

Operating Systems
Course Code: 71203002004
Scheduling 3(Preemptive Scheduling)

by -
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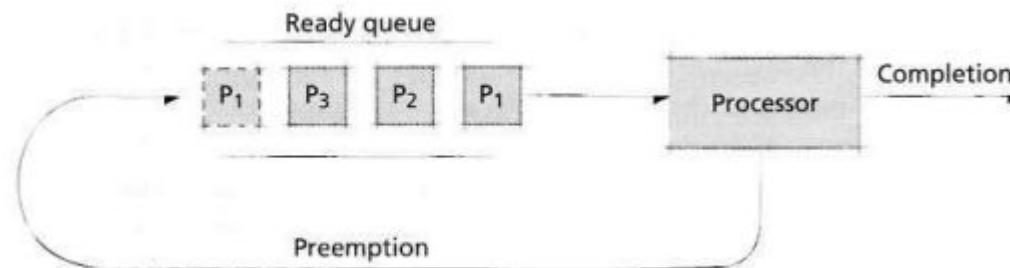


1. Round Robin (RR) Scheduling

- a. are dispatched similar to FIFO but allotted a limited amount of processor time called “time slice or quantum”.
- b. if the process is not completed before the quantum expires, the system interrupts and put process back to the ready queue.

Effective for interactive environments where system needs to guarantee reasonable response time.

Like FIFO, round-robin is commonly found within more sophisticated processor scheduling algos but is rarely the master scheme.





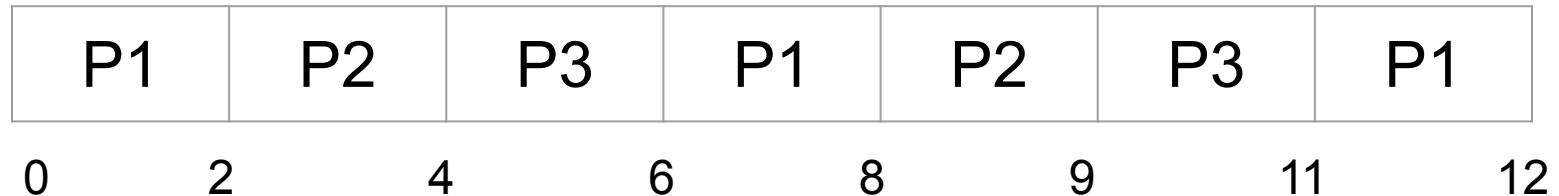
Example 1: Process With Same Arrival time.

Consider the following table of arrival time and burst time for three processes P1, P2 and P3 and given Time Quantum = 2ms.

Process	Arrival Time	Burst Time
P1	0	5
P2	0	3
P3	0	4



Gantt Chart



Process	Arrival Time	Burst Time	Completion time(CT))	Turnaround Time TAT =(CT-AT)	Waiting Time WT=(TAT -BT)
P1	0	5	12	12	7
P2	0	3	9	9	6
P3	0	4	11	11	7

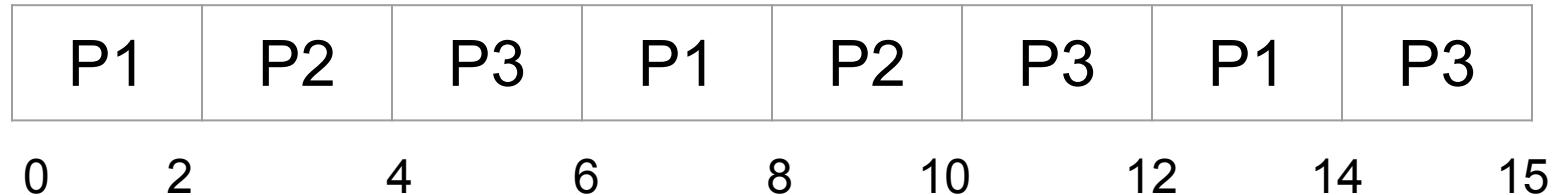
Example 2: Process With Different Arrival time.

Consider the following table of arrival time and burst time for three processes P1, P2 and P3 and given Time Quantum = 2ms.

Process	Arrival Time	Burst Time
P1	0	6
P2	1	4
P3	2	5



Gantt Chart



Process	Arrival Time	Burst Time	Completion time(CT))	Turnaround Time TAT =(CT-AT)	Waiting Time WT=(TAT -BT)
P1	0	6	14	14	8
P2	1	4	10	9	5
P3	2	5	15	13	8

2. Priority Scheduling

- a. schedules process based on priority.
- b. priority is assigned based on criteria such as memory requirement, time requirement and other resource needs.
- c. process with highest priority is selected for execution first.

In non preemptive, cpu is not taken away even if process with high priority arrives.

in preemptive, the CPU can be taken away from a running process.

Preemptive priority Scheduling

Example 1: Process With Same Arrival time.

Consider the following table of arrival time and burst time for three processes P1, P2 and P3.

Process	Arrival Time	Burst Time	Priority
P1	0	7	2
P2	0	4	1
P3	0	6	3



01

Step

Process	Arrival Time	Burst Time	Priority
P ₁	0 ms	7 ms	2 ms
P ₂	0 ms	4 ms	1 ms
P ₃	0 ms	6 ms	3 ms

Ready Queue :
at t = 0

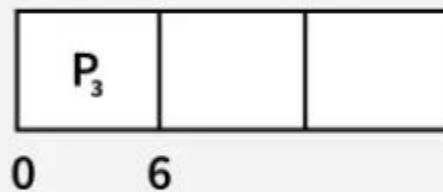
P ₃	P ₁	P ₂
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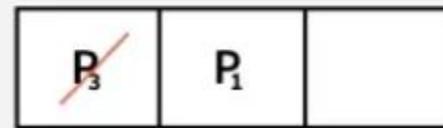
02

Step

Gantt chart at t = 6



Ready Queue :
at t = 6

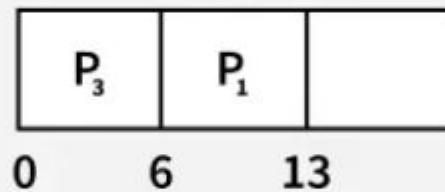




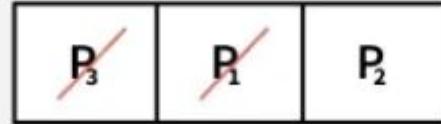
03

Step

Gantt chart at t = 13



Ready Queue :
at t = 13

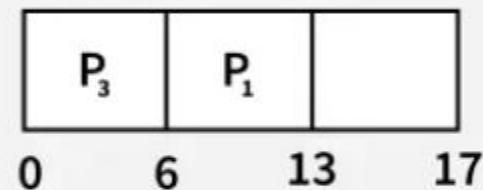




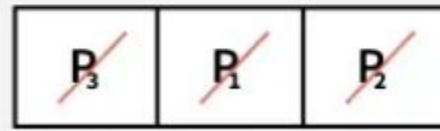
04

Step

Gantt chart at t = 17

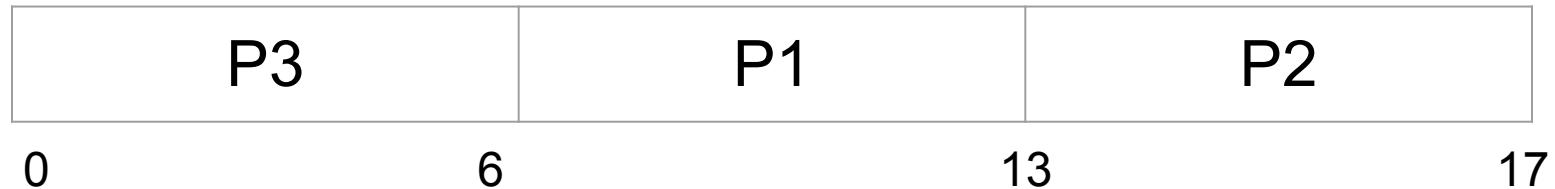


Ready Queue :
at t = 17





Gantt Chart



Process	Arrival Time	Burst Time	Completion time(CT))	Turnaround Time TAT =(CT-AT)	Waiting Time WT=(TAT-BT)
P1	0	7	13	13	6
P2	0	4	17	17	13
P3	0	6	6	6	0

Preemptive priority Scheduling

Example 2: Process With Different Arrival time.

Consider the following table of arrival time and burst time for three processes P1, P2 and P3 and given Time Quantum = 2ms.

Process	Arrival Time	Burst Time	Priority
P1	0	6	2
P2	1	4	3
P3	2	5	1



01

Step

Process	Arrival Time	Burst Time	Priority
P ₁	0 ms	6 ms	2 ms
P ₂	1 ms	4 ms	3 ms
P ₃	2 ms	5 ms	1 ms

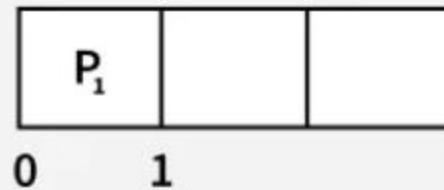
Ready Queue :
 $att = 0$



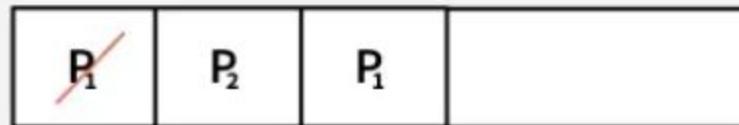


02
Step

Gantt chart at t = 1



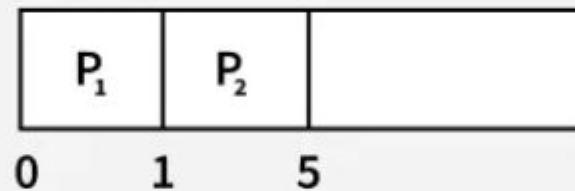
Ready Queue :
at t = 1



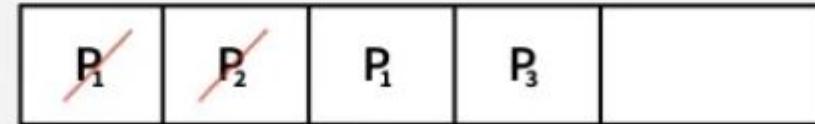


03
Step

Gantt chart at t = 5



Ready Queue :
at t = 5

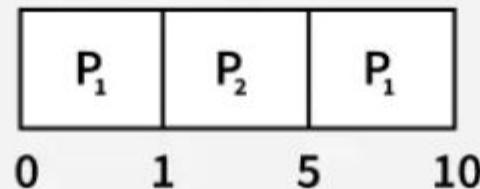




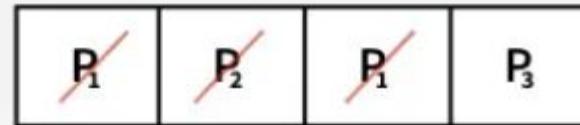
04

Step

Gantt chart at t = 10



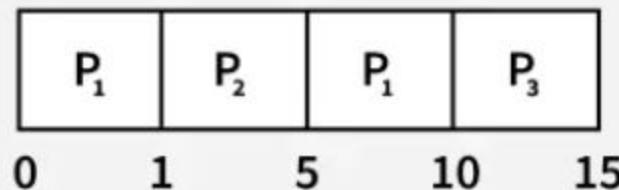
Ready Queue :
at t = 10



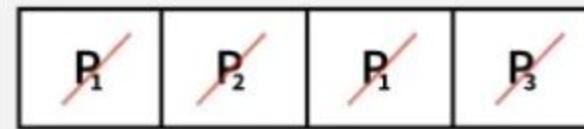


05
Step

Gantt chart at t = 15

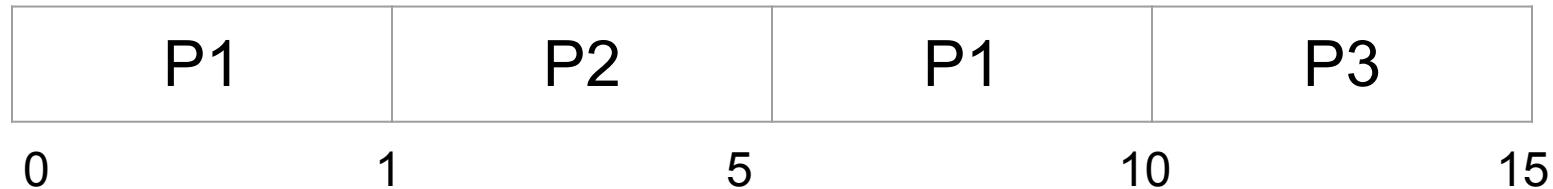


Ready Queue :
at t = 15





Gantt Chart



Process	Arrival Time	Burst Time	Completion time(CT))	Turnaround TAT $= (CT-AT)$	Waiting Time $WT = (TAT - BT)$
P1	0	6	10	10	4
P2	1	4	5	4	0
P3	2	5	15	13	8

Non Preemptive priority Scheduling

Example 1: Process With Different Arrival time.

Consider the following table of arrival time and burst time for three processes P1, P2 and P3.

Process	Arrival Time	Burst Time	Priority
P1	0	4	2
P2	1	2	1
P3	2	6	3



01
Step

Process	Arrival Time	Burst Time	Priority
P ₁	0 ms	4 ms	2 ms
P ₂	1 ms	2 ms	1 ms
P ₃	2 ms	6 ms	3 ms

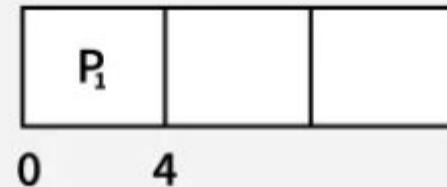
Ready Queue :
at t = 0



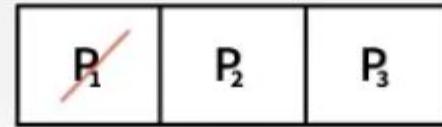


02
Step

Gantt chart at t = 4



Ready Queue :
at t = 4

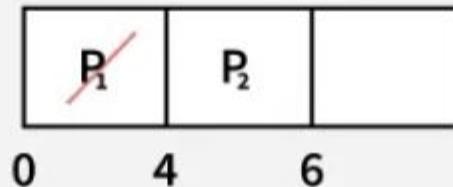




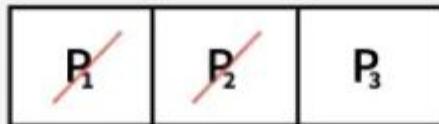
03

Step

Gantt chart at t = 6



Ready Queue :
at t = 6

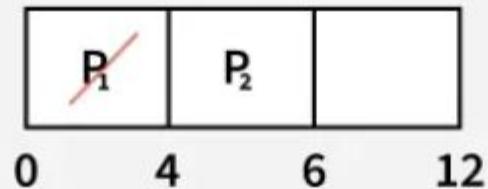




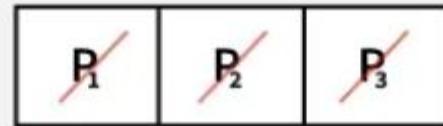
04

Step

Gantt chart at t = 12

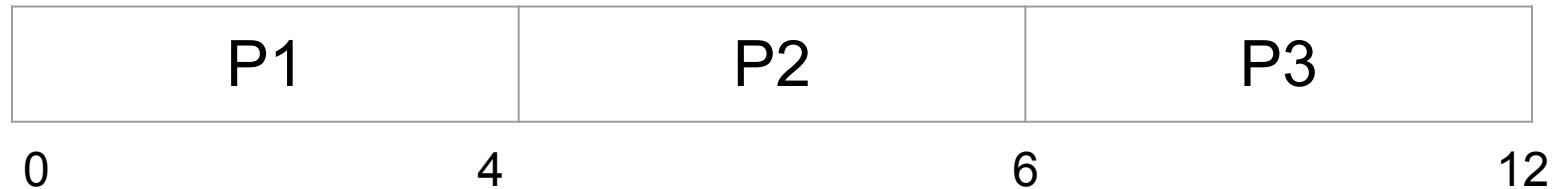


Ready Queue :
at t = 12





Gantt Chart



Process	Arrival Time	Burst Time	Completion time(CT))	Turnaround Time TAT =(CT-AT)	Waiting Time WT=(TAT-BT)
P1	0	4	4		
P2	1	2	6		
P3	2	6	12		



DISCUSSION & REVISION

1. Which scheduling uses priority numbers to pick the next process?
2. In Round Robin, what happens when a process uses all its time slice?
3. Can starvation happen in priority scheduling? Yes or No?
4. Which scheduling gives each process a fair turn — Priority or Round Robin?
5. What do we call the fixed time given to each process in Round Robin?

References

- https://www.tutorialspoint.com/operating_system/os_priority_scheduling_algorithm.htm
- <http://geeksforgeeks.org/dsa/first-come-first-serve-cpu-scheduling-non-preemptive/>
- <https://www.geeksforgeeks.org/operating-systems/shortest-job-first-or-sjf-cpu-scheduling/>
- <https://www.geeksforgeeks.org/operating-systems/shortest-job-first-or-sjf-cpu-scheduling/>