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**CS-501**

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# FILE SYSTEM

# File System

- A *file* is a named collection of related information that is *recorded* on secondary storage.
- From a user's perspective, a file is the smallest allotment of logical secondary storage; that is, data cannot be written to *secondary storage* unless they are within a file.
- Commonly, files represent *programs* (both source and object forms) and data.

# File System

- Data *files* may be numeric, alphabetic, alphanumeric, or binary.
- Files may be *free form*, such as text files, or may be formatted rigidly.
- In general, a file is a *sequence* of bits, bytes, lines, or records, the meaning of which is defined by the file's creator and user.

# File Attributes

- A file's *attributes* vary from one operating system to another but typically consist of these:
- **Name** – only information kept in human-readable form
- **Identifier** – unique tag (number) identifies file within file system
- **Type** – needed for systems that support different types

# File Attributes

- **Location** – pointer to file location on device
- **Size** – current file size
- **Protection** – controls who can do reading, writing, executing
- **Time, date, and user identification** – data for protection, security, and usage monitoring
- Information about files are kept in the directory structure, which is maintained on the disk

# File Operations

- A file is an *abstract data type*. To define a file properly, we need to consider the operations that can be performed on files.

- Create

- Write

- Read

- Reposition within file

- Delete

- Truncate

- Open( $F_i$ ) – search the directory structure on disk for entry  $F_i$ , and move the content of entry to memory

- Close ( $F_i$ ) – move the content of entry  $F_i$  in memory to directory structure on disk

# Open Files

- Several pieces of data are needed to manage open files:
  - **File pointer**: pointer to last read/write location, per process that has the file open.
  - **File-open count**: counter of number of times a file is open – to allow removal of data from open-file table when last process closes it.
  - **Disk location of the file**: cache of data access information.
  - **Access rights**: per-process access mode information.



# Open file locking

- Provided by some operating systems and file systems
- Mediates access to a file
- Mandatory or advisory:
  - **Mandatory** – access is denied depending on locks held and requested
  - **Advisory** – processes can find status of locks and decide what to do

# Homework

- File Types – Name, Extension
- Access Methods
  - Sequential Access
  - Direct Access

# References

1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley.
2. William Stallings, "Operating Systems: Internals and Design Principles", 6<sup>th</sup> Edition, Pearson Education.
3. D M Dhamdhere, "Operating Systems: A Concept based Approach", 2<sup>nd</sup> Edition, TMH.

**Thank You.**

