Assignment 2: Basics of Linux and Open-Source Tools

Course: Computer Science Fundamentals & Career Pathways (ETCCCP105)

Programme: B.Tech CSE (FULL STACK DEVELOPMENT)

Semester: 1

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Assignment Title: Demonstrating Linux Setup, Command Usage, and Automation Through Practical Implementation

1. Introduction

Linux is one of the most powerful and flexible operating systems used in both academics and industry. It is open-source, secure, and widely used for programming, networking, and server management.

This assignment helped me understand how Linux works and how to use it for daily tasks. I learned to install Ubuntu, use different terminal commands, write shell scripts, and upload my work to GitHub. Doing everything step by step made me realize how important command-line practice is for programmers.

2. Linux Installation

I installed Ubuntu 22.04 using VirtualBox on my Windows 11 system.
The system configuration was:

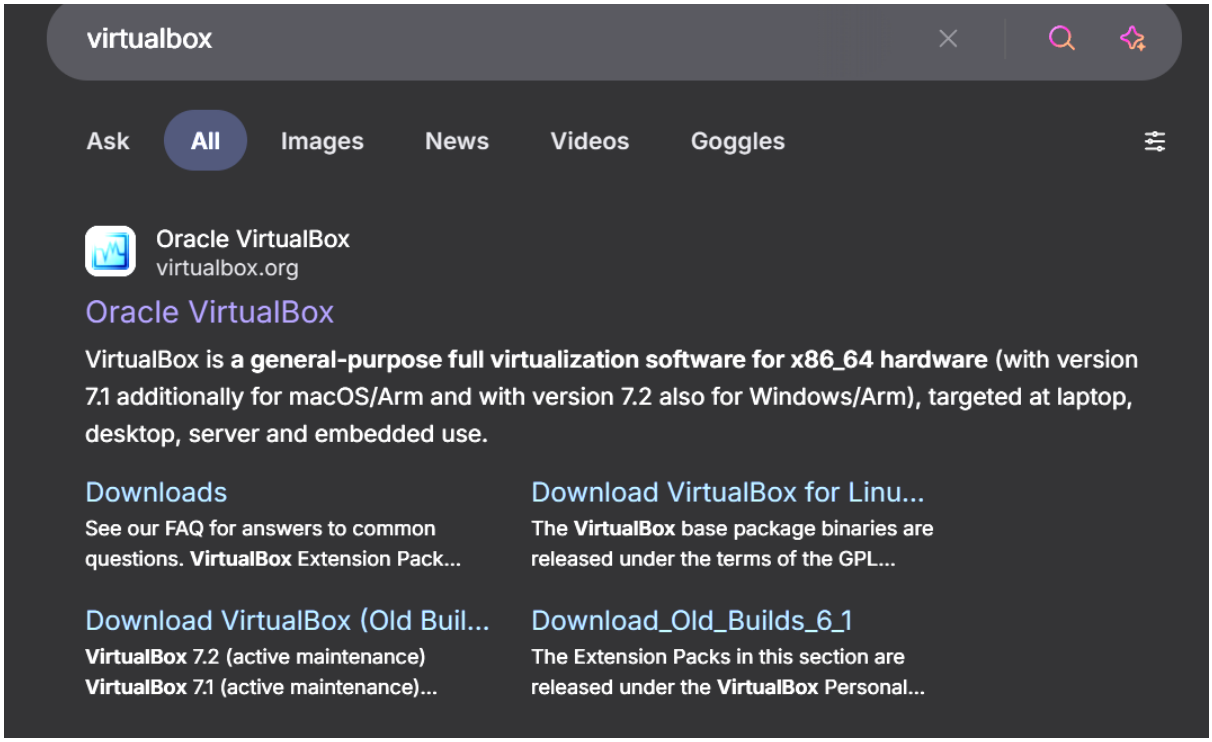
- **Processor: Intel Core i7 13700hx**
- **RAM: 16 GB**
- **Disk Space: 100 GB allocated for Ubuntu**

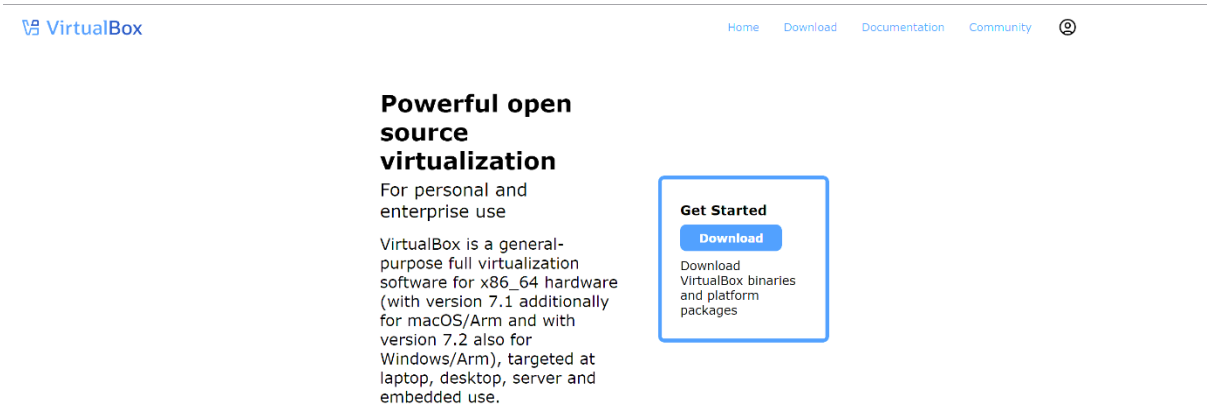
Installation Steps:

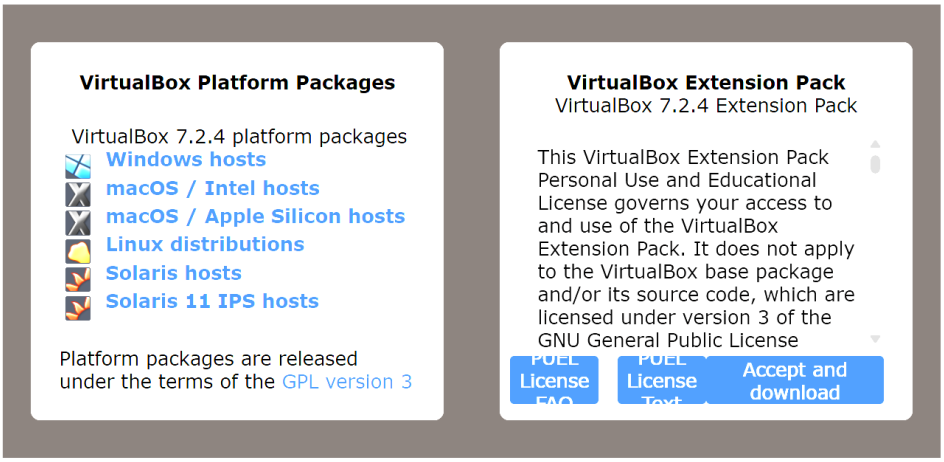
1. Downloaded the Ubuntu ISO file from the official website.
2. Installed **Oracle VirtualBox** and created a new virtual machine.
3. Allocated memory, storage, and attached the ISO file.
4. Started the VM and followed on-screen steps to install Ubuntu.
5. Created a username and password for login.
6. After installation, updated the system using the command:

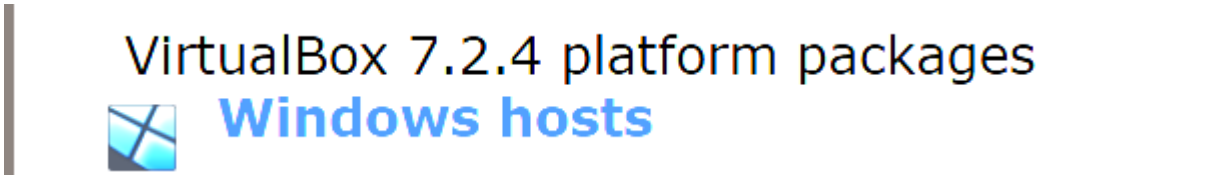
All screenshots are attested below this page

How to install virtual box and ubuntu







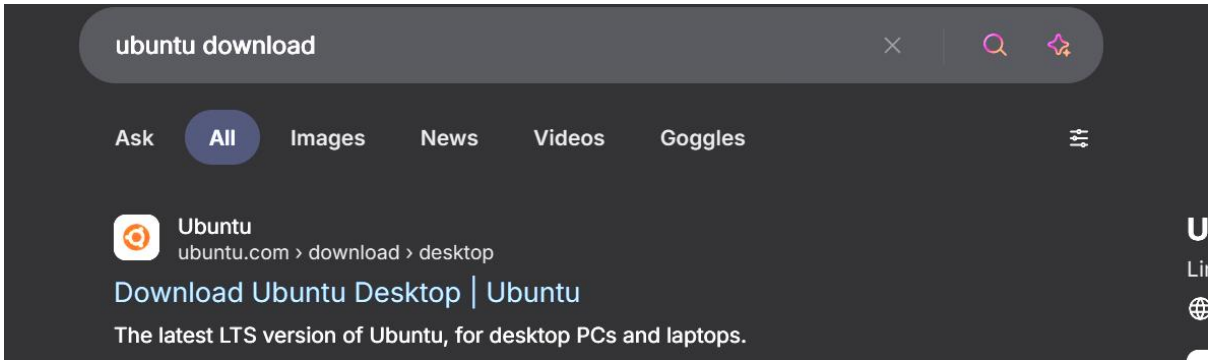


VirtualBox

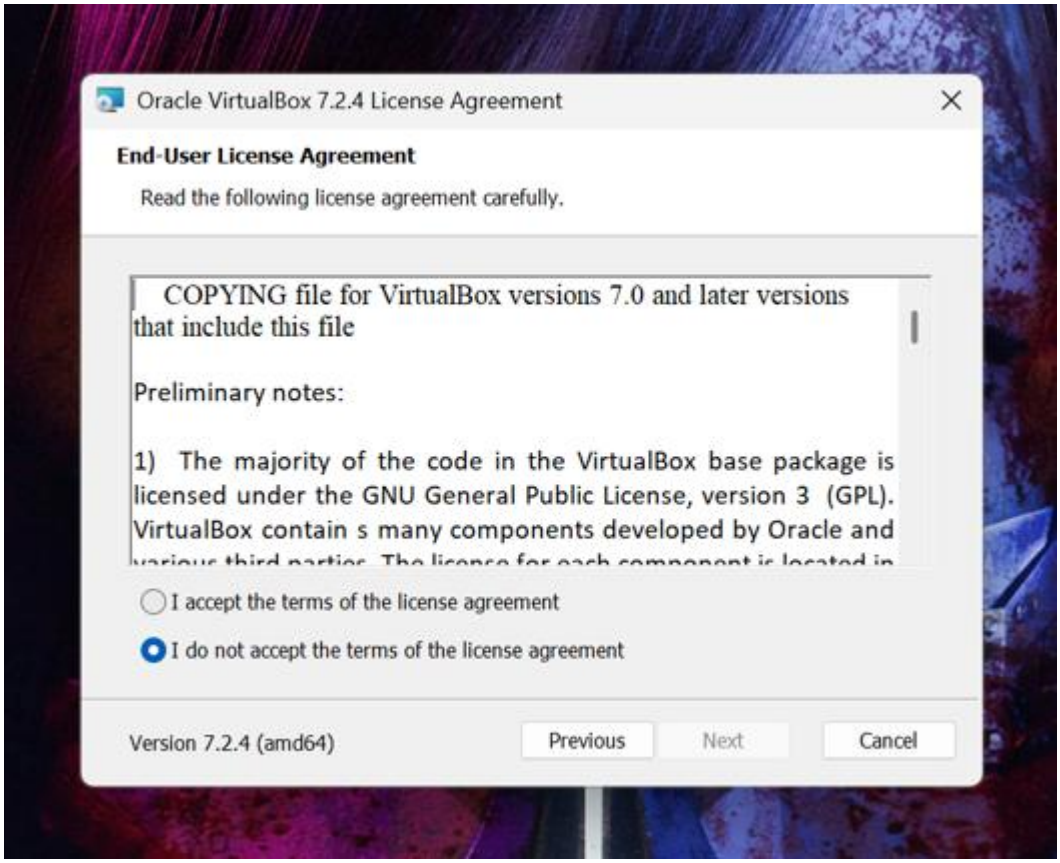
Powerful open source virtualization

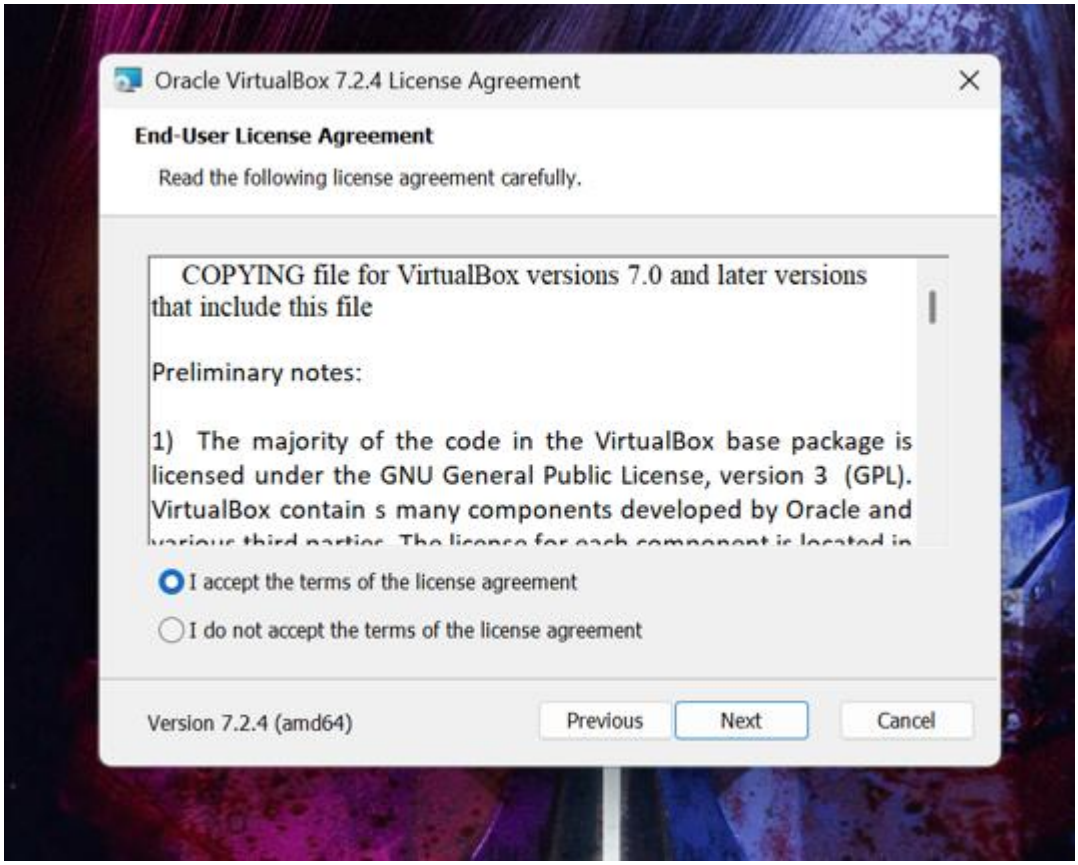
For personal and enterprise use

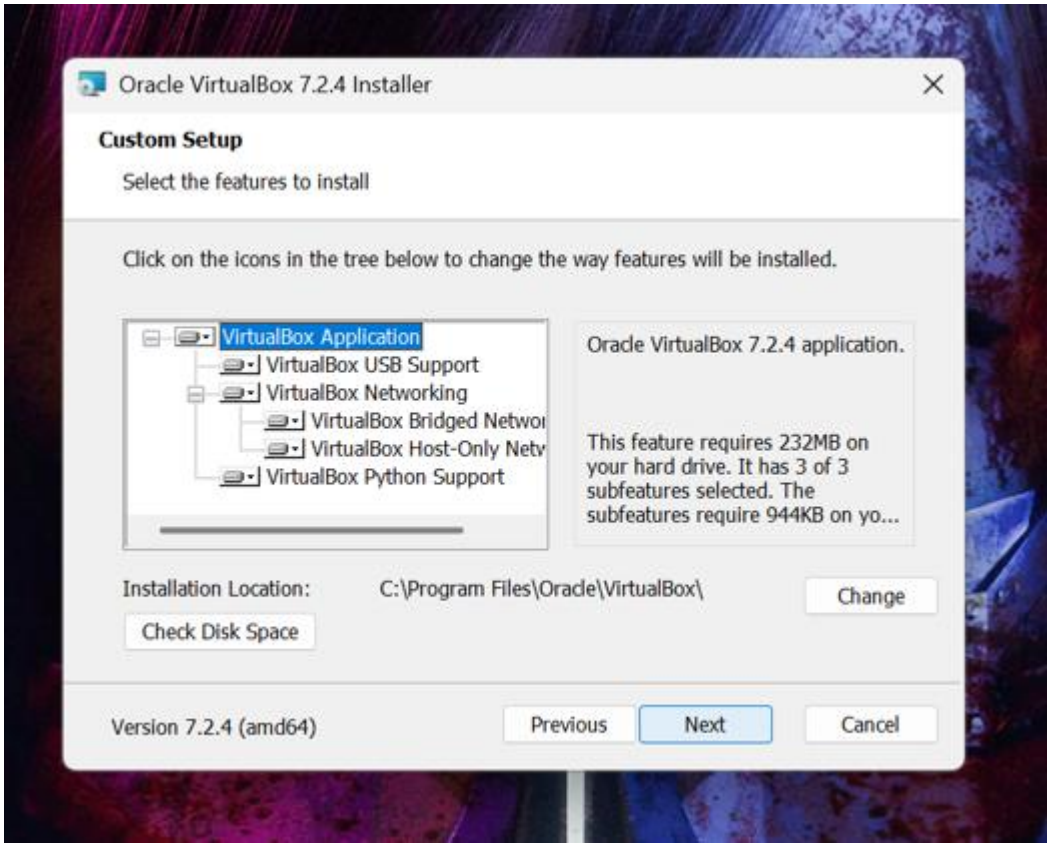
Ge

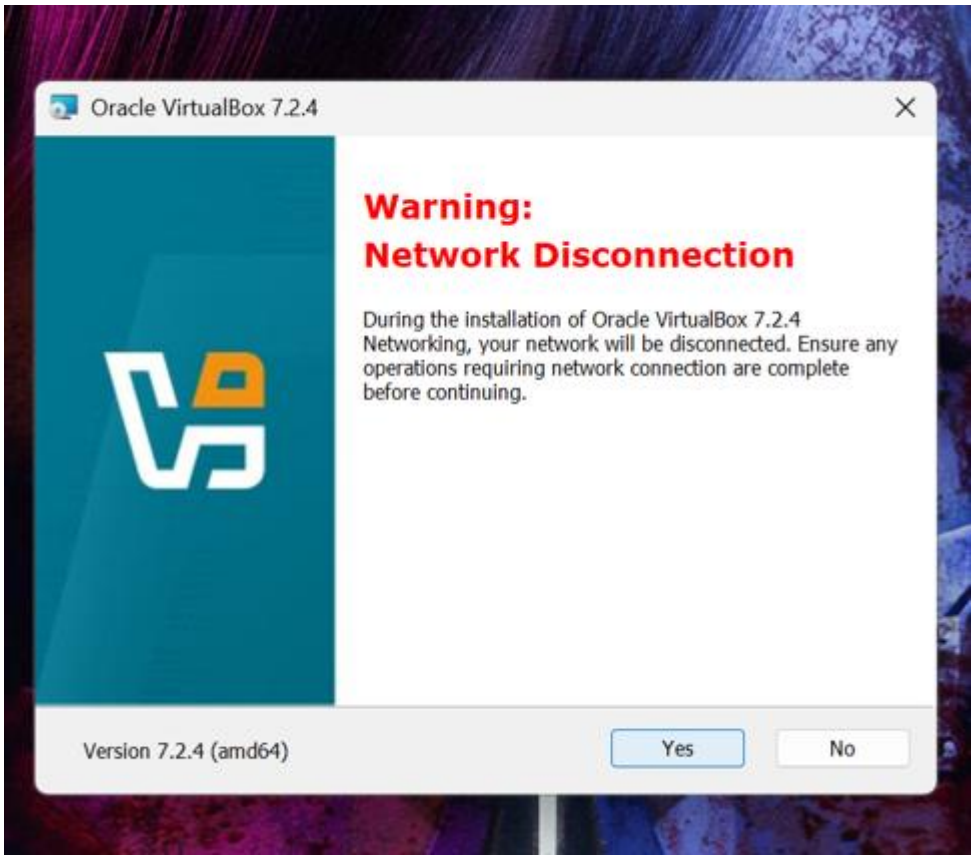


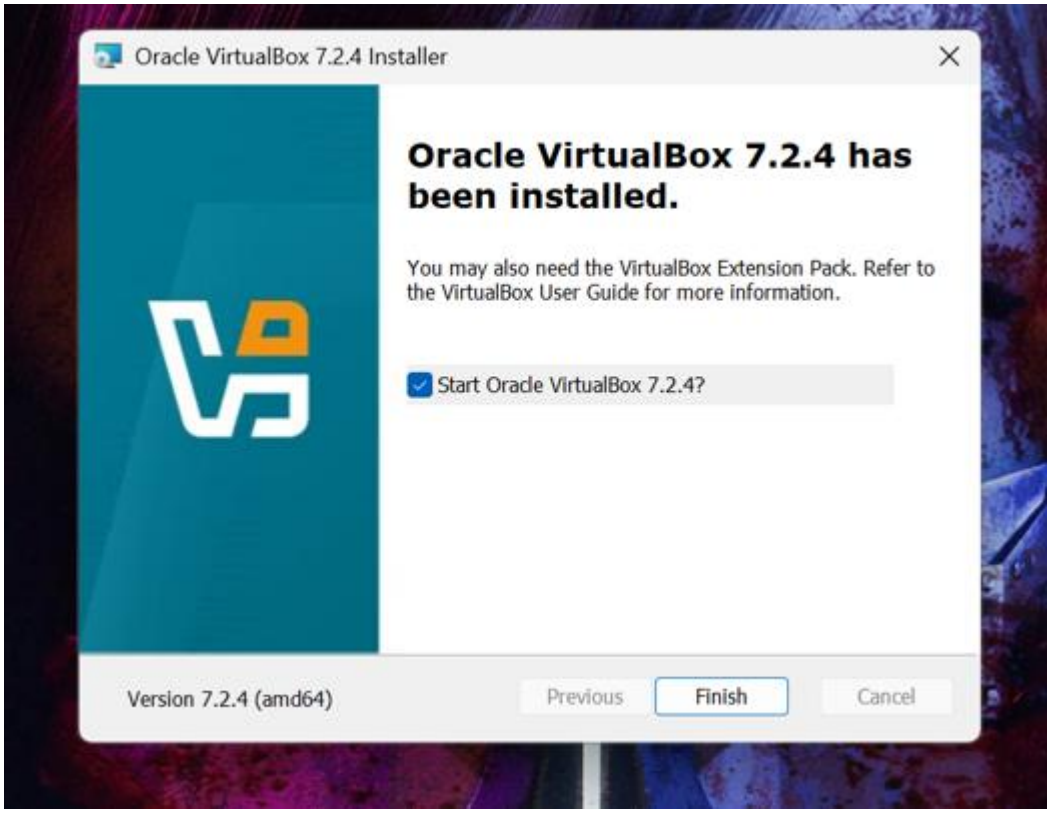
How to setup virtual box and ubuntu

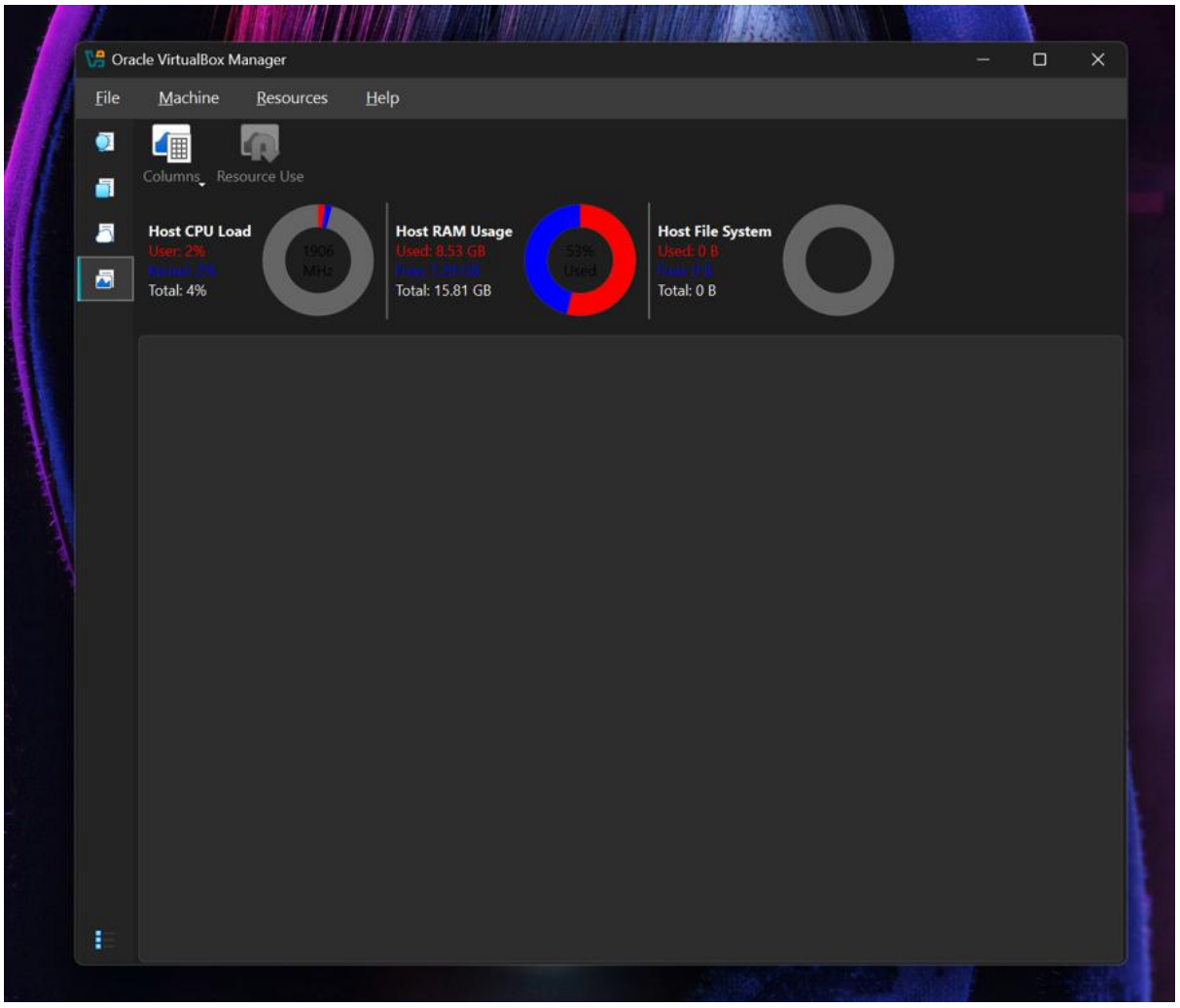


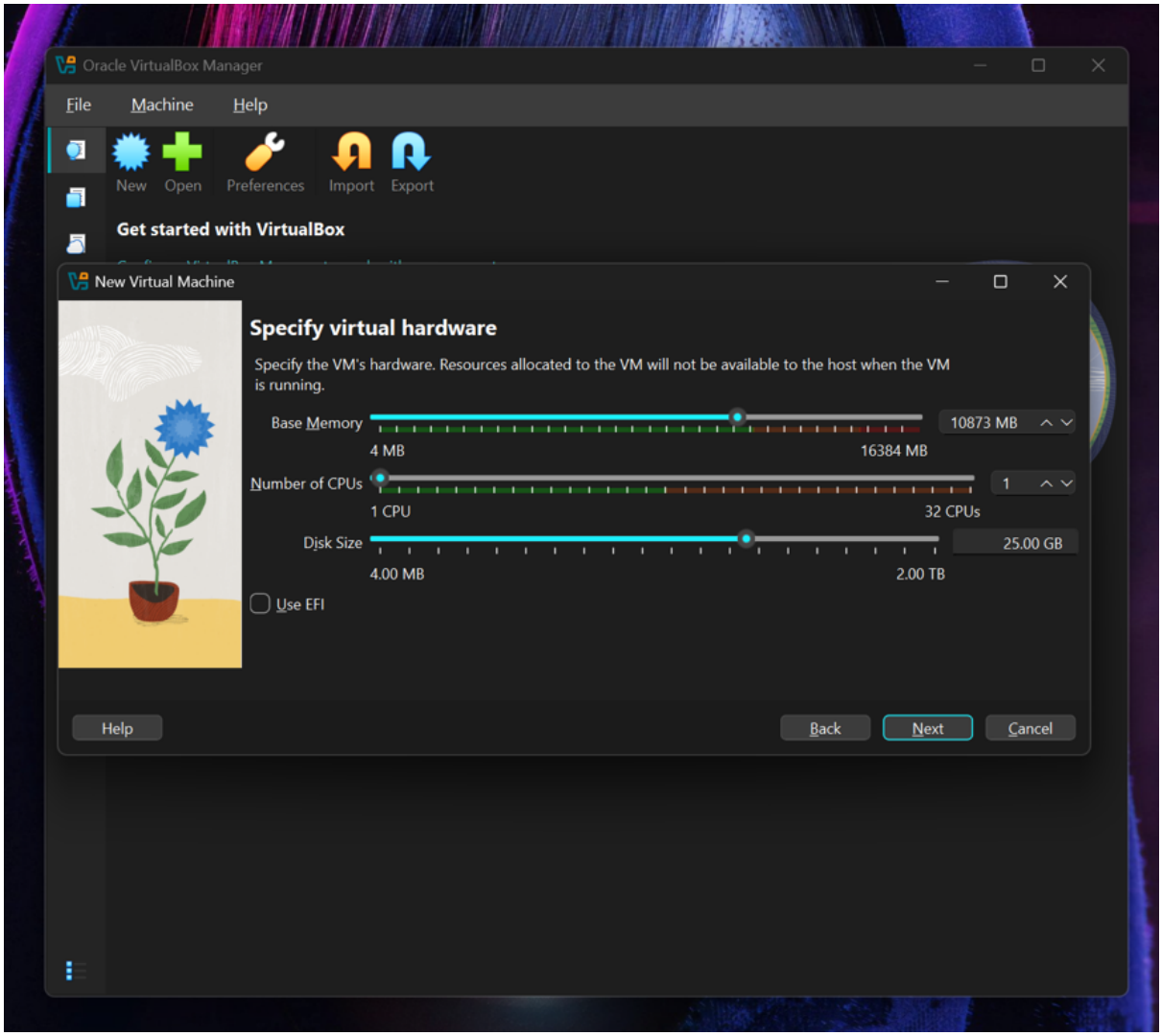



Oracle VirtualBox 7.2.4 Installer
Custom Setup
Select the features to install
Click on the icons in the tree below to change the way features will be installed.
VirtualBox Application
VirtualBox USB Support
VirtualBox Networking
VirtualBox Bridged Networ
VirtualBox Host-Only Netv
VirtualBox Python Support
Oracle VirtualBox 7.2.4 application.
This feature requires 232MB on your hard drive. It has 3 of 3 subfeatures selected. The subfeatures require 944KB on yo...
Installation Location:
C:\Program Files\Oracle\VirtualBox\
Change
Check Disk Space
Version 7.2.4 (amd64)
Previous
Next
Cancel


Oracle VirtualBox 7.2.4
Warning:
Network Disconnection
During the installation of Oracle VirtualBox 7.2.4 Networking, your network will be disconnected. Ensure any operations requiring network connection are complete before continuing.
Version 7.2.4 (amd64)
Yes
No


Oracle VirtualBox 7.2.4 Installer
Oracle VirtualBox 7.2.4 has been installed.
You may also need the VirtualBox Extension Pack. Refer to the VirtualBox User Guide for more information.
Start Oracle VirtualBox 7.2.4?
Version 7.2.4 (amd64)
Previous
Finish
Cancel


Oracle VirtualBox Manager
File
Machine
Resources
Help
Columns
Resource Use
Host CPU Load
User: 2%
Total: 4%
1906 MHz
Host RAM Usage
Used: 8.53 GB
Total: 15.81 GB
53% Used
Host File System
Used: 0 B
Total: 0 B


Oracle VirtualBox Manager
File
Machine
Help
New
Open
Preferences
Import
Export
Get started with VirtualBox
New Virtual Machine
Specify virtual hardware
Specify the VM's hardware. Resources allocated to the VM will not be available to the host when the VM is running.
Base Memory
10873 MB
4 MB
16384 MB
Number of CPUs
1
1 CPU
32 CPUs
Disk Size
25.00 GB
4.00 MB
2.00 TB
Use EFI
Help
Back
Next
Cancel

- **Shell Commands and Their Use**

I performed more than 20 Linux commands and noted their use. Below are some examples:

Command	Syntax / Example	Purpose / Description
pwd	pwd	Shows current working directory.
ls	ls -l	Lists all files and folders in a directory.
cd	cd Documents	Changes the current directory.
mkdir	mkdir myfolder	Creates a new folder.
rmdir	rmdir myfolder	Removes an empty directory.
cp	cp file1.txt backup/	Copies a file to another location.
mv	mv file.txt newname.txt	Moves or renames a file.
rm	rm file.txt	Deletes a file.
cat	cat notes.txt	Displays contents of a file.
touch	touch newfile.txt	Creates an empty file.
chmod	chmod 755 file.sh	Changes file permissions.
chown	chown user:user file.txt	Changes file ownership.
ps	ps	Shows running processes.

Command	Syntax / Example	Purpose / Description
top	top	Displays system performance.
kill	kill 1234	Kills a process using its PID.
ping	ping google.com	Checks network connectivity.
ifconfig	ifconfig	Displays network interface details.
clear	clear	Clears the terminal screen.
whoami	whoami	Displays current logged-in user.
tree	tree	Shows folder structure in tree form.

4. Shell Script Development

I wrote three small shell scripts as part of the assignment. Each one was tested on Ubuntu.

a) Backup Script

Filename: backup.sh

```
#!/bin/bash

# Script to back up a folder with timestamp


src="/home/user/Documents"

dest="/home/user/backup"

timestamp=$(date +%Y-%m-%d_%H-%M-%S)


mkdir -p "$dest"

cp -r "$src" "$dest/backup_$timestamp"


echo "Backup completed successfully at $timestamp."
```

b) CPU/Memory Monitoring Script

Filename: monitor.sh

```
#!/bin/bash
# Script to log CPU and Memory usage

logfile="/home/user/system_usage.log"

echo "System usage on $(date)" >> $logfile
top -b -n1 | head -n 10 >> $logfile
echo "------------------------------" >> $logfile

echo "System usage logged successfully."
```

c) File Download Script

Filename: download.sh

```
#!/bin/bash
# Script to download a file using wget

url="https://example.com/sample.pdf"
dest="/home/user/Downloads"

wget -P $dest $url

echo "File downloaded to $dest"
```

- This is the whole assignment

  This assignment was a very good learning experience.
  At first, using the terminal was confusing, but with practice, I started understanding

how powerful it is. I learned how to automate tasks using simple scripts and how GitHub helps in saving and sharing code.
It also helped me realize the importance of open-source software in the real world. The most challenging part was writing correct syntax in shell scripts, but after testing and debugging, it became easier.