& Process

## Job Scheduling

Job Scheduling is the process of allocating sys resources to many diff. tasks by an OS.

The process scheduling is the activity of the process manager that handles the removal of the running process from the CPU & it selects the another process on the basis of particular strategy.

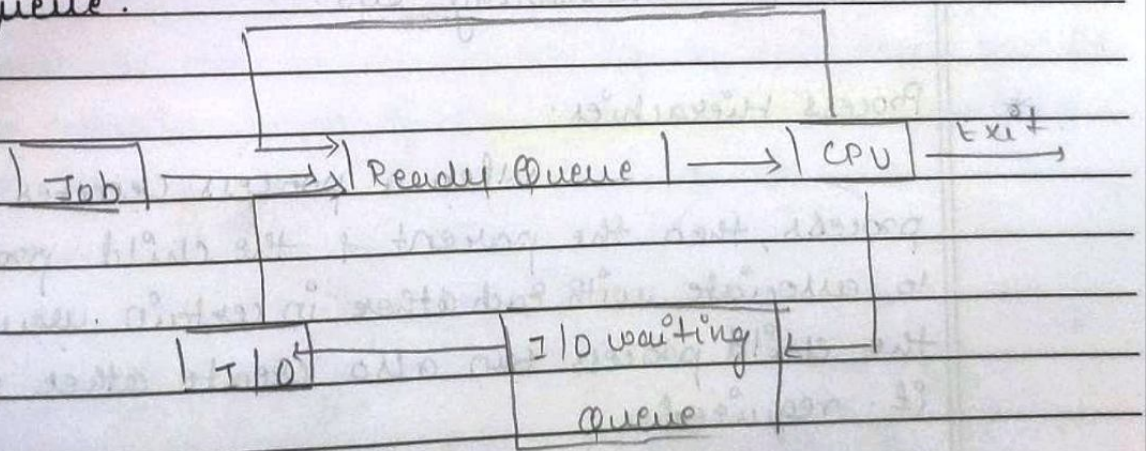
## Process Scheduling:

Scheduling Queue: The Buffer where processes resides & waiting for CPU

1. **Job Queue**: This Queue stores all the process in the sys. Process state will be new.

2. **Ready Queue**: A process which ~~is ready to Execute in the~~ resides in the main memory & ready to Execute is called Ready Queue.

3. **Waiting / Device / I/O Queue**: All the processes which are interrupted due to I/O request or unavailability of an I/O device constitute this queue.




## Schedulers

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* 3 types of scheduler.

1. Job / Long term:
   selects some processes from the pool of processes & keeps them in buffer of main memory.
   - Invoked very infrequently (seconds, min) ⇒ slow in speed.
   - Implemented bet^n. the memory & ready Q.

2. ~~Long~~ / Short term
   Select one process from ~~the~~ some no. of ready ~~Q~~ processes & assign it to CPU for execution.
   - Invoked very frequently (milliseconds) ⇒ fast scheduler

3. Middle Term Scheduler:
   Implemented bet CPU & ready Q to take out a running job from CPU & sends it back to Ready Q.
   - Used by the sys to schedule the processes when a running job is interrupted to leave the CPU used in timesharing sys.

* Process Hierachies:
   When a process creates another process, then the parent & the child processes tend to associate with each other in certain way & further the child process can also create other processes if required.
   - This parent child like structure of processes form a hierachy, called Process Hierarchy.

- There are diff. ways for creating new process.

1. Execution: The child process is executed by the parent process concurrently or it waits till all children get terminated.

2. Sharing: The parent or child process shares all resources like memory or files or children process shares a subset of parent's resources.

* Problem Concurrent process

* Concurrency:

Concurrency is the execution of the multiple instruction sequences at the same time. It happens in the OS when there are several process threads running in parallel.

- The running process always communicate with each other through passing msg or memory.
- This sharing of resources always cause to problems like deadlock & resources starvation.

* Principle Problems in Concurrency

Both interleaved & overlapped processes can be viewed as eg. of concurrent process

- The relative speed of execution cannot be predicted It depends on:

1. The activities of other processes.
2. The way OS handles interrupts
3. The scheduling policies of the OS

4)

* Problems in Concurrency

1. Sharing global resources

Sharing of global resources is difficult.

- If 2 processes both make use of a global variable to perform read & write, the execution becomes critical.

2. Optimal allocation of resources

It becomes difficult for OS to manage the allocation of resources.

3. Locking the channel:

It may be inefficient for the OS to simply lock the channel & prevents its use by other processes.

4. Locating programming Errors:

It is very difficult to locate a prog^m. Error bcoz reports are usually not reproducible.

* Advantages of Concurrency

1. Running of multiple appⁿ:

It enable to run multiple appⁿ. at the same time.

2. Better resource utilization

It enables that the resources that are unused by 1 appⁿ. can be used by other 1 for other appⁿ.

3. **Better average response time:**

Each appn. has to run to complete the process within time or before the next process.

4. **Better performance:**

When 1 appn uses only the processor & another appn uses only the disk driven then the time to run both appn concurrently will be shorter than the time to run

* **Critical section Problem:**

~~The critical section is a code segment where the shared~~ When more than one processes access the same code segment that segment is known as the critical section.

- **Rules for critical section**

1. **Mutual Exclusion**

It is used for controlling access to shared resources.

- It includes priority inheritance mechanism to avoid extended priority.
- It implies only one process can be inside the critical section at any time

2. **Progress:**

It is used when no. of is in the critical selection;

**Bound waiting:** when a process makes a request for getting into critical section, there is a specific limit about no. of processes.

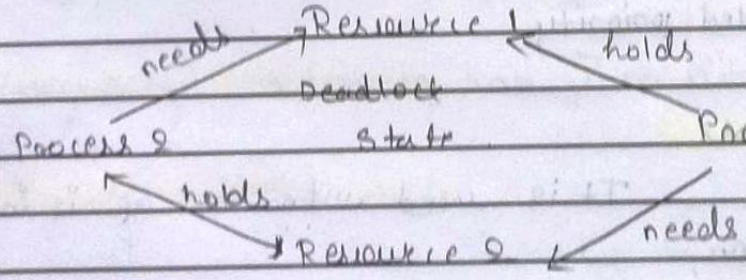
* **Synchronization:**
It is the way by which processes that share the same memory space are managed in an OS.

**Two types of Synchronization**

1. **Process Synchronization:**
The simultaneous execution of multiple threads or processes to reach certain result is PS.

2. **Data Synchronization**
It involves the maintenance of data to keeps multiple copies of data coherent with each other, or maintain data integrity.

* **Deadlock**
It is a situation in which more than one process is blocked bcoz it is holding a resource & also requires some resource that is acquired by some other process.




* **Deadlock occurs ~~in~~ occurs if the following conditions arise.**

1. **Hold & wait.** A process is holding at least 1 resource & waiting for other resource.

2. **Mutual Exclusion.** 2 or more resource are non shareable.

3. **No Preemption**: A resource cannot be taken from a process unless the process releases the resources.

4. **Circular wait**: A set of processes are waiting for each other in circular form.

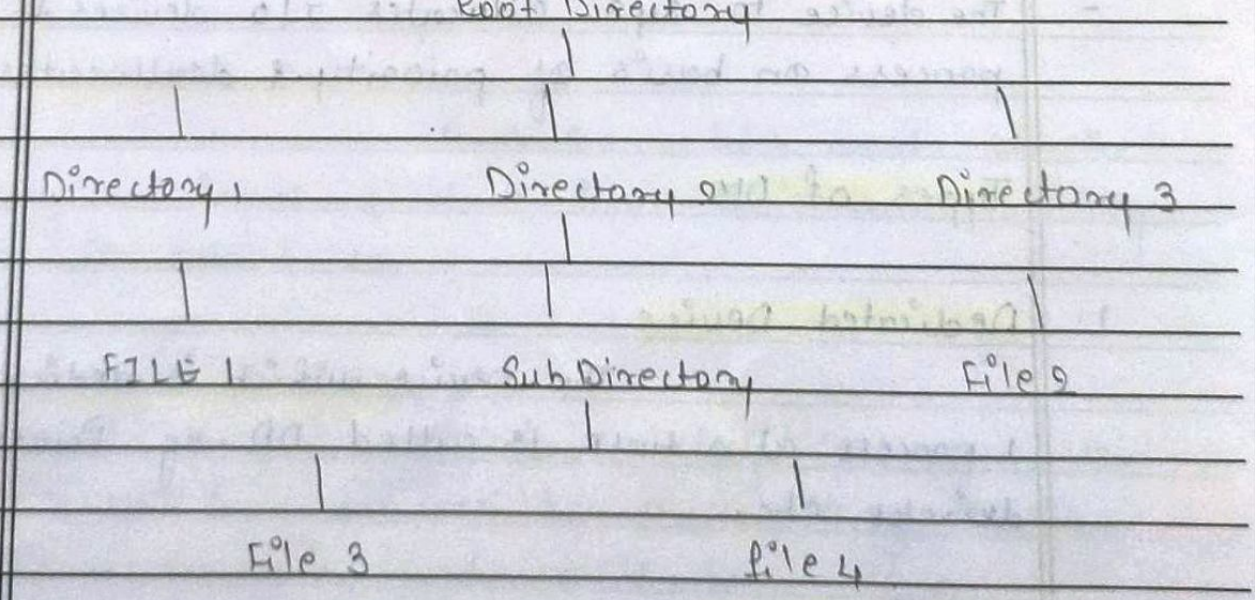
* **Methods for handling deadlock.**

1. Deadlock prevention or avoidance
2. Deadlock detection & recovery
3. Ignore the problem altogether.

* **File Management.**

FM in OS is the software that handles or manages the files.

- The FM in OS allows users to create a new file, modify & delete the old file present at different locations of the computer system.
- The file mangement software manages the locations of the file stored, so that files can be used or extracted, or located easily.
- The file management in the OS provides I/O operation which support read, write ~~opera~~ on the file.



* File management fun. / Components

1. File Attribute :
   characteristics of files like size, location on disk, etc.

2. File Operations :
   task that can be performed on the file

3. File Access permission :

4. File Sys :
   logical method of file storage in a computer sys.

* Operating on file :

1. Creating
2. Reading
3. Writing
4. Deleting
5. Truncating.

* Device Management :
   DM in OS manages all the hardware or virtual device of a computer.
- The device m sys. allocates I/O devices to the process on basis of priority & deallocates too.

Types of DM :

1. Dedicated Device
   The Device which is dedicated for 1 process at a time is called DD ; eg. Printer, tape drivers, etc.

2. Shared Devices : Device which can be shared or allocated bet^n 2 or more processes.

3 **Virtual Device:**

When the dedicated device were converted into shared device it is called virtual Device

* **Fundamental type of I/O devices**

1. **Boot Device**

Boot device were the part of hardware which consists of data or files necessary to start computer

2. **Character Device:**

A device which works on the given input & don't have their own memory is called CD

3. **Network Device:**

The device helps to connect the comp. to a network by transmitting the data packs known as network devices.