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Operating Systems

Assignment

Question 2 :

To calculate the throughput , average response time , average waiting time and average turn around time for each scheduling policy

let calculate time for the given CPU Scheduling Polices.

1. Preemptive shortest Job first (SJF)

In this policy the process with the shortest bust time is given the highest priority.
Gant Chart:
/ P1/ P3/ P5/ P2/ P4

Process P1
Response time :0ms
Waiting time : 0ms
Turn around time : 4ms

Process P2
Response time: 1ms
Waiting time :1ms
Turn around time: 4ms

Process P3
Response time : 1ms
Waiting time : 1ms
Turn around time : 5ms

Process P3
Response time : 1ms
Waiting time :1ms
Turn around time :2ms

Process P4

Response time:9ms
Waiting time : 9ms
Turn around time: 14ms

Process P5
Response time :2ms
Waiting time : 2ms
Turn around time : 4ms

Throughput = Number of processes/ Total burst time
5 / (4+ 5 + 1 + 5 + 2) = 5/17 = 0.294
Average Response time = Sum of response time / Number of Processes
(0 + 3 + 1 + 9 + 2) / 5 = 15/ 5 = 3ms
Average waiting time = sum of waiting times / Number of processes
(0+ 3+ 1+ 9 +2) / 5 = 15/5 = 3ms
Average Turn around time = (4+8 + 2+ 14+ 4) /5 = 32/5 = 6.4ms

2. Preemptive priority

In this policy the process with the highest priority is given the CEO and case of the process with the shortest burst time is selected

Gant Chart
/ P1 / P2 / P4 /P5 / P3
0. 4. 9 14. 16. 17

Process 1
Response time: 0ms
Waiting time : 0ms
Turn around time : 4ms

Process 2
Response time : 4ms
Waiting time : 4ms
Turn around time : 9ms

Process 3
Response time: 16ms
Waiting time :16ms
Turn around time : 17ms

Process 4
Response time : 9ms

Waiting time : 9ms
Turn around time : 14ms

Process 4
Response time :14ms
Waiting time : 14ms
Turn around time : 16ms

Throughput: Number of processes / Total burst time
Throughputs = 5/ (4+ 5+ 1+ 5 + 2) = 5/17 = 0.294

Average response time : sum of response time / Number of processes
(0 + 4 + 9+ 14+ 16) / 5 = 43/5 = 8.6ms

Average waiting time : sum of waiting times / Number of processes
(0+ 4 +9+ 14+ 16)/ 5 = 43/5 = 8.6ms

Average Turn around time : Sum of turnarounds times / Number of processes
(4+ 9 + 14+ 16+ 17) / 5 = 60/5 = 12ms

From the above calculations the throughput is the same because the total burst time for all the process at the same time

3. Calculate the completion time, response time, waiting time, and turnaround time for each process using the Round Robin scheduling policy with a quantum time of 2ms.

Process ID: P1, P2, P3, P4, P5
Arrival Time: 0, 1, 3, 3
Burst Time: 4, 5, 1, 5

Gantt Chart:
| P1 | P2 | P3 | P4 | P5 | P2 | P4 | P5 | P4 |
0 2 4 6 8 10 12 14 16 18

Response Time:
P1: 0
P2: 2
P3: 3
P4: 4
P5: 6

Waiting Time:
P1: 0
P2: 2
P3: 2
P4: 6
P5: 8

Turnaround Time:
P1: 4
P2: 9
P3: 2
P4: 11
P5: 13

Calculate the throughput, average response time, average waiting time, and average turnaround time.

Number of processes: 5
Total Burst Time: 4 + 5 + 1 + 5 = 15

Throughput = Number of processes / Total Burst Time
Throughput = 5 / 15 = 1/3

Average Response Time = Sum of Response Time / Number of processes
Average Response Time = (0 + 2 + 3 + 4 + 6) / 5 = 15 / 5 = 3 ms

Average Waiting Time = Sum of Waiting Time / Number of processes
Average Waiting Time = (0 + 2 + 2 + 6 + 8) / 5 = 18 / 5 = 3.6 ms

Average Turnaround Time = Sum of Turnaround Time / Number of processes.
Average Turnaround Time = (4 + 9 + 2 + 11 + 13) / 5 = 39 / 5 = 7.8 ms