



SNS COLLEGE OF TECHNOLOGY



Coimbatore-35
An Autonomous Institution

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DEPARTMENT OF INFORMATION TECHNOLOGY

23CST202 – Operating Systems **II YEAR - IV SEM**

UNIT 4 – FILE SYSTEMS



Syllabus

- ▶ **UNIT I** **OVERVIEW AND PROCESS MANAGEMENT** **9**
 - ▶ Introduction - Computer System Organization, Architecture, Operation, Process Management - Memory Management - Storage Management - Operating System - Process concept - Process scheduling - Operations on processes - Cooperating processes - Inter process communication. Threads - Multi-threading Models - Threading issues.
- ▶ **UNIT II** **PROCESS SCHEDULING AND SYNCHRONIZATION** **10**
 - ▶ CPU Scheduling - Scheduling criteria - Scheduling algorithms - Multiple-processor scheduling - Real time scheduling - Algorithm Evaluation. Process Synchronization - The critical-section problem - Synchronization hardware - Semaphores - Classical problems of synchronization. Deadlock - System model - Deadlock characterization - Methods for handling deadlocks - Deadlock prevention - Deadlock avoidance - Deadlock detection - Recovery from deadlock.
- ▶ **UNIT III** **MEMORY MANAGEMENT** **9**
 - ▶ Memory Management - Background - Swapping - Contiguous memory allocation - Paging - Segmentation - Segmentation with paging. Virtual Memory - Background - Demand paging - Process creation - Page replacement - Allocation of frames - Thrashing.
- ▶ **UNIT IV** **FILE SYSTEMS** **8**
 - ▶ File concept - Access methods - Directory structure - Files System Mounting - File Sharing - Protection. File System Implementation - Directory implementation - Allocation methods - Free-space management.
- ▶ **UNIT V** **I/O SYSTEMS** **9**
 - ▶ I/O Systems - I/O Hardware - Application I/O interface - Kernel I/O subsystem - Streams - Performance. Mass-Storage Structure: Disk scheduling - Disk management - Swap-space management - RAID - Disk attachment - Stable storage - Tertiary storage. Case study: Implementation of Distributed File system in Cloud OS / Mobile OS.

▶ **L :45 P:0 T: 45 PERIODS**



FILE SYSTEMS

- ▶ File concept
- ▶ Access methods
- ▶ Directory structure
- ▶ Files System Mounting
- ▶ File Sharing
- ▶ Protection



File Attributes

- ▶ Each file has a number of attributes indicating some information of the file.
- ▶ The most common attributes are the
 - ▶ name,
 - ▶ type,
 - ▶ location,
 - ▶ size,
 - ▶ protection bits,
 - ▶ time,
 - ▶ date and
 - ▶ user identification.



File Attributes

- ▶ **Name** is the only information kept in human-readable form. This is the name given to identify the file.
- ▶ **Type** is the type of the file and is needed for systems that support different types. For example, the different types of files are text files, image files and so on.
- ▶ **Location** points to the location of the file on the disk. That is the disk block in the disk where the contents of the file are kept.
- ▶ **Size** refers to the current file size.



File Attributes

Protection bits control who can do reading, writing, executing. Some users can read, some can write, some can execute or some can have a combination of different permissions.

Time, date, and user identification

- Information kept for last creation, last modification and last use
- Data useful for protection, security, and usage monitoring.

Information about the attributes of the files is kept in the directory structure, which is maintained on the disk.



File Operations

- ▶ **The operating system provides a number of system calls to create, write, read, reposition, delete and truncate files. We now see how each of these operations is carried out.**



File Operations

- ▶ Create
- ▶ This operation creates a new file. First, it is necessary to find if there is space for the file in the disk. Then, an entry is made for the new file in the directory. The directory entry stores information about the file like the name of the file, location of the file in disk and so on.
- ▶ Write
- ▶ This operation is used to write contents into a file. The system searches the directory and finds the location of the file. Using this location, contents can be written into the file. The system keeps a write pointer to the location in the file where the next write has to take place. The write pointer is updated after a write occurs.



File Operations

► Read

- The read operation is used to read the contents of a file. The system call used for reading specifies the name of the file and where the next block must be read from. The system needs to keep a read pointer to the location in the file where the next read is to take place. The read pointer is updated after read has taken place. For a particular file, the file position pointer need not be the same for all processes that access the file. Each process maintains its own file position pointer for a particular file.



File Operations

► File seek

- This operation is used to reposition the file pointer within the file. Whenever a read or a write operation is done, the read or write is done on the location which is pointed to by the file pointer. This value of the file pointer or the current-file-position can be modified using the seek operation. The system call used for seek searches the directory for the appropriate entry. The current-file-position maintained in the directory structure is set to the given value. This operation does not access the contents of the file kept in the disk and hence, no I/O is needed. The value of the file pointer alone is changed in the directory structure.



File Operations

Delete

This operation is used to delete a file. The name of the file to be deleted is provided in the system call. The file is searched in the directory. The space allocated for the file in the disk is released. The directory entry created for the file is erased.

Truncate

This operation releases all the contents of the file. The file is not deleted. The file length is reset to zero so that it can be overwritten. The space allocated to the file in the disk is released.



File Operations

Append

This operation is used to add new information to the end of the file. The current file position is moved to the end of the file and the contents to be added are written from that position.

Rename

The name of the file is changed to the new name provided in the system call. For this, the directory entry is modified. The old name is removed and the new name is entered.



File Operations

Copy

- ▶ This operation is used to make a copy of an existing file. The name of the old file and the name of the new file (copy) to be created are provided through the system call. A new file is created, contents of the old file are read and written to the new file.