

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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Lecture-8 By Vivek Dubey

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COMPUTER SCIENCE AND ENGINEERING

CS403PC

COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

CS403PC

BHARAT INSTITUTE OF ENGINEERING AND TECHNOLOGY

Scheme of Operating System

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S. No.	Course Code	Course Title	L	T	P	Credits
3	CS403PC	Operating Systems	3	0	0	3
6	CS406PC	Operating Systems Lab	0	0	3	1.5

UNIT-2:

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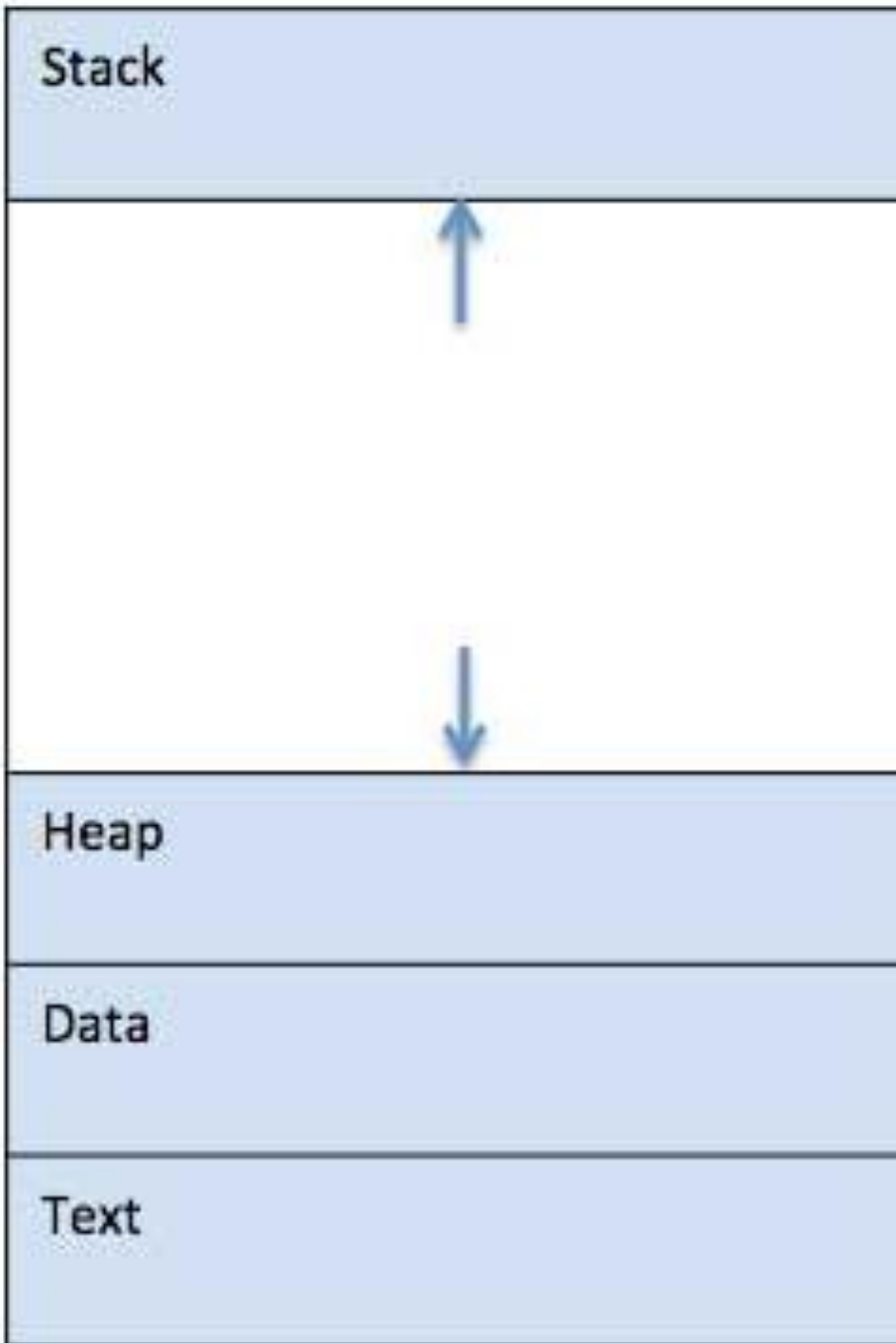
- **Process and CPU Scheduling –**
 - **Process Concepts** and Process Scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.
- **System call interface for process management–**
 - fork, exit, wait, waitpid, exec

Process Concept Definition

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- A process is basically a program in execution. The execution of a process must progress in a sequential fashion.
- A process is defined as an entity which represents the basic unit of work to be implemented in the system.
- To put it in simple terms, we write our computer programs in a text file and when we execute this program, it becomes a process which performs all the tasks mentioned in the program.



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Layout of a Process inside Main Memory

- When a program is loaded into the memory and it becomes a process, it can be divided into four sections —
 - stack,
 - heap,
 - text and
 - data. m

Component of Process & Description



- **Stack**

- The process Stack contains the temporary data such as method/function parameters, return address and local variables.

- **Heap**

- This is dynamically allocated memory to a process during its run time.

- **Text**

- This includes the current activity represented by the value of Program Counter and the contents of the processor's registers.

- **Data**

- This section contains the global and static variables.

Program Vs Process

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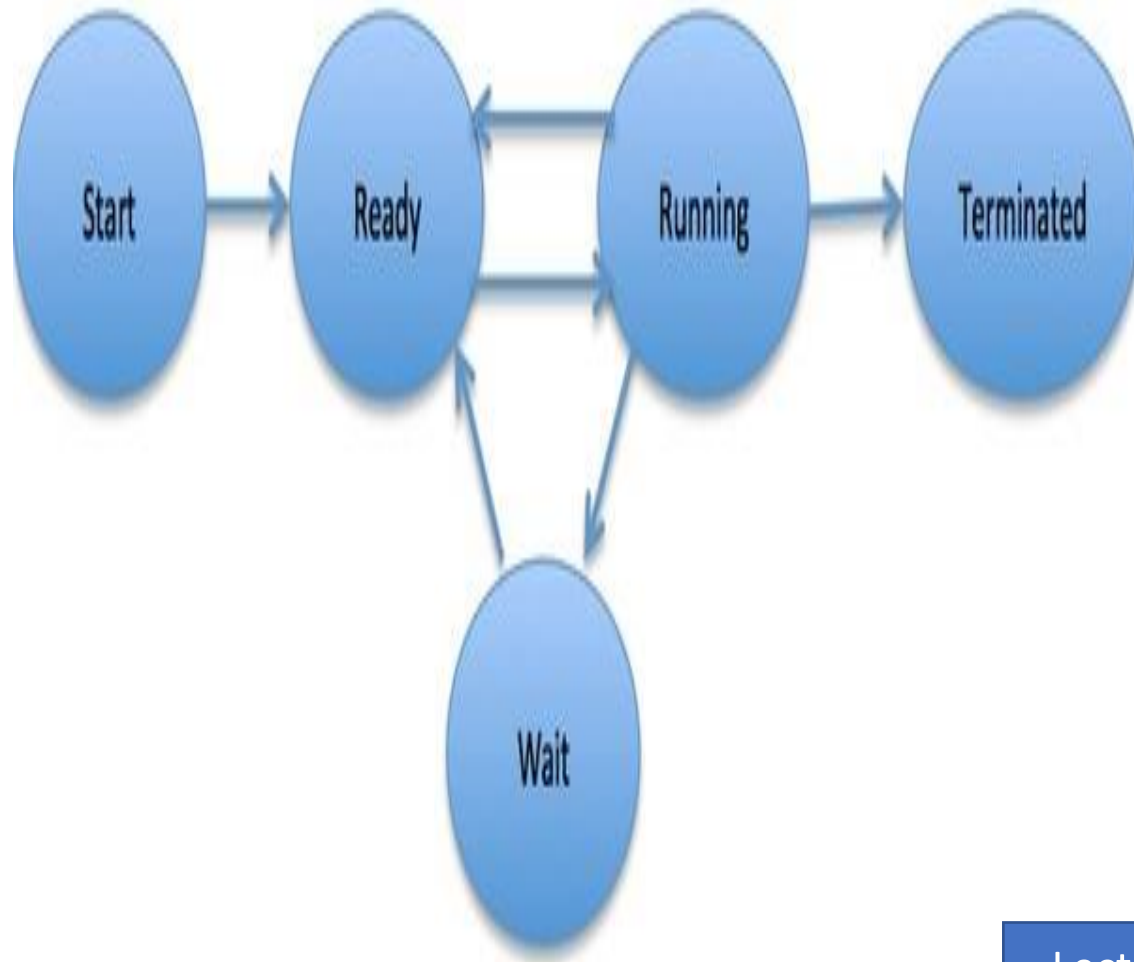
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SN	Program	Process
1	Program contains a set of instructions designed to complete a specific task.	Process is an instance of an executing program.
2	Program is a static entity.	Process is a dynamic entity.
3	Program does not have any resource requirement, it only requires memory space for storing the instructions.	Process has a high resource requirement, it needs resources like CPU, memory address, I/O during its lifetime.
4	Program does not have any control block.	Process has its own control block called Process Control Block.

Process Life Cycle

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- **New:** The process is being created.
- **Running:** Instructions are being executed.
- **Waiting:** The process is waiting for some event to occur (such as an I/O completion or reception of a signal).
- **Ready.** The process is waiting to be assigned to a processor.
- **Terminated.** The process has finished execution.

Process Control Block (PCB)

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Each process is represented in the operating system by a **process control block (PCB)**—also called a *task control block*.

Process ID
State
Pointer
Priority
Program counter
CPU registers
I/O information
Accounting information
etc....

Process privileges

This is required to allow/disallow access to system resources.

Process ID

Unique identification for each of the process in the operating system.

Process State

The current state of the process i.e., whether it is ready, running, waiting, or whatever.

Pointer

A pointer to parent process.

Program Counter

Program Counter is a pointer to the address of the next instruction to be executed for this process.

CPU registers

Various CPU registers where process need to be stored for execution for running state.

CPU Scheduling Information

Process priority and other scheduling information which is required to schedule the process.

Memory management information

This includes the information of page table, memory limits, Segment table depending on memory used by the operating system.

Accounting information

This includes the amount of CPU used for process execution, time limits, execution ID etc.