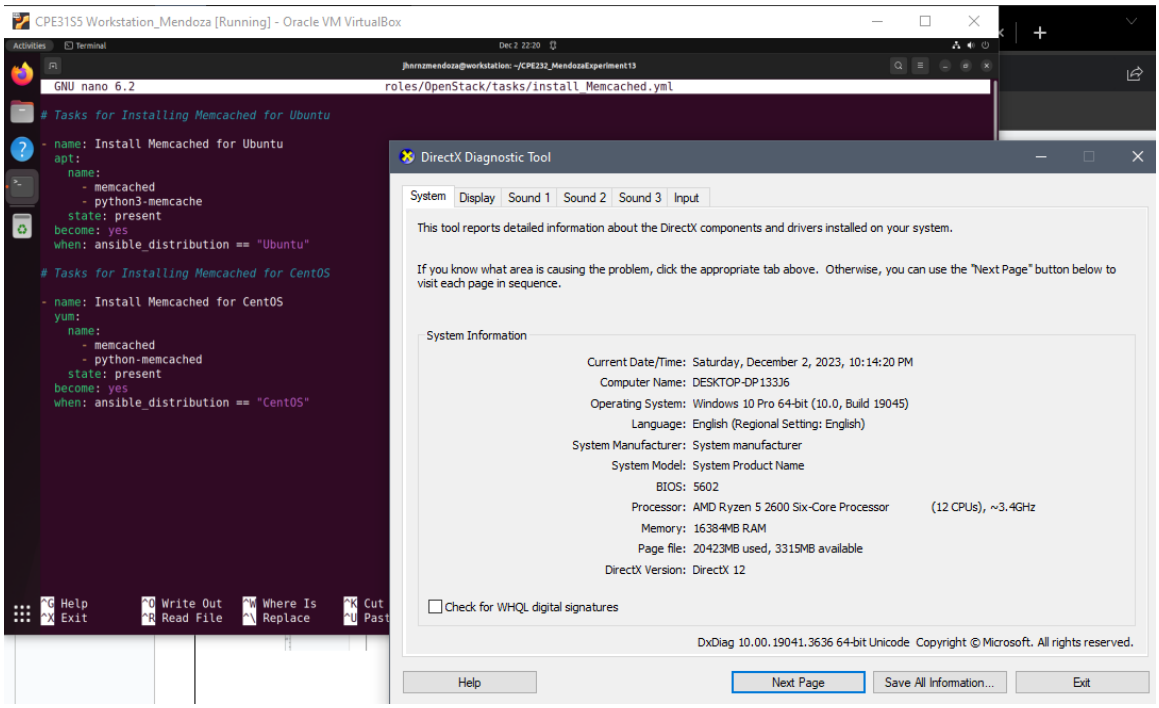
c. SQL Database



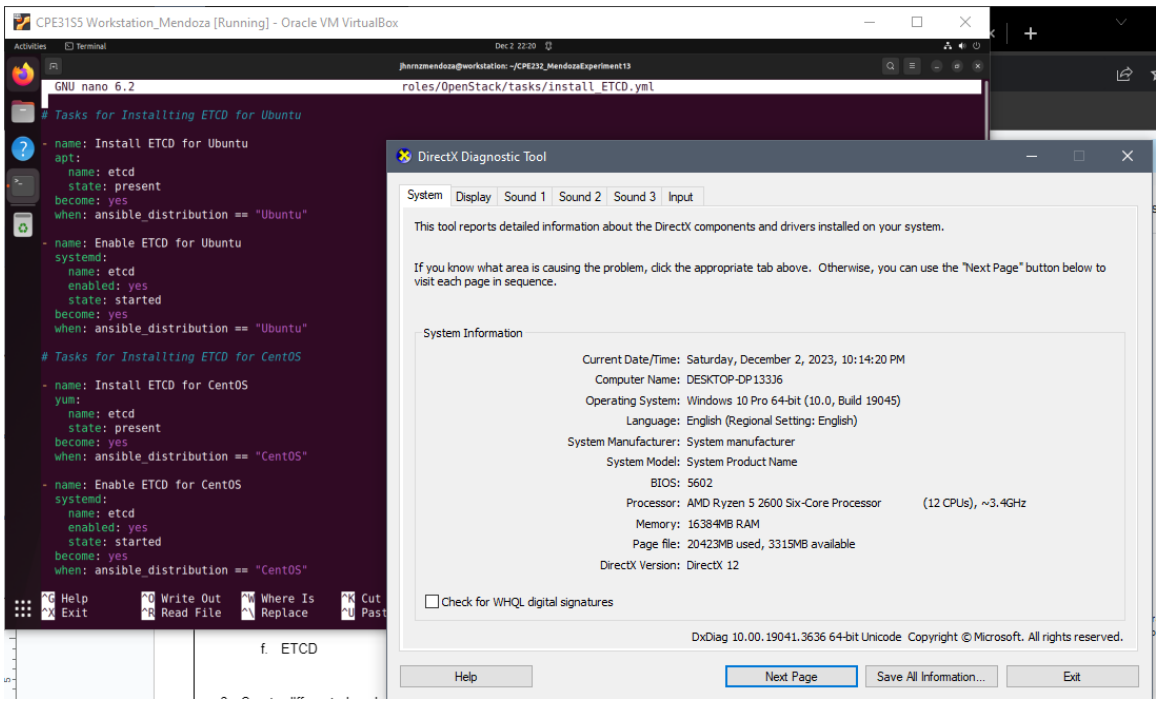
d. Message Queue



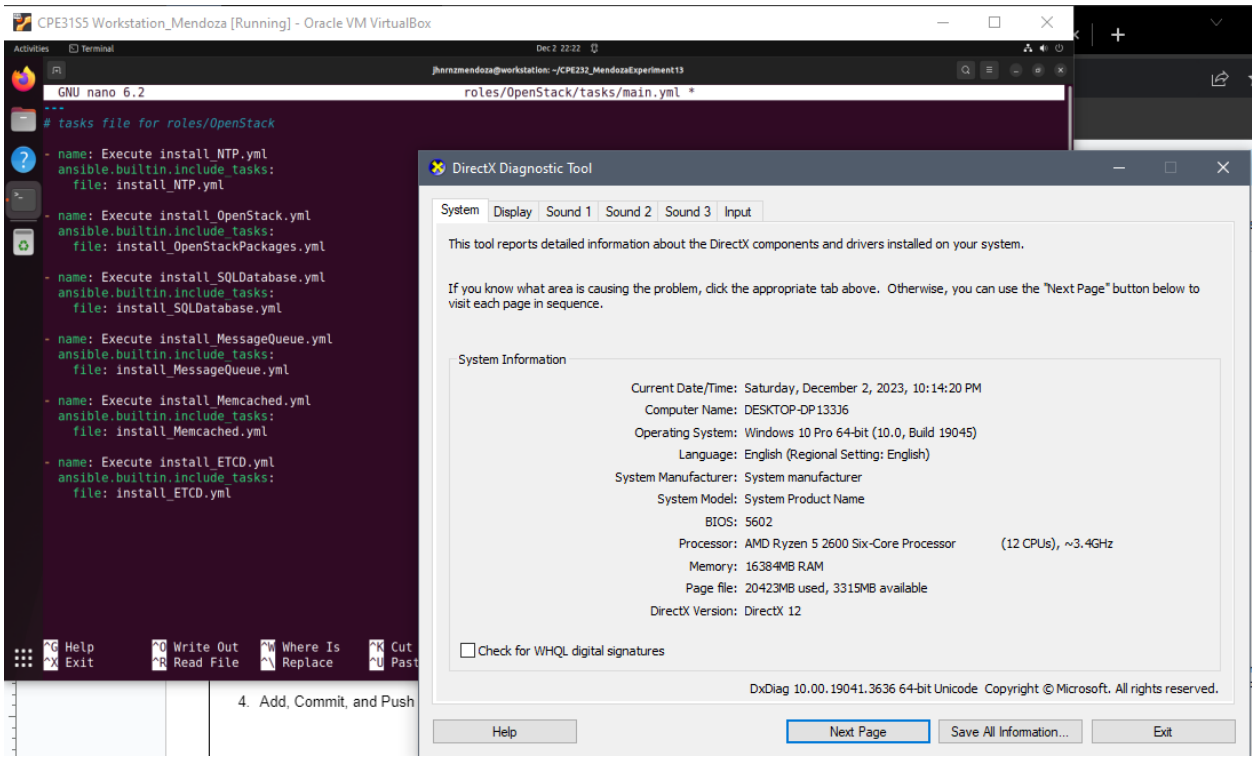
e. Memcached



f. ETCD



3. Create different plays in installing per server type (controller, compute etc.) and identify it as a group in the Inventory file.



Playbook Output:

CPE31S5 Workstation_Mendoza [Running] - Oracle VM VirtualBox

```
jhnrnzmendoza@workstation:~/CPE232_MendozaExperiment13$ ansible-playbook --ask-become-pass config.yml
BECOME password:

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

TASK [Gathering Facts] *********************************************************************************************************
ok: [192.168.56.105]
ok: [192.168.56.101]

TASK [roles/OpenStack : Execute install_NTP.yml] *******************************************************************************
included: /home/jhnrnzmendoza/CPE232_MendozaExperiment13/roles/OpenStack/tasks/install_NTP.yml for 192.168.56.105, 192.168.56.101

TASK [roles/OpenStack : Install NTP for Ubuntu] ********************************************************************************
skipping: [192.168.56.101]
ok: [192.168.56.105]

TASK [roles/OpenStack : Enable NTP Service for Ubuntu] *************************************************************************
skipping: [192.168.56.101]
ok: [192.168.56.105]

TASK [roles/OpenStack : Install NTP for CentOS] ********************************************************************************
skipping: [192.168.56.105]
ok: [192.168.56.101]

TASK [roles/OpenStack : Enable NTP Service for CentOS] *************************************************************************
skipping: [192.168.56.105]
ok: [192.168.56.101]

TASK [roles/OpenStack : Execute install_OpenStack.yml] *************************************************************************
included: /home/jhnrnzmendoza/CPE232_MendozaExperiment13/roles/OpenStack/tasks/install_OpenStackPackages.yml for 192.168.56.105, 192.168.56.1
01

TASK [roles/OpenStack : Install OpenStack for Ubuntu] **************************************************************************
skipping: [192.168.56.101]
ok: [192.168.56.105]

TASK [roles/OpenStack : Import Repository Key of OpenStack for CentOS] *********************************************************
skipping: [192.168.56.105]
```

DirectX Diagnostic Tool

System | Display | Sound 1 | Sound 2 | Sound 3 | 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:	Saturday, December 2, 2023, 10:14:20 PM
Computer Name:	DESKTOP-DP133J6
Operating System:	Windows 10 Pro 64-bit (10.0, Build 19045)
Language:	English (Regional Setting: English)
System Manufacturer:	System manufacturer
System Model:	System Product Name
BIOS:	5602
Processor:	AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
Memory:	16384MB RAM
Page file:	20423MB used, 3315MB available
DirectX Version:	DirectX 12

Check for WHQL digital signatures

CPE31S5 Workstation_Mendoza [Running] - Oracle VM VirtualBox

Activities Terminal Dec 2 23:12

jhnrnzmendoza@workstation: ~/CPE232_MendozaExperiment13

```
TASK [roles/OpenStack : Import Repository Key of OpenStack for CentOS] ***********************************************
skipping: [192.168.56.105]
changed: [192.168.56.101]

TASK [roles/OpenStack : Install OpenStack for CentOS] ******************************************************************
skipping: [192.168.56.105]
ok: [192.168.56.101]

TASK [roles/OpenStack : Execute install_SQLDatabase.yml] ***************************************************************
included: /home/jhnrnzmendoza/CPE232_MendozaExperiment13/roles/OpenStack/tasks/install_SQLDatabase.yml for 192.168.56.105, 192.168.56.101

TASK [roles/OpenStack : Install SQL Database for Ubuntu] ***************************************************************
skipping: [192.168.56.101]
ok: [192.168.56.105]

TASK [roles/OpenStack : Enable SQL Database for Ubuntu] ****************************************************************
skipping: [192.168.56.101]
ok: [192.168.56.105]

TASK [roles/OpenStack : Install SQL Database for CentOS] ***************************************************************
skipping: [192.168.56.105]
ok: [192.168.56.101]

TASK [roles/OpenStack : Enable SQL Database for CentOS] ****************************************************************
skipping: [192.168.56.105]
ok: [192.168.56.101]

TASK [roles/OpenStack : Execute install_MessageQueue.yml] **************************************************************
included: /home/jhnrnzmendoza/CPE232_MendozaExperiment13/roles/OpenStack/tasks/install_MessageQueue.yml for 192.168.56.105, 192.168.56.101

TASK [roles/OpenStack : Install Message Queue for Ubuntu] **************************************************************
skipping: [192.168.56.101]
ok: [192.168.56.105]

TASK [roles/OpenStack : Enable Message Queue Service for Ubuntu] *******************************************************
skipping: [192.168.56.101]
ok: [192.168.56.105]

TASK [roles/OpenStack : Install Message Queue for CentOS] **************************************************************
```

DirectX Diagnostic Tool

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DirectX Version:	DirectX 12

CPE31S5 Workstation_Mendoza [Running] - Oracle VM VirtualBox

Activities Terminal Dec 2 23:12

jhnrnzmendoza@workstation: ~/CPE232_MendozaExperiment13

```
skipping: [192.168.56.105]
changed: [192.168.56.101]

TASK [roles/OpenStack : Execute install_Memcached.yml] ***********************************************************
included: /home/jhnrnzmendoza/CPE232_MendozaExperiment13/roles/OpenStack/tasks/install_Memcached.yml for 192.168.56.101, 192.168.56.105

TASK [roles/OpenStack : Install Memcached for Ubuntu] *************************************************************
skipping: [192.168.56.101]
ok: [192.168.56.105]

TASK [roles/OpenStack : Install Memcached for CentOS] *************************************************************
skipping: [192.168.56.105]
ok: [192.168.56.101]

TASK [roles/OpenStack : Execute install_ETCD.yml] *****************************************************************
included: /home/jhnrnzmendoza/CPE232_MendozaExperiment13/roles/OpenStack/tasks/install_ETCD.yml for 192.168.56.105, 192.168.56.101

TASK [roles/OpenStack : Install ETCD for Ubuntu] ******************************************************************
skipping: [192.168.56.101]
ok: [192.168.56.105]

TASK [roles/OpenStack : Enable ETCD for Ubuntu] *******************************************************************
skipping: [192.168.56.101]
ok: [192.168.56.105]

TASK [roles/OpenStack : Install ETCD for CentOS] ******************************************************************
skipping: [192.168.56.105]
ok: [192.168.56.101]

TASK [roles/OpenStack : Enable ETCD for CentOS] *******************************************************************
skipping: [192.168.56.105]
ok: [192.168.56.101]

PLAY RECAP ********************************************************************************************************
192.168.56.101             : ok=18   changed=2    unreachable=0    failed=0    skipped=10   rescued=0    ignored=0
192.168.56.105             : ok=17   changed=0    unreachable=0    failed=0    skipped=11   rescued=0    ignored=0

jhnrnzmendoza@workstation:~/CPE232_MendozaExperiment13$
```

DirectX Diagnostic Tool

System | Display | Sound 1 | Sound 2 | Sound 3 | 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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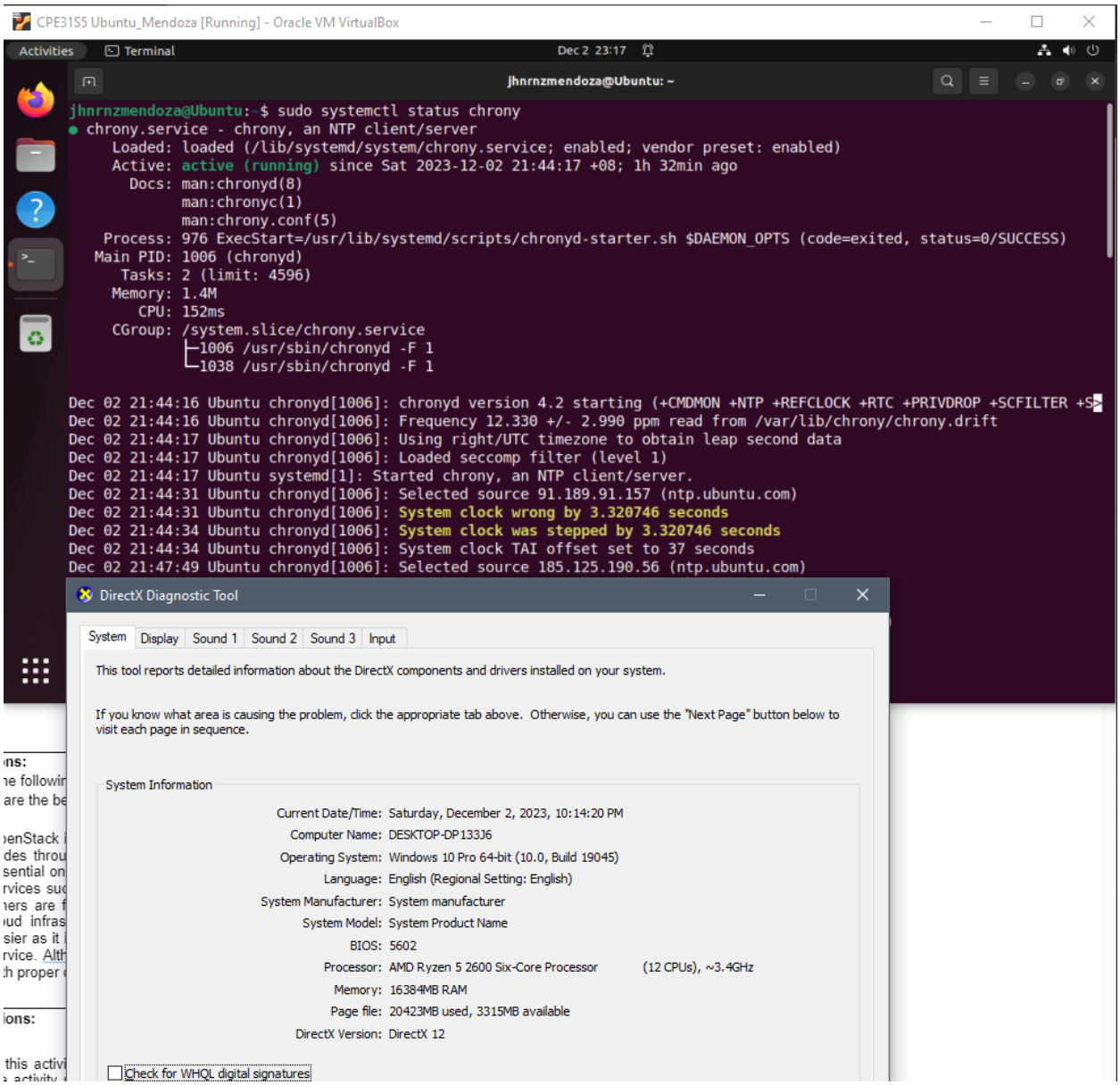
Computer Name:	DESKTOP-DP133J6
Operating System:	Windows 10 Pro 64-bit (10.0, Build 19045)
Language:	English (Regional Setting: English)
System Manufacturer:	System manufacturer
System Model:	System Product Name
BIOS:	5602
Processor:	AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
Memory:	16384MB RAM
Page file:	20423MB used, 3315MB available
DirectX Version:	DirectX 12

Verification: Ubuntu



CPE31S5 Ubuntu_Mendoza [Running] - Oracle VM VirtualBox

Activities Terminal Dec 2 23:18

jhnrnzmendoza@Ubuntu: ~

```
jhnrnzmendoza@Ubuntu:~$ sudo systemctl status nova-compute.service
● nova-compute.service - OpenStack Compute
     Loaded: loaded (/lib/systemd/system/nova-compute.service; enabled; vendor preset: enabled)
     Active: active (running) since Sat 2023-12-02 21:45:32 +08; 1h 31min ago
   Main PID: 2963 (nova-compute)
      Tasks: 2 (limit: 4596)
     Memory: 31.7M
        CPU: 4.087s
     CGroup: /system.slice/nova-compute.service
             └─2963 /usr/bin/python3 /usr/bin/nova-compute --config-file=/etc/nova/nova.conf --config-file=/etc/nova/n>

Dec 02 21:45:32 Ubuntu systemd[1]: Started OpenStack Compute.
Dec 02 21:46:13 Ubuntu nova-compute[2963]: Modules with known eventlet monkey patching issues were imported prior to e>
jhnrnzmendoza@Ubuntu:~$ sudo systemctl status mariadb.service
● mariadb.service - MariaDB 10.6.12 database server
     Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
     Active: active (running) since Sat 2023-12-02 21:44:54 +08; 1h 31min ago
       Docs: man:mariadbd(8)
             https://mariadb.com/kb/en/library/systemd/
    Process: 985 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var/run/mysqld (code=exited, status=0/SUCCE>
    Process: 1001 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_START_POSITION (code=exited, status=0/SUC>
    Process: 1052 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && VAR= ||   VAR=`cd /usr/bin/..; /usr/bin>
    Process: 2142 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_START_POSITION (code=exited, status=0/SU>
    Process: 2144 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/SUCCESS)
   Main PID: 1127 (mariadbd)
     Status: "Taking your SQL requests now..."
```

DirectX Diagnostic Tool

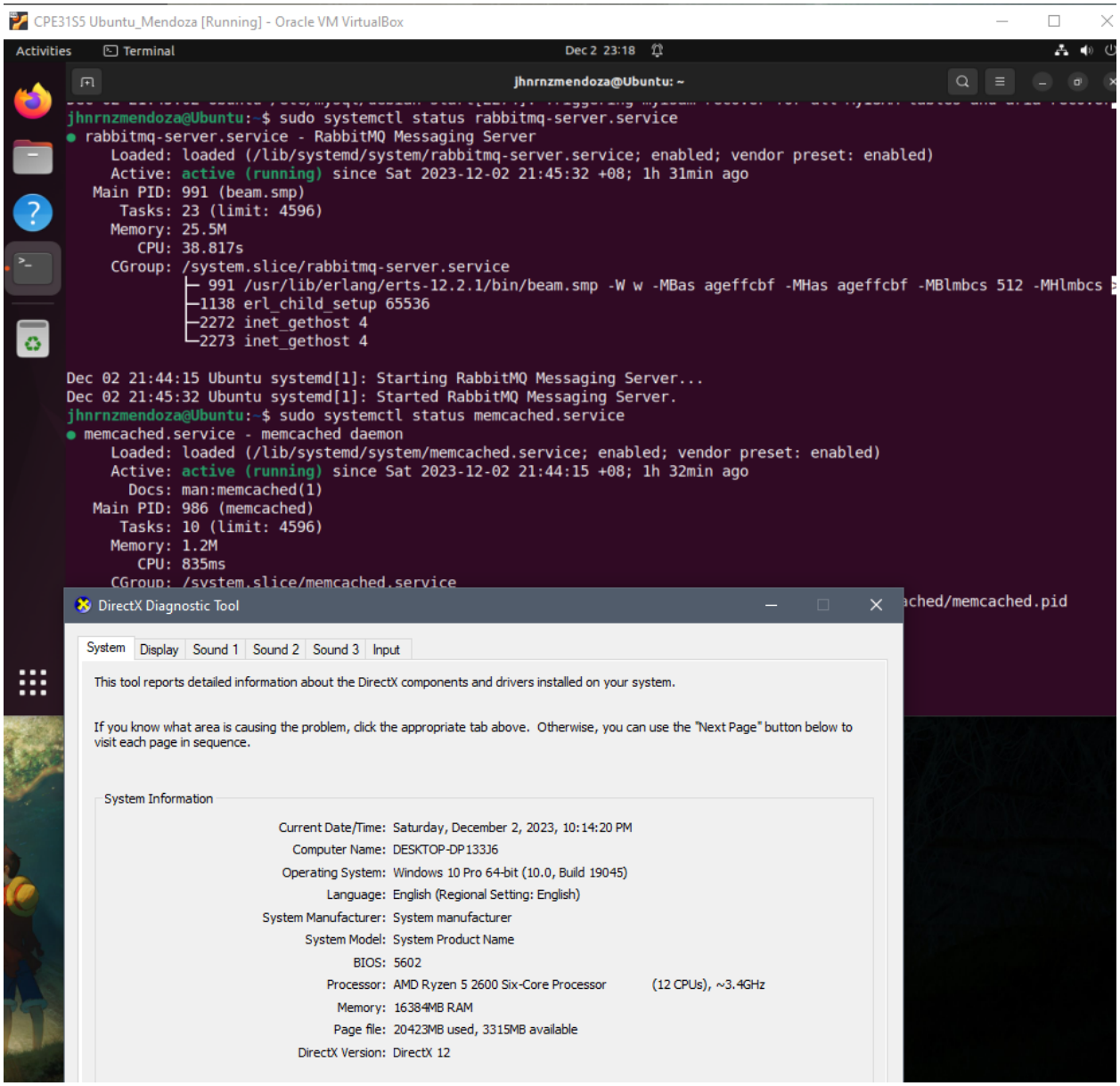
System | Display | Sound 1 | Sound 2 | Sound 3 | Input

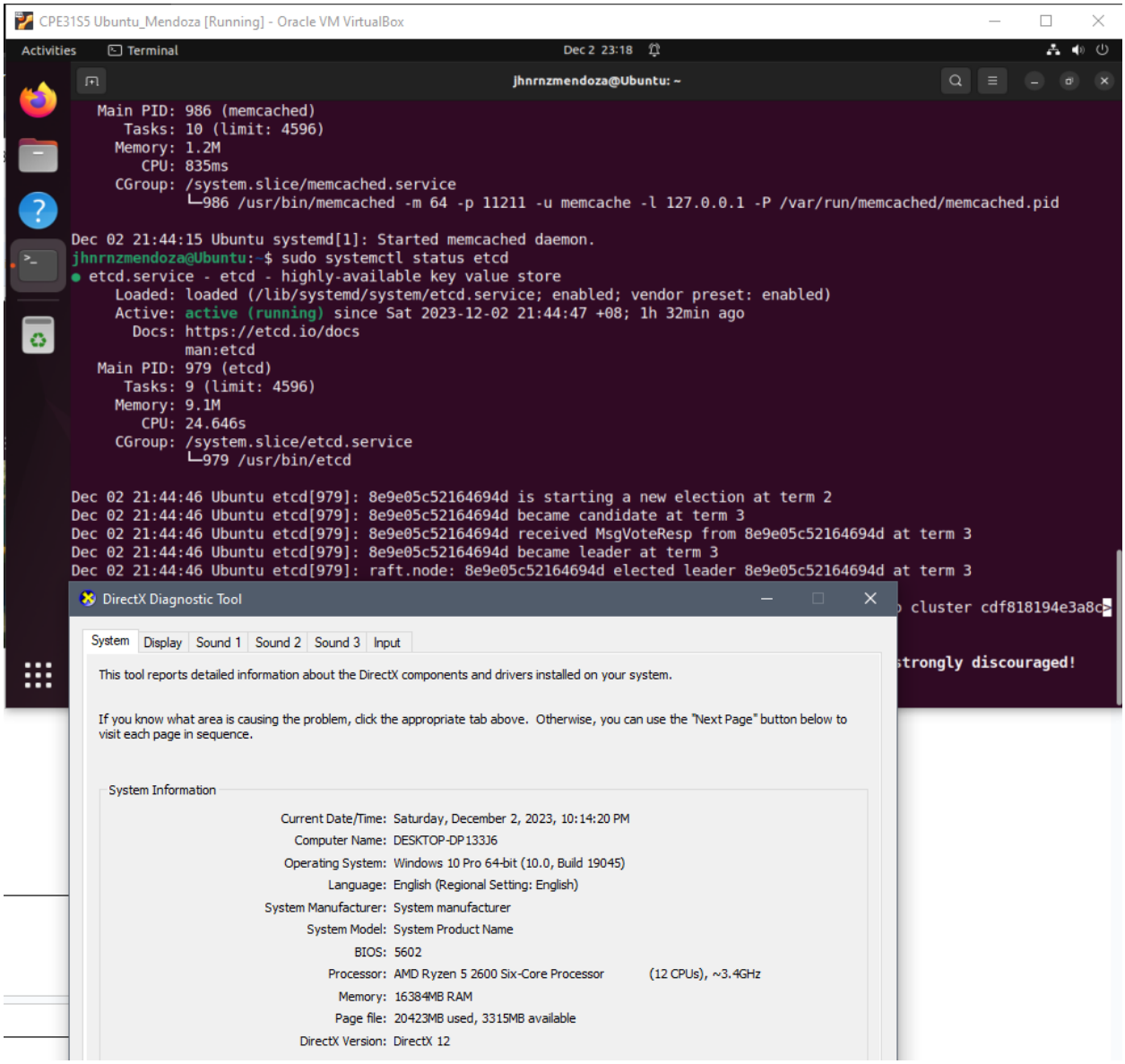
This tool reports detailed information about the DirectX components and drivers installed on your system.

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:	Saturday, December 2, 2023, 10:14:20 PM
Computer Name:	DESKTOP-DP133J6
Operating System:	Windows 10 Pro 64-bit (10.0, Build 19045)
Language:	English (Regional Setting: English)
System Manufacturer:	System manufacturer
System Model:	System Product Name
BIOS:	5602
Processor:	AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
Memory:	16384MB RAM
Page file:	20423MB used, 3315MB available
DirectX Version:	DirectX 12

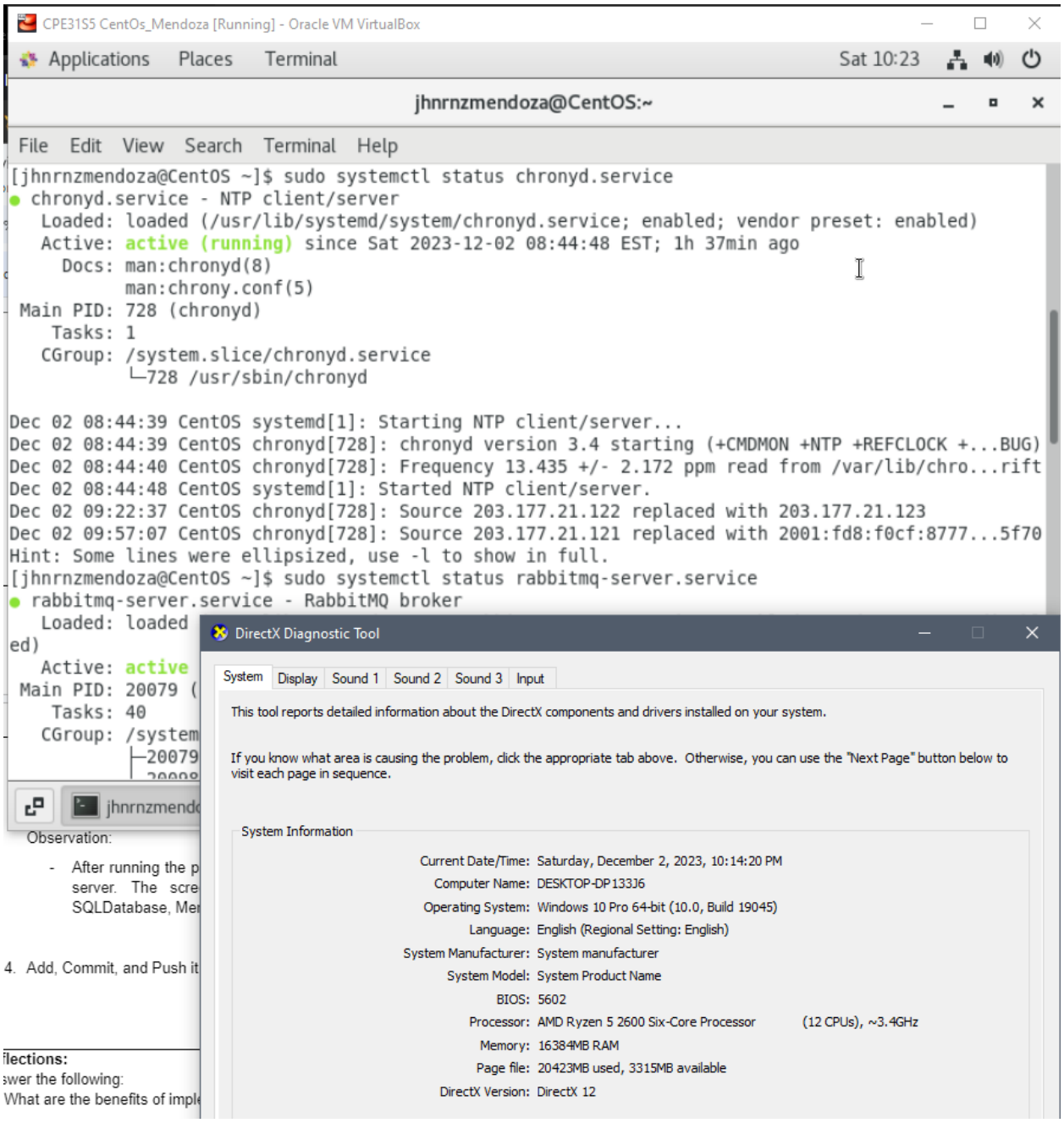

CPE31S5 Ubuntu_Mendoza [Running] - Oracle VM VirtualBox
Activities
Terminal
Dec 2 23:18
jhnrnzmendoza@Ubuntu: ~
jhnrnzmendoza@Ubuntu:~$ sudo systemctl status rabbitmq-server.service
● rabbitmq-server.service - RabbitMQ Messaging Server
Loaded: loaded (/lib/systemd/system/rabbitmq-server.service; enabled; vendor preset: enabled)
Active: active (running) since Sat 2023-12-02 21:45:32 +08; 1h 31min ago
Main PID: 991 (beam.smp)
Tasks: 23 (limit: 4596)
Memory: 25.5M
CPU: 38.817s
CGroup: /system.slice/rabbitmq-server.service
├─ 991 /usr/lib/erlang/erts-12.2.1/bin/beam.smp -W w -MBas ageffcbf -MHas ageffcbf -MBlmbcs 512 -MHlmbcs
├─1138 erl_child_setup 65536
├─2272 inet_gethost 4
└─2273 inet_gethost 4
Dec 02 21:44:15 Ubuntu systemd[1]: Starting RabbitMQ Messaging Server...
Dec 02 21:45:32 Ubuntu systemd[1]: Started RabbitMQ Messaging Server.
jhnrnzmendoza@Ubuntu:~$ sudo systemctl status memcached.service
● memcached.service - memcached daemon
Loaded: loaded (/lib/systemd/system/memcached.service; enabled; vendor preset: enabled)
Active: active (running) since Sat 2023-12-02 21:44:15 +08; 1h 32min ago
Docs: man:memcached(1)
Main PID: 986 (memcached)
Tasks: 10 (limit: 4596)
Memory: 1.2M
CPU: 835ms
CGroup: /system.slice/memcached.service
ched/memcached.pid
DirectX Diagnostic Tool
System
Display
Sound 1
Sound 2
Sound 3
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: Saturday, December 2, 2023, 10:14:20 PM
Computer Name: DESKTOP-DP133J6
Operating System: Windows 10 Pro 64-bit (10.0, Build 19045)
Language: English (Regional Setting: English)
System Manufacturer: System manufacturer
System Model: System Product Name
BIOS: 5602
Processor: AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
Memory: 16384MB RAM
Page file: 20423MB used, 3315MB available
DirectX Version: DirectX 12



Observation:

- After running the playbook, here are the installed services on the Ubuntu remote server. The screenshot results are done respectively: NTP, OpenStack, SQLDatabase, MemoryQueue, Memcached, and ETCD.

Verification: CentOS



CPE31S5 CentOs_Mendoza [Running] - Oracle VM VirtualBox

Applications Places Terminal Sat 10:23

jhnrnzmendoza@CentOS:~

File Edit View Search Terminal Help

```
[jhnrnzmendoza@CentOS ~]$ sudo systemctl status rabbitmq-server.service
● rabbitmq-server.service - RabbitMQ broker
   Loaded: loaded (/usr/lib/systemd/system/rabbitmq-server.service; enabled; vendor preset: disabl
ed)
   Active: active (running) since Sat 2023-12-02 10:08:14 EST; 14min ago
 Main PID: 20079 (beam.smp)
    Tasks: 40
   CGroup: /system.slice/rabbitmq-server.service
           ├─20079 /usr/lib64/erlang/erts-5.10.4/bin/beam.smp -W w -K true -A30 -P 1048576 -- -...
           ├─20098 /usr/lib64/erlang/erts-5.10.4/bin/epmd -daemon
           ├─20170 inet_gethost 4
           └─20171 inet_gethost 4

Dec 02 10:08:10 CentOS systemd[1]: Got notification message from PID 20097, but reception o...0079
Dec 02 10:08:10 CentOS systemd[1]: Got notification message from PID 20098, but reception o...0079
Dec 02 10:08:13 CentOS rabbitmq-server[20079]: RabbitMQ 3.3.5. Copyright (C) 2007-2014 GoPiv...nc.
Dec 02 10:08:13 CentOS rabbitmq-server[20079]: ##  ##      Licensed under the MPL.  See http...om/
Dec 02 10:08:13 CentOS rabbitmq-server[20079]: ##  ##
Dec 02 10:08:13 CentOS rabbitmq-server[20079]: ##########  Logs: /var/log/rabbitmq/rabbit@Ce...log
Dec 02 10:08:13 CentOS rabbitmq-server[20079]: ######  ##        /var/log/rabbitmq/rabbit@Ce...log
Dec 02 10:08:13 Ce
Dec 02 10:08:14 Ce
Dec 02 10:08:14 Ce
Hint: Some lines w
[jhnrnzmendoza@Cen
● memcached.servic
   Loaded: loaded
```

jhnrnzmendo

DirectX Diagnostic Tool

System | Display | Sound 1 | Sound 2 | Sound 3 | Input

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

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System Information

Current Date/Time:	Saturday, December 2, 2023, 10:14:20 PM
Computer Name:	DESKTOP-DP133J6
Operating System:	Windows 10 Pro 64-bit (10.0, Build 19045)
Language:	English (Regional Setting: English)
System Manufacturer:	System manufacturer
System Model:	System Product Name
BIOS:	5602
Processor:	AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
Memory:	16384MB RAM
Page file:	20423MB used, 3315MB available
DirectX Version:	DirectX 12

Observation:

- After running the p

CPE31S5 CentOs_Mendoza [Running] - Oracle VM VirtualBox

Applications Places Terminal Sat 10:24

jhnrnzmendoza@CentOS:~

File Edit View Search Terminal Help

```
[jhnrnzmendoza@CentOS ~]$ sudo systemctl status memcached.service
● memcached.service - Memcached
   Loaded: loaded (/usr/lib/systemd/system/memcached.service; disabled; vendor preset: disabled)
   Active: active (running) since Sat 2023-12-02 10:22:21 EST; 15s ago
 Main PID: 21827 (memcached)
    Tasks: 6
   CGroup: /system.slice/memcached.service
           └─21827 /usr/bin/memcached -u memcached -p 11211 -m 64 -c 1024

Dec 02 10:22:21 CentOS systemd[1]: Started Memcached.
[jhnrnzmendoza@CentOS ~]$ sudo systemctl status mariadb.service
● mariadb.service - MariaDB database server
   Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled; vendor preset: disabled)
   Active: active (running) since Sat 2023-12-02 08:46:07 EST; 1h 36min ago
 Main PID: 1820 (mysqld_safe)
    Tasks: 20
   CGroup: /system.slice/mariadb.service
           ├─1820 /bin/sh /usr/bin/mysqld_safe --basedir=/usr
           └─2055 /usr/libexec/mysqld --basedir=/var/lib/mysql --plugin-dir=/usr...

Dec 02 08:45:32 Ce
Dec 02 08:45:37 Ce
Dec 02 08:45:37 Ce
Dec 02 08:45:38 Ce
Dec 02 08:45:38 Ce
Dec 02 08:46:07 Ce
Hint: Some lines w
```

jhnrnzmendo

DirectX Diagnostic Tool

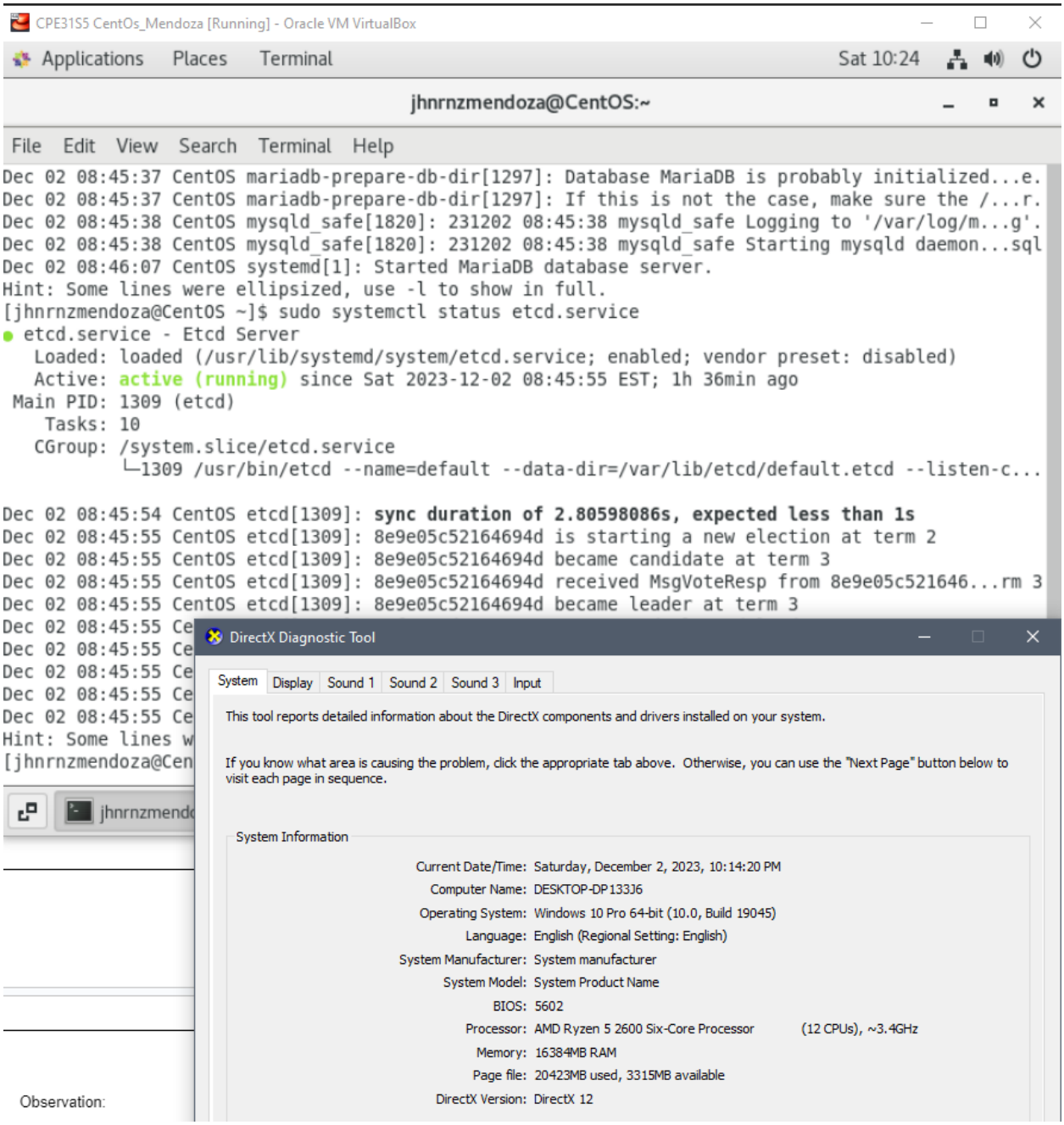
System | Display | Sound 1 | Sound 2 | Sound 3 | Input

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

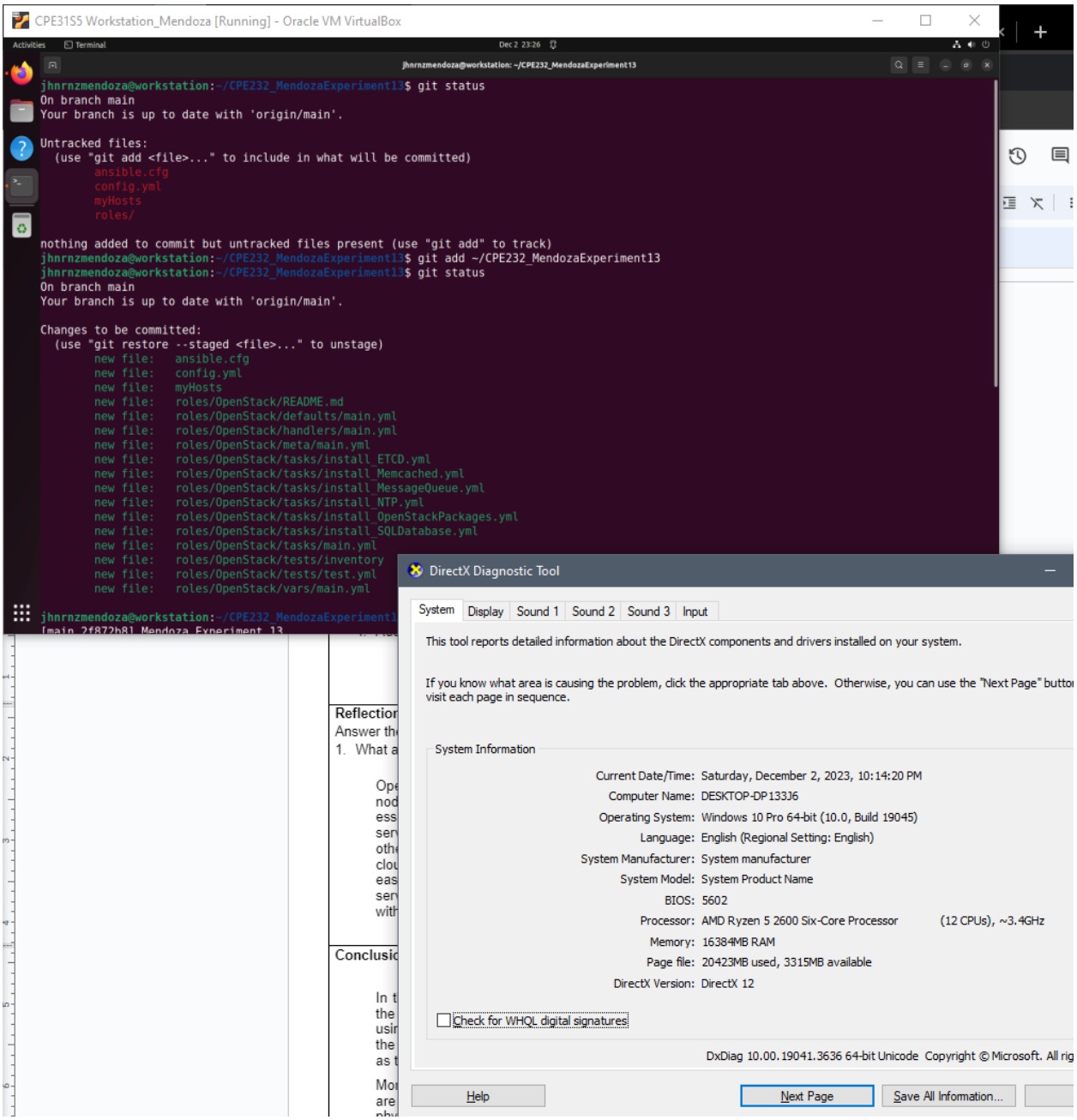
Current Date/Time:	Saturday, December 2, 2023, 10:14:20 PM
Computer Name:	DESKTOP-DP133J6
Operating System:	Windows 10 Pro 64-bit (10.0, Build 19045)
Language:	English (Regional Setting: English)
System Manufacturer:	System manufacturer
System Model:	System Product Name
BIOS:	5602
Processor:	AMD Ryzen 5 2600 Six-Core Processor (12 CPUs), ~3.4GHz
Memory:	16384MB RAM
Page file:	20423MB used, 3315MB available
DirectX Version:	DirectX 12



Observation:

- After running the playbook, here are the installed services on the CentOS remote server. The screenshot results are done respectively: NTP, OpenStack, SQLDatabase, MemoryQueue, Memcached, and ETCD.

4. Add, Commit, and Push it to your GitHub repository.



CPE31S5 Workstation_Mendoza [Running] - Oracle VM VirtualBox

Activities Terminal Dec 2 23:27

jhnrnzmendoza@workstation: ~/CPE232_MendozaExperiment13

```
        new file:   roles/OpenStack/tasks/install_OpenStackPackages.yml
        new file:   roles/OpenStack/tasks/install_SQLDatabase.yml
        new file:   roles/OpenStack/tasks/main.yml
        new file:   roles/OpenStack/tests/inventory
        new file:   roles/OpenStack/tests/test.yml
        new file:   roles/OpenStack/vars/main.yml

jhnrnzmendoza@workstation:~/CPE232_MendozaExperiment13$ git commit -m "Mendoza Experiment 13"
[main 2f872b8] Mendoza Experiment 13
 17 files changed, 333 insertions(+)
 create mode 100644 ansible.cfg
 create mode 100644 config.yml
 create mode 100644 myHosts
 create mode 100644 roles/OpenStack/README.md
 create mode 100644 roles/OpenStack/defaults/main.yml
 create mode 100644 roles/OpenStack/handlers/main.yml
 create mode 100644 roles/OpenStack/meta/main.yml
 create mode 100644 roles/OpenStack/tasks/install_ETCD.yml
 create mode 100644 roles/OpenStack/tasks/install_Memcached.yml
 create mode 100644 roles/OpenStack/tasks/install_MessageQueue.yml
 create mode 100644 roles/OpenStack/tasks/install_NTP.yml
 create mode 100644 roles/OpenStack/tasks/install_OpenStackPackages.yml
 create mode 100644 roles/OpenStack/tasks/install_SQLDatabase.yml
 create mode 100644 roles/OpenStack/tasks/main.yml
 create mode 100644 roles/OpenStack/tests/inventory
 create mode 100644 roles/OpenStack/tests/test.yml
 create mode 100644 roles/OpenStack/vars/main.yml
jhnrnzmendoza@workstation:~/CPE232_MendozaExperiment13$ git push origin main
Enumerating objects: 28, done.
Counting objects: 100% (28/28), done.
Delta compression using up to 2 threads
Compressing objects: 100% (18/18), done.
Writing objects: 100% (27/27), 4.12 KiB | 844.00 KiB/s, done.
Total 27 (delta 4), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (4/4), done.
To github.com:MendozaJRL/CPE232_MendozaExperiment13.git
   233b630..2f872b8  main -> main
jhnrnzmendoza@workstation:~
```

DirectX Diagnostic Tool

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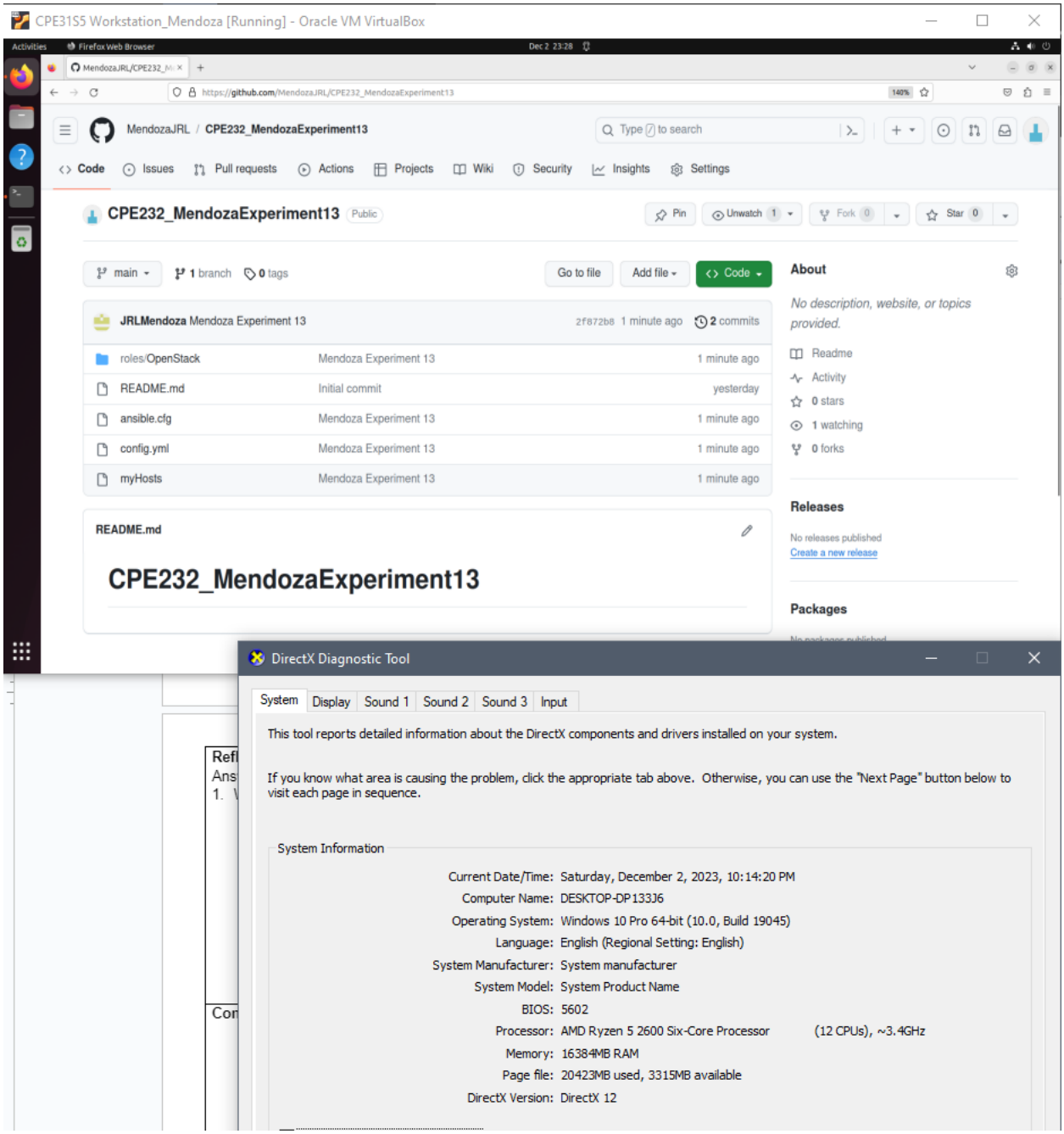

GitHub Link: https://github.com/MendozaJRL/CPE232_MendozaExperiment13.git

Reflections:

Answer the following:

1. What are the benefits of implementing OpenStack?

OpenStack is a cloud service which enables the user to access and manage the remote nodes through the cloud. OpenStack offers different packages and services that are essential on data handling, security, monitoring, and others. As observed in the activity, services such as maria database, SQL database, memory queue, memory cache, and others are few of the different services that are available with open stack. Due to its cloud infrastructure, OpenStack lets the system administrator to scale the network easier as it is deployed in the cloud. It also enables different remote hosts to access the service. Although some drawbacks in terms of security are at risk, it can be mitigated with proper data breach techniques.

Conclusions:

In this activity, the students are able to execute and perform the required objectives of the activity such as installing the required packages wherein it should be implemented using ansible and must be divided into different plays. The students were able to use the previously learned understanding about the ansible playbook and its features such as the use of the ansible role. In addition, the created playbook would install

Moreover, the students have found out that remote management such as cloud services are able to be accessed or managed remotely, be scaled easily, and do not require physical access for it to be modified. Although, it has some drawbacks of a security breach, data loss, and others. Cloud services such as OpenStack may be implemented publicly, and privately. Meaning, it can be available publicly and be accessed by a mass number of remote users. Whereas, privately offers a limited access within a specific number of remote users.