



K.R MANGALAM UNIVERSITY, Gurugram

THE COMPLETE WORLD OF EDUCATION

 *Basic of Linux* & open source tool

SCHOOL OF ENGINEERING AND TECHNOLOGY

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COURSE: B.tech CSE

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SEMESTER: 1st

COURSE NAME: Computer Science Fundamentals &
Career Pathways

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FACULTY: MR. RAJESH SIR

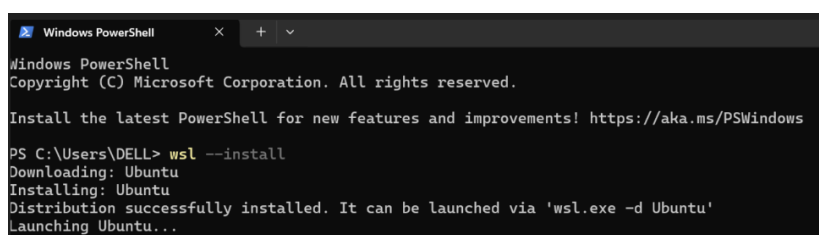
2.1) LINUX INSTALLATION

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.Enable WSL feature

- Press Windows + R, type **power shell**, and click ➡ **Run as Administrator**
- In power shell type: `wsl --install`
- This command install **Windows Subsystem for Linux and Virtual Machine Platform** automatically.
- Restart your system once installation completes.



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\DELL> wsl --install
Downloading: Ubuntu
Installing: Ubuntu
Distribution successfully installed. It can be launched via 'wsl.exe -d Ubuntu'
Launching Ubuntu...
```

2.Download Ubuntu

- Open Microsoft store
- Search for “**Ubuntu 22.04 LTS**”
- Click **Get/install**
- Once installed, click open

3.Set up Ubuntu for the First Time

- When you launch Ubuntu for the first time, it will show:
“Installing, this may take a few minutes...”
- After setup, it asks to create:
 - Username
 - Password
- Once done, you’ll see the Ubuntu terminal prompt like:

```
aadii@DESKTOP-878LBQ8: ~  
Welcome to Ubuntu 22.04.5 LTS (GNU/Linux 6.6.87.2-microsoft-standard-WSL2 x86_64)  
  
* Documentation:  https://help.ubuntu.com  
* Management:    https://landscape.canonical.com  
* Support:        https://ubuntu.com/pro  
  
System information as of Wed Nov 12 10:04:57 IST 2025  
  
System load:  0.04      Processes:            61  
Usage of /:   0.1% of 1006.85GB   Users logged in:     0  
Memory usage: 6%          IPv4 address for eth0: 172.31.195.88  
Swap usage:   0%  
  
This message is shown once a day. To disable it please create the  
/home/aadii/.hushlogin file.  
aadii@DESKTOP-878LBQ8:~$
```

4. Verify installation

- To confirm Ubuntu is installed and running, type:

```
Administrator: Windows PowerShell  
Windows PowerShell  
Copyright (C) Microsoft Corporation. All rights reserved.  
  
Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows  
  
PS C:\WINDOWS\system32> wsl -l -v  
>>  
  NAME                STATE      VERSION  
* Ubuntu-22.04        Running    2  
  Ubuntu              Running    2  
  Ubuntu-24.04        Stopped    2  
PS C:\WINDOWS\system32>
```

5. Final Working Ubuntu Terminal

- You now have a fully functional Ubuntu command -line system

running inside Windows -no separate virtual machine required.

- You can directly execute Linux commands , create shell scripts, and perform all tasks safely within WSL.

• *Hardware Configuration Details:*

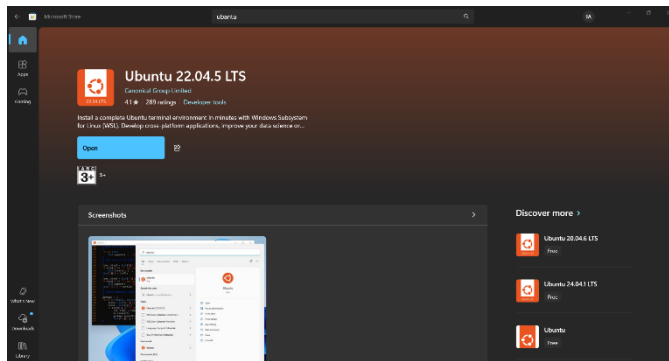
Component	Specification
System Manufacturer	HP
System Model	HP Laptop 15s-du3xxx
Processor (CPU)	11 th Gen Intel® Core™ i3-1115G4@3.00GHz (4CPUs)
Installed Ram	8.00GB
System Type	64-bit operating system, x64-based processor
Graphic Card	Intel® UHD Graphic
Storage	1.14TB
Disk Allocated for Ubuntu (WSL)	Automatically managed by windows (Dynamically allocation)

Virtualization

Windows Subsystem for
Linux (WSL 2) using
lightweight Hyper -V
backend

Final Working Ubuntu Environment

Now you have **Ubuntu 22.04 LTS** running **inside Windows using WSL 2** -a fully functional Linux terminal environment. It's ready to **execute shell commands, write and run shell scripts**, and perform all Linux operations seamlessly, **without needing a separate virtual machine**.



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (c) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\WINDOWS\system32> wsl -l -v

  NAME      STATE            VERSION
  *-----*
  Ubuntu-22.04 Running         2
  Ubuntu    Running         2
  Ubuntu-24.04 Stopped         2
PS C:\WINDOWS\system32>
```

```
vansh@LAPTOP-1SG7SCMB: ~
vansh@LAPTOP-1SG7SCMB:~$
```

2.2) SHELL COMMANDS IMPLEMENTATION AND DOCUMENTATION

1.pwd command

Description:

This command shows the current folder (directory) in which I am working. It basically tells “where I am” in the Linux file system.

When I applied it:

When I applied `pwd` to confirm that I was in my home directory `/home/vansh`

```
vansh@LAPTOP-1SG75CH8:~$ cd  
vansh@LAPTOP-1SG75CH8:~$ pwd  
/home/vansh  
vansh@LAPTOP-1SG75CH8:~$
```

2.ls command

Description:

This command lists all the files & folders present in the current directory.

When I applied it:

I applied **ls** to check what items were present inside my home folder & inside my test folder

```
vansh@LAPTOP-ISG7SCM8:~$ ls  
demo folder testfolder txt
```

3.ls -1 command

Description:

That's a number 1, not a lowercase L) is an option for the ls command.

When I applied it:

I used ls -1 to list the contents of a directory with exactly one file or directory per line.

```
vansh@LAPTOP-ISG7SCM8:~$ ls -1  
demo  
demoofolder  
folder  
testfolder  
txt
```

4.tree command

Description:

It shows the folder structure in a tree-like format. Very useful to visualize directories and files.

When I applied it:

I created a small test structure (folders f1, f2, & then run **tree** to display the structure neatly.

```
vansh@LAPTOP-1SG7SCM8:~$ tree
.
├── demo
│   └── file1.txt
├── demofolder
├── folder
├── testfolder
└── txt
5 directories, 1 file
```

5.cd folder frame

Description:

When I applied it:

```
vanish@LAPTOP-1SG7SCN8:~$ cd foldername
-bash: cd: foldername: No such file or directory
```

6.mkdir command

Description:

This command creates a new directory (folder). It helps me organize files by keeping them inside separate folder.

When I applied it:

I used mkdir myfolder to create a new directory called myfolder in my current working directory.

```
vanish@LAPTOP-1SG7SCN8:~$ mkdir myfolder
```

7.touch command

Description:

This command is used to create an empty file. It's one of the easiest ways to quickly make text or config files.

When I applied it:

I used to create an empty file called `file.1txt` in my current directory.

```
vansh@LAPTOP-1SG7SCM8:~$ touch file1.txt
```

8.cp command

Description:

This command copies a file or folder from one place to another.

When I applied it:

I used `cp` to copy `file.1.txt` into the `backup` folder to check if the copy command works correctly.

```
vansh@LAPTOP-1SG7SCM8:~$ cp file1.txt backup/  
cp: cannot create regular file 'backup/': Not a directory
```

9.mv command

Description:

This command can **rename** a file or **move** it to a different location.

When I applied it:

I used `mv file1.txt newname.txt` to rename the file and test how file renaming works in Linux.

```
vansh@LAPTOP-ISG7SCM8:~$ mv file1.txt newname.txt
```

10. rm command

Description:

This command removes (deletes) a file permanently.

When I applied it:

I used `rm` to delete the `newname.txt` file as a part of file management testing.

```
vansh@LAPTOP-ISG7SCM8:~$ rm newname.txt  
vansh@LAPTOP-ISG7SCM8:~$ ls
```

11.chmod 744 file.txt command

Description:

chmod is used to change the permissions of a file . Permissions decided who can read, write, or execute the file.

When I applied it:

I used `chmod 744` to give(read , write, execute) permission to owner and give only read permission to the group& others.

```
vansh@LAPTOP-1567SCM8:~$ chmod 744 file.txt
```

12.sudo chown user: user file.txt command

Description:

Chown changes the owner of a file or directory.

When I applied it:

I used it to change of file.txt from my user to root , just to test ownership change.

```
vansh@LAPTOP-ISG7SCM8:~$ sudo chown vansh:vansh file.txt
vansh@LAPTOP-ISG7SCM8:~$ ls -l
backup
demo
demoFolder
file.txt
folder
myfolder
testFolder
```

13.ps command

Description:

Shows the running processes for the current usage.

When I applied it:

To check processes are active in my Ubuntu session.

```
van$
vansh@LAPTOP-ISG7SCM8:~$ ps
  PID TTY          TIME CMD
 336 pts/0    00:00:00 bash
1470 pts/0    00:00:00 ps
```

14.top command

Description:

This command shows the real time usage of CPU, memory, processes, etc.

When I applied it:

To see the system resource usage live.

```
vansh@LAPTOP-1SG7SCM8:~$ top
top - 28:14:28 up 1:17, 1 user, load average: 0.00, 0.00, 0.00
Tasks: 25 total, 1 running, 24 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.0 us, 0.0 sy, 0.0 ni, 100.0 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 3789.2 total, 3354.4 free, 331.6 used, 103.2 buff/cache
MiB Swap: 1024.0 total, 1024.0 free, 0.0 used, 3383.4 avail Mem

  PID USER      PR  NI  VIRT  RES  SHR  S  %CPU  %MEM     TIME+ COMMAND
 1471 vansh    20   0   7792   3712 3072 R   0.3   0.1   0:00.29 top
    1 root     20   0 165776 10856 8040 S   0.0   0.3   0:01.14 systemd
    2 root     20   0   3072   1792 1664 S   0.0   0.0   0:00.00 init-systemd(Ub
    7 root     20   0   3088   2024 1920 S   0.0   0.1   0:00.00 init
   61 root    19  -1 478220 14544 13648 S   0.0   0.4   0:00.33 systemd-journal
   91 root     20   0 22848   5632 4480 S   0.0   0.1   0:00.43 systemd-udevd
```

15.kill<PID> command

Description:

Used to stop /terminate a running process.

When I applied it:

I tried killing a dummy background process created with **kill 1478**

```
vansh@LAPTOP-1SG7SCM8:~$ kill 1478
-bash: kill: (1478) - No such process
vansh@LAPTOP-1SG7SCM8:~$ ps
  PID TTY          TIME CMD
  536 pts/0        00:00:00 bash
 1484 pts/0        00:00:00 ps
```

16.ping google.com command

Description:

Check if your system can reach another server on the network.

When I applied it:

To check connectivity to google and verify networking.

```
vansh@LAPTOP-ISG7SCM8:~$ ping google.com
PING google.com (142.250.67.78) 56(84) bytes of data:
64 bytes from maa05s13-in-f14.1e100.net (142.250.67.78): icmp_seq=1 ttl=118 time=4.81 ms
64 bytes from maa05s13-in-f14.1e100.net (142.250.67.78): icmp_seq=2 ttl=118 time=4.27 ms
64 bytes from maa05s13-in-f14.1e100.net (142.250.67.78): icmp_seq=3 ttl=118 time=4.25 ms
64 bytes from maa05s13-in-f14.1e100.net (142.250.67.78): icmp_seq=4 ttl=118 time=31.2 ms
64 bytes from maa05s13-in-f14.1e100.net (142.250.67.78): icmp_seq=5 ttl=118 time=4.74 ms
64 bytes from maa05s13-in-f14.1e100.net (142.250.67.78): icmp_seq=6 ttl=118 time=6.98 ms
64 bytes from tzdela-bf-in-f14.1e100.net (142.250.67.78): icmp_seq=7 ttl=118 time=5.17 ms
64 bytes from tzdela-bf-in-f14.1e100.net (142.250.67.78): icmp_seq=8 ttl=118 time=5.22 ms
64 bytes from maa05s13-in-f14.1e100.net (142.250.67.78): icmp_seq=9 ttl=118 time=5.47 ms
64 bytes from tzdela-bf-in-f14.1e100.net (142.250.67.78): icmp_seq=10 ttl=118 time=4.24 ms
64 bytes from maa05s13-in-f14.1e100.net (142.250.67.78): icmp_seq=11 ttl=118 time=5.44 ms
```

```
64 bytes from bom07s28-in-f14.1e100.net (142.250.182.206): icmp_seq=33 ttl=118 time=7.04 ms
64 bytes from bom07s28-in-f14.1e100.net (142.250.182.206): icmp_seq=34 ttl=118 time=5.33 ms
64 bytes from bom07s28-in-f14.1e100.net (142.250.182.206): icmp_seq=35 ttl=118 time=5.04 ms
64 bytes from tzdelb-au-in-f14.1e100.net (142.250.182.206): icmp_seq=36 ttl=118 time=6.53 ms
64 bytes from bom07s28-in-f14.1e100.net (142.250.182.206): icmp_seq=37 ttl=118 time=5.04 ms
64 bytes from bom07s28-in-f14.1e100.net (142.250.182.206): icmp_seq=38 ttl=118 time=6.41 ms
64 bytes from bom07s28-in-f14.1e100.net (142.250.182.206): icmp_seq=39 ttl=118 time=5.61 ms
64 bytes from tzdelb-au-in-f14.1e100.net (142.250.182.206): icmp_seq=40 ttl=118 time=4.91 ms
64 bytes from tzdelb-au-in-f14.1e100.net (142.250.182.206): icmp_seq=41 ttl=118 time=4.99 ms
64 bytes from bom07s28-in-f14.1e100.net (142.250.182.206): icmp_seq=42 ttl=118 time=5.35 ms
64 bytes from bom07s28-in-f14.1e100.net (142.250.182.206): icmp_seq=43 ttl=118 time=5.02 ms
^Z
[1]+  Stopped                  ping google.com
```

17.ipaddr command

Description:

Show all the network interfaces and their IP address.

When I applied it:

To see my WSL network details & IP.


```
vansh@LAPTOP-ISG7SCM8:~$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet 10.255.255.254/32 brd 10.255.255.255 scope global lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 00:15:5d:fb:20:bd brd ff:ff:ff:ff:ff:ff
    inet 172.18.80.252/20 brd 172.18.95.255 scope global eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::215:5dff:fefb:20bd/64 scope link
        valid_lft forever preferred_lft forever
```

18.netstat -tulnp

Description:

Displays ports that are open /listening on the system.

When I applied it:

To check active TCP/UDP ports.

```
vansh@LAPTOP-ISG7SCM8:~$ netstat -tulnp
Not all processes could be identified, non-owned process info
will not be shown, you would have to be root to see it all.)
Active Internet connections (only servers)

```

Proto	Recv-Q	Send-Q	Local Address	Foreign Address	State	PID/Program name
tcp	0	0	127.0.0.53:53	0.0.0.0:*	LISTEN	-
tcp	0	0	10.255.255.254:53	0.0.0.0:*	LISTEN	-
udp	0	0	127.0.0.53:53	0.0.0.0:*	-	-
udp	0	0	10.255.255.254:53	0.0.0.0:*	-	-
udp	0	0	127.0.0.1:323	0.0.0.0:*	-	-
udp6	0	0	:::1:323	:::*	-	-

19.whoami command

Description:

The whoami command in Linux is used to display the current logged-in user's username.

When I applied it:

I used this command to show my username.

A screenshot of a Linux terminal window with a dark background. The prompt is 'vansh@LAPTOP-1SG7SCM8:~\$'. The user has entered the command 'whoami'. The output of the command is 'vansh', displayed on the line immediately following the command.

```
vansh@LAPTOP-1SG7SCM8:~$ whoami
vansh
```

20.history command

Description:

The history command in Linux shows a list of commands that you previously entered in the terminal.

When I applied it:

I used history| tail command to get the most recent 10 commands I have executed.

```
vansh@LAPTOP-ISG7SCM8:~$ history | tail
74 ps
75 ping google.com
76 q
77 ip addr
78 netstat -tulnp
79 sudo apt install net-tools
80 netstat -tulnp
81 whoami
82 history
83 history | tail
```

2.3 SHELL SCRIPT DEVELOPMENT:

Script1: Backup Script (backup.sh)- This script compresses a directory into a time stamped.tar.gz file.

```
vansh@LAPTOP-ISG7SCM8:~$ cat backup.sh
#!/bin/bash
# Purpose: Backup a directory with timestamp
# Author: vansh
# Date: 2025-11-14

SOURCE="/home/vansh/myfolder"
TARGET="/home/vansh/backup"

TIMESTAMP=$(date +%Y-%m-%d_%H-%M-%S)
mkdir -p "$TARGET"

cp -r "$SOURCE" "$TARGET/backup_$TIMESTAMP"

echo "Backup completed: backup_$TIMESTAMP"
-bash: !/bin/bash: event not found
Backup completed: backup_2025-11-14_20-50-36
```

Script2: CPU and Memory Monitoring (monitor.sh)-This script logs CPU and RAM usage to a log file every few seconds:

```
vansh@LAPTOP-1SG7SCM8:~$ cat system_usage.log
----- CPU and Memory Usage on Fri Nov 14 21:13:24 IST 2025 -----

CPU Usage:

Memory Usage:


|       | total | used  | free  | shared | buff/cache | available |
|-------|-------|-------|-------|--------|------------|-----------|
| Mem:  | 3.7Gi | 323Mi | 3.1Gi | 3.0Mi  | 275Mi      | 3.3Gi     |
| Swap: | 1.0Gi | 0B    | 1.0Gi |        |            |           |


```

Script3: Automated File Downloader

(download.sh) -This script automatically downloads a file from internet and stores into Download folder.

```
vansh@LAPTOP-1SG7SCM8:~$ #!/bin/bash
# Purpose: Download a file using wget
# Author: vansh
# Date: 2025-11-14

URL="https://filesamples.com/samples/document/pdf/sample1.pdf"
DEST="/home/vansh/downloads"

mkdir -p "$DEST"

wget "$URL" -P "$DEST"

echo "Download completed and saved in $DEST"
--2025-11-14 21:17:23-- https://filesamples.com/samples/document/pdf/sample1.pdf
Resolving filesamples.com (filesamples.com)... 104.21.17.252, 172.67.178.244, 2606:4700:3035::ac43:b2f4, ...
Connecting to filesamples.com (filesamples.com)[104.21.17.252]:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [application/pdf]
Saving to: '/home/vansh/downloads/sample1.pdf'

sample1.pdf                               [ <=> ] 567.78K --.-KB/s  in 0.02s

2025-11-14 21:17:23 (26.4 MB/s) - '/home/vansh/downloads/sample1.pdf' saved [581407]

Download completed and saved in /home/vansh/downloads
```