

## Assignment no. 3

Q.2) What are the parts of the process?

→ An Operating system executes a variety of programs.

- Batch system-jobs.

- Time-shared systems-user programs or tasks.

- Process-a program in execution is process.

- Multiple parts:-

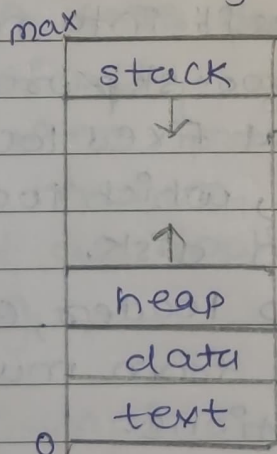
- a) The program code, also called text section.

- b) Current activity including program counter, processor registers.

- c) Stack containing temporary data which function parameters, return addresses, local variables.

- d) Data section containing global variables.

- e) Heap containing memory dynamically allocated during run time.



Q.3) Explain Process Control Block?

→ Information associated with each process is called as Process 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 files.

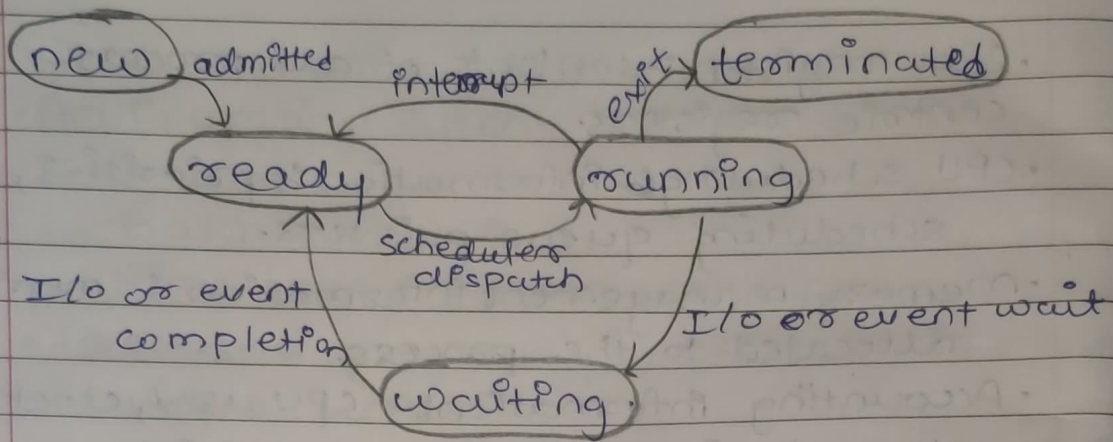
Process state
Process number
Program Counter
Registers
memory limits
list of open files
.....

Q.4) What are the states of the process? Explain with diagram.

→ As a process executes, it changes states.

- 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.





Q.5) Define.

1) CPU scheduling:-

Short-term scheduler selects from among the processes in ready queue, and allocates the CPU to one of them.

2) Job scheduling:-

Process that allocates system resources to control the execution of unattended background programs.

3) Job queue:-

Job queue set of all processes in the system.

4) Ready queue:-

Ready queue set of all processes residing in main memory, ready and waiting to execute.

5) Device queue:-

Device queue set of processes waiting for an I/O device.

6) Scheduler:-

A special type of system software that handles process scheduling in numerous ways.

7) Short-term scheduler:-

It selects which process should be executed next and allocates CPU.

8) Long-term scheduler:-

It selects which process should be brought into the ready queue.

9) Degree of multiprogramming:-

It describes the maximum number of processes that a single processor system can accommodate efficiently.

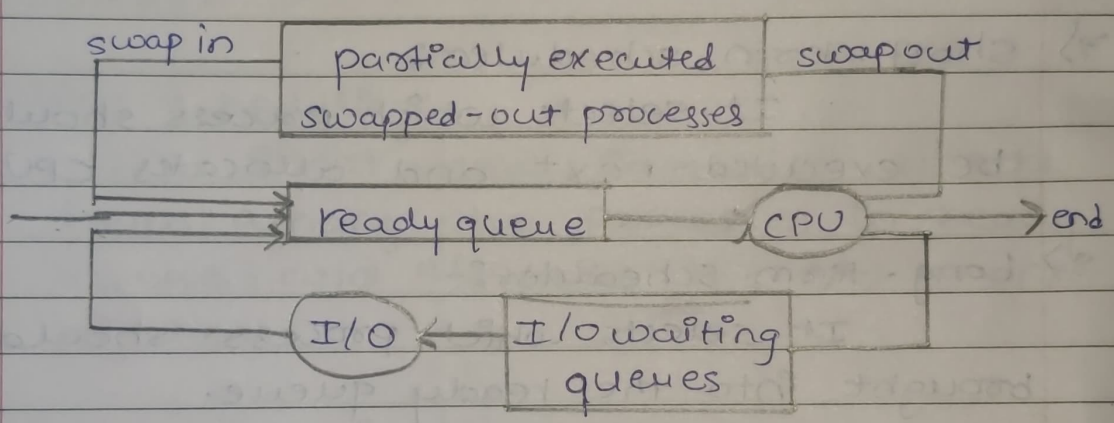
10) Context Switch:-

When CPU switches to another process, the system must save the state of the old processes and load the saved state for the new processes via context switch.



Q.6) Explain medium term scheduling with diagram.

- • medium-term schedulers can be added if degree of multiple programming needs to decrease.
- It removes process from memory, store on disk, bring back in from disk to continue execution: swapping.



Q.7) What is interprocess communication?

- • Processes within a system may be independent or cooperating.
- Cooperating process can affect or be affected by other processes, including sharing data.
- Reasons for cooperating process.
- Information sharing.
  - ~~Compp~~ Computation Speedup.
- Cooperating system processes need interprocess communication.
- It is the way by which multiple processes or threads communicate among each others.

Q.8) What are the advantages of cooperative process?

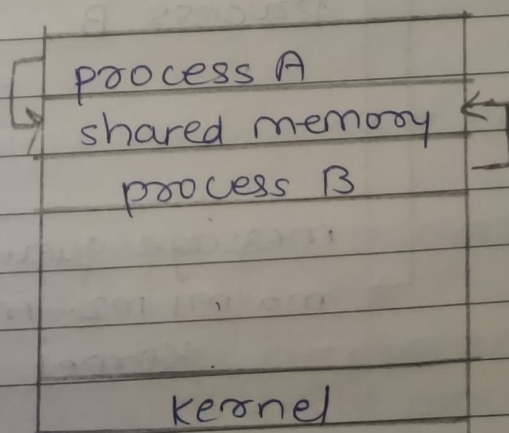
- 
- Independent process cannot affect or be affected by the execution of another process.
  - Cooperating process can affect or be affected by the execution of another process.
  - Advantages of cooperative process are as follows:-
    - a) Information sharing.
    - b) Computation speed-up.
    - c) modularity.
    - d) Convenience.

Q.9) Explain models used in IPC.

→ models used in IPC are as follows:-

1) Shared memory:-

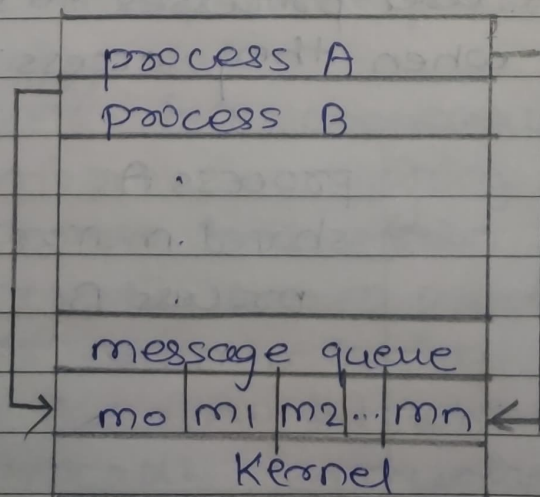
- An area of memory shared among the processes that wish to communicate.
- The communication is under control of user processes not OS.
- ~~So~~ A major issue is to provide mechanism that will allow user processes to synchronize their actions when they access shared memory.





## 2) message Passing:-

- Mechanism for processes to communicate and to synchronize their actions.
- Message system - processes communicate with each other without resorting to shared variables.
- If processes P and Q wish to communicate, they need to:
  - Establish a communication link between them.
  - Exchange messages via send/receive.
- Implementation of communication link
  - Physical:
    - a) Shared memory.
    - b) Hardware bus.
    - c) Network.
  - Logical:
    - a) Direct or indirect.
    - b) Synchronous or asynchronous.
    - c) Automatic or explicit buffering.



Q.1) Explain communication methods used in Client-server System.

→ 1) Sockets:-

- A socket is defined as an endpoint for communication.
- Concatenation of IP address and port - a numbers included at start of message packet.
- Communication consists between a pair of sockets.
- Three types of Sockets:-
  - Connection-oriented (TCP).
  - Connectionless (UDP).
  - Multisocket.

2) Remote Procedure calls:-

- Remote procedure call abstracts procedure calls between processes on networked system.
- The client-side stub locates server and marshalls the parameters.
- Remote communication has more failure scenarios than local. Messages can be delivered exactly once rather than at most once.

3) Pipes:-

- Acts as conduit allowing two processes to communicate.
- Ordinary Pipes:- cannot be accessed from outside process that created it. Typically, a parent process creates a pipe and uses it to communicate with child processes.



- Named Pipes :- can be accessed without parent-child relationship.

Q.12) Define.

1) CPU I/O Burst Cycle :-

This process execution consists of a cycle of CPU execution and I/O wait.

2) Dispatcher :-

Dispatcher module gives control of the CPU to the process selected by short-term scheduler.

3) Dispatch Latency :-

Time it takes for the dispatcher to stop one process and start another running.

4) CPU Utilization :-

CPU utilization is the process which keeps the CPU as busy as possible.

5) Throughput :-

# of processes that complete their execution per time unit.

6) Turnaround time :-

amount of time to execute a particular process.

7) Waiting time:-

amount of time a process has been waiting in the ready queue.

8) Response time:-

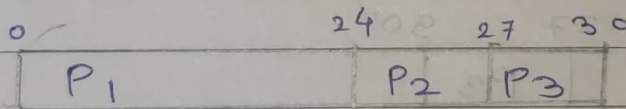
amount of time it takes from when a request was submitted until the first response is produced, not output.

Q.13) Calculate average waiting time & average turnaround time.

	Bursttime	Priority
P <sub>1</sub>	24	2
P <sub>2</sub>	3	1
P <sub>3</sub>	3	3

quantum = 4.

a) First Come, First serve scheduling:-



Waiting Time

$$P_1 = 0$$

$$P_2 = 24$$

$$P_3 = 27$$

Turnaround time

$$P_1 = 24$$

$$P_2 = 27$$

$$P_3 = 30$$

avg waiting time =

$$\frac{0 + 24 + 27}{3}$$

$$= \frac{51}{3}$$

$$= \underline{\underline{17}}$$

avg Turnaround time

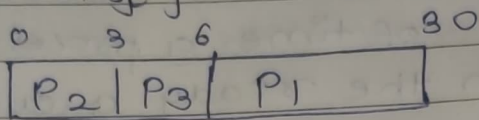
$$\frac{24 + 27 + 30}{3}$$

$$= \frac{81}{3}$$

$$= \underline{\underline{27}}$$



b) Shortest job first scheduling:-



Waiting Time

$$P_1 = 0$$

$$P_2 = 3$$

$$P_3 = 6$$

Turnaround time

$$P_1 = 3$$

$$P_2 = 6$$

$$P_3 = 30$$

avg waiting time =

$$\frac{0+3+6}{3}$$

$$= \frac{9}{3}$$

$$= \underline{\underline{3}}$$

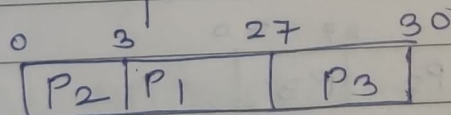
avg Turnaround time =

$$\frac{3+6+30}{3}$$

$$= \frac{39}{3}$$

$$= \underline{\underline{13}}$$

c) priority scheduling:-



Waiting Time

$$P_1 = 0$$

$$P_2 = 3$$

$$P_3 = 27$$

Turnaround time

$$P_1 = 3$$

$$P_2 = 27$$

$$P_3 = 30$$

avg waiting time =

$$\frac{0+3+27}{3}$$

$$= \frac{30}{3}$$

$$= \underline{\underline{10}}$$

avg Turnaround time =

$$\frac{3+27+30}{3}$$

$$= \frac{60}{3}$$

$$= \underline{\underline{20}}$$

d) Round-Robin algorithm:-

4	7	10	14	18	22	26	30
P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>1</sub>	P <sub>1</sub>	P <sub>1</sub>	P <sub>1</sub>	P <sub>1</sub>

Waiting time

$$P_1 = 30 - 24 = 6$$

$$P_2 = 7 - 3 = 4$$

$$P_3 = 10 - 3 = 7$$

Turn around time

$$P_1 = 30$$

$$P_2 = 7$$

$$P_3 = 10$$

avg waiting time =

$$\frac{6 + 4 + 7}{3}$$

$$= \frac{17}{3}$$

$$= \underline{\underline{5.6}}$$

avg Turnaround time =

$$\frac{30 + 7 + 10}{3}$$

$$= \frac{47}{3}$$

$$= \underline{\underline{15.6}}$$

short job first scheduling