

# Parul University

## Faculty of Engineering & Technology

### BACHELOR OF TECHNOLOGY

#### **High Performance Computing (303105356)**

3<sup>rd</sup> Year / 6<sup>th</sup> Semester

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

## Laboratory Manual

**Submitted by :**

Name : Prince kumar  
Enroll. No. : 2303051240166  
Division : 6B2\_AI  
Roll No. : 26

**Submitted to :**

Mrs. Kusum Lata

# CERTIFICATE

*This is to certify that*

*Mr./Ms. \_\_\_\_\_ Prince kumar \_\_\_\_\_ with*

*Enrollment no. 2303051240166 has successfully completed*

*his/her laboratory practical in the High Performance*

*Computing (303105356) from the Department of*

*Computer Science & Engineering during the academic*

*year 2025 - 26*



Date of Submission

Staff In charge

Head of Department

## INDEX

Subject Code: 303105356

Class: 3<sup>rd</sup> Year / 6<sup>th</sup> Sem

Subject : High Performance Computing

Academic Year: 2025 - 2026

S.No.	Practical Title	Page No.		Date of Perf.	Date of Sub.	Marks	Sign
		From	To				
01.	Study the facilities provided by Google Colab.						
02.	Demonstrate basic Linux Commands.						
03.	Using Divide and Conquer Strategies design a class for Concurrent Quick Sort using C++.						
04.	Demonstrate MPI functions through a simple program.						
05.	Write a program to check task distribution using Gprof.						
06.	Write a simple CUDA program to print “Hello World!”						
07.	Write a simple CUDA program to add two numbers.						
08.	Write a CUDA program to add two arrays.						
09.	Analyze the code using Nvidia-Profilers.						
10.	Demonstration of OpenMP and pthread functions.						

## Practical 2

### Aim : Demonstrate basic Linux Commands.

**Overview :** This practical focuses on introducing fundamental Linux commands essential for navigating and managing a Linux-based operating system using Command Line Interface(CLI). We will learn how to use terminal commands for file manipulation, directory navigation, system monitoring, and user management. Key topics include creating, moving, and deleting files and directories, understanding file permissions.

### Commands :

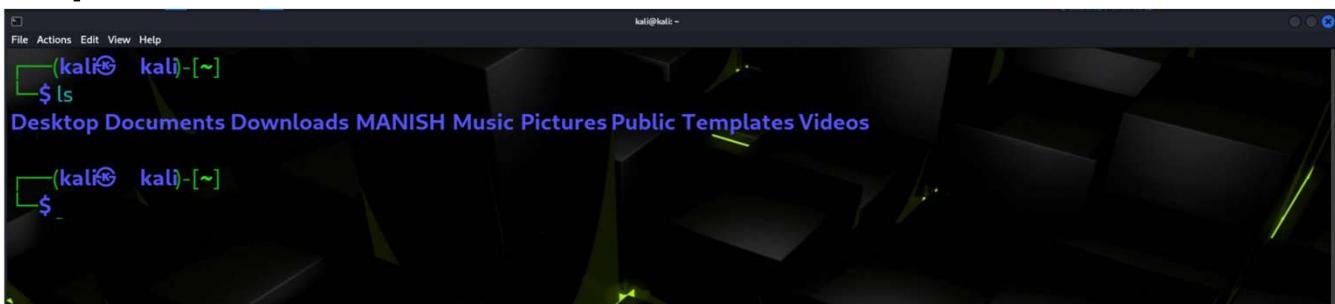
#### **1.ls**

Lists files and directories in the current directory.

#### **Syntax :**

ls

#### **Output :**



The screenshot shows a terminal window with a dark background and green text. The prompt is '(kali㉿ kali) [~]'. The user types '\$ ls' and presses Enter. The terminal then lists several directories and files in blue text: Desktop, Documents, Downloads, MANISH, Music, Pictures, Public, Templates, and Videos. Below the list, there is another blank line starting with '\$'.

## Practical 2

### **2. pwd**

Prints the working directory (shows the current directory path)

**Syntax :**

`pwd`

**Output:**



```
(kali㉿ kali) [~]
$ pwd
/home/kali

(kali㉿ kali) [~]
$
```

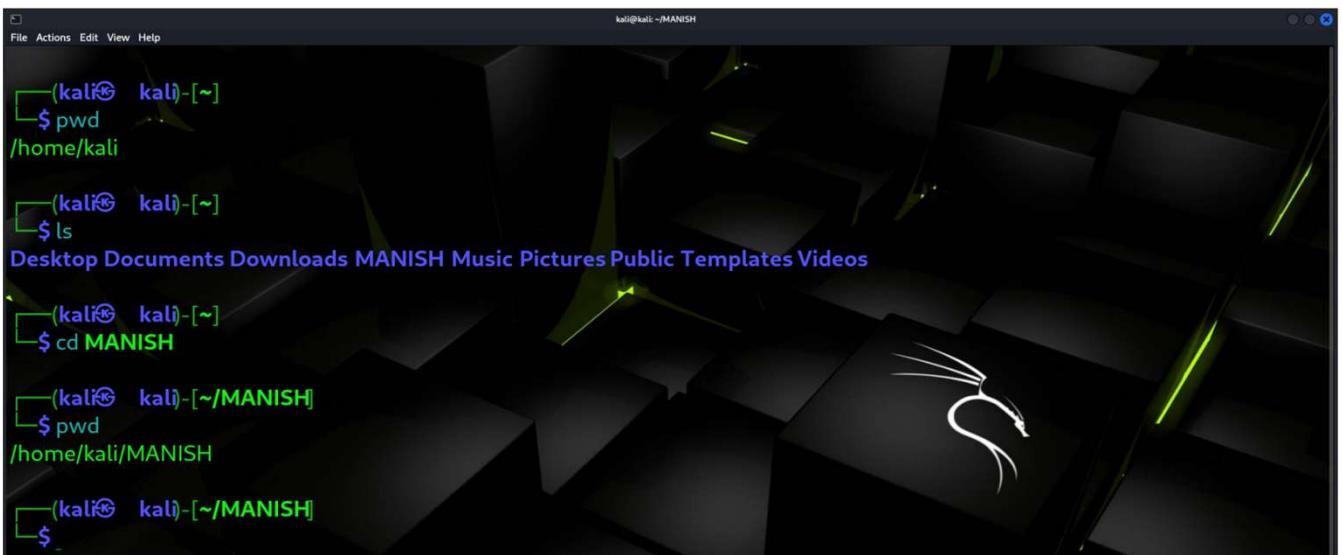
### **3. cd**

Changes the current directory.

**Syntax :**

`cd "directory_name"`

**Output:**



```
(kali㉿ kali) [~]
$ pwd
/home/kali

(kali㉿ kali) [~]
$ ls
Desktop Documents Downloads MANISH Music Pictures Public Templates Videos

(kali㉿ kali) [~]
$ cd MANISH
(kali㉿ kali) [~/MANISH]
$ pwd
/home/kali/MANISH

(kali㉿ kali) [~/MANISH]
$
```

## Practical 2

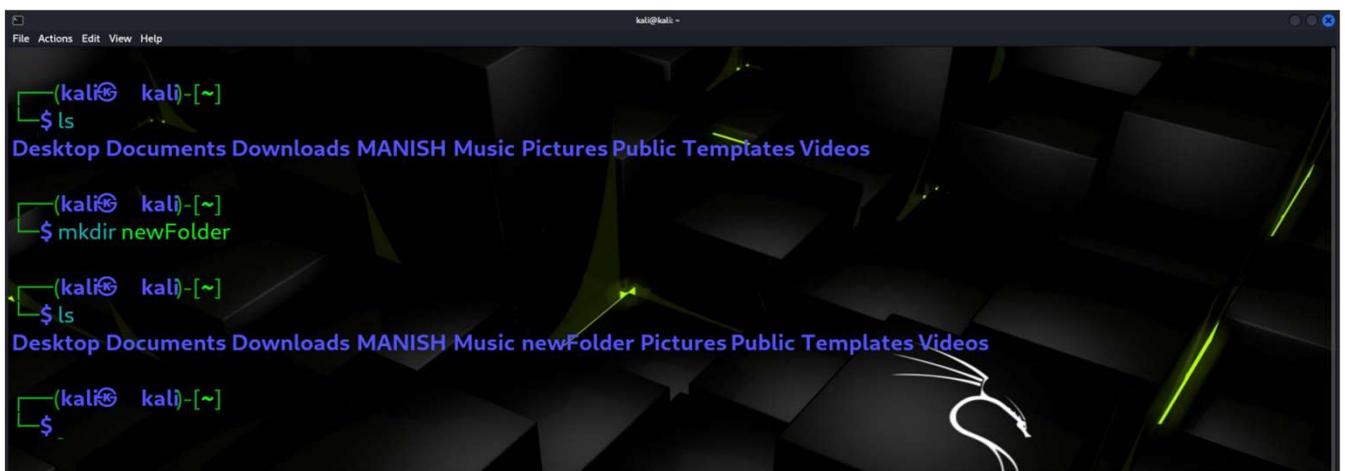
### 4. **mkdir**

Creates a new directory.

**Syntax :**

**mkdir “directory\_name”**

**Output:**



```
(kali㉿ kali) [~]
$ ls
Desktop Documents Downloads MANISH Music Pictures Public Templates Videos
(kali㉿ kali) [~]
$ mkdir newFolder
(kali㉿ kali) [~]
$ ls
Desktop Documents Downloads MANISH Music newFolder Pictures Public Templates Videos
(kali㉿ kali) [~]
$
```

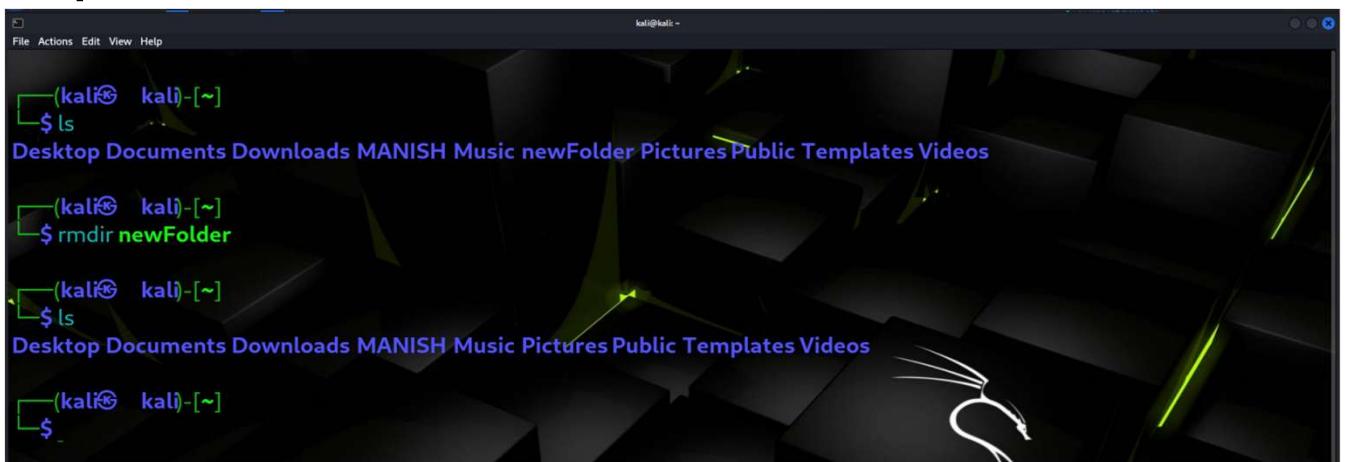
### 5. **rmdir**

Removes a directory.

**Syntax :**

**rmdir “directory\_name”**

**Output:**



```
(kali㉿ kali) [~]
$ ls
Desktop Documents Downloads MANISH Music newFolder Pictures Public Templates Videos
(kali㉿ kali) [~]
$ rmdir newFolder
(kali㉿ kali) [~]
$ ls
Desktop Documents Downloads MANISH Music Pictures Public Templates Videos
(kali㉿ kali) [~]
$
```

## Practical 2

### 6. ls -l

Used to list the contents of a directory in long format, providing detailed information.

**Syntax :**

```
ls -l
```

**Output:**

```
(kali㉿ kali) [~]
$ ls -l
total 36
drwxr-xr-x 2 kali kali 4096 Nov 27 03:30 Desktop
drwxr-xr-x 2 kali kali 4096 Nov 27 03:30 Documents
drwxr-xr-x 2 kali kali 4096 Nov 27 03:30 Downloads
drwxrwxr-x 3 kali kali 4096 Nov 27 03:40 MANISH
drwxr-xr-x 2 kali kali 4096 Nov 27 03:30 Music
drwxr-xr-x 2 kali kali 4096 Nov 27 03:37 Pictures
drwxr-xr-x 2 kali kali 4096 Nov 27 03:30 Public
drwxr-xr-x 2 kali kali 4096 Nov 27 03:30 Templates
drwxr-xr-x 2 kali kali 4096 Nov 27 03:30 Videos

(kali㉿ kali) [~]
$
```

### 7. touch

Creates an empty file or updates the timestamp of an existing file.

**Syntax :**

```
touch filename.txt
```

**Output:**

```
(kali㉿ kali) [~/MANISH]
$ touch demo.txt

(kali㉿ kali) [~/MANISH]
$ ls
demo.txt Lab1

(kali㉿ kali) [~/MANISH]
$
```

## Practical 2

### 8. cat

Concatenates and displays the content of a file.

#### Syntax :

cat>> filename.txt {To create a file with data}  
cat fileName.txt {To display data of file }

#### Output:



The screenshot shows a terminal window titled "kali@kali:~\$". The user has navigated to the "/MANISH" directory. They run the command "cat>> demo.txt", which creates a file named "demo.txt" containing the text "This is a demo text file". After pressing Ctrl-Z to suspend the process, they run "cat demo.txt" again, which displays the same text. The terminal interface includes a dark background with a white cat logo.

```
(kali㉿kali)-[~]
$ ls
Desktop Documents Downloads MANISH Music Pictures Public Templates Videos
(kali㉿kali)-[~]
$ cd MANISH
(kali㉿kali)-[~/MANISH]
$ cat>> demo.txt
This is a demo text file
Demo texts is in demo file
^Z
zsh: suspended  cat >> demo.txt
(kali㉿kali)-[~/MANISH]
$ cat demo.txt
This is a demo text file
Demo texts is in demo file
```

### 9. cd

Returns to the root directory

#### Syntax :

cd

#### Output:



The screenshot shows a terminal window titled "kali@kali:~\$". The user has navigated to the "/MANISH" directory. They then run "cd", which returns them to the root directory. They then run "pwd" to print the current working directory, which is "/home/kali". The terminal interface includes a dark background with a white cat logo.

```
(kali㉿kali)-[~]
$ cd MANISH
(kali㉿kali)-[~/MANISH]
$ cd
(kali㉿kali)-[~]
$ pwd
/home/kali
```

## Practical 2

### **10. cp**

Copies data from one file to another file.

**Syntax :**

`cp oldFile.txt newFile.txt`

**Output:**



```
(kali㉿kali)-[~/MANISH]
$ ls
demo.txt  new.txt  old.txt

(kali㉿kali)-[~/MANISH]
$ cat>> old.txt
This text is in old file.
^Z
zsh: suspended  cat >> old.txt

(kali㉿kali)-[~/MANISH]
$ cp old.txt new.txt

(kali㉿kali)-[~/MANISH]
$ cat new.txt
This text is in old file.
```

### **11. mv**

Moves data from one file to another file.

**Syntax :**

`mv oldFile.txt newFile.txt`

**Output:**



```
(kali㉿kali)-[~/MANISH]
$ ls
demo.txt  new.txt  old.txt

(kali㉿kali)-[~/MANISH]
$ mv old.txt new.txt

(kali㉿kali)-[~/MANISH]
$ cat old.txt
cat: old.txt: No such file or directory

(kali㉿kali)-[~/MANISH]
$ cat new.txt
This text is in old file.
```

## Practical 2

### **12. rm**

Removes files or directories.

**Syntax :**

`rm file1.txt`

**Output:**



```
kali㉿kali:[~/MANISH]
$ ls
demo.txt new.txt

(kali㉿kali:[~/MANISH]
$ rm demo.txt

(kali㉿kali:[~/MANISH]
$ ls
new.txt
```

### **13.ps**

Displays information about running processes.

**Syntax :**

`ps`

**Output:**



```
kali㉿kali:[~/MANISH]
$ ps
 PID TTY          TIME CMD
 6618 pts/0    00:00:03 zsh
 10453 pts/0    00:00:00 cat
 12860 pts/0    00:00:00 cat
 14936 pts/0    00:00:00 ps

(kali㉿kali:[~/MANISH]
$
```

## Practical 2

### **14. who**

Displays who is logged into the system.

**Syntax :**

**who**

**Output:**



```
kali㉿kali:[~/MANISH]
$ who
kali    tty7          2024-12-10 09:57 (:0)

(kali㉿kali:[~/MANISH]
$ █
```

### **15.date**

Displays or sets the system date and time.

**Syntax :**

**date**

**Output:**



```
kali㉿kali:[~/MANISH]
$ date
Tue Dec 10 10:23:59 AM EST 2024

(kali㉿kali:[~/MANISH]
$ █
```

## Practical 2

### 16. whoami

Used to display the current username.

**Syntax :**

whoami

**Output:**



```
(kali㉿kali)-[~/MANISH]$ whoami
kali
(kali㉿kali)-[~/MANISH]$
```

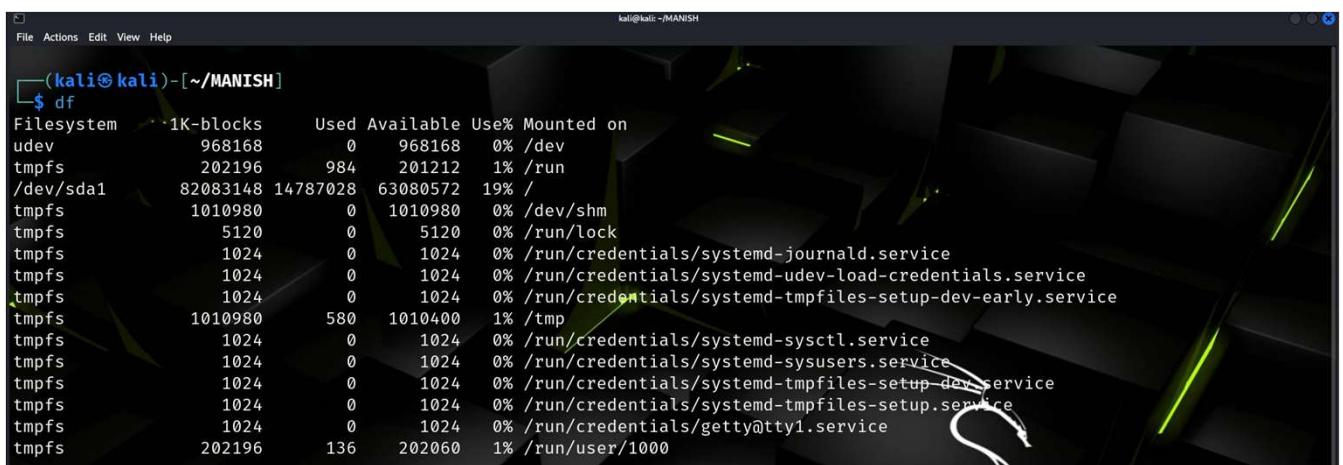
### 17. df

Gets the details of the File System

**Syntax :**

df

**Output:**



```
(kali㉿kali)-[~/MANISH]$ df
Filesystem      1K-blocks    Used Available Use% Mounted on
udev             968168      0   968168  0% /dev
tmpfs            202196    984   201212  1% /run
/dev/sda1       82083148 14787028  63080572 19% /
tmpfs           1010980      0  1010980  0% /dev/shm
tmpfs            5120        0   5120  0% /run/lock
tmpfs            1024        0   1024  0% /run/credentials/systemd-journald.service
tmpfs            1024        0   1024  0% /run/credentials/systemd-udev-load-credentials.service
tmpfs            1024        0   1024  0% /run/credentials/systemd-tmpfiles-setup-dev-early.service
tmpfs           1010980     580  1010400  1% /tmp
tmpfs            1024        0   1024  0% /run/credentials/systemd-sysctl.service
tmpfs            1024        0   1024  0% /run/credentials/systemd-sysusers.service
tmpfs            1024        0   1024  0% /run/credentials/systemd-tmpfiles-setup-dev.service
tmpfs            1024        0   1024  0% /run/credentials/systemd-tmpfiles-setup.service
tmpfs            1024        0   1024  0% /run/credentials/getty@tty1.service
tmpfs            202196     136  202060  1% /run/user/1000
```

## Practical 2

### **18. echo**

Displays a message or the value of a variable.

**Syntax :**

echo “Message to print.”

**Output:**



A screenshot of a terminal window titled "kali@kali:~/MANISH". The window has a dark background with a green and black geometric pattern. The terminal prompt "(kali㉿kali)-[~/MANISH]" is visible. The user types the command "\$ echo Hello World!" and presses Enter. The output "Hello World!" is displayed below the command. The cursor is shown as a small white square at the end of the command line.

```
(kali㉿kali)-[~/MANISH]
$ echo Hello World!
Hello World!
(kali㉿kali)-[~/MANISH]
```

### **19. time**

Displays the current time

**Syntax :**

time

**Output:**



A screenshot of a terminal window titled "kali@kali:~/MANISH". The window has a dark background with a green and black geometric pattern. The terminal prompt "(kali㉿kali)-[~/MANISH]" is visible. The user types the command "\$ time" and presses Enter. The output shows two sets of performance metrics. The first set is for a command that took 1437.87 seconds real time, 2.10 seconds user time, 2.21 seconds system time, and 0% CPU usage. The second set is for another command that took 1437.87 seconds real time, 0.79 seconds user time, 0.37 seconds system time, and 0% CPU usage. The cursor is shown as a small white square at the end of the command line.

```
(kali㉿kali)-[~/MANISH]
$ time
real    1437.87s
user     2.10s
sys      2.21s
cpu      0%
real    1437.87s
user     0.79s
sys      0.37s
cpu      0%
(kali㉿kali)-[~/MANISH]
```

## Practical 2

### **20. cal**

Displays a calendar(current month).

**Syntax :**

cal

**Output:**



```
(kali㉿kali)-[~/MANISH]
$ cal
December 2024
Su Mo Tu We Th Fr Sa
 1  2  3  4  5  6  7
 8  9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

(kali㉿kali)-[~/MANISH]
$
```

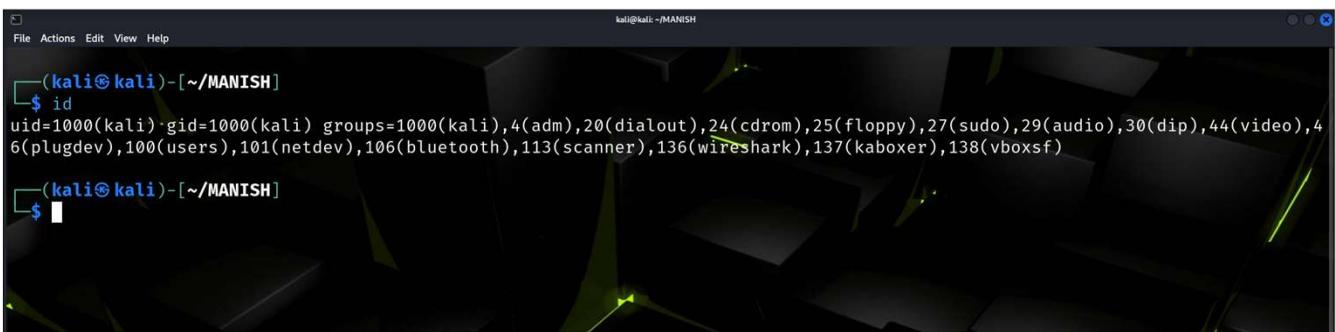
### **21. id**

Displays User ID ( UID ) and Group ID ( GID )

**Syntax :**

id

**Output:**



```
(kali㉿kali)-[~/MANISH]
$ id
uid=1000(kali) gid=1000(kali) groups=1000(kali),4(adm),20(dialout),24(cdrom),25(floppy),27(sudo),29(audio),30(dip),44(video),46(plugdev),100(users),101(netdev),106(bluetooth),113(scanner),136(wireshark),137(kaboxer),138(vboxsf)

(kali㉿kali)-[~/MANISH]
$
```