



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35.

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COURSE NAME : 19CST201 – OPERATING SYSTEMS

II YEAR/ IV SEMESTER

UNIT – I OVERVIEW AND PROCESS MANAGEMENT

Topic: Memory management, Storage management

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Memory Management



- To execute a program all (or part) of the instructions must be in memory
- All (or part) of the data that is needed by the program must be in memory.
- Memory management determines what is in memory and when
 - Optimizing CPU utilization and computer response to users
- Memory management activities
 - Keeping track of which parts of memory are currently being used and by whom
 - Deciding which processes (or parts thereof) and data to move into and out of memory
 - Allocating and deallocating memory space as needed



Storage Management



- OS provides uniform, logical view of information storage
 - Abstracts physical properties to logical storage unit - **file**
 - Each medium is controlled by device (i.e., disk drive, tape drive)
 - ▶ Varying properties include access speed, capacity, data-transfer rate, access method (sequential or random)

1. File-System management

- Files usually organized into directories
- Access control on most systems to determine who can access what
- OS activities include
 - ▶ Creating and deleting files and directories
 - ▶ Primitives to manipulate files and directories
 - ▶ Mapping files onto secondary storage
 - ▶ Backup files onto stable (non-volatile) storage media



Storage Management



2. Mass-Storage Management

- Usually disks used to store data that does not fit in main memory or data that must be kept for a “long” period of time
- Proper management is of central importance
- Entire speed of computer operation hinges on disk subsystem and its algorithms
- OS activities
 - Free-space management
 - Storage allocation
 - Disk scheduling



Storage Management



3. Caching → Performance of Various Levels of Storage

Level	1	2	3	4	5
Name	registers	cache	main memory	solid state disk	magnetic disk
Typical size	< 1 KB	< 16MB	< 64GB	< 1 TB	< 10 TB
Implementation technology	custom memory with multiple ports CMOS	on-chip or off-chip CMOS SRAM	CMOS SRAM	flash memory	magnetic disk
Access time (ns)	0.25 - 0.5	0.5 - 25	80 - 250	25,000 - 50,000	5,000,000
Bandwidth (MB/sec)	20,000 - 100,000	5,000 - 10,000	1,000 - 5,000	500	20 - 150
Managed by	compiler	hardware	operating system	operating system	operating system
Backed by	cache	main memory	disk	disk	disk or tape

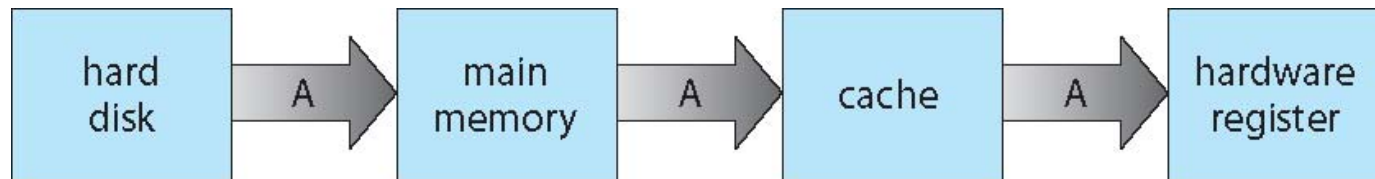
Movement between levels of storage hierarchy can be explicit or implicit



Migration of data “A” from Disk to Register



- ❑ Multitasking environments must be careful to use most recent value, no matter where it is stored in the storage hierarchy



- ❑ Multiprocessor environment must provide **cache coherency** in hardware such that all CPUs have the most recent value in their cache
- ❑ Distributed environment situation even more complex
 - ❑ Several copies of a datum can exist
 - ❑ Various solutions covered in Chapter 17



Storage Management



4. I/O Subsystem

- One purpose of OS is to hide peculiarities of hardware devices from the user
- I/O subsystem responsible for
 - Memory management of I/O including buffering (storing data temporarily while it is being transferred), caching (storing parts of data in faster storage for performance), spooling (the overlapping of output of one job with input of other jobs)
 - General device-driver interface
 - Drivers for specific hardware devices



REFERENCES



TEXT BOOKS:

- T1 Silberschatz, Galvin, and Gagne, “Operating System Concepts”, Ninth Edition, Wiley India Pvt Ltd, 2009.)
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- R1 Gary Nutt, “Operating Systems”, Third Edition, Pearson Education, 2004.
- R2 Harvey M. Deitel, “Operating Systems”, Third Edition, Pearson Education, 2004.
- R3 Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9th Edition, John Wiley and Sons Inc., 2012.
- R4. William Stallings, “Operating Systems – Internals and Design Principles”, 7th Edition, Prentice Hall, 2011