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Department of Computer Science and Engineering

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Lab Report: 01
COMP 307

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1. Introduction

1.1 What is Linux?

Linux is an open-source operating system based on UNIX. It is known for its stability, security, and flexibility, making it widely used in servers, networking, cloud computing, and software development. Being open-source, Linux allows users to view, modify, and distribute the source code freely.

1.2 The Linux Hierarchical File System

Linux uses a tree-like directory structure. The top-most directory, called the root directory (/), contains essential system directories such as /home, /etc, /bin, and /usr. Users typically work within their own directories under /home/username, which ensures organized file management and separation between system files and user data.

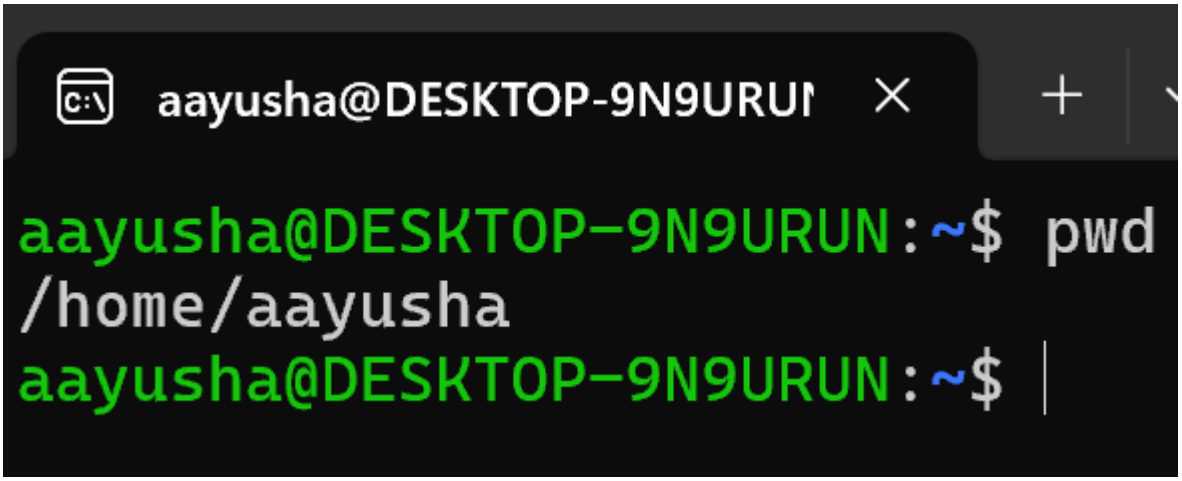
1.3 Importance of Linux Commands

Linux commands provide a powerful interface for controlling and managing the system efficiently. They allow users to navigate directories, manage files and folders, monitor processes, and perform system administration tasks. Mastery of these commands is essential for working effectively in a Linux environment, whether for development, administration, or troubleshooting.

2. Linux Commands

2.1 Command: pwd

The *pwd* command in Linux stands for “print working directory”. Its primary function is to display the absolute path of the current directory within which we are currently operating. This helps users understand their location within the file system hierarchy..
For example: /home/aayusha/Documents
It’s useful when navigating through multiple folders.
Output:
/home/aayusha

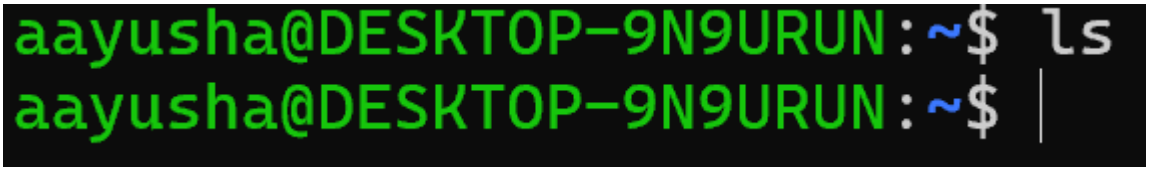


2.2 Command: ls

This command is used to list all the files and directories in the current working directory. In this case, when the command was executed in the root directory (/root), nothing was displayed because the directory is currently empty. This simply means there are no visible files or folders present in that directory. The command only shows non-hidden files, so any files starting with '.' will not appear. This helps the user quickly check which files and folders are available without showing system or hidden configuration files. Thus, an empty output from *ls* is normal in a directory with no files.

Output:

No files or directories in /root, so nothing is shown

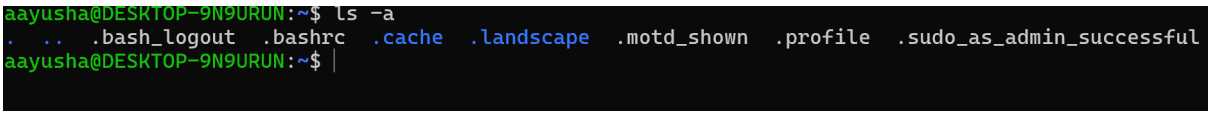


2.3 Command: ls -a

The *ls -a* command lists all files in the directory, including hidden files that start with a dot (.). Even if a directory appears empty with *ls*, *ls -a* will show hidden files like *.bashrc* or *.profile*. In this example, running *ls -a* in /root showed the special entries . (current directory) and .. (parent directory), along with any hidden configuration files. Hidden files are usually system or environment configuration files. This command is useful to check for any hidden files that may not be visible with a simple ls. If there are no hidden files other than . and .., the directory is truly empty.

Output:

. .. .bashrc Documents file.txt



2.4 Command: ls -l

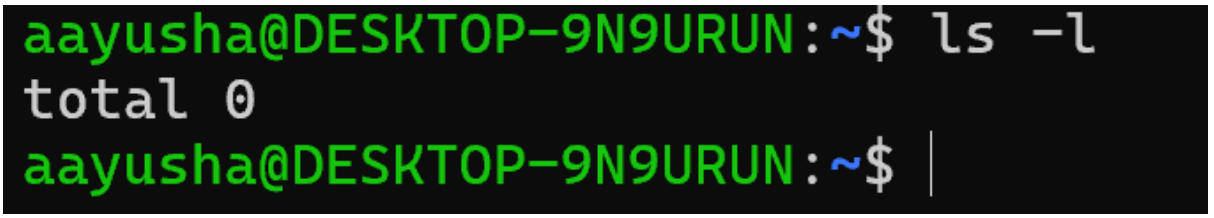
The *ls -l* command displays files and directories in long listing format with detailed information, including:

• Permissions (read/write/execute)
• Owner and group
• File size
• Last modified date and time
• Name of the file or directory

Since the /root directory is empty, there are no files or folders to display. Even though the output is empty, running this command is useful in other directories to check the properties and metadata of files. It is a more informative way to view files compared to a simple *ls*, especially for managing permissions and ownership.

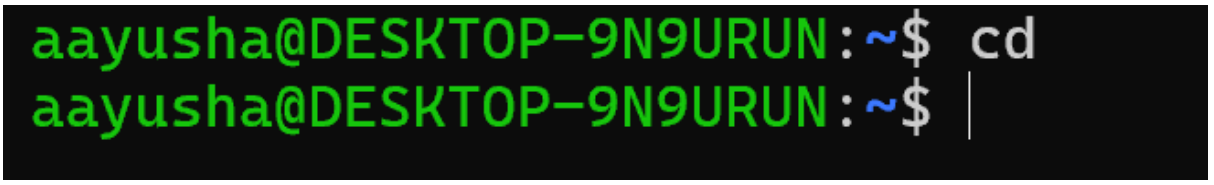
Output:

Total:0



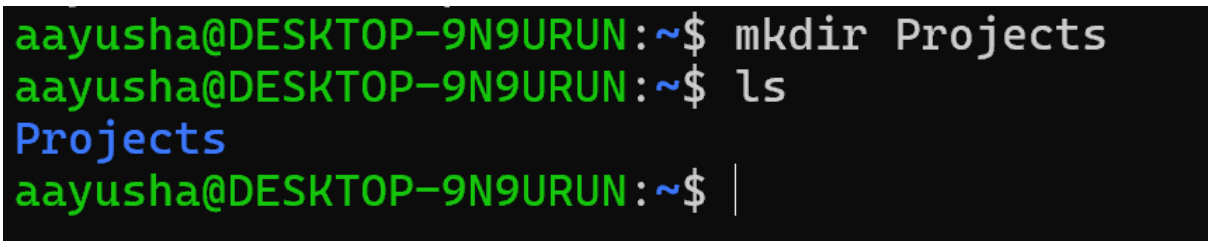
2.5 Command: cd

The *cd* command allows you to move between directories.
• cd .. → moves one level up in the directory tree.
• cd /path/to/folder → moves directly to a specific folder.
• cd without any arguments → takes you to your home directory.
It helps in navigating the file system efficiently. Here, represents the home directory of the current user (in this case, root). This is a quick way to return to the home directory from anywhere in the file system. The command does not produce any output; it only changes the current directory.



2.6 Command: mkdir

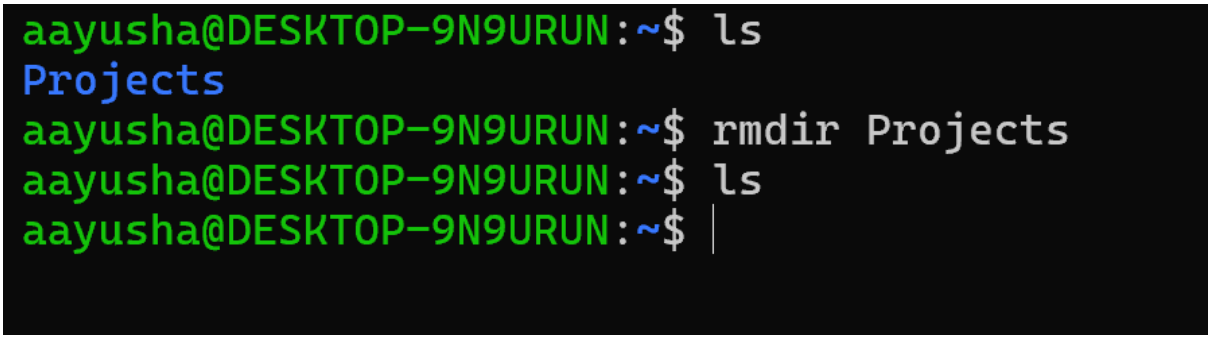
The *mkdir* command is used to create a new directory in the current working directory. Example: *mkdir Projects* creates a folder named Projects immediately in the current directory. To create nested directories in one command, you can use: *mkdir -p folder1/folder2*. The command does not show any output when successful, it silently creates the directory. To verify that the directory was created, you can run *ls* or *ls -l* in the same location.
ls will list the directory name: Projects



2.7 Command: rmdir

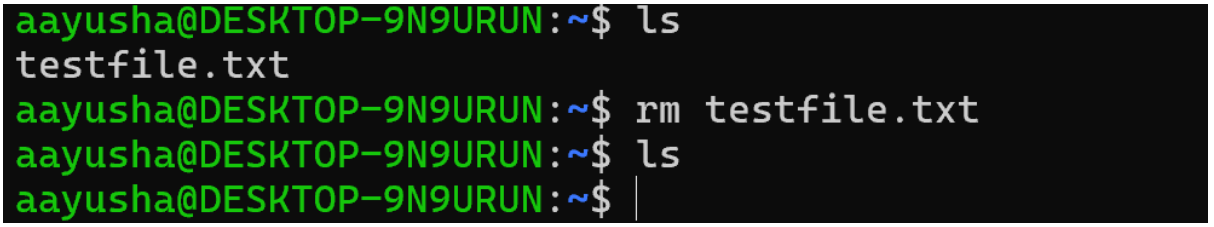
The *rmdir* command deletes an empty directory. It cannot delete directories that contain files; attempting to do so will produce an error. Only directories with no contents can be

removed using this command. It is useful for cleaning up unnecessary empty folders. Example: *rmdir Projects* deletes the Projects folder if it is empty. If successful, there is no output, if the directory contains files, an error is displayed.



2.8 Command: rm

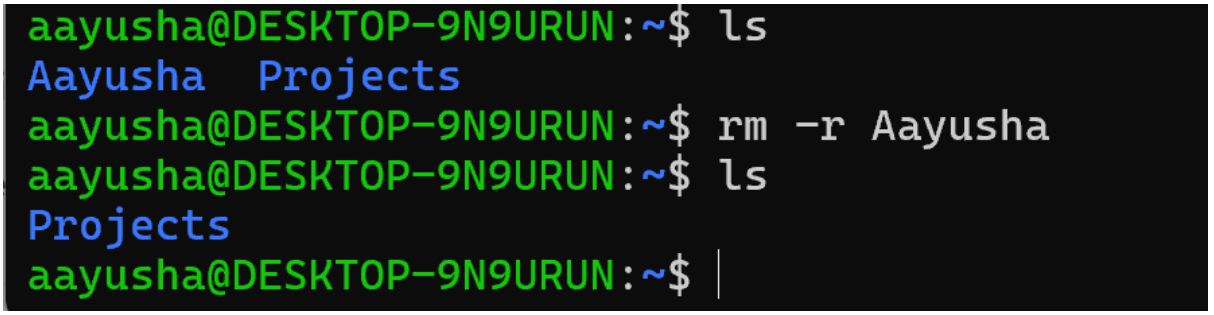
The *rm* command is used to delete files permanently.
Example: *rm testfile.txt* deletes the file named *testfile.txt*. It does not move files to a trash/recycle bin, so deleted files cannot be recovered easily. It is useful for removing unwanted files quickly. For safety, options like *-i* can be used to confirm deletion interactively. If successful, there is no output, an error is shown if the file does not exist.



2.9 Command: rm -r

The *rm -r* command deletes directories and all their contents recursively. It can remove folders even if they contain files and subdirectories.

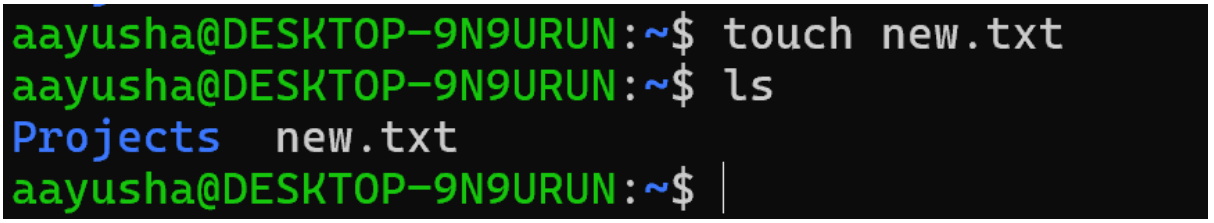
Example: *rm -r Aayusha* deletes folder1 along with everything inside it. This command is dangerous if used carelessly because deletion is permanent. It is useful for cleaning up entire project directories. No output is shown if deletion is successful, errors appear if the directory does not exist.



2.10 Command: touch

The *touch* command creates a new empty file or updates the timestamp of an existing file.

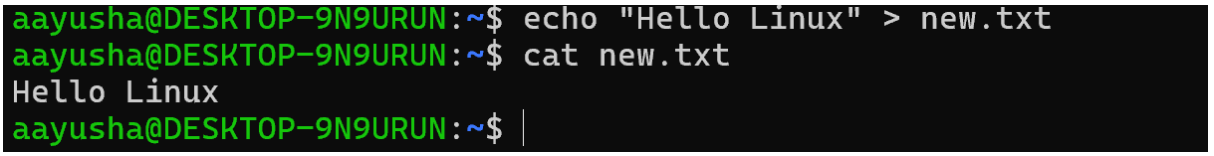
Example: *touch new.txt* creates a file named *new.txt*. It is commonly used to create placeholder files quickly. If the file already exists, the command updates the last modified time without changing the content. This command produces no output, but listing the directory with ls will show the new file. Useful in scripting or preparing file structures for projects.



2.11 Command: cat

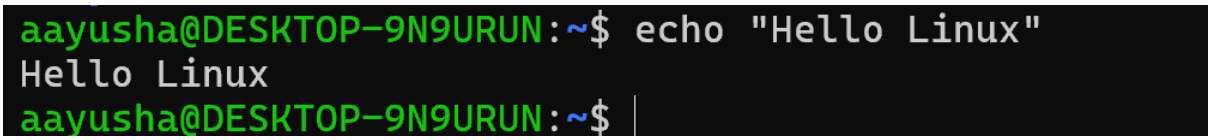
The *cat* command displays the contents of a file in the terminal.

Example: *cat new.txt* prints everything in *new.txt* to the screen. It is best for viewing small files quickly. For long files, use less or more to scroll page by page. It does not modify the file, it only shows the content. Output is the actual content of the file.



2.12 Command: echo

The *echo* command prints text to the terminal or writes it to a file.
Example: *echo "Hello Linux"* prints Hello Linux on the screen. You can also redirect output to a file: *echo "Hello" ¿ file.txt*. It is useful in scripts to display messages or create content for files. By default, it writes to standard output, using ¿ or ¿¿ writes to files. Output is the exact text provided in the command.



2.13 Command: cp

The *cp* command copies files or directories from one location to another.

Example: *cp a.txt b.txt* creates a copy of *a.txt* named *b.txt*. It is useful for making backups or duplicating files. Options like *-r* can be used to copy directories recursively. If the destination file already exists, it will be overwritten. No output is shown if the copy is successful; errors occur if the source file does not exist.

```
aayusha@DESKTOP-9N9URUN:~$ cp new.txt Aayusha.txt
aayusha@DESKTOP-9N9URUN:~$ cat Aayusha.txt
Hello Linux
aayusha@DESKTOP-9N9URUN:~$
```

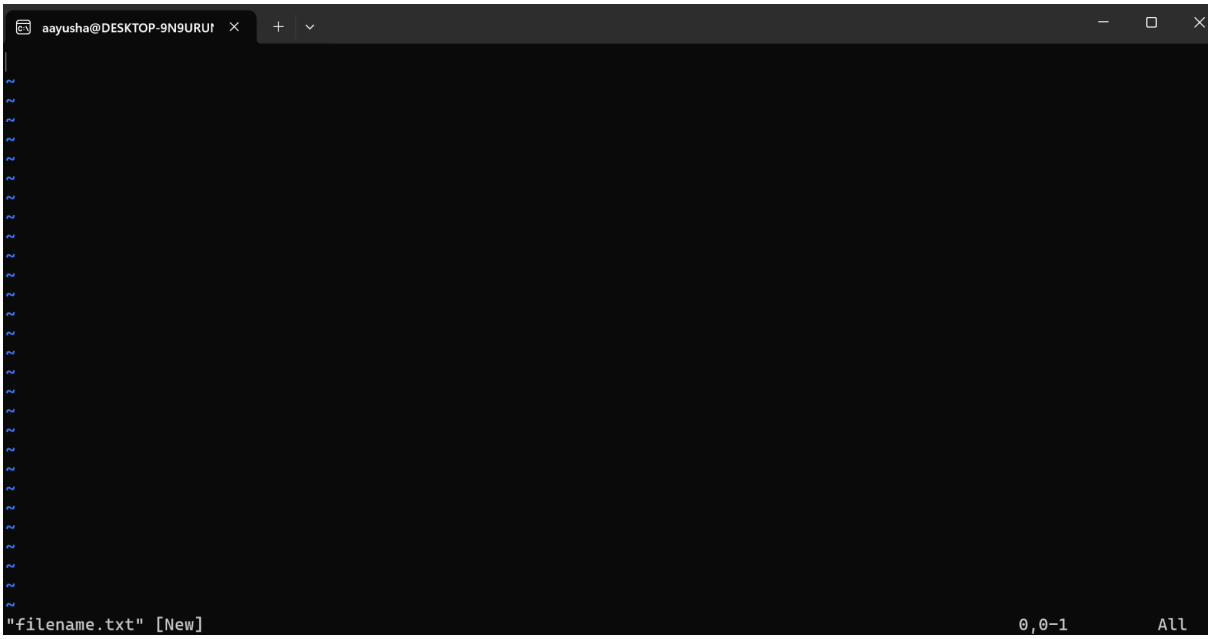
2.14 Command: nano/vi/jed

These are terminal-based text editors used to create and edit files directly from the command line.

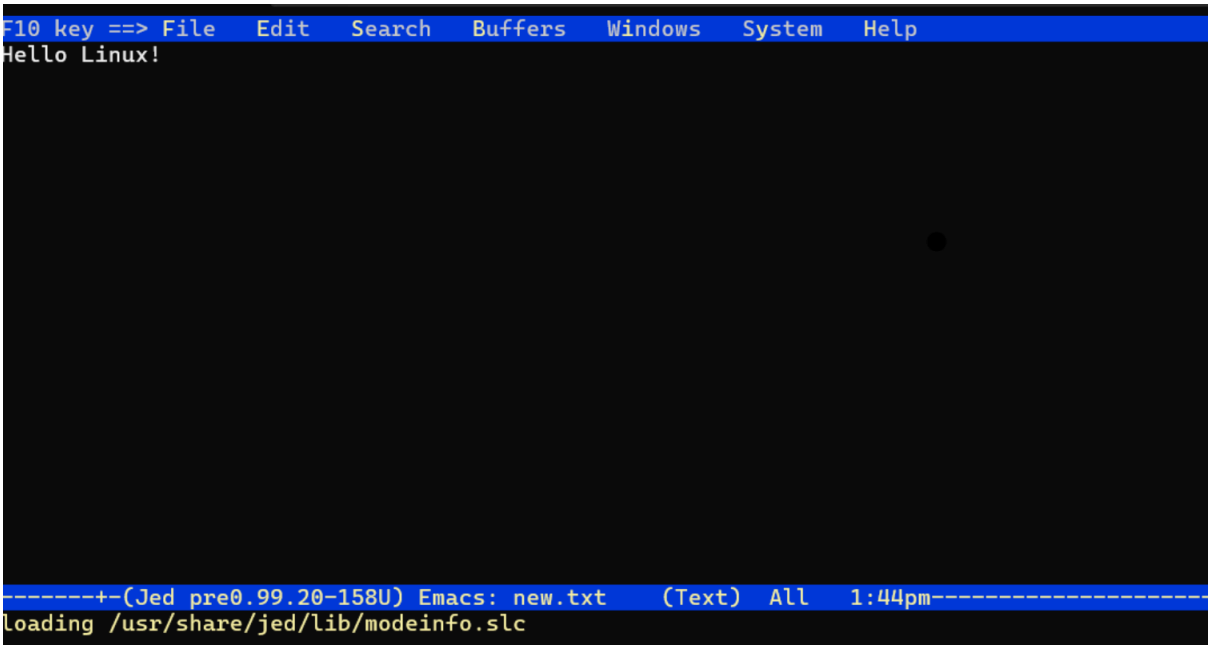
- **nano:** Beginner-friendly, commands are displayed at the bottom of the editor.
  Example: nano filename.txt

- **vi:** Powerful but a bit complex, requires switching between command and insert modes.

Example: vi filename.txt



- **jed:** Lightweight editor, good for coding and quick edits.
  Example: jed myfile.txt



2.15 Command: mv

The *mv* command moves or renames files and directories.
Example: *mv old.txt new.txt* renames *old.txt* to *new.txt*.
Example: *mv file.txt folder/* moves *file.txt* into the folder folder. It can be used for both moving files to a different location and renaming them. If the destination exists, it will be overwritten without warning unless *-i* is used. No output appears if successful, errors occur if the source does not exist.

```
aayusha@DESKTOP-9N9URUN:~$ ls
Aayusha.txt  Projects  new.txt
aayusha@DESKTOP-9N9URUN:~$ mv Aayusha.txt Projects/
aayusha@DESKTOP-9N9URUN:~$ ls
Projects  new.txt
aayusha@DESKTOP-9N9URUN:~$ cd Projects/
aayusha@DESKTOP-9N9URUN:~/Projects$ ls
Aayusha.txt
aayusha@DESKTOP-9N9URUN:~/Projects$
```

2.16 Command: uname -a

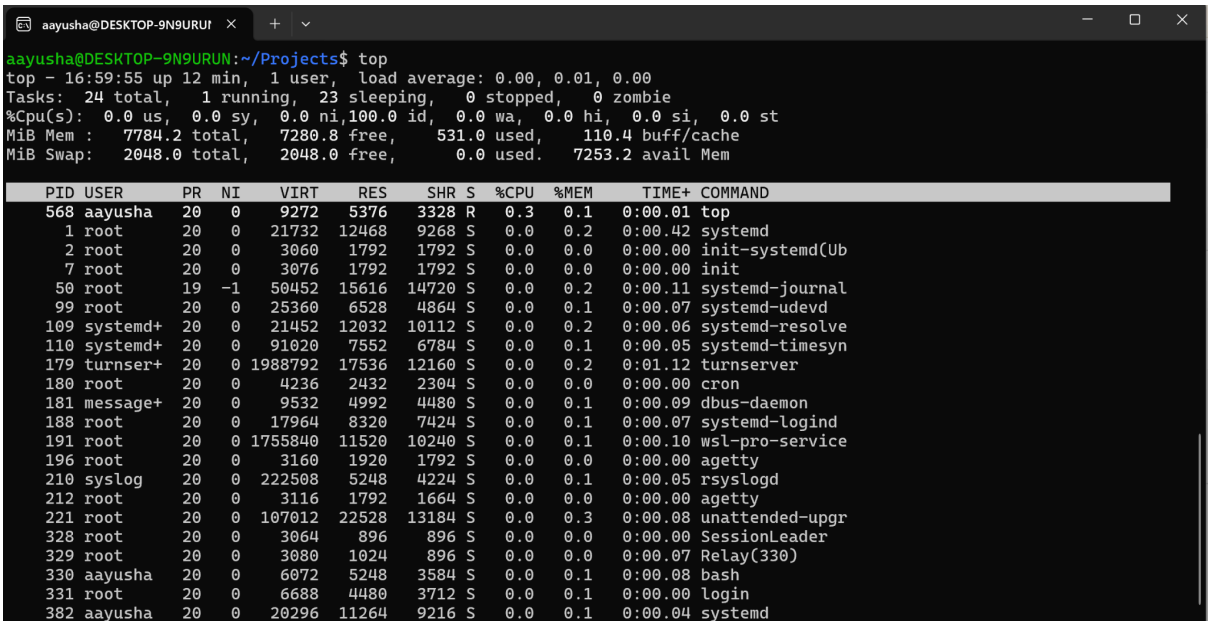
The *uname -a* command displays system information. It shows kernel name, hostname, kernel version, OS type, architecture, and other details.
Example output: Linux DESKTOP-9N9URUN 6.6.87.2-microsoft-standard-WSL2 #1 SMP PREEMPT_DYNAMIC Thu Jun 5 18:30:46 UTC 2025 x86_64 x86_64 x86_64 GNU/Linux
Useful for checking system configuration and environment details. This command does not modify the system. Output appears directly on the terminal.

```
aayusha@DESKTOP-9N9URUN:~/Projects$ uname -a
Linux DESKTOP-9N9URUN 6.6.87.2-microsoft-standard-WSL2 #1 SMP PREEMPT_DYNAMIC Thu Jun  5 18:30:46 UTC 2025 x86_64 x86_64
 x86_64 GNU/Linux
aayusha@DESKTOP-9N9URUN:~/Projects$
```

2.17 Command: top

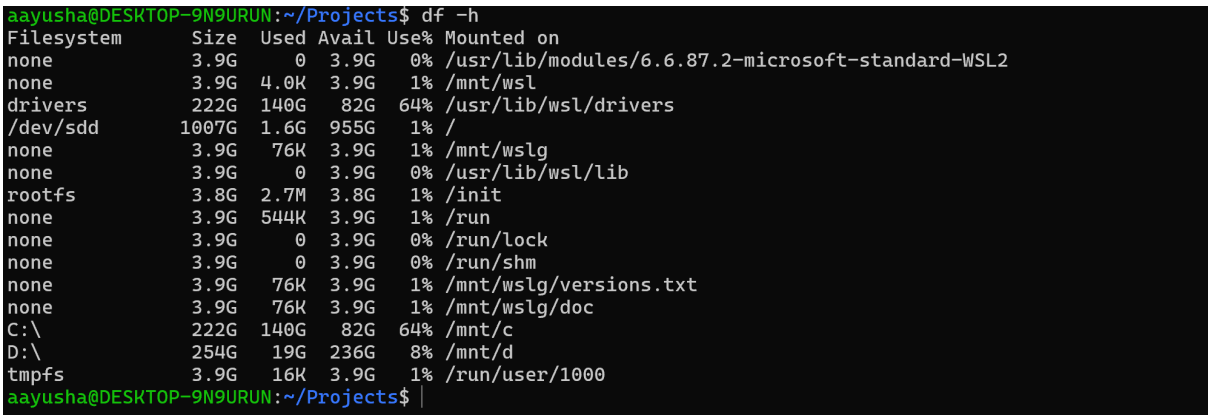
The *top* command displays real-time system process information. It shows CPU, memory usage, and active processes dynamically.

Example: running top continuously updates the display until you press *q* to quit. Useful for monitoring system performance and identifying resource-heavy processes. The display includes PID, user, priority, CPU. It is a live interactive command, not a static output.



2.17 Command: df -h

The *df -h* command displays disk usage in a human-readable format (e.g., GB, MB). Example output shows filesystem name, size, used space, available space, usage percentage, and mount point. It is useful for monitoring storage and ensuring there is enough space. The *-h* flag makes it easier to read compared to bytes-only output. No changes



are made to the system by this command. Output lists all mounted filesystems

3. Conclusion

This report showcased a set of frequently used Linux commands, accompanied by clear explanations and actual terminal outputs. Through hands-on practice with these commands, I developed skills in navigating directories, creating and managing files, and efficiently organizing folders. Additionally, the commands enhanced my understanding of monitoring system information, checking disk usage, and viewing active processes. Utilities such as *echo*, *df -h*, *ps*, and *top* strengthened my ability to interact with the system and assess its performance. Overall, becoming familiar with these essential Linux commands has made working with the system more intuitive, efficient, and streamlined.