SNS COLLEGE OF TECHNOLOGY

Coimbatore-35.
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COURSE NAME : OPERATING SYSTEMS

II YEAR/ IV SEMESTER

UNIT – IV FILE SYSTEMS
Topic: Introduction to File Concepts

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File Concepts

File Attributes

File Operations

File Types

File Structures

Directory Structure

Directory Organization

application programs

↓

logical file system

↓

file-organization module

↓

basic file system

↓

I/O control

↓

devices

File Concept

Contiguous logical address space

Types:

    Data

        numeric

        character

        binary

    Program

Contents defined by file's creator

    Many types

        Consider **text file, source file, executable file**

File Attributes

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

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

File Operations

➤ File is an **abstract data type**

➤ **Create**

➤ **Write –** at **write pointer** location

➤ **Read –** at **read pointer** location

➤ **Reposition within file -** **seek**

➤ **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:
  - **Open-file table**: tracks 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 processes 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
  - Similar to reader-writer locks
  - **Shared lock** similar to reader lock – several processes can acquire concurrently
  - **Exclusive lock** similar to writer lock
- 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

File Types – Name, Extension

file type	usual extension	function
executable	exe, com, bin or none	ready-to-run machine-language program
object	obj, o	compiled, machine language, not linked
source code	c, cc, java, pas, asm, a	source code in various languages
batch	bat, sh	commands to the command interpreter
text	txt, doc	textual data, documents
word processor	wp, tex, rtf, doc	various word-processor formats
library	lib, a, so, dll	libraries of routines for programmers
print or view	ps, pdf, jpg	ASCII or binary file in a format for printing or viewing
archive	arc, zip, tar	related files grouped into one file, sometimes com-pressed, for archiving or storage
multimedia	mpeg, mov, rm, mp3, avi	binary file containing audio or A/V information

File Structure

- None - sequence of words, bytes
- Simple record structure
  - Lines
  - Fixed length
  - Variable length
- Complex Structures
  - Formatted document
  - Relocatable load file
- Can simulate last two with first method by inserting appropriate control characters
- Who decides:
  - Operating system
  - Program

Access Methods

- *Sequential Access*

  read next

  write next

  reset

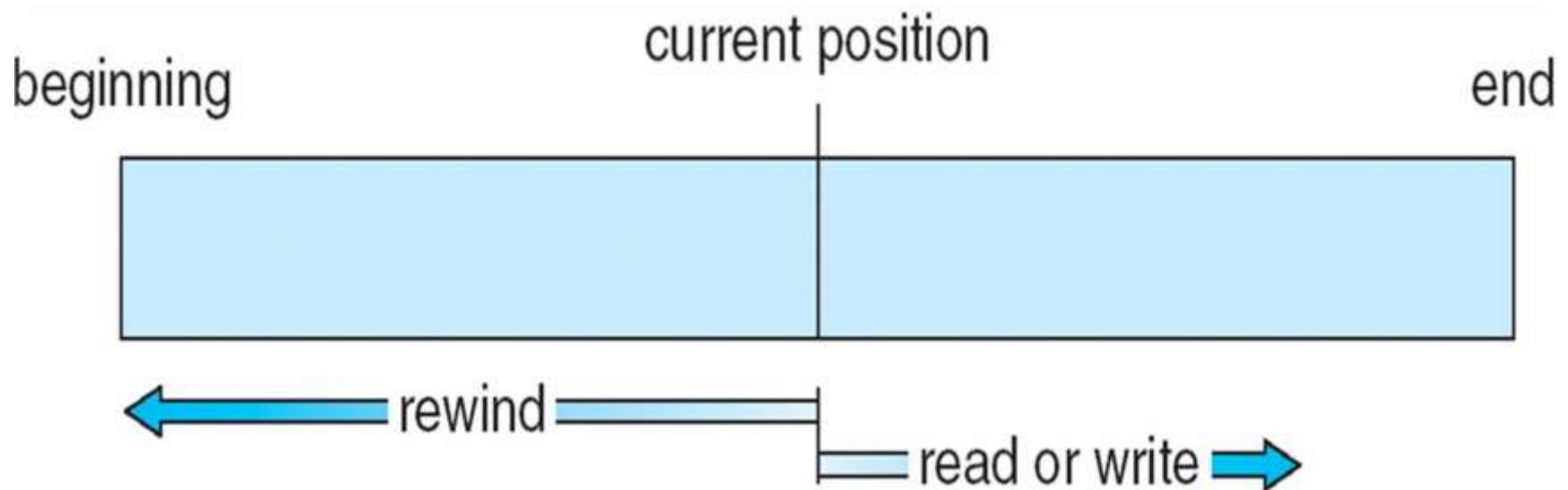 no read after last write

  (rewrite)

- *Direct Access* – file is fixed length logical records

  read *n*

  write *n*

  position to *n*

  read next

  write next

  rewrite *n*
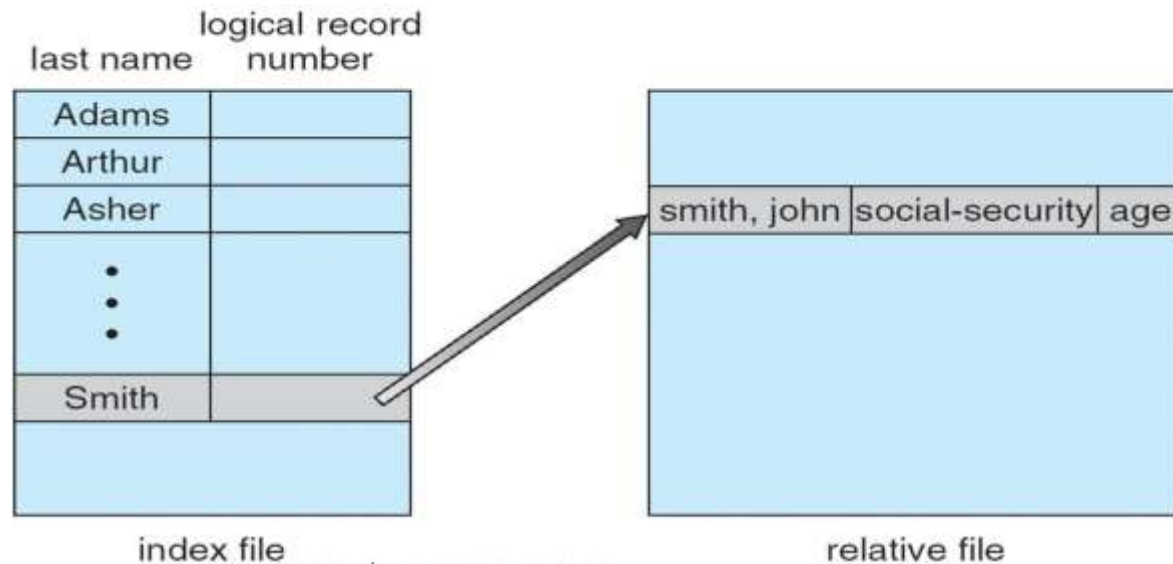
n = relative block number

- Relative block numbers allow OS to decide where file should be placed

Sequential-access File

Simulation of Sequential Access on Direct-access File & other access methods

sequential access	implementation for direct access
reset	$cp = 0;$
read next	read cp; $cp = cp + 1;$
write next	write cp; $cp = cp + 1;$

logical record
last name   number

last name	logical record number
Adams	
Arthur	
Asher	
• • •	
Smith	

index file

smith, john	social-security	age

relative file

References

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", Ninth Edition, Wiley India Pvt Ltd, 2009.
2 .   Andrew S. Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education, 2010.

Summarization