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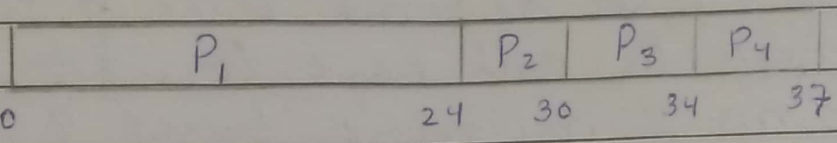
Case A:-

a) Gantt Chart:-

Suppose that process arrives in order P_1, P_2, P_3, P_4:-



b) response time:

$P_1 = 0$, $P_2 = 24$, $P_3 = 30$, $P_4 = 34$

waiting time:

$P_1 = 0$, $P_2 = 24$, $P_3 = 30$, $P_4 = 34$

Here response and waiting time is same.

Average waiting time:

$= (0 + 24 + 30 + 34) / 4 = 22$

Turnaround time:

$P_1 = 24$, $P_2 = 30$, $P_3 = 34$, $P_4 = 37$

c) In FCFS algorithm the process will arrive & complete their execution in order.

→ P_1 process is the first to arrive having a burst time of 24, it will complete its execution in 24ms,

Date:

having 0ms of response & waiting time.

→ Process P_2 is the second to arrive but it can't execute prior to P_1 hence P_2 will wait 24 ms & since burst time is 6ms, hence it will have Turn around time of 30 ms

→ Process P_3 will have to wait for 30 ms & having a burst time of 4 ms it will have a turn around time of 34 ms.

→ Process P_4 is the last process in queue to be executed having a response & waiting time of 34 ms therefore with 3 ms burst time, it will have a turn around time of 37 ms.

Results & Conclusion:

→ Process P_1 has response time & waiting time = 0 & turn around time of 24 ms.

→ Process P_2 has response time & waiting time = 24 ms & turn around time of 30 ms.

→ Process P_3 has response time & waiting time = 30 ms & turn around time of 34 ms.

→ Process P_4 has response time & waiting time = 34 ms & turn around time of 37 ms.

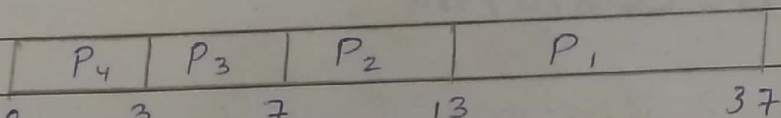
13
24
37

Date:

The average waiting time is 22 ms, if we rearrange the order of execution process, it will take much lesser time. Long process cause small process to be stuck here in fcfs.

Case B :-

a) The process are arriving in order P_4, P_3, P_2, P_1



b) response time:

$P_1 = 13$, $P_2 = 7$, $P_3 = 3$, $P_4 = 0$

Waiting time:

$P_1 = 13$ $P_2 = 7$, $P_3 = 3$, $P_4 = 0$

Average waiting time:

$$(13 + 7 + 3 + 0)/4 = 5.75$$

Turnaround time:

$P_1 = 37$, $P_2 = 13$, $P_3 = 7$, $P_4 = 3$

c) • P_4, the first one to be executed having a response time of 0 ms & turn around time is 3 ms.
• P_3 will wait for 3 ms & then

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Date:

complete its execution in 7 ms.

- Process P_2 will wait for 7 ms where it gets its first response & completed its execution in 13 ms after having burst time of 6 ms
- P_1 is the one having the largest burst time therefore it will have its first response after 13 ms & have a turnaround time of 37 ms.

Conclusion:-

- P_1 → Respone & waiting = 13 ms, turnaround = 37 ms
- P_2 → Response & waiting = 7 ms, turnaround = 13 ms.
- P_3 → Response & waiting = 3 ms, turnaround = 7 ms
- P_4 → Response & waiting = 0 ms, turnaround = 3 ms.

Average waiting time is 5.75.