

# Assignment-1 Operating System

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1) Difference b/w Multiprogramming & Multitasking ?

- Multiprogramming

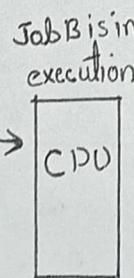
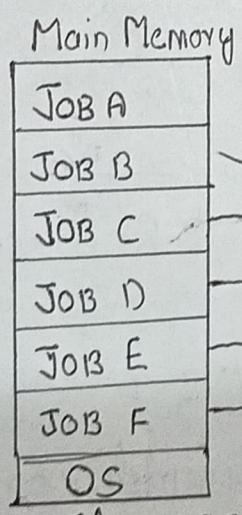
Whenever a needs I/O then the CPU takes the next process & process it. which means CPU will be busy all the time.

- Multitasking / Time sharing

The CPU will be multiplexing among the jobs without completing any job completely and that way interactiveness can be improved

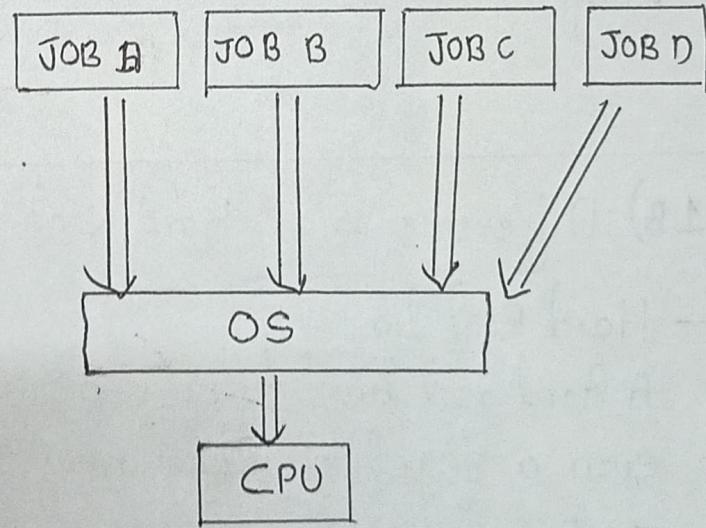
Diagram

Multiprogramming



Non preemptive in nature

Multitasking



Preemption is present

MULTIPROGRAMMING

- 1) Both of these are for single CPU.
- 2) In this OS CPU takes picks up a different job when the first process needs I/O.
- 3) Multiprogramming increases CPU utilization by organizing the jobs.

MULTITASKING

- Both of these are for single CPU.
- CPU will be multiplexing among the jobs without completing any.
- Multitasking increases both utilization & interactiveness.

4) Context switching is used here but the amount of context switching is greatly reduced

Context switching is more

5) Starvation is more as compare to Multitasking as when one job is in CPU then all the other jobs have to wait for their turn

Starvation is decreased due to multiplexing

6) Process with high priority will be executed first & those process with low priority have to ~~stop~~ wait for too long.

Process with high or low priority both will get chance of its execution

1B) Difference b/w Hard Real time & Soft Real time ?

- Hard Real time -

A Hard real time system is a system in which a failure to meet even a single deadline may lead to complete or appalling system failure.

- Soft Real time

System in which one or more failures to meet the deadline are not considered complete system failure, but that performance is considered to be degraded.

File Size	Size	
Terms	Hard Real time	Soft Real Time
File size	File size is small or medium.	Size of the data file is large.
Response time	Response time is predefined that is in millisecond.	Response time is higher.
Utility	A hard real time system has more utility.	It has less utility.
Databases	Has short databases	Has enlarged databases
Performance	Peak load performance should be predictable.	In soft real time , peak load can be tolerated.
Computation	In case of an error the computation is rolled back.	In soft real time computation is rolled back to previously established checkpoint to initiate a recovery action.
Examples	Air Traffic Control Satelite Systems, Space research Medical Systems Tools used for scientific experiments	Computer Games Multimedia Transmission

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1e) Difference b/w short term & long term scheduler?

Short term Scheduler	Long term Scheduler
Short term scheduler decides which process must be executed next & after deciding it will call 'Dispatcher'. Dispatcher is the software that is responsible for moving the process from Ready to Run state & vice-versa. It is called context switching.	No of processes that can be present in the ready state at maximum also known as degree of Multiprogramming is decided by Long term scheduler.
It is also known as CPU scheduler.	It is also referred as the Job scheduler.
It is faster	It is slower
It controls the processes present inside the CPU	It controls the degree of multiprogramming.
It chooses the processes from the ready queue.	It chooses the processes from the job pool.
Short term scheduler changes the process state from Ready to running	Long term scheduler changes the process state from New to ready.

Q-2) What are the purposes of operating system?

- 1) An operating system acts as ~~an~~ communication bridge <sup>(Interface)</sup> b/w the user and the computer hardware. ~~Interaction~~
- 2) Security - The operating system uses password protection to protect user data & similar other techniques. It also prevents unauthorized access to programs & user data.
- 3) Error detection - The operating system monitors the system to detect errors & ~~to~~ avoid the malfunctioning of a computer.
- 4) Process management - In a multiprogramming environment, OS decides the order in which processes have access to the processor, and how much time ~~a~~ each process must have. This function is called process scheduling. We have different scheduling algorithms with the help of which we can manage the processes.  
Ex - First come first serve  
Round Robin  
Shortest job first  
also known as CPU scheduling.
- 5) Memory management - The operating system manages the primary memory or main memory. For a program to be executed, it should first be loaded in the main memory. And it is the responsibility of OS. ~~to - keep track~~
  - OS keeps track of main memory.
  - " " " " how much memory is allocated, and how much is free.
  - OS keeps track of the process ~~whose~~ to whom memory is ~~allocated~~ allocated and how much is allocated to that process.

6) Process Synchronization - when two process needs to communicate they need to communicate using shared memory, whenever they communicate using shared memory there may be some problem/ some inconsistency. And it is the responsibility of OS to handle this.

Consider

7) File management - A file system is organized into directories for efficient or easy navigation & usage. These directories may contain other directories & other files. It is the responsibility of OS to keep track of where information is stored, user access, etc.

8) Resources management - Each process requires some resources for its successful execution. It is the responsibility of OS to allocate & deallocate resources. Ex of resource - I/O devices

9) Deadlock prevention

Q-3) Explain Multiprocessing operating System?

Ans- Instead of having one processor like in Multiprogramming we will have multiple processor. Multiprocessing helps in parallel computing and each of these processor can run multiple processes simultaneously. The system throughput is significantly improved.

- Starvation is greatly reduced because instead of executing one process at a time we are executing multiple processes.

Q-4) Explain Different states of a process?

New - when a process is created it is in New state. Process is in secondary memory

Ready - when process is ready to be picked up by the OS. Process is in main memory

Running - when process is in CPU or is <sup>in</sup> the execution phase.

Block/Wait - when a process needs I/O then it will be temporarily blocked

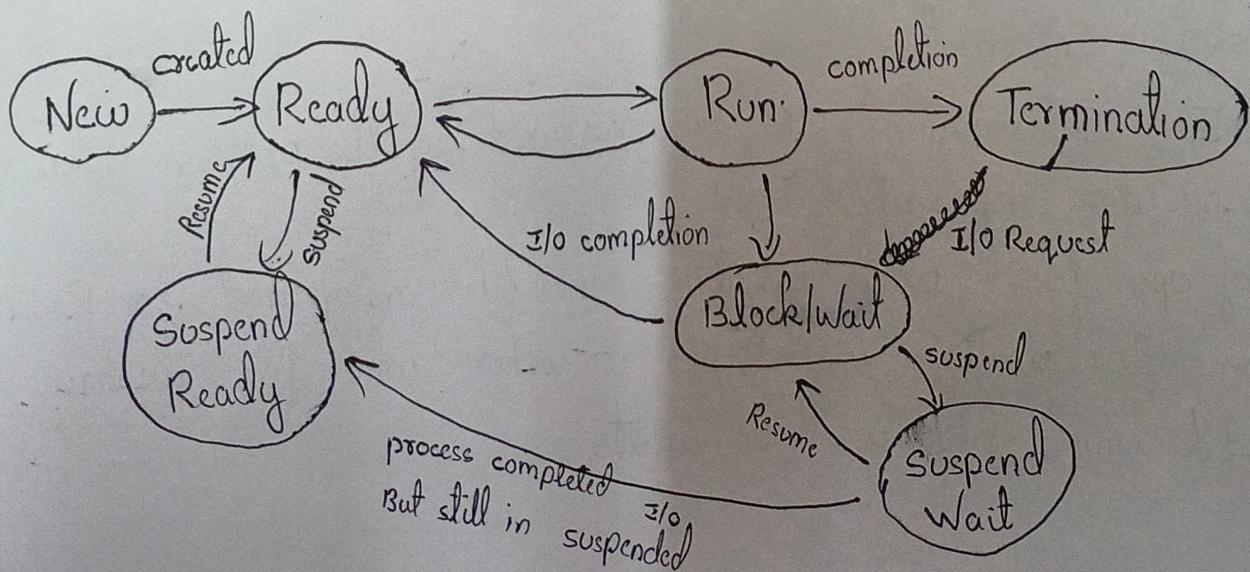
~~Suspend Ready~~

~~Suspend Block~~

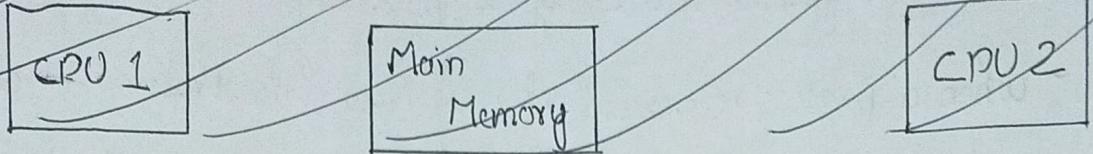
Termination - when a process is executed completely and is ready to leave the CPU.

Suspend Ready - when the main memory is full and a new process having highest priority has arrived then a process in the main memory should be suspended & room must be made for new process.

Suspend Block - Suspending the process which is in Block state because a process with high priority has arrived



Diagram



Q-5) what is a process Control Block ?

Ans- A PCB is a data structure used by computer operating system to store all the information about a process. When a process is created, the operating system creates a corresponding process control block.

PCB contains the following attributes of a process

- 1) Process ID - Unique no given to a process to identify it.
- 2) Process Counter - stores the pointer to the next ~~process~~ instruction to be executed.
- 3) Process state - New, Ready, Run, Blocked etc.
- 4) Priority - Number assigned to the process when it is created.
- 5) CPU Registers
- 6) CPU Scheduling Information
- 7) Memory Management Information
- 8) I/O status Information
- 9) Accounting Information - CPU time required by the process is known as accounting information.
- 10) List of open files - while executing some files are opened for Reading & some for writing. we should remember which files we have read & which files we have written.

### 6 a) Cascading Termination

Cascading Termination refers to termination of all child processes if the parent process terminates normally or abnormally.

Some processes don't allow child processes to exist if the parent process has terminated. Cascading termination is normally initiated by the operating system.

### 6 b) Functions of kernel

The Kernel is the heart of the operating system. It is the kernel of an OS through the medium of which OS exercises control over the computer system.

#### Functions of kernel

- scheduling processes
- Resource allocation
- Device Management - Devices include I/O etc
- Interrupt handling & system calls
- Memory Management
- Process Management

### 6 c) Context Switching - It is a technique used by OS to switch a process from one state to another to execute the function using CPUs in the system.

In computing, a context switch is the process of storing the state of a process or thread, so that it can be restored & resume execution at a later point, & then restoring a different, previously saved, state.

## 6.d) Spooling

Spooling is a process in which data is temporarily held to be used & execute by device, program or the system. Data is sent to & stored in memory or other volatile storage until the program or computer requests it for execution. "Spool" is technically an acronym for simultaneous peripheral operations online.