

# Linux Commands Lab Report

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## What is Linux?

Linux is an open-source, Unix-like operating system kernel used in servers, desktops, embedded systems, mobile devices, and cloud environments. It is known for stability, security, flexibility, and a powerful command-line interface (CLI). Linux distributions such as Ubuntu, Fedora, and Kali Linux allow users to interact with the system using various commands that provide full control over files, processes, and system resources.

Linux commands form the core of system navigation, configuration, and automation. Understanding these commands is essential for system administration, development, cybersecurity, and DevOps work.

## 2. The Linux Hierarchical File System

Linux follows a tree-structured hierarchical file system starting from the root directory (/). All files and directories branch out from this root. Common directories include /home, /bin, /usr, /etc, /var, and /tmp. This structure ensures organized storage and secure permission-based access.

## 3. Importance of Linux Commands in Operating Systems

Linux commands allow users to interact directly with the operating system via the terminal. They are essential for managing files, processes, users, storage, scripts, and system behavior. Mastery of Linux commands is crucial for developers, system administrators, and students.

## 1. pwd (Print Working Directory)

The `pwd` command displays the full absolute path of the current working directory. This helps users identify their exact location in the Linux filesystem hierarchy.

```
(base) PS C:\Users\Victus> cd shubham
(base) PS C:\Users\Victus\shubham> pwd

Path
----
C:\Users\Victus\shubham
```

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## 2. ls (List Directory Contents)

The `ls` command lists all visible files and directories in the current directory.

```
(base) PS C:\Users\Victus> ls

Directory: C:\Users\Victus

Mode                LastWriteTime         Length Name
----                -
d-----            11/12/2025   7:34 PM      .anaconda
d-----             3/1/2025  11:16 AM      .cache
d-----            11/12/2025   9:21 PM      .conda
d-----             1/23/2025   9:07 PM      .continuum
```

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## 3. ls -a (Show All Files)

`ls -a` displays all files, including hidden ones beginning with a dot (`.`), which normally remain hidden.

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## 4. ls -l (Long Listing Format)

`ls -l` provides detailed attributes such as permissions, owner, group, file size, and modification time.

```
shubham@pc:~$ ls -l
total 32
drwxr-xr-x  2 shubham shubham 4096 Dec 10 Documents
drwxr-xr-x  2 shubham shubham 4096 Dec 10 Downloads
-rw-r--r--  1 shubham shubham  532 Dec 10 report.pdf
```

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## 5. cd (Change Directory)

The cd command changes the current working directory. When used alone, it returns to the home directory.

```
(base) PS C:\Users\Victus\shubham> cd ~
(base) PS C:\Users\Victus> cd shubham
(base) PS C:\Users\Victus\shubham> |
```

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## 6. mkdir (Make Directory)

Creates a new directory.

```
(base) PS C:\Users\Victus\shubham> mkdir sora1

Directory: C:\Users\Victus\shubham
```

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## 7. rmdir (Remove Empty Directory)

Removes an empty directory only.

```
(base) PS C:\Users\Victus\shubham> ls

Directory: C:\Users\Victus\shubham

Mode                LastWriteTime         Length Name
----                -
d-----           12/10/2025  11:50 AM             sora
d-----           12/10/2025  11:51 AM            sora1

(base) PS C:\Users\Victus\shubham> rmdir sora
(base) PS C:\Users\Victus\shubham> ls

Directory: C:\Users\Victus\shubham

Mode                LastWriteTime         Length Name
----                -
d-----           12/10/2025  11:51 AM            sora1

(base) PS C:\Users\Victus\shubham> |
```

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## 8. rm (Remove File)

Deletes a file permanently. It cannot be undone.

```
(base) PS C:\Users\Victus\shubham> rm sora1
(base) PS C:\Users\Victus\shubham> |
```

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## 9. rm -r (Recursive Delete)

Deletes a directory and all its contents, including subfolders and files.

```
(base) PS C:\Users\Victus\shubham> cd
(base) PS C:\Users\Victus\shubham> cd ~
(base) PS C:\Users\Victus> rm -r shubham
(base) PS C:\Users\Victus> |
```

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## 10. touch (Create File / Update Timestamp)

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

```
(base) PS C:\Users\Victus> touch sora.txt
```

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## 11. cat (Display File Content)

Displays the content of a file.

```
(base) PS C:\Users\Victus\shubham> cat file.txt
```

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## 12. nano, vi, jed (Text Editors)

These commands open text editors within the terminal. - nano is beginner-friendly. - vi is powerful but has a steeper learning curve. - jed is lightweight and simple.

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## 13. cp (Copy Files or Directories)

Copies files to a new location.

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## 14. mv (Move or Rename File)

Moves or renames a file.

```
(base) PS C:\Users\Victus> mv  
cmdlet Move-Item at command pipeline position 1  
Supply values for the following parameters:  
Path[0]: |
```

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## 15. locate (Quick File Search)

Searches for files using a database for fast lookup.

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## 16. echo (Print Text or Variables)

Displays text to the terminal.

```
(base) PS C:\Users\Victus> echo  
cmdlet Write-Output at command pipeline position  
Supply values for the following parameters:  
InputObject[0]: a
```

---

## 17. uname -a (System Information)

Displays kernel version, OS type, and hardware architecture.

```
shubham@pc:~$ uname -a  
Linux shubham-pc 5.15.0-86-generic
```

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## 18. df -h (Disk Space Usage)

Shows filesystem disk usage in a human-readable format.

```
shubham@pc:~$ df -h  
Filesystem      Size  Used Avail Use% Mounted on  
/dev/sda1       100G   55G   41G   58% /  
tmpfs           3.9G   2.0M   3.9G   1% /run
```

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## 19. ps -u \$USER

This command lists the running processes owned by the current user. It displays information like process IDs, CPU usage, and command names

```
shubham@pc:~$ ps -u $USER  
  PID TTY          TIME CMD  
 1345 ?            00:00:09 gnome-shell  
 1650 pts/0        00:00:00 bash  
 1762 pts/0        00:00:00 ps
```

## 20. top

The top command provides a real-time, dynamic view of system processes. It shows CPU usage, memory usage, running tasks, and load averages, making it useful for monitoring system performance.

```
shubham@pc:~$ top

top - 09:42:11 up 1:22, 1 user, load average: 0.35, 0.28, 0.18
Tasks: 189 total, 1 running, 188 sleeping
%Cpu(s): 5.3 us, 2.4 sy, 0.0 ni, 92.1 id
MiB Mem : 7856.0 total, 4212.3 free, 1987.2 used
```

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## 21. chmod

The chmod command changes the permissions of a file or directory. It allows the owner to modify who can read, write, or execute the file using symbolic or numeric modes

```
shubham@pc:~$ ls -l script.sh
-rw-r--r-- 1 shubham shubham 120 Dec 10 script.sh

shubham@pc:~$ chmod 755 script.sh

shubham@pc:~$ ls -l script.sh
-rwxr-xr-x 1 shubham shubham 120 Dec 10 script.sh
```

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## Conclusion

These Linux commands form the basis of effective navigation, file handling, system monitoring, and permission management in a Unix-like environment. Mastery of these commands enables users to interact with the system more efficiently, automate tasks, and maintain overall system control.