



SNS COLLEGE OF ENGINEERING

Kurumbapalayam(Po), Coimbatore – 641 107

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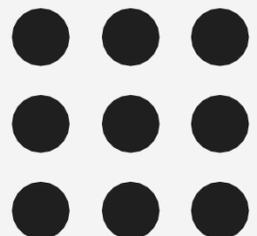
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Department Of Artificial Intelligence and Data Science

Course Name – Operating Systems

II Year / IV Semester

**Unit 1 - OPERATING SYSTEMS
OVERVIEW(PROCESS CONCEPT)**





Processes

- Process concept
- Operations on Processes
- Inter- process Communication
- Examples of IPC Systems
- Communication in Client-Server Systems



Objectives

- To introduce the notion of a process -- a program in execution, which forms the basis of all computation
- To describe the various features of processes, including scheduling, creation and termination, and communication
- To explore inter process communication using shared memory and message passing
- To describe communication in client-server systems

Process concept

- A process is a program in execution
- **Process memory** is divided into four sections for efficient working :
 - ✓ The **Text section** is made up of the compiled program code, read in from non-volatile storage when the program is launched
 - ✓ The **Data section** is made up of the global and static variables, allocated and initialized prior to executing the main.
 - ✓ The **Heap** is used for the dynamic memory allocation and is managed via calls to new, delete, malloc, free, etc.
 - ✓ The **Stack** is used for local variables. Space on the stack is reserved for local variables when they are declared.

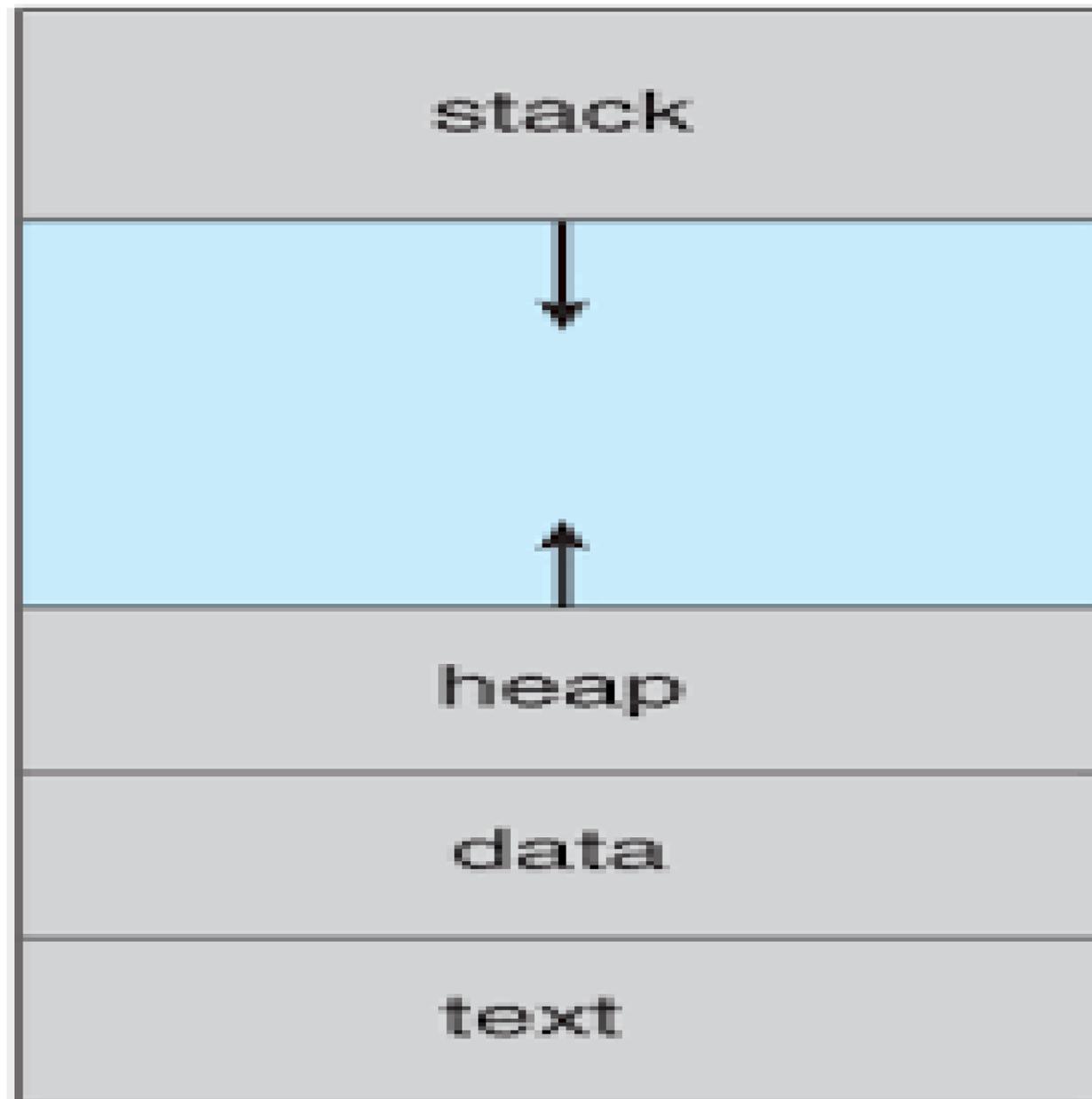


Process Concept (Cont.)

- Program is **passive** entity stored on disk (executable file)
- Process is active –
- Program becomes process when executable file loaded into memory
- Execution of program started via GUI mouse clicks, command line entry of its name, etc
- One program can be several processes – Consider multiple users executing the same program

Process in Memory

max

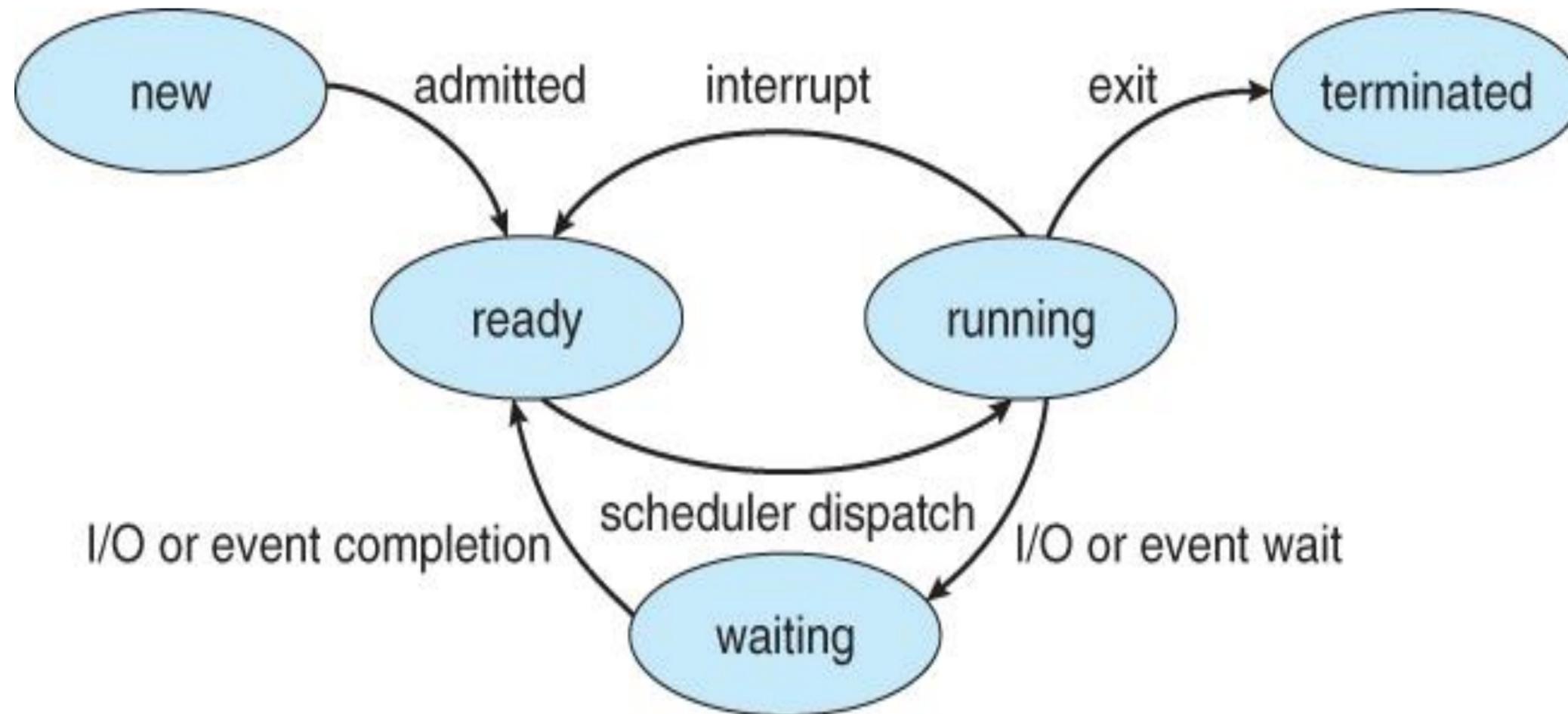




Process State

- As a process executes, it changes state
 - **new**: The process is being created
 - **running**: Instructions are being executed
 - **waiting**: The process is waiting for some event to occur
 - **ready**: The process is waiting to be assigned to a processor
 - **terminated**: The process has finished execution

Process state Diagram

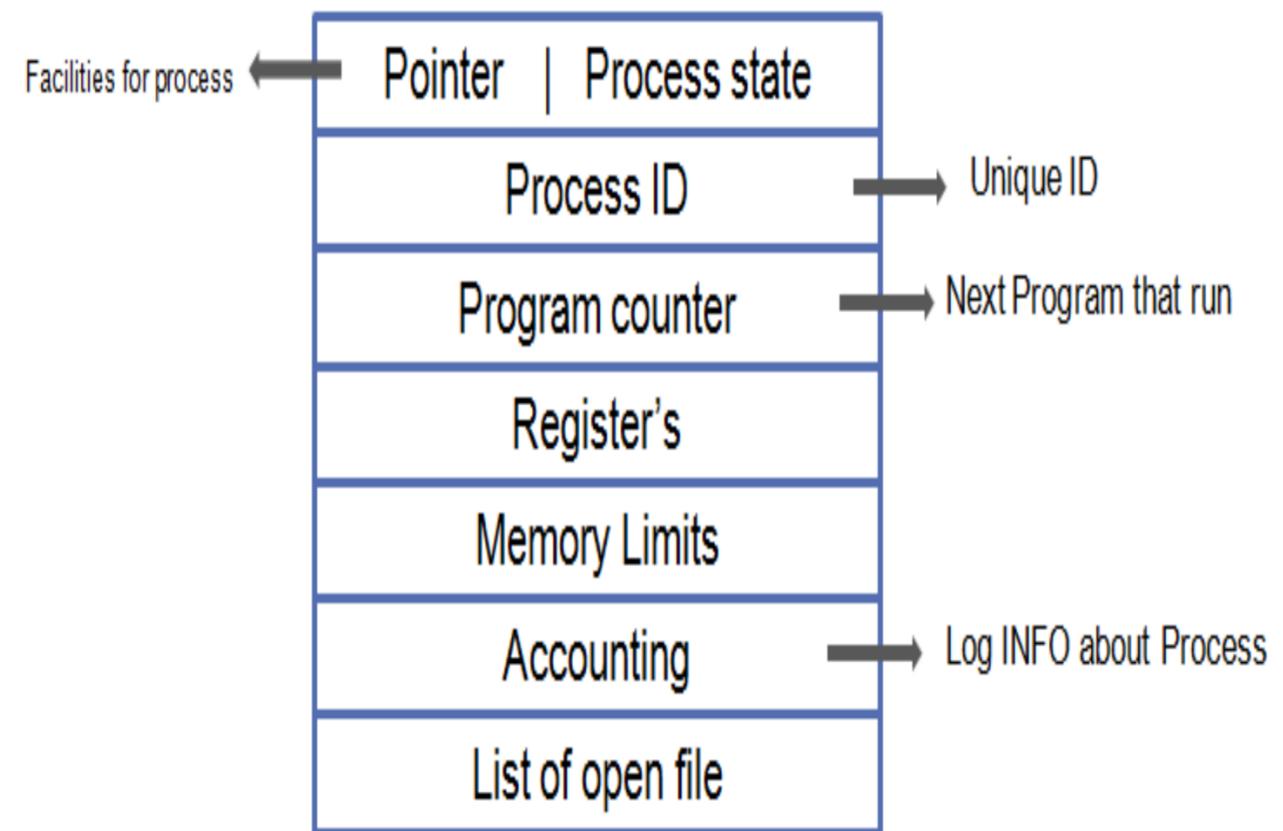


Process Control Block (PCB)

Information associated with each process (also called task control block)

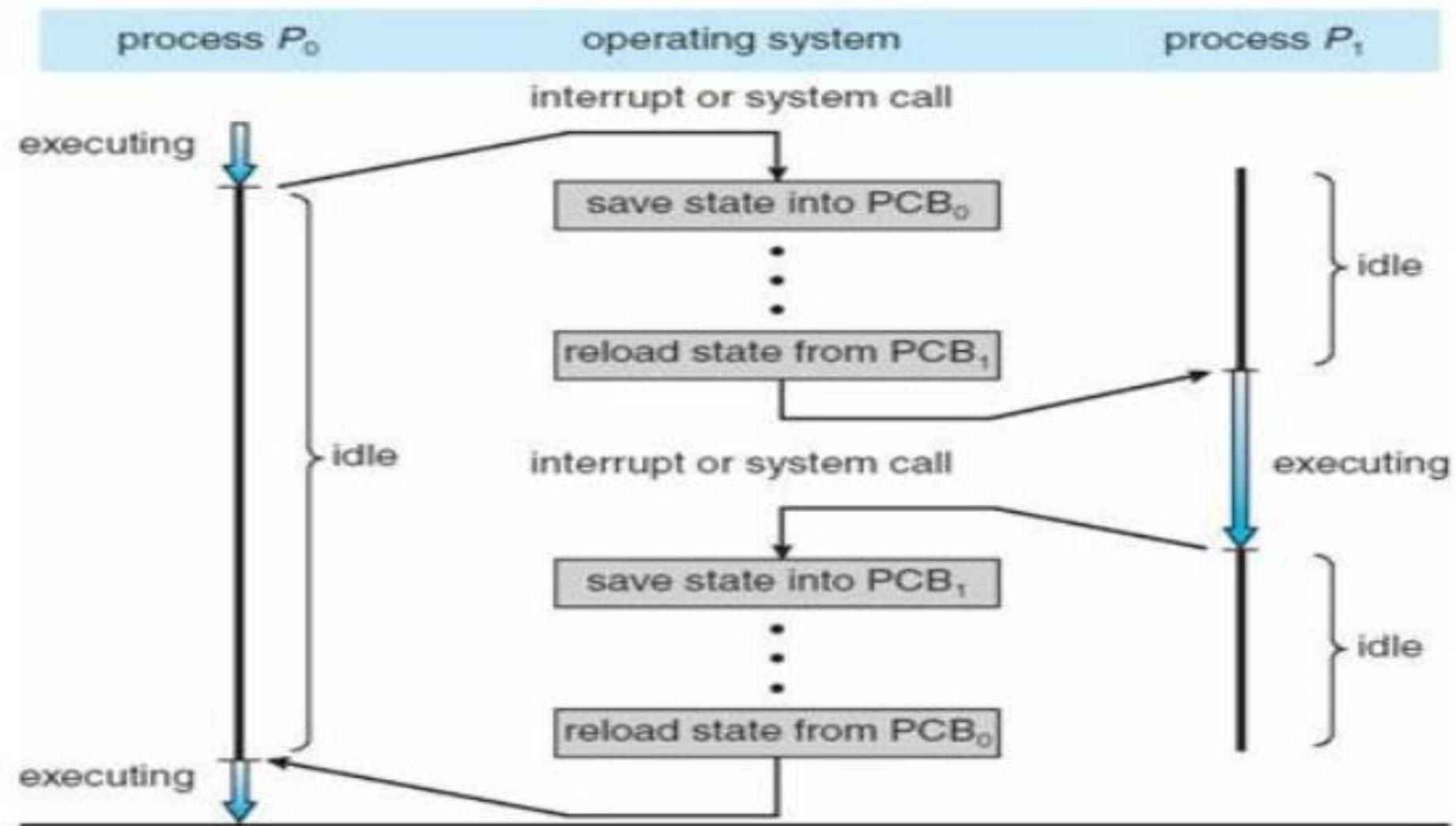
- **Process state** – running, waiting, etc
- **Program counter** – location of instruction to next execute
- **CPU registers** – contents of all process - centric registers
- **CPU scheduling information** - priorities, scheduling queue pointers
- **Memory-management information** – memory allocated to the process
- **Accounting information** – CPU used, clock time elapsed since start, time limits
- **I/O status information** – I/O devices allocated to process, list of open file

PROCESS CONTROL BLOCK (PCB)



PCB Diagram

CPU Switch From Process to Process



Threads

- A thread is a basic unit of CPU utilization
 - A sequence of instructions enclosed in a function which CPU can execute as a unit
- A process is a program in execution
 - A process is composed of one or more threads
- Each thread is comprised of (from OS perspective)
 - Program counter
 - Register set, and
 - Stack
- Threads belonging to the same process share
 - Code section
 - Data section
 - OS resources such as open files and signals