K.R.MANGALAM UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY

TITLE : Basics of Linux and Open-Source Tools

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COURSE CODE : ETCCCP105

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2.1) LINUX INSTALLATION

Introduction:

I installed UBUNTU Linux on my system using ORACLE VIRTUAL BOX. Virtual box allows us to run Linux as Virtual Machine on top of Windows OS. This gives a safe environment to practice Linux commands without disturbing my main Windows system.

Steps:

1. **Download UBUNTU.**

- Go to official UBUNTU website(ubuntu.com/download/desktop)
- Download the Ubuntu ISO image(ex-Ubuntu 22.04 LTS)
- Go to official VirtualBox website(virtualbox.org)
- Download and install Oracle VirtualBox for Windows

2. **Create New Virtual Machine**

- Open VirtualBox-> click New
- Type Name: Ubuntu
- Type: Linux
- Version: Ubuntu(64bit)

3. Allocate Hardware Resources

- RAM allocation->(ex- 3GB out of 8GB)
- CPU allocation->(ex-2 cores)
- Create a virtual hard disk VDI->(ex-25GB Dynamically allocated)

4. Attach Ubuntu ISO

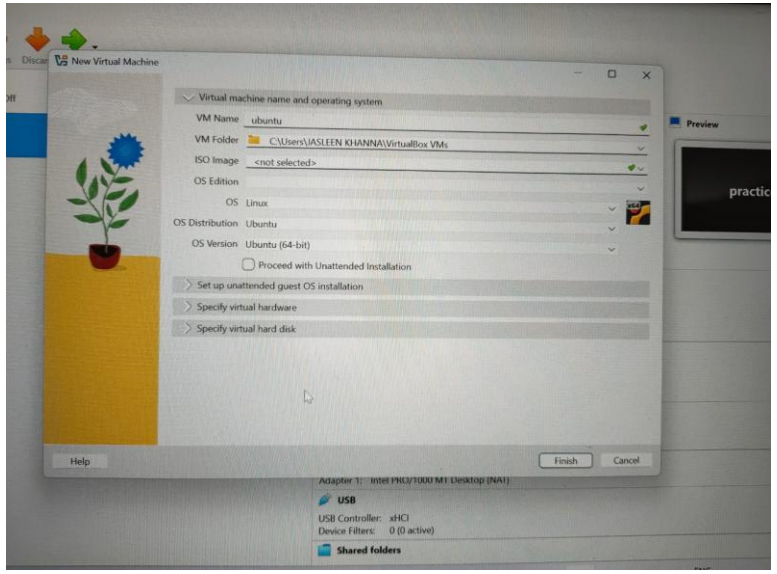
- Select the VM->settings->storage
- Under Controller IDE-> click empty CD icon
- Select Iso file of Ubuntu download earlier

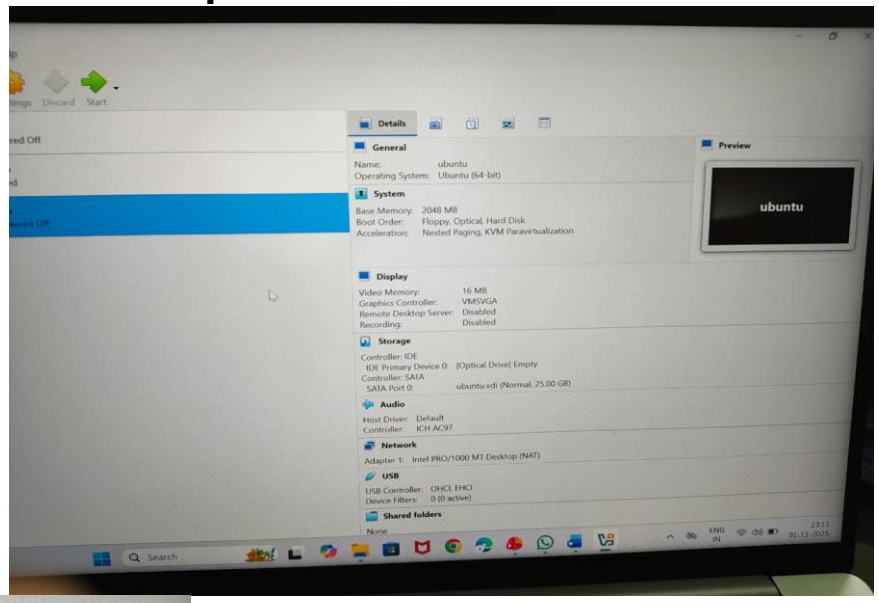
5. Start VM and Install Ubuntu

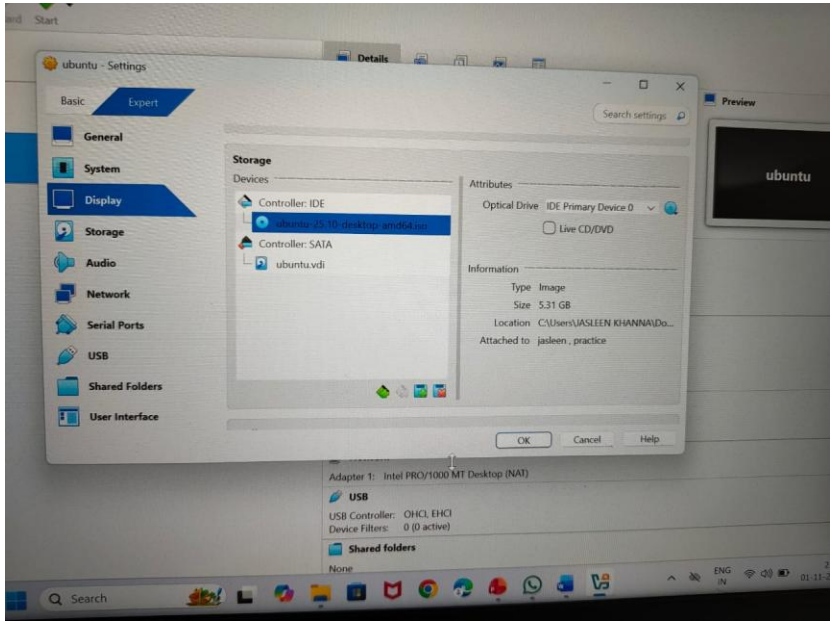
- Click Start
- Ubuntu installer loads
- Select Try or Install Ubuntu
- Select Install Ubuntu
- Set Username and Password
- Installation completes-> restart VM

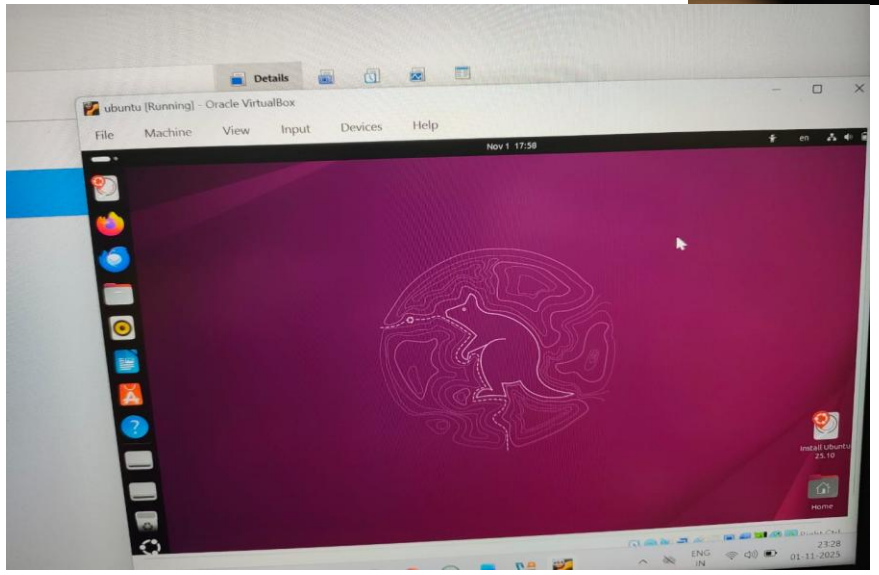
6.Final Working Ubuntu Desktop

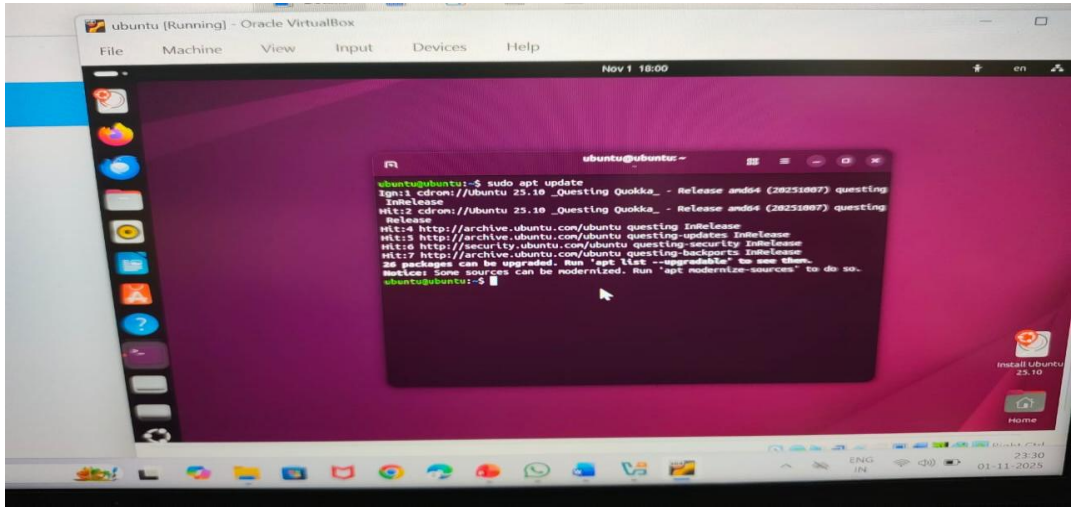
Now you have Ubuntu Desktop running inside Virtual->ready to execute commands and write shell script.











Hardware Configuration Details

Component	Specification
Laptop Processor	AMD Ryzen 7
Laptop RAM (total)	16 GB
Virtual Machine RAM Allocated	2 GB
Virtual Disk Allocated to VM	25 GB
Operating System Installed	Ubuntu 25.10(Linux 64-bit)
Virtualization Software	Oracle VirtualBox 7.x
Host Operating System	Windows 11

2.2) SHELL COMMANDS IMPLEMENTATION AND DOCUMENTATION

S.NO	Command	Syntax	Description	When to use
1)	ls	ls	Lists files and folders in current directory	To see what files are present

2)	ls- 1	ls -1	Shows detailed list with permissions, owner, size, date	When you need more information about files

3)	pwd	pwd	prints current working directory path	to know we are inside the file system

4)	cd	cd directory name	changes current working directory	when you want to move to another folder

```
ubuntu@ubuntu:~$ cd Desktop
ubuntu@ubuntu:~/Desktop$ pwd
/home/ubuntu/Desktop
ubuntu@ubuntu:~/Desktop$
```

5)	mkdir	mkdir folder name	creates a new folder	when creating a new directory

```
ubuntu@ubuntu:~/Desktop$ mkdir testfolder
ubuntu@ubuntu:~/Desktop$ ls
testfolder
ubuntu-desktop-bootstrap_ubuntu-desktop-bootstrap.desktop
ubuntu@ubuntu:~/Desktop$
```

6)	touch	touch file name	creates an empty file	when a user needs to create test/ sample files

```
ubuntu-desktop-bootstrap_ubuntu-desktop-bootstrap.desktop
ubuntu@ubuntu:~/Desktop$ cd testfolder
ubuntu@ubuntu:~/Desktop/testfolder$ touch file1.text
ubuntu@ubuntu:~/Desktop/testfolder$ ls
file1.text
ubuntu@ubuntu:~/Desktop/testfolder$
```

7)	cp	cp source_file destination_file	copies file from one name/location to another	To duplicate files

```
file1.text
ubuntu@ubuntu:~/Desktop/testfolder$ cp file1.text file2.text
ubuntu@ubuntu:~/Desktop/testfolder$ ls
file1.text  file2.text
ubuntu@ubuntu:~/Desktop/testfolder$
```

8)	mv	mv old name newname	rename or moves a file/folder	to change name or move file to another location

```
ubuntu@ubuntu:~/Desktop/testfolder$ mv file2.text file3.text
ubuntu@ubuntu:~/Desktop/testfolder$ ls
file1.text  file3.text
ubuntu@ubuntu:~/Desktop/testfolder$
```

9)	rm	rm filename	removes file	to delete files

```
ubuntu@ubuntu:~/Desktop/testfolder$ rm file3.text
ubuntu@ubuntu:~/Desktop/testfolder$ ls
file1.text
ubuntu@ubuntu:~/Desktop/testfolder$
```

10)	tree	tree	show directory tree structure	to understand directory hierarchy

```
ubuntu@ubuntu:~/Desktop/testfolder$ sudo apt install tree
Installing:
  tree

Summary:
  Upgrading: 0, Installing: 1, Removing: 0, Not Upgrading: 26
  Download size: 49.7 kB
  Space needed: 116 kB / 610 MB available

Get:1 http://archive.ubuntu.com/ubuntu questing/universe amd64 tree amd64 2.2.1-
1 [49.7 kB]
Fetched 49.7 kB in 6s (8112 B/s)
Selecting previously unselected package tree.
(Reading database ... 204322 files and directories currently installed.)
Preparing to unpack .../tree_2.2.1-1_amd64.deb ...
Unpacking tree (2.2.1-1) ...
Setting up tree (2.2.1-1) ...
Processing triggers for man-db (2.13.1-1) ...
ubuntu@ubuntu:~/Desktop/testfolder$ tree
└── file1.text

1 directory, 1 file
ubuntu@ubuntu:~/Desktop/testfolder$
```

11)	cat	cat file1.text	display file content	to quickly read a file

```
1 directory, 1 file
ubuntu@ubuntu:~/Desktop/testfolder$ echo "Hello Linux" > file1.text
ubuntu@ubuntu:~/Desktop/testfolder$ cat file1.text
Hello Linux
ubuntu@ubuntu:~/Desktop/testfolder$
```

12)	grep	grep Linux file1.text	search and filter text	filter the text

```
ubuntu@ubuntu:~/Desktop/testfolder$ echo "Linux is powerful" >> file1.text
ubuntu@ubuntu:~/Desktop/testfolder$ grep Linux file1.text
Hello Linux
Linux is powerful
```

13)	tail	tail filename	quickly wants to see end part of a file	to see last logs/last sata appended

```
echoLinux is fast: command not found
ubuntu@ubuntu:~/Desktop/testfolder$ echo "Linux is fast" >> file1.text
ubuntu@ubuntu:~/Desktop/testfolder$ echo "Linux is secure" >> file1.text
ubuntu@ubuntu:~/Desktop/testfolder$ tail file1.text
Hello Linux
Linux is powerful
Linux is fast
Linux is fast
Linux is secure
ubuntu@ubuntu:~/Desktop/testfolder$
```

14)	head	head filename	shows first line of a file	to see first line of file quickly

```
Linux is secure
ubuntu@ubuntu:~/Desktop/testfolder$ head file1.text
Hello Linux
Linux is powerful
Linux is fast
Linux is fast
Linux is secure
```

15)	wc	wc filename	used to count lines , words in a file	count words, line quickly in a file

```
ubuntu@ubuntu:~/Desktop/testfolder$ wc file1.text
 5 14 74 file1.text
ubuntu@ubuntu:~/Desktop/testfolder$
```

16)	sort	sort filename	arrange lines in a file in alphabetical/ sorted order	to arrange the lines in sorted order

```
ubuntu@ubuntu:~/Desktop/testfolder$ sort file1.text
Hello Linux
Linux is fast
Linux is fast
Linux is powerful
Linux is secure
ubuntu@ubuntu:~/Desktop/testfolder$
```

17)	uniq	uniq filename	removes duplicate adjacent lines from output	to remove duplicacy from file

```
ubuntu@ubuntu:~/Desktop/testfolder$ sort file1.text | uniq
Hello Linux
Linux is fast
Linux is powerful
Linux is secure
ubuntu@ubuntu:~/Desktop/testfolder$
```

18)	chmod	chmod permission filename	change file permission	to change the permission of the working file

```
ubuntu@ubuntu:~/Desktop/testfolder$ ls -l file1.text
-rwxrw-r-- 1 ubuntu ubuntu 74 Nov  1 20:21 file1.text
ubuntu@ubuntu:~/Desktop/testfolder$ chmod g+x file1.text
ubuntu@ubuntu:~/Desktop/testfolder$ ls -l file1.text
-rwxrwxr-- 1 ubuntu ubuntu 74 Nov  1 20:21 file1.text
ubuntu@ubuntu:~/Desktop/testfolder$
```

19)	find	find . –name “file1 .text”	search files/directories	to help out search files quickly

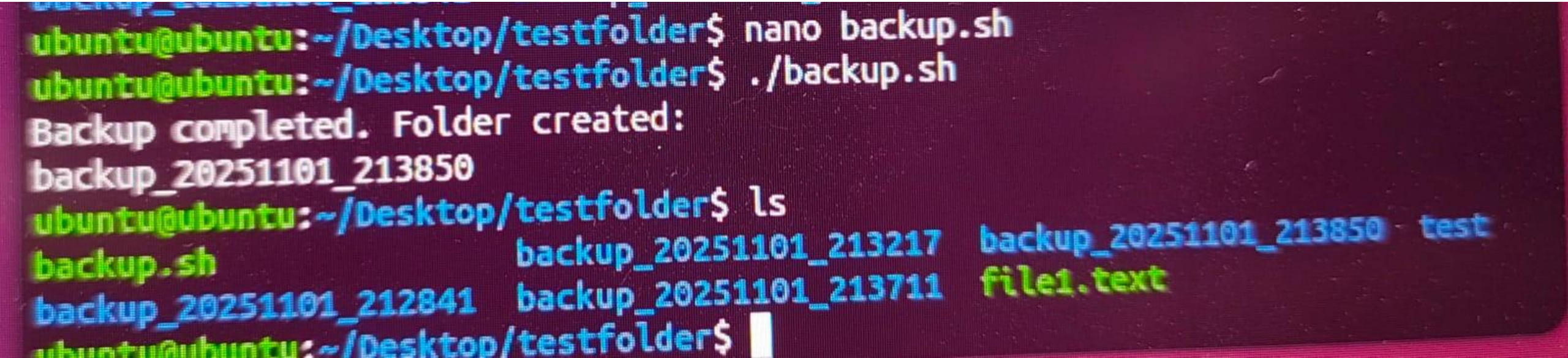
```
ubuntu@ubuntu:~/Desktop/testfolder$ find . -name "file1.text"
./file1.text
ubuntu@ubuntu:~/Desktop/testfolder$
```

20)	date	date	show current system date and time	to show time and date

```
ubuntu@ubuntu:~/Desktop/testfolder$ date
Sat Nov  1 21:03:00 UTC 2025
ubuntu@ubuntu:~/Desktop/testfolder$
```

2.3) SHELL SCRIPT DEVELOPMENT

- Script 1: Backup Directory (backup.sh)- this script takes a folder and create a backup copy with timestamp.
- Script 2: CPU and Memory Monitoring (monitor.sh)- this script lags CPU and RAM usage to a log file every few seconds.
- Script 3: Auto Download (download.sh)-this script automatically downloads a file from internet and stores into Downloads folder.
- All script include header , author name , date, variables and comments.



```
ubuntu@ubuntu:~/Desktop/testfolder$ chmod +x monitor.sh
ubuntu@ubuntu:~/Desktop/testfolder$ ./monitor.sh
-----------------------------------
Monitoring data saved in usage.log
ubuntu@ubuntu:~/Desktop/testfolder$ cat usage.log
------ Sat Nov  1 21:49:02 UTC 2025 ------
CPU Usage:
%Cpu(s):  0.0 us, 11.1 sy,  0.0 ni, 88.9 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 s
Memory Usage:
               total        used        free      shared  buff/cache   availab
Mem:           1.9Gi       1.6Gi        71Mi       437Mi       842Mi       311
Swap:             0B          0B          0B
ubuntu@ubuntu:~/Desktop/testfolder$
```

```
ubuntu@ubuntu:~/Desktop/testfolder$ nano download.sh
ubuntu@ubuntu:~/Desktop/testfolder$ chmod +x download.sh
ubuntu@ubuntu:~/Desktop/testfolder$ ./download.sh
--2025-11-01 22:19:10--  https://www.google.com/robots.txt
Resolving www.google.com (www.google.com)... 142.251.43.164, 2404:6800:4002:8
:2004
Connecting to www.google.com (www.google.com)|142.251.43.164|:443... connecte
HTTP request sent, awaiting response... 200 OK
Length: 7153 (7.0K) [text/plain]
Saving to: 'mydownloads/robots.txt'

robots.txt          100%[===================>]   6.99K  --.-KB/s    in 0s

2025-11-01 22:19:10 (97.2 MB/s) - 'mydownloads/robots.txt' saved [7153/7153]

Download completed. File saved in mydownloads
ubuntu@ubuntu:~/Desktop/testfolder$ ls mydownloads
robots.txt
ubuntu@ubuntu:~/Desktop/testfolder$
```