In computing, scheduling is the method by which work specified by some means is assigned to resources that complete the work.

A scheduler is what carries out the scheduling activity. Schedulers are often implemented so they keep all computer resources busy, allow multiple users to share system resources effectively, or to achieve a target quality of service. Scheduling is fundamental to computation itself, and an intrinsic part of the execution model of a computer system; the concept of scheduling makes it possible to have computer multitasking with a single central processing unit

A scheduler may aim at one of many goals, for example, maximizing throughput, minimizing response time, or minimizing latency, maximizing fairness. In practice, these goals often conflict, thus a scheduler will implement a suitable compromise. Preference is given to any one of the concerns mentioned above, depending upon the user's needs and objectives.

Another component that is involved in the CPU-scheduling function is the dispatcher, which is the module that gives control of the CPU to the process selected by the scheduler. It receives control in kernel mode as the result of an interrupt or system call.

The dispatcher should be as fast as possible, since it is invoked during every process switch. The time it takes for the dispatcher to stop one process and start another is known as the dispatch latency.

**Earliest Deadline First**: Earliest deadline first (EDF) or least time to go is a dynamic scheduling algorithm used in real-time operating systems to place processes in a priority queue. Whenever a scheduling event occurs, the queue will be searched for the process closest to its deadline, which will be the next to be scheduled for execution.

**Multilevel queue scheduling:** This is used for situations in which processes are easily divided into different groups. For example, a common division is made between foreground (interactive) processes and background (batch) processes. These two types of processes have different response-time requirements and so may have different scheduling needs. It is very useful for shared memory problems.

**First in, first out:** First in, first out (FIFO), also known as first come, first served (FCFS), is the simplest scheduling algorithm. FIFO simply queues processes in the order that they arrive in the ready queue. This is commonly used for a task queue, for example as illustrated in this section.

Since context switches only occur upon process termination, and no reorganization of the process queue is required, scheduling overhead is minimal.

Throughput can be low, since long processes can hold the CPU

Turnaround time, waiting time and response time can be high for the same reasons above

No prioritization occurs, thus this system has trouble meeting process deadlines.

The lack of prioritization means that as long as every process eventually completes, there is no starvation. In an environment where some processes might not complete, there can be starvation.

It is based on queuing.

In concurrent computing, a deadlock is a state in which each member of a group of actions, is waiting for some other member to release a lock. In an operating system, a deadlock occurs when a process or thread enters a waiting state because a requested system resource is held by another waiting process, which in turn is waiting for another resource held by another waiting process. If a process is unable to change its state indefinitely because the resources requested by it are being used by another waiting process, then the system is said to be in a deadlock.

**Handling Methods**

**Ignoring deadlock**

**Detection:** Always grant resource request when possible. Periodically check for deadlocks. If a deadlock exists, recover from it.

**Prevention:** Disallow one of the four necessary conditions for deadlock.

The final condition is the circular wait condition

The no preemption condition

The hold and wait or resource holding condition

the mutual exclusion condition

**Avoidance:** Do not grant a resource request if this allocation have the potential to lead to a deadlock.