OPERATING SYSTEMS

Module2_Part8

Textbook : Operating Systems Concepts by Silberschatz

Scheduling algorithms

CPU scheduling deals with the problem of deciding which of the processes in the ready queue

is to be allocated the CPU. There are many different CPU-scheduling algorithms. Some of

them are

First-Come, First-Served Scheduling

Shortest-Job-First Scheduling

shortest-remaining-time-first

Priority Scheduling

Round-Robin Scheduling

Priority scheduling

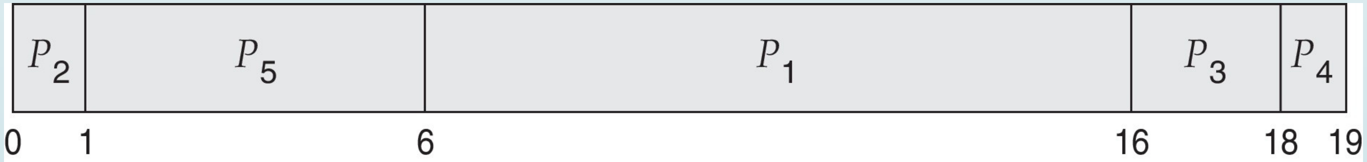
- A priority number (integer) is associated with each process
- The CPU is allocated to the process with the highest priority (usually, smallest integer   highest priority)
- Two schemes:
  - Preemptive
  - Nonpreemptive
- Problem   **Starvation** – low priority processes may never execute
- Solution   **Aging** – as time progresses increase the priority of the process
- Note: SJF is priority scheduling where priority is the inverse of predicted next CPU burst time

- As an example, consider the following set of processes, assumed to have arrived at time 0 in the order P1, *P2*, · · ·, *P5*, with the length of the CPU burst given in milliseconds:assume that low numbers represent high priority.

Example of Priority Scheduling

Process	Burst Time	Priority
P_1	10	3
P_2	1	1
P_3	2	4
P_4	1	5
P_5	5	2

- Priority scheduling Gantt Chart



- Average waiting time = 8.2

Priority scheduling

- A major problem with priority scheduling algorithms is starvation.
- A process that is ready to run but waiting for the CPU can be considered blocked. A

  priority scheduling algorithm can leave some low priority processes waiting indefinitely.

  In a heavily loaded computer system, a steady stream of higher-priority processes can

  prevent a low-priority process from ever getting the CPU

A solution to the problem of indefinite blockage of low-priority processes

is aging. Aging is a technique of gradually increasing the priority of processes

that wait in the system for a long time.

Example
simple case -non preemptive

Assume large number high priority in this case

process	Arrival time	Burst time	priority
A	0.0000	5	4
B	2.0001	4	2
C	2.0001	2	6
D	4.0001	4	3

0 5 7 11 15

Waiting time=turn around time – execution time

A:(5-5)=0 B:(13-2)=11 C:(5-2)=3 D:(7-4)=3 average waiting time =3.75

Example
simple case - preemptive

Assume large number high priority in this case

process	Arrival time	Burst time	priority
A	0.0000	5	4
B	2.0001	4	2
C	2.0001	2	6
D	4.0001	4	3

0 2 4 7 1 1
1 5

Waiting time=turn around time – execution time
5
A:(7-5)=2 B:(13-4)=9 C:(2-2)=0 D:(7-4)=3 average waiting time
=3.5