CST2555
Operating Systems & Computer Networks
Week 9

Introduction:

In this tutorial, we are going to investigate CPU scheduling algorithms and calculate the waiting time and turnaround time obtained by each algorithm considering some specific scenarios.

Please **watch video 1** to practice how to calculate these metrics. Then, continue with other questions and finally **submit your answers in ONE file** using the corresponding link on the module page, assignment (week 9). For more information, refer to the lecture notes in week 4 and 5.

1 FCFS, FIFO

First-come, first-serve or first-in-first-out is a common approach to scheduling. From Table 1 create a Gantt chart of the processes. From Table 1 calculate the waiting and turnaround times, WT and TT, for each process, P_n, respectively. When completed calculated the mean, or average waiting and turnaround times.

1.1 FCFS with arrival times

From Table 2 create a Gantt chart for the processes. From Table 2 calculate the waiting and turnaround times, WT and TT, for each process, P_n, respectively.

P_n	bt	wt	tt
1	25		
2	20		
3	15		
4	10		
5	5		

Table 1: processes and their respective burst times, bt.

P_n	bt	at	wt	tt
1	10	10		
2	9	9		
3	5	5		
4	1	2		
5	3	1		

Table 2: Processes, burst times, and arrival times

P_n	bt	at	wt	tt
1	20	0		
2	18	0		
3	15	0		
4	10	0		
5	5	0		

Table 3: processes, burst times, and arrival times

When completed calculated the mean, or average waiting and turnaround times.

2 SPN or SJF

Shortest Process Next or Shortest Job First is a common CPU scheduling algorithm. From Table 3 create a Gantt chart for the processes. From Table 3 calculate the waiting and turnaround times, WT and TT, for each process, P_n, respectively. When completed calculate the mean average waiting and turnaround times.

2.1 SPN with Arrival Times

Shortest Process Next or Shortest Job First is a common CPU scheduling algorithm. From Table 4 create a Gantt chart for the processes. From Table 4 calculate the waiting and turnaround times, WT and TT, for each process, P_n, respectively. When completed calculate the mean average waiting and turnaround times.

P_n	bt	at	wt	tt
1	20	0		
2	18	5		
3	15	10		
4	10	10		
5	5	12		

Table 4: processes, burst times, and arrival times

P_n	bt	at	wt	tt
1	2	0		
2	16	4		
3	12	8		
4	12	9		
5	16	6		

Table 5: processes, burst times, and arrival times

3   Non-preemptive

Discuss the disadvantages and advantages of non-preemptive scheduling algorithms?

4   Round Robin, RR

Round Robin is a common CPU scheduling algorithm. **Set the quantum to 6**. From Table 5 create a Gantt chart for the processes. From Table 5 calculate the waiting and turnaround times, WT and TT, for each process, P_n, respectively. When completed calculate the mean average waiting and turnaround times.

5   Priority Scheduling

Priority Scheduling is a common CPU scheduling algorithm. From Table 6 create a Gantt chart for the processes. From Table 6 calculate the waiting and turnaround times, WT and TT, for each process, P_n, respectively. When completed calculate the mean average waiting and turnaround times. Consider that the algorithm is preemptive.

3

P_n	Pri	bt	at	wt	tt
1	8	8	0		
2	4	9	8		
3	1	3	7		
4	2	6	9		
5	7	19	12		

Table 6: processes, priority (Pri), burst times, and arrival times

6 Preemptive

Discuss the disadvantages and advantages of preemptive scheduling algorithms?

References

[1] William Stallings. *Operating Systems: Internals and Design Principles*. Pearson, 9 edition, 2018.

[2] Andrew S. Tanenbaum and Herbert Bos. *Modern Operating Systems*. Pearson, 4 edition, 2015.