SNS COLLEGE OF TECHNOLOGY
Coimbatore-35

DEPARTMENT OF AIML

23CST201-OPERATING SYSTEMS

II YEAR IV SEM AIML- A SECTION

UNIT 1 – OVERVIEW AND PROCESS MANAGEMENT

TOPIC –PROCESS,MEMORY,STORAGE MANAGEMENT

Process Management

- A process is a program in execution. It is a unit of work within the system. Program is a ***passive entity***, process is an ***active entity***.

- Process needs resources to accomplish its task
  - CPU, memory, I/O, files
  - Initialization data

- Process termination requires reclaim of any reusable resources

- Single-threaded process has one **program counter** specifying location of next instruction to execute
  - Process executes instructions sequentially, one at a time, until completion

- Multi-threaded process has one program counter per thread

- Typically system has many processes, some user, some operating system running concurrently on one or more CPUs
  - Concurrency by multiplexing the CPUs among the processes
/ threads

Process Management Activities

The operating system is responsible for the following activities in connection with process management:

- Creating and deleting both user and system processes
- Suspending and resuming processes
- Providing mechanisms for process synchronization
- Providing mechanisms for process communication
- Providing mechanisms for deadlock handling

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)

- 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

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

- Some storage need not be fast

    - Tertiary storage includes optical storage, magnetic tape

    - Still must be managed – by OS or applications

    - Varies between WORM (write-once, read-many-times) and RW (read-write)

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

Reference

- Silberschatz, Galvin, and Gagne, "Operating System Concepts", Tenth Edition, Wiley India Pvt Ltd, 2018.