

# DIPLOMA WALLAH

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## OPERATING SYSTEM AND ADMINISTRATION

 Complete Notes Based on Full Syllabus

- Diploma Engineering  
4<sup>th</sup> Semester



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Notes prepared by Sangam

Unit-03File System:-

A file system is a method an operating system uses to store, organize, and manage files and directories on a storage device.

Some common types:-

- FAT (File Allocation Table):-  
An older file system used by older version of windows and other operating system.
- NTFS (New Technology File System):-  
A modern file system used by windows. It supports features such as file and folder permissions, compression and encryption.
- ext (extended file system):- A file system commonly used on linux and unix based OS.
- HFS (Hierarchical File System):-  
A system used by mac OS.
- APFS:- (Apple file system):-  
A new file system introduced by Apple for their mac and iOS devices.

A file is a collection of related information that is recorded on Secondary Storage.

The name of the file divided into two categories:-

- Name
- Extension, separated by a period.

## \* File System - pathnames

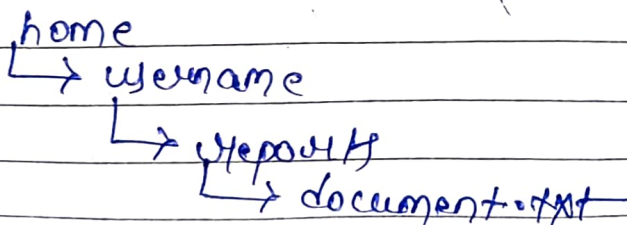
The function of a pathname in a file directory is to identify a file or directory position in the directory tree.

A delimiter such as forward slash (/) in unix-based system or a backslash (\) in windows system, is used to divide the list of directory names.

A program or user must apply the pathnames for the file system or directory in the file system when they wish to access it.

The file or directory is then found in the directory tree using this pathname by the OS.

ex - /home/username/stepwork/document.txt



## Special path symbols

- ~ → Root or separator
- → current directory
- · → parent directory
- ~ → Home directory of current user.

ph

## Linux command to navigate.

- pwd → Show current directory.
- cd folder → Change another directory.
- cd · · → Move one level up
- ls → List all files and folders.
- ls -l → List with details.
- cd / → Go to root directory.

## Why it is important

- Helps to locate file easily.
- Used in programming, scripting and system navigation.
- Essential for file operations like copy, move, delete, open.

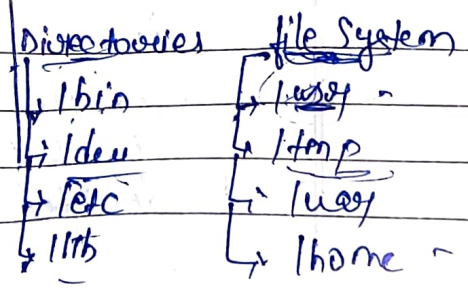
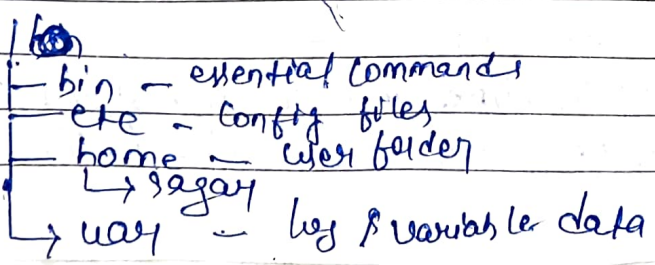
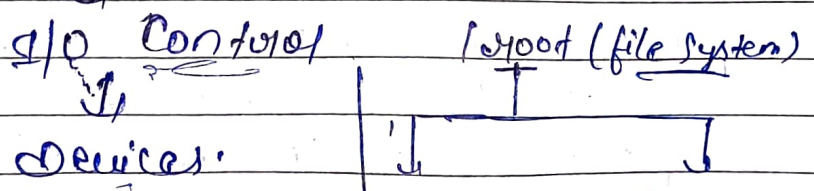
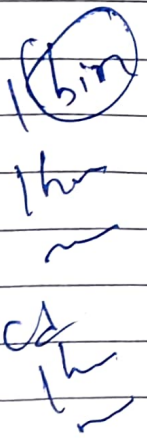
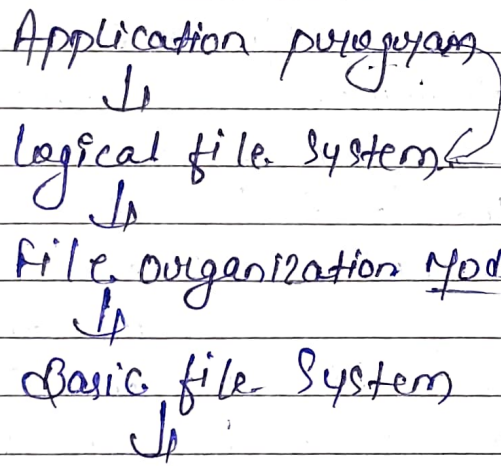
# File System Structure

File system provide access to the disk by allowing data to be stored, located and retrieve in a convenient way.

A file system must be able to store the file, and retrieve the file.

Most of the OS used almost layering approach for every task including file system.

The image shows how the file system is divided into different layers.



- When an application program asks for a file, the first request is directed to the logical file system.

The logical file system contains the meta data of the file and directory structure.

If the application program doesn't have the required permission of the file then this layer will throw an error.

Logical file system also verify the path of the file.

### \* File Types: —

File types describe the kind of data stored in a file and how the OS or application handle that file.

#### Common File Types:—

- Text files (.txt) :- Contain readable characters like notes or code.
- Binary files :- Contain data in binary form.
- Executable files (.exe, .bat) :- files that the OS can run as programs.
- System files: files used internally by the OS for configuration or operation.
- Document files (.doc, .pdf) :- files created by office applications.

#### Why file types matter:—

OS use file type info (usually from file extension) to decide which program opens the file.

## \* Attributes

File attributes are metadata describing properties of a file.

- Ex Read-only (cannot modify), Hidden (not shown normally), System (important for OS), Archive (for backup) etc.
- Attributes help OS control file access and behaviour.

## \* Access Control List (ACL)

ACL is a list specifying permission for users/groups on a file or resources.

- Define who can read, write, or execute the file.
- Important for security and controlled access.

## \* Adding Text to a file

The process of writing or appending new text/data into a file:

- open the file in append or write mode.
- write the new text.
- close the file to save changes.

Ex - Linux command

```
echo "new text" >> file.txt
```

or - py

→ ek temporary data channel jo processed kr beech data pass karta hai.

Types

ordinary pipes — only one direction flow

\* pipes — Named PIPE (FIFO) — both direction communication possible.



• pipes are a way to connect the output of one command to the input of another in UNIX/Linux system.

• It allows you to chain commands, passing data directly without using intermediate files.

Symbol used: |

ls -l | grep ".txt"

This command lists files (ls -l) and passes the list to grep to filter only .txt files.

\* File Comparison

File Comparison Commands check differences or similarities b/w files.

• Useful for finding changes, debugging or verifying file content.

Common Commands:

• diff file 1 file 2

Shows line by line differences b/w two files.

• cmp file1 file2 (Binary Comparison)

Compare files byte by byte and report difference.

• comm file1 file2 (Text Comparison)

Compares sorted file line by line and o/p common and unique lines.

Types

(I) Binary Comparison → Check file byte by byte.

(II) Text Comparison → File ko line by line ya word by word compare karta hai.

## \* Filters

- Filters are commands that process input data and produce output, often modifying or selecting specific parts.
- They read from standard input and write to standard output, so they can be combined with pipes.

Ex

grep - searches text using patterns

sort - sorts line of text

uniq - removes duplicate lines

cut - extract columns or fields.

head/tail - Shows first or last lines of a file.

wc - Counts lines, words, and characters.

## \* Text preprocessing commands.

These are tools used to manipulate or analyze text files.

- "grep "pattern" file - find lines matching a pattern.
- awk - powerful for pattern scanning and processing columns.
- sed - stream editor for text substitution, insertion, deletion.
- tr - translate or delete characters.
- cut - extract sections from each line.

Ex. pipeline

```
cat file.txt | grep "error" | sort | uniq -c |  
sort -nr
```

- cat outputs file contents
- grep filters lines containing "error"
- sort sorts these lines
- uniq -c counts duplicates
- final sort -nr sorts counts numerically in reverse order

Jagan Jagan