Linux Filesystem:

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1 . Introduction to Linux Filesystem:

•Consider the Linux Filesystem not as a technical tool, but as a system for organising a large, efficient workplace.
•Typically, computers have separate sections labelled C: Drive for programs and D: Drive for documents. Linux sets aside this idea.
•It follows the notion of a single headquarters. Called the Root Directory.
•The root directory is represented by a slash (/). Every single thing, your programs, images, system settings, and even your keyboard and mouse is assigned an address inside this headquarters, as if they were files or folders within a Library.
•Everything is in the form of a file in Linux.

2 . Key features of Linux Filesystems:

The Linux filesystem design has some essential features that make the operating system remain stable, secure, and perform optimally.

i)Hierarchical Directory Structure:

•All folders and files are structured in a one tree structure that originates from the root directory (denoted by /).

•This structure makes each item have an easy to use and uniform path for finding it in the system.

ii)Case Sensitivity:

•Linux considers uppercase and lowercase letters to be two distinct characters in directory and file names. For instance, a file with the name document.txt is different from Document.txt.

iii)Filesystem Type Support:

•Linux is able to read and write from numerous disparate disk formats (or filesystem types) such as ext4 and XFS.

•All this flexibility is controlled by the Virtual Filesystem (VFS) layer that enables the system to

access various physical storage formats using a single common set of commands.

iv)Security (Permissions and Ownership):

•Each file and directory is given an owner (User) and a group.

•It is also guarded by permissions (Read, Write, and Execute) which control very strictly who can read, modify, or execute the file. This system is critical in multi user security.

v)Hard and Soft Links:

Two kinds of links are provided by the filesystem, which are references to files.

•Hard Links refer directly to the disk's physical data; data is not deleted until the last hard link to it has been removed.

•Soft Links (Symbolic Links) are just file shortcuts. If the source file is deleted or relocated, the soft link will be broken.

3 . Directory Structure:

•The way folders are organized in Linux is guided by a set of rules known as the Filesystem Hierarchy Standard (FHS).

•This structure guarantees that regardless of which

Linux system you use, you can always locate the essential files in the same place.
•The entire system starts at the root directory (/). Below the root, certain folders (directories) have specific, fixed roles.
•This clear structure is important for Linux's stability because it keeps system files separate from user files.
•A few examples include /, /home, /bin, and /sbin.

4 . List and explain basic commands:

Some basic commands used in linux are:

- **ls**: This command **lists** the files and directories inside the current location, showing you what is there.
- **cd**: **Change Directory** moves your current session to a different folder in the filesystem hierarchy.
- **pwd**: **Print Working Directory** displays the full, absolute path of the folder you are currently using.
- **mkdir**: **Make Directory** creates a new, empty

folder (directory) at the specified path.

- **rm**: **Remove** deletes files permanently from the system, and can also delete entire directory structures if told to do so.
- **cp**: **Copy** duplicates a file or directory from one location to another, leaving the original intact.
- **mv**: **Move** relocates a file or directory to a new path, and can also be used to **rename** an item.
- **cat**: **Concatenate** prints the entire content of a text file directly to your terminal screen for viewing.
- **touch**: This command creates an empty new file or updates the access and modification date of an existing file.
- **chmod**: **Change Mode** modifies the Read, Write, and Execute **permissions** that control access to a file or directory.