**Grand Home Assignment (Operating Systems)**

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OS = Windows

Topic = Process Scheduling

**Process:**

It is a program being executed by an OS.

**CPU Burst:**

Amount of time an OS allows a processor to be used by a process before it is no longer in the ready queue.

**Process Scheduling:**

In a few windows operating systems, the mode of scheduling of a process is priority based and the process in the system with the highest priority runs first but despite what mode of scheduling is applied, the processes that run can get constrained by the processors on which they run.

Processes in some other windows operating systems can also run for a fixed length of time (quantum) before control shifts to another process.

For processes to go into CPU for execution, dispatcher is used and the following factors play a part in Process Scheduling:

1. Process Start Time
2. Process Completion Time
3. Process Response Time
4. Process Turnaround Time
5. Throughput

In windows, a process goes through a number of states during the time it gets performed and different schedulers are used in order to ensure efficient working of processes in state transition however long term schedulers are not used in windows as processes (when they are created) go into the ready queue immediately after creation.

**Dispatcher:**

It is located in the windows kernel and is used in the handling of windows process scheduling.

**Medium Term Scheduler:**

It is used in the removal of error-ridden programs out of the state transition

**Short Term Scheduler:**

It is used in deciding which one of the processes that are ready for execution gets CPU from the dispatcher. They are also known as CPU schedulers.

**Processing Algorithms in windows:**

While there are many processing techniques applicable for windows Operating systems such as:

1. **FCFS (First Come First Serve)**

A temporal scheduling strategy where the process to first request the services of CPU gets executed and though it is a robust algorithm , it has glaring flaws such as convoy effect (An effect in which the OS slows down due to a few slow processes) or Production of high average waiting time.

1. **Shortest Job First (SJF)**

A process scheduling strategy which gives priority towards processes with smaller burst length (less execution time) but cannot be implemented practically since process sizes need to be determined before execution for SJF to be possible.

1. **Round Robin**

Preemptive version of FCFS algorithm where each process is allocated a fixed time quantum for execution sequentially and continues to get the time quantum until it is executed.

1. **Preemptive Priority:**

An scheduling technique where Process with the greatest priority is given CPU time first.

1. **Multi-Level Feedback Queue:**

Processes are placed in different Priority queues depending on how much CPU time a process will take and the priority queue of a process can change in accordance with it’s behavior.

In windows, many different scheduling techniques are applied in different versions of windows operating systems such as round robin in combination with multi-level feedback queue in Windows NT or preemptive priority scheduling in windows XP while preference was also given to I/O bound processes and shorter jobs.

In windows, many harmful events can occur in Process scheduling and great care has to be taken in the negation of such events such as:

1. Starvation of processes:

If Process starvation (delaying of execution of Process) occurs then the solution of aging is applied where a process suffering from starvation will be allowed an increment in priority until it reaches a level of priority where it can get processed.

1. Priority Inversion:

If Priority Inversion (preemption of a process with greater priority by a process of lesser priority) occurs then it can be rectified by Priority Inheritance Protocol.

For process scheduling in windows, there are multiple priority levels for a process such as Real-time, High, Above Normal, Normal, Below Normal, and Low.