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# OPERATING SYSTEMS ITE2002

# THEORY DIGITAL ASSIGNMENT

## * Priority Scheduling Algorithm

Priority Scheduling Algorithm executes the processes depending upon their priority. Each process is allocated a priority and the process with the highest priority is executed first. Priorities can be defined internally as well as externally. Internal priorities are decided by the system depending upon the number of resources required, time needed etc. whereas external priorities are based upon the time in which the work is needed or the amount being paid for the work done or the importance of process. Priority Scheduling can be preemptive or non-preemptive.

NOTE:

- If two processes have the same priority then tie is broken using FCFS.
- The waiting time for the highest priority process is always zero in preemptive mode while it may not be zero in case of non-preemptive mode.

DISADVANTAGES:

The major problem is the starvation or indefinite blocking. It may so happen that in stream of processes, the system keeps executing the high priority processes and the low priority processes never get executed.

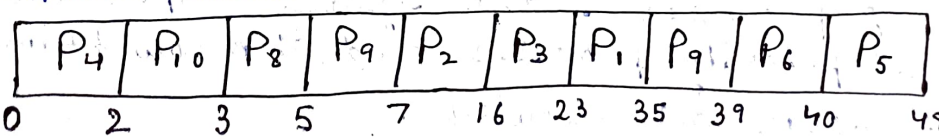
Example :

| Process | Burst Time | Priority |
|---|---|---|
| $P_1$ | 12 | 7 |
| $P_2$ | 9 | 5 |
| $P_3$ | 7 | 6 |
| $P_4$ | 2 | 1 |
| $P_5$ | 8 | 10 |
| $P_6$ | 1 | 9 |
| $P_7$ | 4 | 8 |
| $P_8$ | 2 | 3 |
| $P_9$ | 2 | 4 |
| $P_{10}$ | 1 | 2 |

* Given the burst time and priority of the processes, we create another table according to decreasing priorities.

| Process | Burst Time | Priority | Waiting Time |
|---|---|---|---|
| $P_4$ | 2 | 1 | 0 |
| $P_{10}$ | 1 | 2 | 2 |
| $P_8$ | 2 | 3 | 3 |
| $P_9$ | 2 | 4 | 5 |
| $P_2$ | 9 | 5 | 7 |
| $P_3$ | 7 | 6 | 16 |
| $P_1$ | 12 | 7 | 23 |
| $P_7$ | 4 | 8 | 35 |
| $P_6$ | 1 | 9 | 39 |
| $P_5$ | 8 | 10 | 40 |

* Gantt Chart



* The Gantt Chart is prepared using given priorities and burst time of processes. By making use of the Gantt Chart, we find out the Waiting Time for each process.

⇒ Waiting Time : $P_1 = 23$ ms, $P_2 = 7$ ms, $P_3 = 16$ ms, $P_4 = 0$ ms, $P_5 = 40$ ms, $P_6 = 39$ ms, $P_7 = 35$ ms, $P_8 = 3$ ms, $P_9 = 5$ ms, $P_{10} = 2$ ms

⇒ Average Waiting Time $= \frac{\text{Sum of Waiting Time for all Process}}{\text{Total number of Process}}$

$$= \frac{P_1 + P_2 + P_3 + P_4 + P_5 + P_6 + P_7 + P_8 + P_9 + P_{10}}{10}$$

$$= \frac{23 + 7 + 16 + 0 + 40 + 39 + 35 + 3 + 5 + 2}{10} \text{ ms}$$

$$= \frac{170}{10} = 17 \text{ ms}$$

Answer : The Average Waiting Time for all the given processes using Priority Scheduling Algorithm is 17 ms

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* Round Robin Scheduling Algorithm

It is particularly designed for time sharing systems. The processes are put into the ready queue (a circular queue). The algorithm selects the first process from the queue and executes it for the time defined by the time quantum. If the process has burst time less than the time quantum then the CPU executes the next process but if it has burst time higher than the time quantum then the process is interrupted and next process is executed for same time quantum

⇒ It is preemptive in nature.

* The difference between Priority Scheduling and Round Robin Scheduling Algorithms are as follows:

| PRIORITY SCHEDULING | ROUND ROBIN |
|---|---|
| It executes the processes according to the priority, i.e, process with higher priority is executed first. | It executes the processes based upon the time-quantum defined, i.e; each process is executed for a fixed amount of time. |
| It is both preemptive and non-preemptive in nature. | It is preemptive in nature. |
| The average waiting time and average response time is unknown beforehand. | The average waiting time for given set of processes is quite small and depends on the time quantum. |
| It is easy to implement and least suited for real time operating systems. | It is quite easy to implement RR in any system. |
| The problem of blocking of a process can be solved using aging. | Each process is executed and every user feels that his work is being done as the CPU gives equal amount of time to each process. |

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