



K.R MANGALAM UNIVERSITY, Gurugram

THE COMPLETE WORLD OF EDUCATION

 Basic of Linux & open source tool

SCHOOL OF ENGINEERING AND TECHNOLOGY

SUBMITTED BY: VANSH AHUJA

COURSE: B.tech CSE

ROLL NO:2501010247

SEMESTER: 1st

COURSE NAME: Computer Science Fundamentals &
Carrer Pathways

COURSE CODE: ETCCCP105

FACULATY: MR. RAJESH SIR

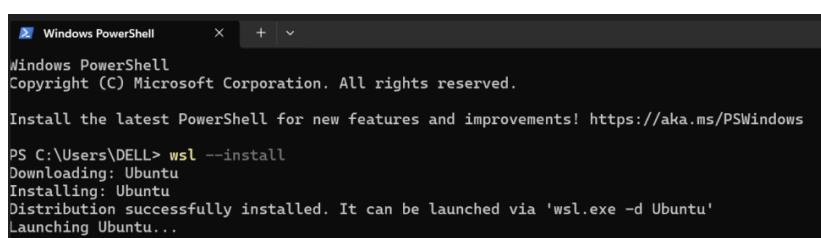
2.1) LINUX INSTALLATION

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

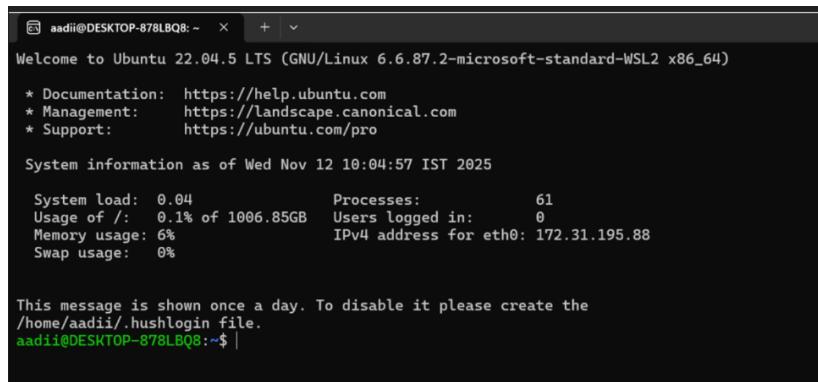
PS C:\Users\DELL> wsl --install
Downloading: Ubuntu
Installing: Ubuntu
Distribution successfully installed. It can be launched via 'wsl.exe -d Ubuntu'
Launching Ubuntu...
```

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

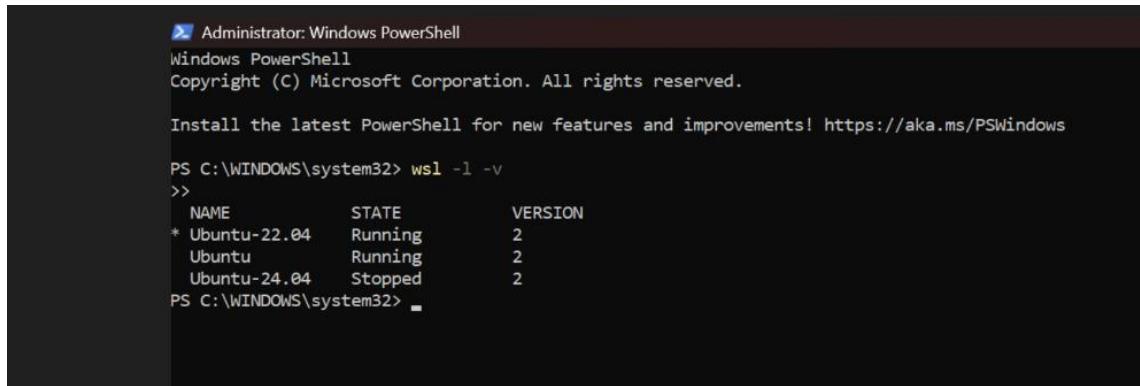
System information as of Wed Nov 12 10:04:57 IST 2025

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:*

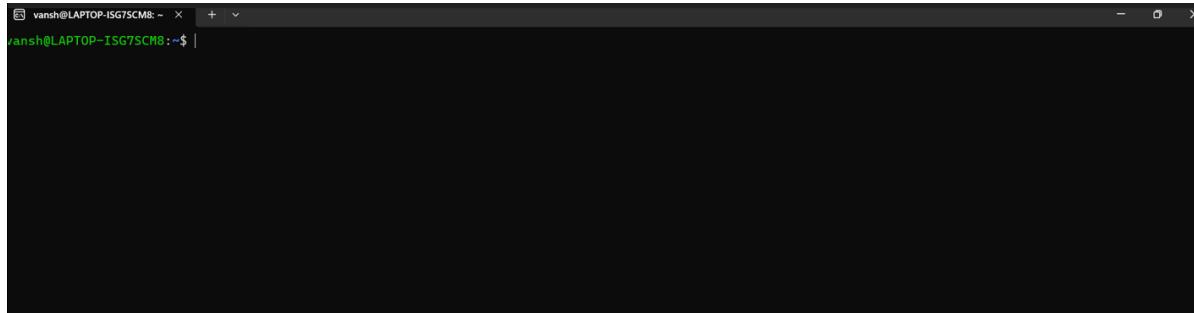
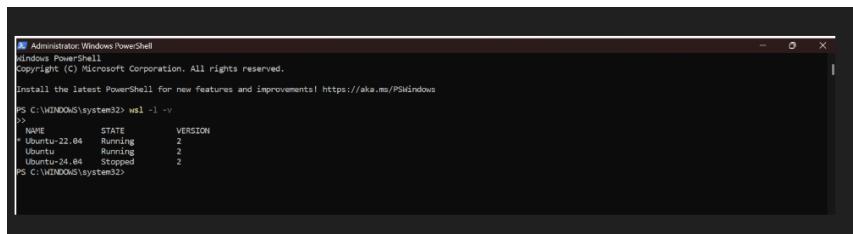
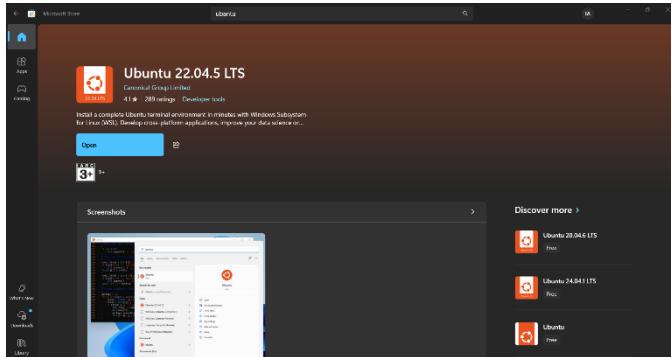
Component	Specification
System Manufacturer	HP
System Model	HP Laptop 15s-du3xxx
Processor (CPU)	11 th Gen Intel® Core™ i3-1115G4@3.00GHz (4CPUs)
Installed Ram	8.00GB
System Type	64-bit operating system, x64-based processor
Graphic Card	Intel® UHD Graphic
Storage	1.14TB
Disk Allocated for Ubuntu (WSL)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



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-ISG7SCM8:~$ cd  
vansh@LAPTOP-ISG7SCM8:~$ pwd  
/home/vansh  
vansh@LAPTOP-ISG7SCM8:~$
```

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-ISG75CMB:~$ 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 lists the contents of a directory with exactly one file or directory per line.

```
vansh@LAPTOP-ISG75CMB:~$ ls -1  
demo  
demofolder  
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.



```
vanshi@LAPTOP-ISG7SCHB:~$ tree
└── demo
    └── file1.txt
└── demofolder
└── folder
└── testfolder
    └── txt
5 directories, 1 file
```

5.cd folder frame

Description:

When I applied it:

```
vansh@LAPTOP-ISG7SCM8:~$ 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.

```
vansh@LAPTOP-ISG7SCM8:~$ 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-ISG7SCWB:~$ 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-ISG7SCWB:~$ 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-ISG7SCM0:~$ 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.

```
vansh@LAPTOP-ISG7SCM8:~$ ps
  PID TTY      TIME CMD
 536 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-ISG7SCM8:~$ top
top - 20:14:28 up 1:17, 1 user,  load average: 0.00, 0.00, 0.00
Tasks: 25 total, 0 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
Mem: 3789.2 total, 3354.4 free, 331.6 used, 183.2 buff/cache
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  8848 S  0.0  0.3  0:01,14 systemd
  2 root      20   0  3872  1792  1664 S  0.0  0.0  0:00,00 init-systemd[Ub
  7 root      20   0  3688  2824  1928 S  0.0  0.1  0:00,00 init
 61 root     19  -1 47820 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-ISG7SCM8:~$ kill 1478
-bash: kill: (1478) - No such process
vansh@LAPTOP-ISG7SCM8:~$ 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-ISG7SCMB:~$ 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 maa05s13-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
```

```
^C
64 bytes from bom07s28-in-f14.1e100.net (142.250.182.206): icmp_seq=33 ttl=118 time=7.34 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 10.255.255.254 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
cp      0      0 127.0.0.53:53           0.0.0.0:*          LISTEN     -
cp      0      0 10.255.255.254:53       0.0.0.0:*          LISTEN     -
dp      0      0 127.0.0.53:53           0.0.0.0:*          LISTEN     -
dp      0      0 10.255.255.254:53       0.0.0.0:*          LISTEN     -
dp      0      0 127.0.0.1:323          0.0.0.0:*          LISTEN     -
dp6     0      0 ::1:323                 ::*:*              LISTEN     -
```

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.



```
vansh@LAPTOP-ISG7SCMB:~$ whoami
vansh
```

A screenshot of a terminal window. The background is dark. At the top, there is a light-colored header bar. In the header bar, the text "vansh@LAPTOP-ISG7SCMB:~\$" is displayed in green, followed by a black "\$" symbol. Below the header bar, the main terminal area is dark. In the center of the terminal, the command "whoami" is typed in white, followed by its output "vansh" in white. There is a small vertical cursor at the end of the line.

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:~$ *#!/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-ISG7SCM8:~$ 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-ISG7SCM8:~$ #!/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
```