

O.S Assignment-1
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$$1) P.A = 64MB.$$

$$LAS = 32-bit$$

$$\text{Page size} = 4KB$$

$$\text{No. of pages} = \frac{LAS}{\text{Pagesize}} = \frac{2^{32}}{2^{12}} = 2^{20}$$

$$\text{No. of frames} = \frac{64 \times 2^{20}}{2^{12}} = 2^{14}$$

$$\text{Page table size} = \text{No. of pages} \times \text{No. of frames.}$$

$$\Rightarrow 2^{20} \times 2^{14} \Rightarrow 2^{34}$$

$$\text{page offset} = LA - \text{Page size} = 32 - 12 = 20 \text{ bits.}$$

$$\text{Bits for Physical address} = 64MB = 2^6 \times 2^{20} = 2^{26}$$

$$= 26 \text{ bits.}$$

$$\text{Bits for Logical address} = 32 \text{ bits.}$$



2. A program that acts as an intermediary between a user of a computer and the computer hardware.

Type of o.s.

- ① Batch operating system.
- ② Time-sharing operating system.
- ③ Distributed operating system.
- ④ Network operating system.

1) Batch operating system:-

This type of operating system does not interact with the computer directly. There is an OS which takes similar jobs having similar req. and groups them in batch.
Example:- Payroll System, Bank statement, etc.

2) Time-sharing OS:-

Each task is given sometime to execute so that all the tasks work smoothly. Each user gets the time of CPU as the single system.

Example:- Multics, Unix etc.

3) Distributed Operating System :-

Major benefit of working with these type of O.S is that it always possible that one user can access the file or software which are not actually present on his system but some other system connected with this system.

Example = LOCUS, etc.

4) Network Operating System :-

These system run on a server and provide capability to manage data, users, group, security, application, and other networking functions.

Example :- Microsoft Windows server 2008, UNIX, LINUX etc

3) The interrupt is a signal emitted by hardware or software when a process or an event needs immediate attention.

There are two type of interrupt :

- o Hardware

- A device may trigger an interrupt by sending a signal to the CPU, usually by a way of the system bus.

- o Software

- A program may trigger an interrupt by executing a special operation called a system call.

4) i) FCFS [First come First service].

Process	AT	BT	CT	TAT	WT	RT.
P ₁	0	4	4	4	0	0
P ₂	1	2	6	5	3	3
P ₃	2	3	9	7	4	4
P ₄	3	1	10	7	6	6
P ₅	4	2	12	8	6	6
P ₆	5	6	18	13	7	7

Gantt chart :-

P ₁	P ₂	P ₃	P ₄	P ₅	P ₆	
0	4	6	9	10	12	18

$$ATT = \frac{44}{6} = 7.33$$

$$AWT = \frac{26}{6} = 4.33$$

(ii) SJF [Shortest Job First]:

Process	AT	BT.	CT	TAT	WT	RT.
P ₁	0	4	4	4	0	0
P ₂	1	2	7	6	4	4
P ₃	2	3	12	10	7	7
P ₄	3	1	5	2	1	1
P ₅	4	2	9	5	3	3
P ₆	5	6	18	13	7	7

Grantt chart:-

P ₁	P ₄	P ₂	P ₅	P ₃	P ₆	
0	4	5	7	9	12	18

$$\text{Avg WT} = \frac{22}{6} = 3.666 \quad \text{Avg TAT} = \frac{40}{6} = 6.666$$

(iii) SRTF [Shortest Remaining Time first]:

Process	AT	BT	CT	TAT	WT	RT
P ₁	0	4	9	9	5	0
P ₂	1	2	3	2	0	0
P ₃	2	3	12	10	7	7
P ₄	3	1	4	1	0	0
P ₅	4	2	6	2	0	0
P ₆	5	6	18	13	7	7

Grantt chart:-

P ₁	P ₂	P ₂	P ₄	P ₅	P ₁	P ₃	P ₆	
0	1	2	3	4	6	9	12	18

$$\text{Avg WT} = \frac{19}{6} = 3.166$$

$$\text{Avg TAT} = \frac{37}{6} = 6.166$$

(iii) RR [Round Robin]

Process	AT	BT	CT	TAT	WT	RT
P ₁	0	4	11	11	7	0
P ₂	1	2	5	4	2	0
P ₃	2	3	13	11	8	1
P ₄	3	1	6	3	2	2
P ₅	4	2	12	8	6	3
P ₆	5	6	18	13	7	4

Ready Que: [P₁|P₂|P₃|P₅|P₂|P₄|P₁|P₅|P₃|P₆|P₁|P₅|P₃|P₆]

Grantt Chart: [P₁|P₂|P₁|P₃|P₂|P₄|P₁|P₅|P₃|P₆|P₁|P₅|P₃|P₆]
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

$$\text{Avg WT} = \frac{32}{6} = 5.333$$

$$\text{Avg TT} = \frac{50}{6} = 8.333$$

(iv) Priority Scheduling, Preemptive

Process	AT	BT	Priority	CT	TAT	WT	RT
P ₁	0	4	4	18	18	14	0
P ₂	1	2	5	15	14	12	0
P ₃	2	3	6	14	12	9	0
P ₄	3	1	10	4	1	0	0
P ₅	4	2	9	6	2	0	0
P ₆	5	6	7	12	7	1	1

Grantt chart: [P₁|P₂|P₃|P₄|P₅|P₆|P₃|P₂|P₁]
0 1 2 3 4 5 6 7 8

$$\text{Avg WT} = \frac{36}{6} = 6$$

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$$\text{Avg TT} = \frac{54}{6} = 9$$

(iv) \rightarrow ② Priority Scheduling [Non-Preemptive].

Process.	AT	BT	Priority	CT	TAT	WT	RT
P ₁	0	4	4	4	4	0	0
P ₂	1	2	5	18	17	15	15
P ₃	2	3	6	16	14	11	11
P ₄	3	1	10	5	2	1	1
P ₅	4	2	9	7	3	1	1
P ₆	5	6	7	13	8	2	2

Grant chart : $\begin{array}{|c|c|c|c|c|c|c|c|} \hline P_1 & P_4 & P_5 & P_6 & P_3 & P_2 \\ \hline 0 & 4 & 5 & 7 & 13 & 10 & 18 \\ \hline \end{array}$

$$\text{Avg WT} = \frac{30}{6} = 5$$

$$\text{Avg TAT} = \frac{48}{6} = 8$$

5)

Long-Term Scheduler

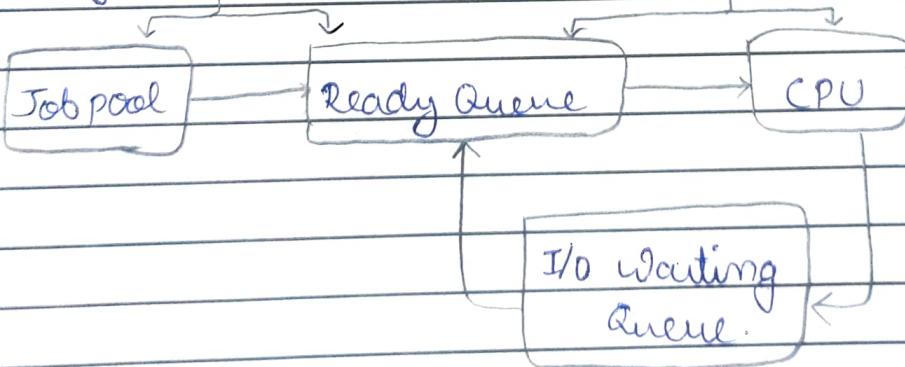
Short-Term Scheduler

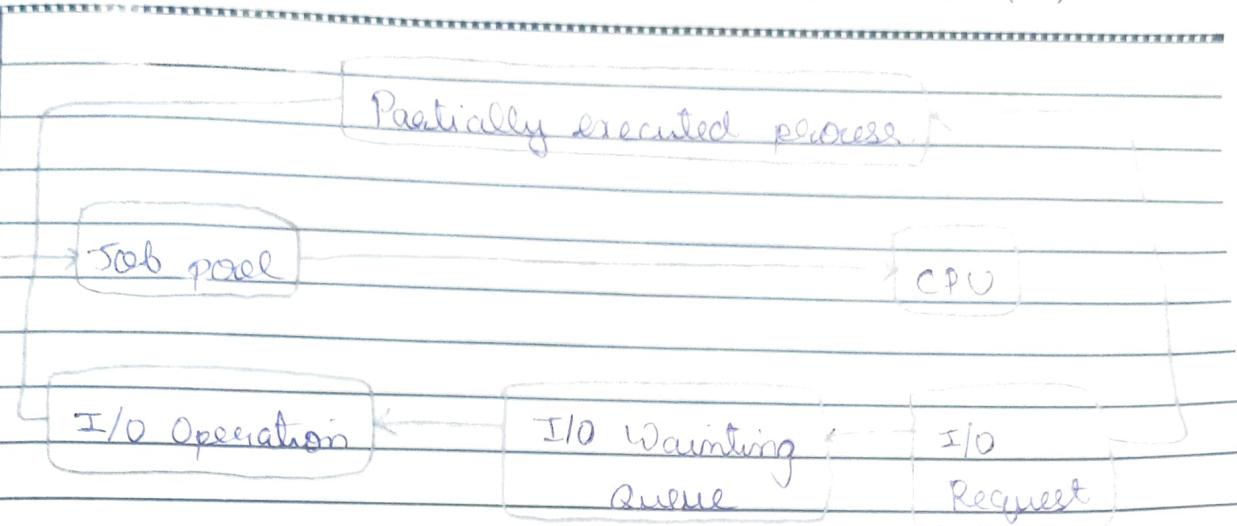
Medium-Term Scheduler

- It is a Job scheduler. It is a CPU Scheduler. It is a process swapping scheduler.
- It takes process from the job pool. It takes process from the ready state. It takes process from running or wait/dead state.
- Its speed is lesser than short-term scheduler. It is fastest among the two schedules. Its speed is in between long-term and short term.
- It controls the degree of multiprogramming. It has less control over the degree of multiprogramming. It reduces the degree of multiprogramming.

Long-term scheduler

short term scheduler.





Medium - Term scheduler

A-6

Thread

- Segment of process
- less time to terminate
- It take less time for creation
- It take less time for context switching
- It takes will be more efficient in term of communication
- Consume less resources

Process

- Programming execution
- More time to terminate
- It take more time for creation
- Takes more time for context switching
- Less efficient in terms of communication
- Consume more resources

7) A System call is the programmatic way in which a computer program requests a service from the kernel of the operating system it is executed on. A system call is a way for programs to interact with the operating system.

Service provided by System call:

1. Main memory management.
2. File access, Directory and File system management.
3. Device handling.
4. Protection
5. Networking, etc.

Fork system call is used for creating a new process which is called child process which runs concurrently with the process that makes the fork() call [parent process]

Example :

```
#include < std.h >
```

```
int main () {
```

```
fork();
```

```
print f ("Hello World")
```

```
return 0;
```

```
}
```

Output :

Hello World

Hello World

Q. # Multilevel Feedback Queue Scheduling (MLFQ) :-

This scheduling is like MLQ scheduling but in this process can move between the queues. MLFQ keep analyzing its behavior of process and according to which it changes its priority.

Advantage :-

- It is flexible.
- Allows aging, thus no starvation.

Disadvantage :-

- This algorithm is too complex.
- More CPU overheads

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- 1) Important functions of an operating system:
- 2) Security: The OS uses password protection to protect user data and employs other techniques.
- 3) Job accounting: Operating systems keep track of time and resources used by various tasks and users. This information can be used to track resources usage for a particular user or group of users.
- 4) Control over system performance: Monitors overall system health to help improve performance.
- 5) Error detecting aids: The OS constantly monitors the system to detect error and avoid the malfunctioning of a computer system.
- 6) Memory management: The operating system manages the primary or Main memory. Main memory is made up of a large array of bytes or words, i.e. assigned a certain address.

The operating system provides certain services to the users which can be listed in the following manner:

- 1) Program Execution: The OS is responsible for the execution of all type of programs whether it be user programs or system programs.
- 2) Handling Input/Output operation: The OS is responsible for handling all sort of inputs i.e from keyboard, mouse etc.
- 3) Resource Allocation: The OS is responsible for ensuring the proper use of all resources available by deciding which to be used by whom for how much time.
- 4) Manipulation of File system: The OS is responsible for making decision regarding the storage of all type of data or files.
- 5) Error Detection and Handling: The OS is responsible for the detection of any type of error or bugs that can occur while any task.