

Assignment - 1

Name: Shreerang Mhatre

Roll no: 29

Faculty: SY B.Tech Electrical & Computer Engg

PRN : 1032211745

Course: COOS

Q 1) Explain operating system and its functions.

→ * Operating System:

An operating system is a program which manages all the computer hardware. It provides the base for application program and acts as an intermediary between a user and the computer hardware.

* Functions of Operating System -

① Process Management -

A program does nothing unless their instructions are exactly by a CPU. A process is a program in execution. A time shared user program such as a compiler is a process. A word processing program being run by an individual user on a pic is a process.



② Main Memory Management -

The main memory is central to the operation of a modern computer system. Main memory is a large array of words or bytes ranging in size from hundreds of thousand to billions. Main memory stores the quickly accessible data shared by CPU & I/O device.

③ File Management -

File management is one of the most important components of an OS computer can store information on several different types of physical media magnetic tape, magnetic disk & optical disk are the most common media.

④ I/O System Management -

One of the purposes of an OS is to hide the peculiarities of specific hardware devices from the user.

⑤ Secondary Storage Management -

The main purpose of computer system is to execute programs. These programs with the data they access must be in main memory during execution. The computer system must provide secondary storage to back-up main memory.

Q 2) what are various operating system services?

→ The various operating system services are-

① Program Execution:

The system must be able to load a program into memory and to run that program. The program must be able to terminate this execution either normally or abnormally.

② I/O operation:

A running program may require I/O. This I/O may involve a file or a I/O device for specific device.

③ File system Manipulation:

The programs need to create and delete files by name and read and write files.

Therefore the operating system must maintain each and every files correctly.

④ Communication:

The communication is implemented via shared memory or by the technique of message passing in which packets of information are moved between the processes by the operating system.

Q 3) Explain various types of operating systems.

→ Types of operating systems are -

① Mainframe System:

It is the system where the first computer used to handle many commercial scientific applications.

② Personal Computer System:

Personal computer appeared in 1970's. They are microcomputers that are smaller & less expensive than mainframe systems.

③ Microprocessor Systems:

These systems have more than one processor in close communications which share the computer bus, clock, memory, & peripheral devices.

④ Distributed Systems:

In contrast to highly coupled systems, the processors do not share memory or a clock. Instead, each processor has its own local memory.

⑤ Real Time Systems:

Real time system is used when there are rigid time requirements on the operation of a processor or flow of data.

Q 4) what is process? Explain process life cycle and process control block.

→ • Process -

A process or task is an instance of a program in execution. The execution of a process must programs in a sequential manner. At any time at most one is executed.

• Process life cycle -

Process life cycle in OS is one of the five states in which a process can be starting from the time it has been submitted for execution, till the time when it has been executed by the system.

• Process Control Block.

Each process is represented in the OS by a process control block. It is also by a process control block. It is also known as task control block. A process control block contains many pieces of information associated with a specific process.

Q) Differentiate between process and thread.

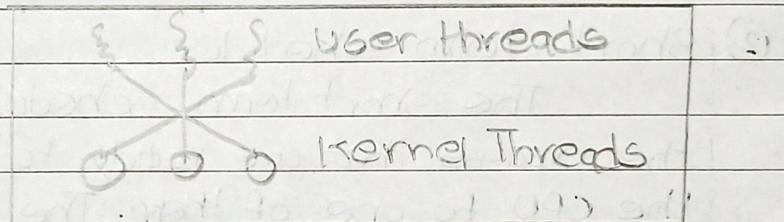
| Process | Thread. |
|---|---|
| ① Process means any program is in execution. | ① Thread means a segment of a process. |
| ② The process takes more time to terminate. | ② The thread takes less time to terminate. |
| ③ It takes more time for creation. | ③ It takes less time for creation. |
| ④ It also takes more time for context switching. | ④ It takes less time for context switching. |
| ⑤ The process is less efficient in terms of communication. | ⑤ Thread is more efficient in terms of communication. |
| ⑥ The process is isolated. | ⑥ Threads share memory. |
| ⑦ The process is called the heavy weight process. | ⑦ A thread is lightweight as each thread in a process shares code, data. |
| ⑧ If one process is blocked then it will not affect the execution of other process. | ⑧ If a user-level thread is blocked, then all other user-level threads are blocked. |

Q) Explain multithreading models with diagram.

→ Multithreading:- It is a process of multiple threads executes at same time.

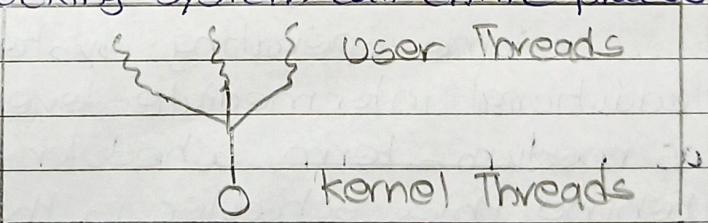
① Many to Many model

In this model, we have multiple user threads multiplex to same or lesser number of kernel level threads.



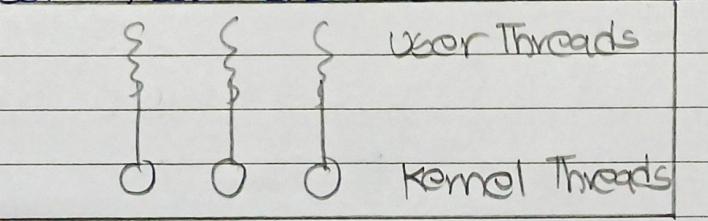
② Many to One Model:

In this model, we have multiple user threads mapped to one kernel thread. When a user thread makes a blocking system call entire process blocks.



③ One to One Model:

In this model, one to one relationship between Kernel and user thread. One thread can run on multiple processor.



Q 7) what are types of schedulers? Explain them with suitable diagram?

→ ① Long term scheduler:-

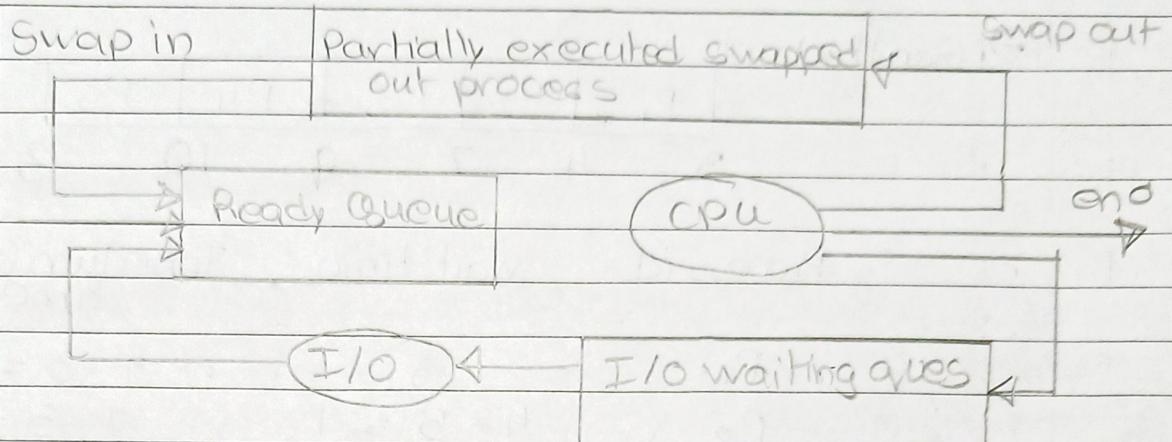
Long term scheduler selects process from the disk & loads them into memory for execution. It controls the degree of multi-programming i.e. no. of processes in memory. It executes less frequently than other schedulers.

② Short-term scheduler:

The short term scheduler selects among the processes that are ready to execute & allocates the CPU to one of them. The primary distinction between these two schedulers is the frequency of their execution.

③ Medium-term scheduler:

Some operating systems introduce an additional intermediate level of scheduling known as medium-term scheduler. The main idea behind this scheduler is that sometimes it is advantageous to remove processes from memory & thus reduce the degree of multiprogramming.

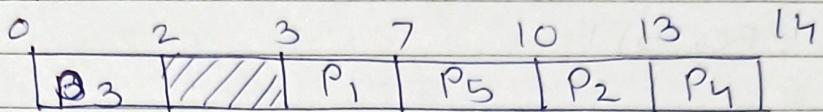


Q8) Consider the set of 5 processes whose arrival time and burst time are given below:-

| Process id | Arrival time | Burst time |
|------------|--------------|------------|
| P1 | 3 | 4 |
| P2 | 5 | 3 |
| P3 | 0 | 2 |
| P4 | 5 | 1 |
| P5 | 4 | 3 |

If the CPU scheduling policy is FCFS, SJF and RR. Calculate the average waiting time and average turn around time.

→ Gantt chart: For FCFS



The shaded box represents the idle time of CPU turn around time
 $= \text{Completion time} - \text{Arrival time}$

$$\text{Waiting time} = \text{Turn around time} - \text{Burst time}$$

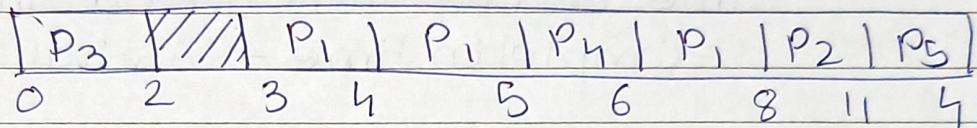
| Process ID | Completion time | Turn around time | Waiting time |
|----------------|-----------------|------------------|--------------|
| P ₁ | 7 | 7 - 3 = 4 | 0 |
| P ₂ | 12 | 13 - 5 = 8 | 5 |
| P ₃ | 2 | 2 - 0 = 2 | 0 |
| P ₄ | 14 | 14 - 5 = 9 | 8 |
| P ₅ | 10 | 10 - 4 = 6 | 3 |

$$\text{Average turn around time} = \frac{4+8+2+9+6}{5} = 5.8$$

$$\text{Average waiting time} = \frac{0+5+0+8+3}{5} = 3.2$$

For SJF

Gaunt chart



| Process ID | C.T | TAT | WT |
|----------------|-----|-----|----|
| P ₁ | 8 | 5 | 1 |
| P ₂ | 11 | 6 | 3 |
| P ₃ | 2 | 2 | 0 |
| P ₄ | 6 | 1 | 0 |
| P ₅ | 14 | 10 | 7 |

$$\text{Average TAT} = \frac{5+6+2+1+10}{2} = 4.8$$

$$\text{Average WT} = \frac{1+3+0+0+7}{5} = 2.2$$