

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

Introduction

The purpose of this assignment is to explore and document essential Linux shell commands and develop practical shell scripts. Linux is widely used in server environments, cloud computing, and development due to its flexibility, robustness, and open-source nature. Shell scripting automates repetitive tasks, improves efficiency, and enables powerful system management. Learning Linux commands and shell scripting is fundamental for IT professionals, developers, and system administrators.

Linux Installation:

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

- Processor: Intel Core i5 13420H
- 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:

How to Install virtual box and ubuntu

A screenshot of a search results page from a dark-themed search engine. The search bar at the top contains the query "virtualbox". Below the search bar are five filter buttons: "Ask", "All" (which is selected and highlighted in blue), "Images", "News", "Videos", and "Goggles". To the right of the filters is a settings icon. The main content area displays the result for "Oracle VirtualBox" from "virtualbox.org". The result includes the Oracle logo, the text "Oracle VirtualBox", and a brief description: "VirtualBox is a general-purpose full virtualization software for x86_64 hardware (with version 7.1 additionally for macOS/Arm and with version 7.2 also for Windows/Arm), targeted at laptop, desktop, server and embedded use." Below the description are two columns of links:

Downloads	Download VirtualBox for Linu...
See our FAQ for answers to common questions. VirtualBox Extension Pack...	The VirtualBox base package binaries are released under the terms of the GPL...
Download VirtualBox (Old Buil... VirtualBox 7.2 (active maintenance) VirtualBox 7.1 (active maintenance)...	Download_Old_Builds_6_1 The Extension Packs in this section are released under the VirtualBox Personal...

A screenshot of the Oracle VirtualBox homepage. At the top, there is a navigation bar with links for "Home", "Download", "Documentation", "Community", and a user profile icon. Below the navigation bar, there is a large heading "Powerful open source virtualization" with the subtext "For personal and enterprise use". A detailed description follows: "VirtualBox is a general-purpose full virtualization software for x86_64 hardware (with version 7.1 additionally for macOS/Arm and with version 7.2 also for Windows/Arm), targeted at laptop, desktop, server and embedded use." To the right of this text is a call-to-action box with a blue border. The box contains the "Get Started" button, which is highlighted in blue, and a "Download" button below it. Below the download button, there is descriptive text: "Download VirtualBox binaries and platform packages".

VirtualBox Platform Packages

VirtualBox 7.2.4 platform packages

- [Windows hosts](#)
- [macOS / Intel hosts](#)
- [macOS / Apple Silicon hosts](#)
- [Linux distributions](#)
- [Solaris hosts](#)
- [Solaris 11 IPS hosts](#)

Platform packages are released under the terms of the [GPL version 3](#)

VirtualBox Extension Pack
VirtualBox 7.2.4 Extension Pack

This VirtualBox Extension Pack Personal Use and Educational License governs your access to and use of the VirtualBox Extension Pack. It does not apply to the VirtualBox base package and/or its source code, which are licensed under version 3 of the GNU General Public License

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VirtualBox 7.2.4 platform packages

Windows hosts

 VirtualBox

**Powerful open
source
virtualization**

For personal and
enterprise use



ubuntu download

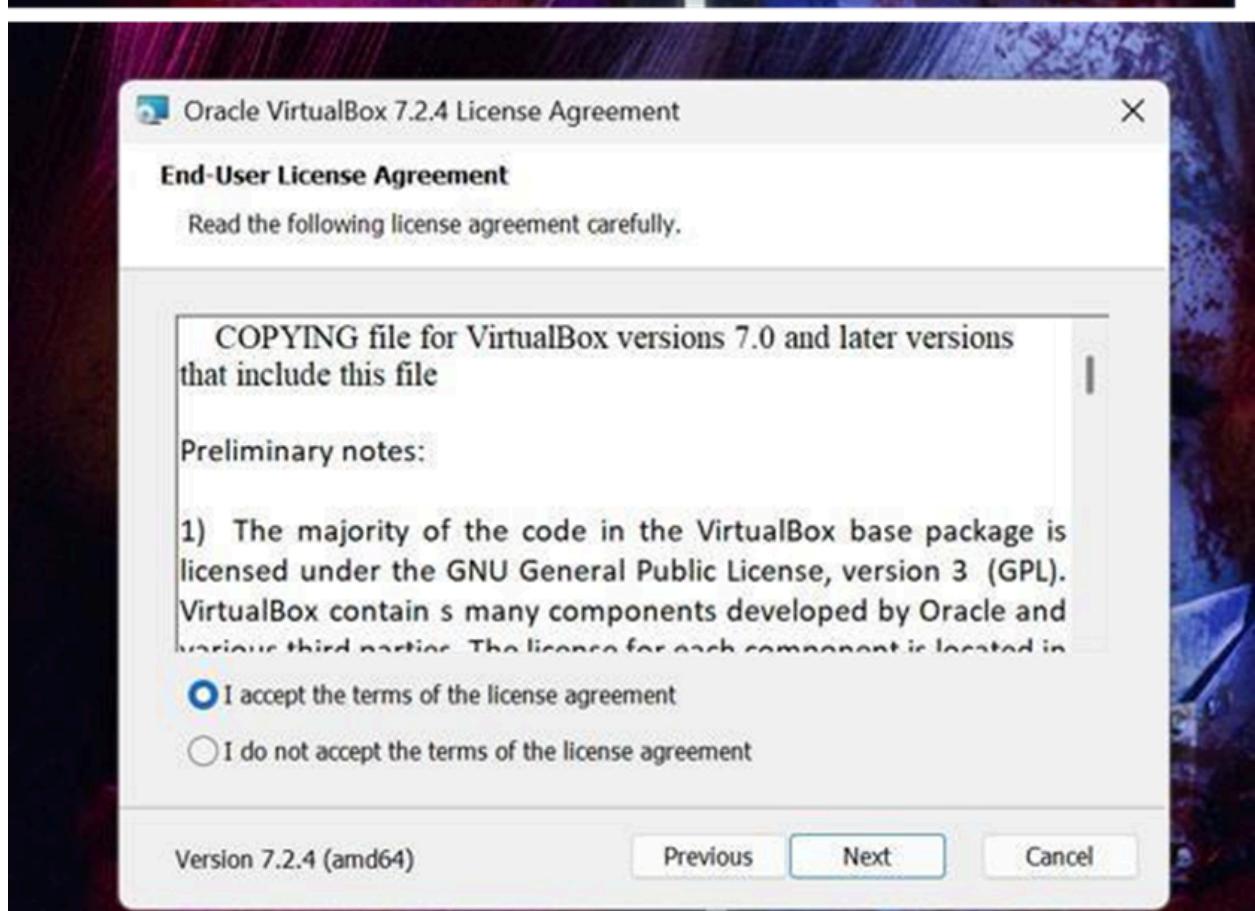
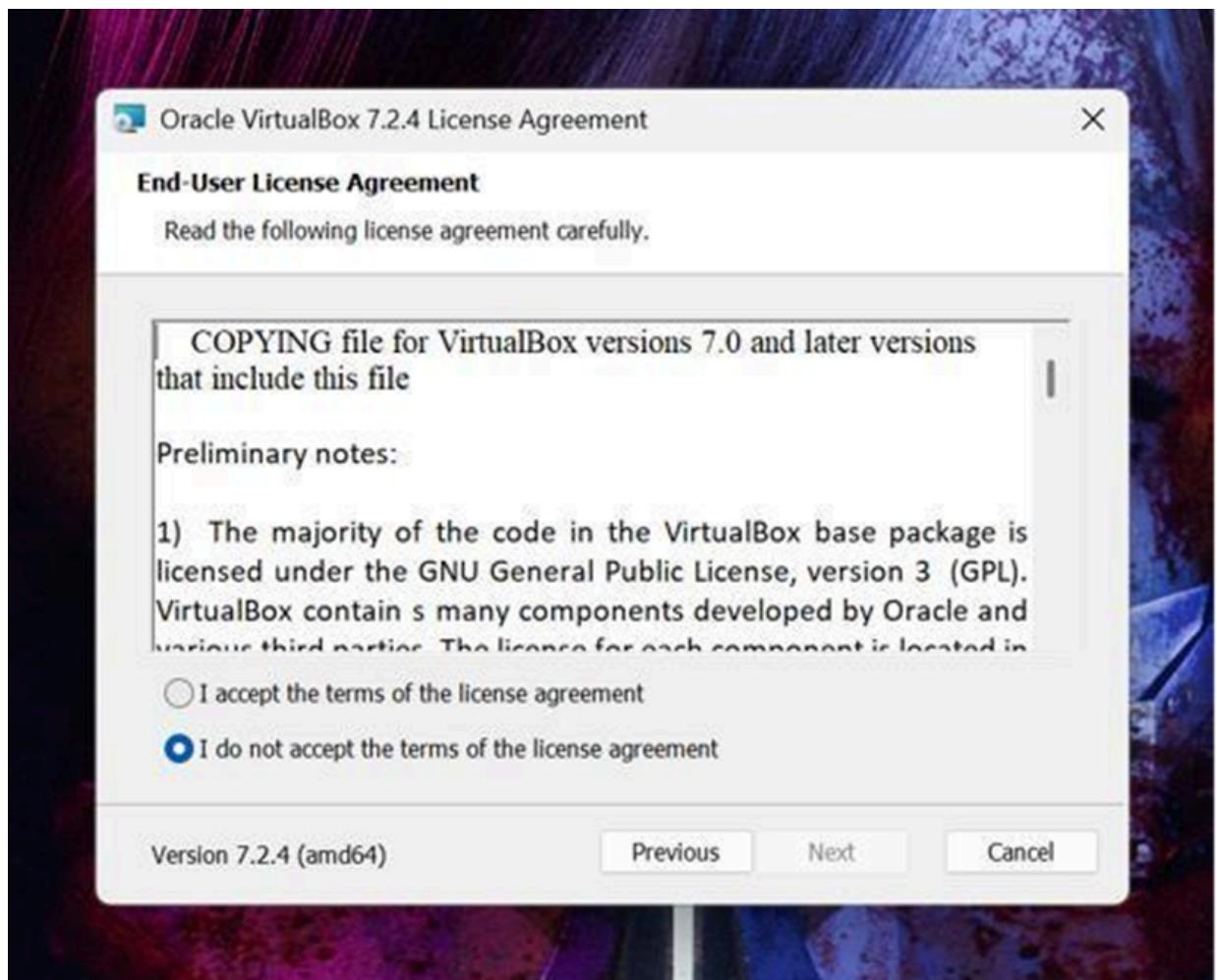
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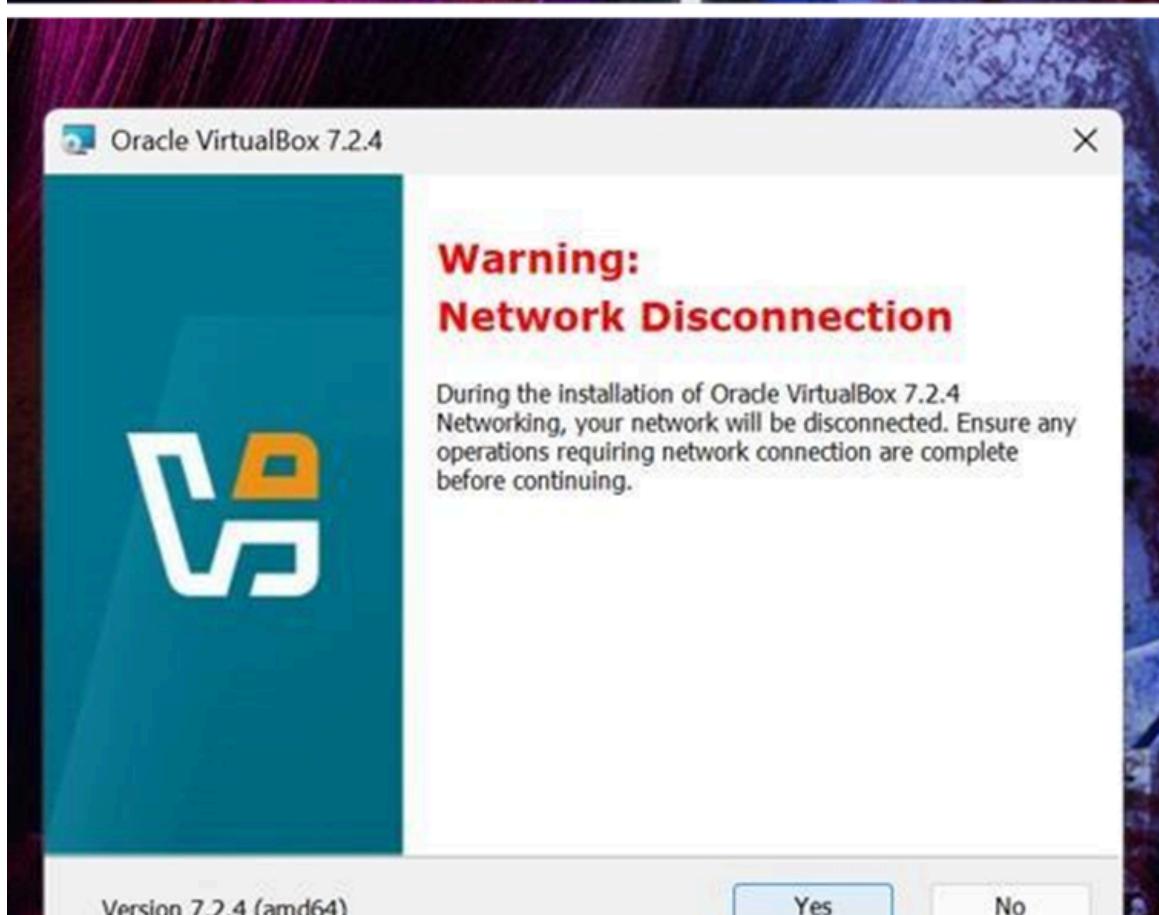
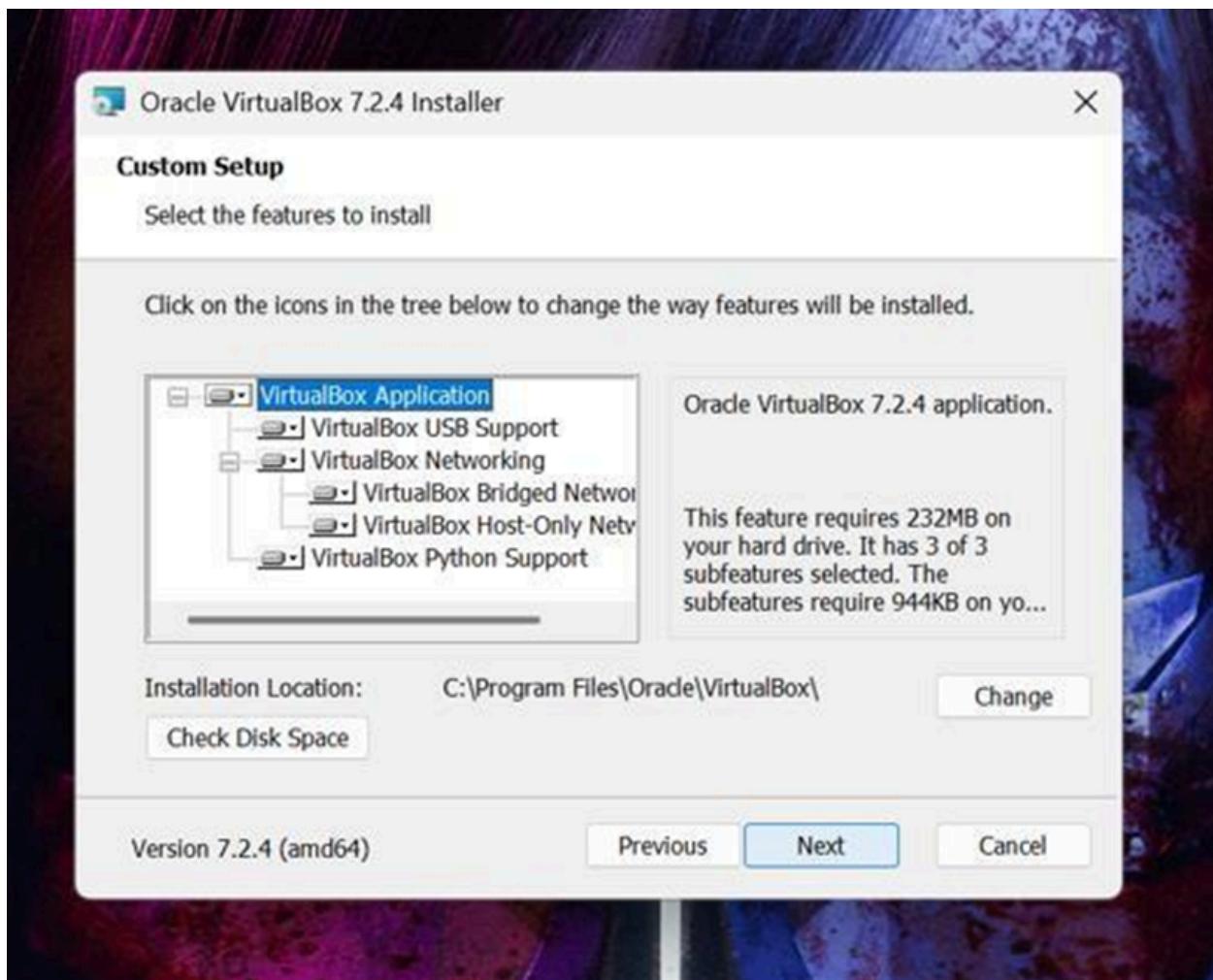
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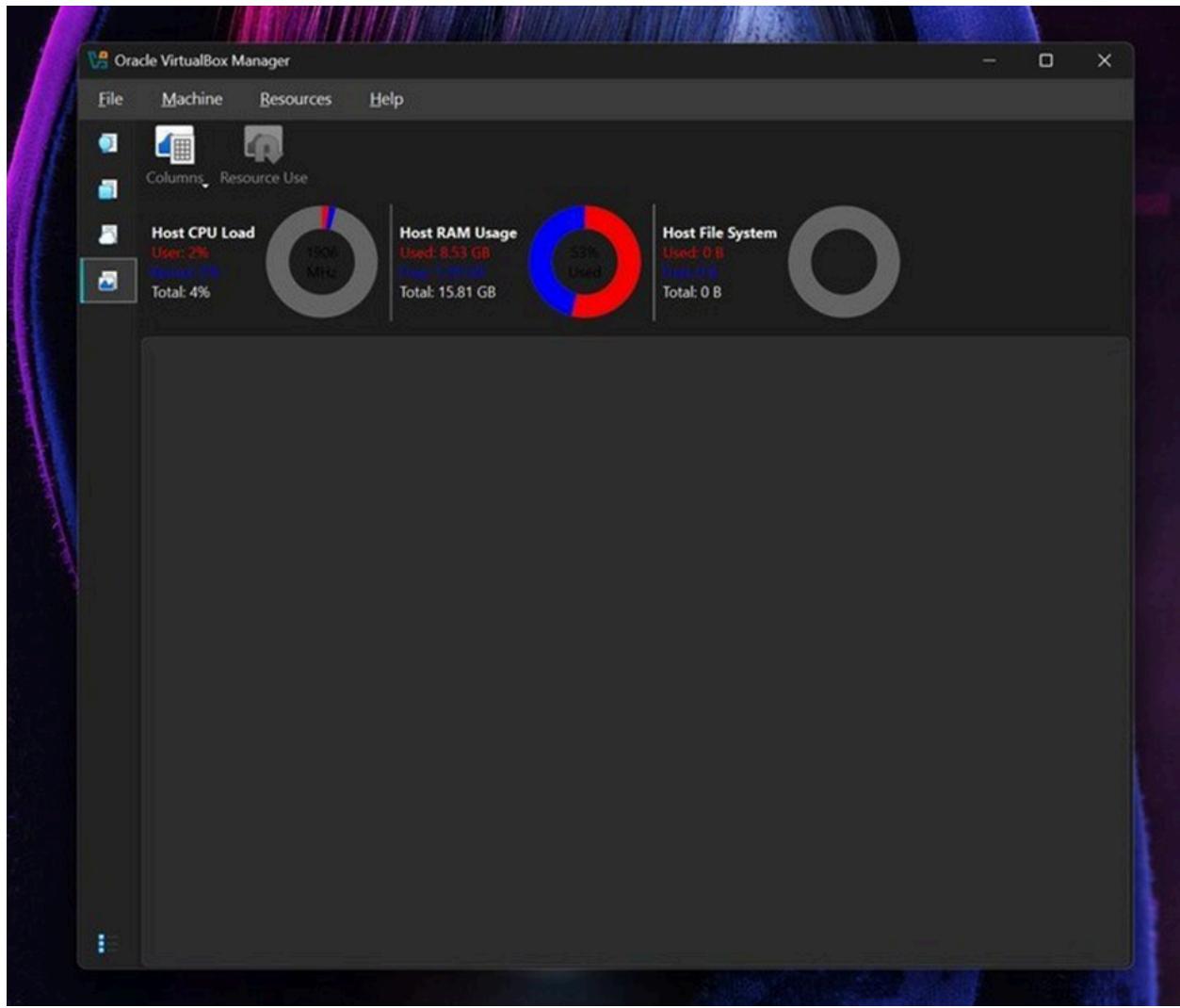
The latest LTS version of Ubuntu, for desktop PCs and laptops.

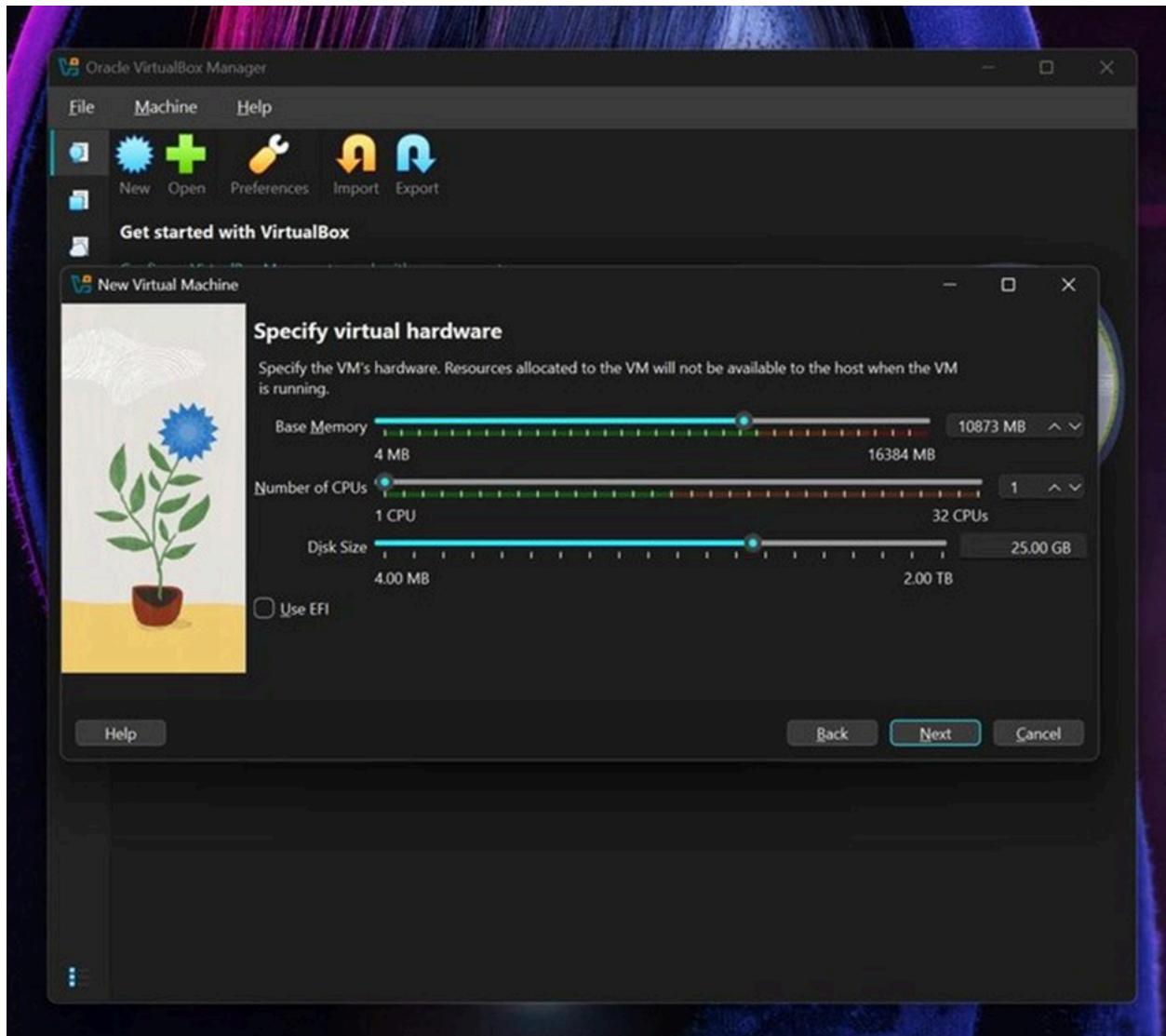
How to setup virtual box and ubuntu











#Shell Commands Documentation

1. File Navigation Commands:

- Ls
 - Syntax: ls [options] [directory]
 - Description: Lists files and directories in the specified directory or current directory by default.
 - Use: To see contents of a directory.
- .cd
 - Syntax: cd [directory]
 - Description: Changes the current working directory.
 - Use: To navigate to different directories.
- Pwd
 - Syntax: pwd
 - Description: Prints the absolute path of the current working directory.
 - Use: To know the current directory's full path.
- Tree
 - Syntax: tree [directory]
 - Description: Displays a graphical directory tree.
 - Use: To view directory hierarchy visually.

2. File and Directory Management:

- Mkdir
 - Syntax: mkdir [directory_name]

- Description: Creates a new directory.
 - Use: To create folders.
- Touch
 - Syntax: touch[file_name]
 - Description: Creates a new empty file or updates timestamp of an existing file.
 - Use: To create or update files.
- Cp
 - Syntax: cp [source] [destination]
 - Description: Copies files or directories.
 - Use: To duplicate files.
- Mv
 - Syntax: mv [source] [destination]
 - Description: Moves or renames files/directories.
 - Use: To relocate or rename files.
- Rm
 - Syntax: rm [file_name]
 - Description: Removes/deletes files.
 - Use: To delete files.

3. Permissions Management:

- Chmod
 - Syntax: chmod [permissions] [file/directory]
 - Description: Changes access permissions.
 - Use: To set read/write/execute permissions.

- Chown
 - Syntax: chown [owner][:group] [file/directory]
 - Description: Changes ownership.
 - Use: To change file owner or group.

4.Process Monitoring:

- Ps
 - Syntax: ps [options]
 - Description: Displays running processes.
 - Use: To view current processes.
- Top
 - Syntax: top
 - Description: Interactive real-time process viewer.
 - Use: To monitor system usage and running processes.
- Kill
 - Syntax: kill [process_id]
 - Description: Sends signal to terminate or control a process.
 - Use: To stop/kills a process.

5.Networking Tools:

- Ping
 - Syntax: ping [hostname or IP]
 - Description: Tests network connectivity.
 - Use: To check if host is reachable.
- ifconfig / ip
 - Syntax: ifconfig or ip addr show

- Description: Shows network interfaces and configurations.
 - Use: To view/set network device parameters.
-
- Netstat
 - Syntax: netstat [options]
 - Description: Displays network connections, routing tables.
 - Use: To monitor network status.

Shell command table

Command	Syntax	Description
ls	ls[options][directory]	lists files and directories
cd	cd[directory]	changes current directory
pwd	pwd	print current directory path
tree	tree[directory]	shows directory structure
mkdir	mkdir[dir]	creates new directory
touch	touch[file]	creates or update a file
cp	cp[src][dest]	copies files/directory
mv	mv[src][dest]	moves or renames files/dirs
rm	rm[file]	removes files
chmod	chmod[perm][file]	change file permissions
chown	chown[owner][file]	changes file owner
ps	ps[option]	lists current processes
top	top	display real time processes
kill	kill[pid]	terminates a process
ping	ping[host]	tests network connectivity
ifconfig/ip	ifconfig or ip addr show	show network interface info
netsat	netsat[options]	displays network statistics

Shell Scripts

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."
```

CPU/ Memory Monitoring Script

File name: 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."
```

File download Script

File name: 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"
```

Reflection

During this assignment, challenges included understanding complex command options and writing robust scripts with error handling. Through practical experience, skills in shell scripting, Linux command line operations, and automation were greatly enhanced. These skills apply to real-world scenarios by simplifying system administration tasks, automating backups, monitoring system health, and managing network resources efficiently.