OSV

* What is OS

An operating system is an interface between users and computer hardware. It provides users an environment in which a user can execute a programms conviently and efficiently.

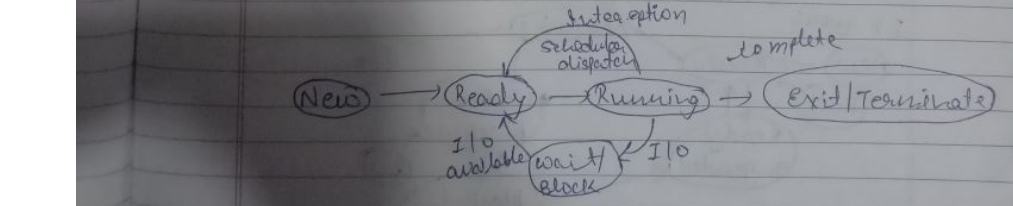
In technical terms it is a software which manages hardware. It controls the allocation of resources and services. Such as memory processors devices and information.

Up:2 :- Process Management

* What is process

A process is a programm in execution. A process is more than the programm code. When we write a programm in C or C++ and compile it compiler creates a binary code. The original code and binary code both are programms but when we actually run the binary code programm it becomes a process.

A process is an active entity whereas a programm is a passive entity.



* State of process

As a process executes it changes a state. The state of process is defined in part by the current activity of that process. A process may be in one of the following state

1. New :- It is a Newly created process.

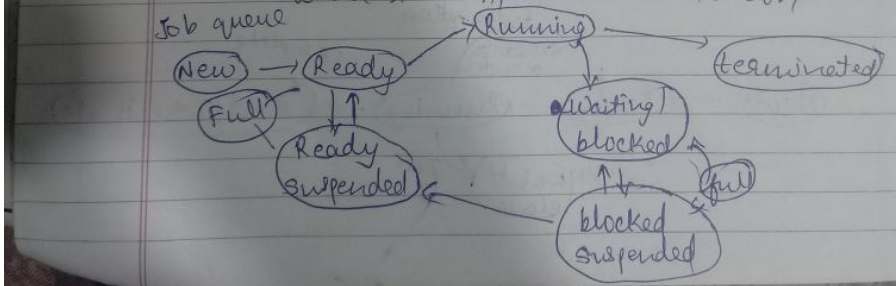
2. Ready :- After creation process moves to ready state. In this state process is ready for execution.

3. Running :- It stores currently running process in CPU.

Note down that only one process at a time can be under execution in a single processor.

4. Wait/block :- Process moves to this state when process request for I/o.

5. Terminated/completed :- Process enters in this state when it completed its execution



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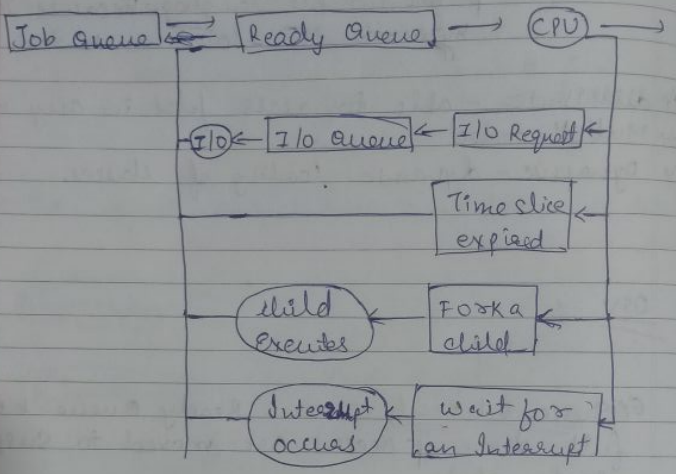
6) Suspended Ready :- When Ready queue becames full some processes are moved to susped Ready state.

7) Suspended block :- When waiting queue becomes full some process are moved to Suspend block

Scheduling Queue
Queuing Diagram



Their are three Schedule Queues

1. Job Queue
2. Ready Queue
3. I/O Queue or devices Queue.

1. Job Queue :- All process in system are put into Job Queue.

2. Ready Queue :- The processes that are residing in main memory and are ready and waiting to executed are kept on a list called read Queue.

* Devices Queue :- The list of process waiting for particular I/O (like printers, disc etc) is called a Device Queue or I/O Queue. Each Devices has its own device Queue.

A Queuing Diagram as shown above gives presention of process scheduling. Each rectangular box represents a Queue. The circle represents the sources that serves the queue. and the arrow indicates flow of the process in System

A new process is initially put in the Job Queue. Its waits in the ready queue until it is selected for execution.

Once the process is assigned to the CPU an is executing one of the several events could occur. The process could issue I/O request and then be placed in I/O queue or the process could create a New Sub process and waits for its termination or the process could be removed forcible from the CPU as a result of an Interrupt and be put back in ready queue.

The process continuously cycle until it terminates.

Objective of process scheduling

1. To keep the CPU busy at all time
2. Deliver acceptable response times for all programme particularly for interactive ones.

* The process scheduler

When more than one process is runable The operating system must decide which one is first. The part of the component of O.S concern with this decision is called the scheduler. And algorithm it uses is called the scheduling algorithm.

General Goals of Scheduler / functions / criteria

1. Fairness :- A scheduler make sure that each process gets its Fair share of CPU and no process can suffer indefinite post forward. Note that giving equal time is not the fair share.

2. Efficiency :- Scheduler should keep the system busy for 100%. of the time when possible If the CPU and all the I/O devices can be kept running all the time more work gets done per second when if they are Idle.

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Response Time

3) Response Time :- It a difference between first execution time & arrival time. The time taken by the system to respond to an input and display of required updated information is term as response time.

4) Through put :- Number of processes completed per unit time

5) Waiting Time :- Amount of time a process has been waiting in the ready Queue

6) Turn around Time :- It is interval of time between the submission of the process and its completion

7) CPU utilization :- Keeping the CPU as busy as possible i.e 0% to 100%.

8)

* Schedulers :-
Schedulers are special system software which handles process scheduling in various ways. Their main task is to select the Job to be submitted into the system. And to decide which process to run.
The Schedulers are of three types.
1) long Term
2) Short Term
3) Medium Term

1) long Term :- It is also known as a Job Queue scheduler. It determines which programs are admitted to the system for processing. It selects proc from the Job Queue and load them into memory for execution. It controls the degr of multiprogramming. If the degree of multiprogramming is stable then the average rate of process creation must be equal to the average depar rate of process leaving the system.

2. Short Term: Also known as CPU Scheduler. Its main objective is increase system performance. It is change of ready state to running state of the process. CPU Scheduler selects a process among the processes that are ready to execut and allocates CPU to one of them. Short Term Schedulers also known as dispatchers make the decision of which process to execute. Next short term scheduler is more faster than long terms.

3. Medium Term :- It is a part of Swapping. It removes the process from the memory. It is inharge of Handling the swap out processes. Running process may become suspended if it makes an I/O request. A suspended process cannot make any process towards completion. In this condition to remove the process from memory and makes space for other process. The suspended process move to the secondary ~~process~~ storage. This process is known as ~~Swapping~~. Medium Term scheduler

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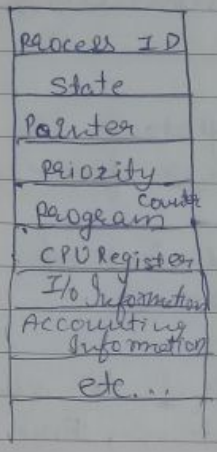
PCB → Process control block



Process control block is a datastructure maintain by OS for every process. The PCB is Identify by Inter process ID that is PID.
A PCB keeps all the Information needed to keep track of process as given in the diagram.

1) Process ID :- It is Unique Identification for each of the process in the operating System.

2) Process State :- The current state of the process is given in the field that is whether it is ready, running, waiting or whatever.

3) Pointer :- A Pointer to parent process

4) Priority :- It Indicates the priority of the process that is which process will occupy the CPU.

5) Program counter :- Program counter is a pointer to the address of the next instruction to be executed for this process.

6) CPU Registers :- Various CPU registers are there where process need to be store for execution

7) I/O Information :- These includes list of I/O services allocated to the process.

8) Accounting Information :- These include amount of CPU used for process execution, time limit, execution ID etc.

CPU Scheduling terms

1) Burst Time (BT) :- The amount of time process uses the processor or it is a time required by a process for CPU execution. It is also called as running time.

2) Arrival Time (AT) :- It is a time at which process enters in ready queue or ready state.

3) Completion Time (Finish Time) (CT) :- It is a time at which process completes its execution.

4) Turn around Time :-

$$TAT = CT - AT$$

SY Waiting Time :-(WT)

$$WT = TAT - BT$$

Primitive Scheduling	Nonprimitive scheduling
→ In primitive scheduling the task are mostly assigned with their peiority. Some times it is important to run a task with a higher peiority before another lower peiority task. Even if lower peiority task is still running. The lower peiority task holds for sometime and resumes when the higher peiority task finish its execution.	In this type of scheduling method CPU has been allocated to a specific process. The process that keeps the CPU busy will release the CPU either by switching context or teaminating. It is only method that can be used for various hardware platform.

CPU scheduler algorithm

1. FCFS
2. SJF
3. SRTF
4. Priority sched
5. RR scheduler

* FCFS

It is simplest scheduling algorithm that schedules the CPU according to arrival time of process.

eg:- Find out average waiting time and average turn around time for the following processes.

P.NO	AT	BT
1	0	4
2	1	3
3	2	1
4	3	2
5	4	5

dus.

P No	AT	BT	CT	TAT	WT
P1	0	4	4	4	0
2	1	3	7	6	3
3	2	1	8	6	5
P4	3	2	10	7	5
P5	4	5	15	11	6

WT = TAT - CT

TAT = CT - AT

$$ATAT = \frac{4+6+6+7+11}{5} = \frac{34}{5} = 6.8$$

$$AWT = \frac{0+3+5+5+6}{5} = \frac{19}{5} = 3.8$$