CS & IT ENGINEERING

2024

Operating System

CPU Scheduling

Lecture - 04

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Recap of Previous Lecture

Topic — SRTF Scheduling

Topic — LJF & LRTF Scheduling

Topic — HRRN Algorithm

Topic — Priority based algorithm

Topics to be Covered

Topic — Priority based algorithm

Topic — Round Robin Algorithm
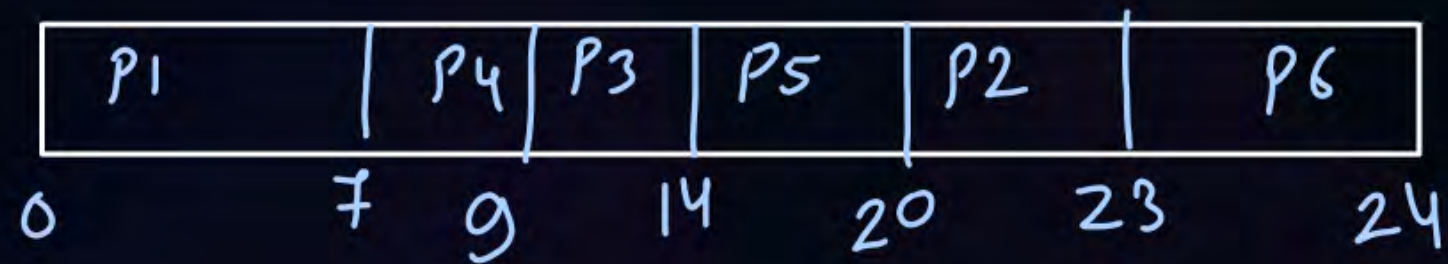
Topic — Multilevel Queue Scheduling

Topic — Multilevel Feedback Queue Scheduling

Process	Arrival Time	Burst Time	Priority
P1	0	7	9
P2	1	3	4
P3	2	5	2
P4	3	2	1 (Highest)
P5	4	6	3
P6	5	1	8

P1		P4	P3	P5	P2	P6

0　　　　　　7　9　　14　　　20　　　23　　　24

Topic : Priority Based Algorithm Question Preemptive

Process	Arrival Time	Burst Time	Priority
P1	0	7	9
P2	1	3	4
P3	2	5	2
P4	3	2	1 (Highest)
P5	4	6	3
P6	5	1	8

time	R. Q.
0	P1
1	P1 (9), P2 (4)

P1	P2	P3	P4	P3	P5	P2	P6	P1

0   1   2   3   5   9   15   17   18   24

Advantages:

1.   Better response for real time situations

Disadvantages:

2.   Low Priority Processes may suffer from starvation

Solution of Starvation:

Aging (with dynamic priority for processes)

Priority
- static $\Rightarrow$ fixed priority for processes
- Dynamic $\Rightarrow$ priorities may increase or decrease

Aging :-

If a process waits for a predefined time, then it's priority is increased by 1.

After waiting for long & increase in priority will make the process, the highest priority process at some point of time.

Scheduling Criteria: Arrival time + Quantum (Q)

Tie breaker for
↓↓   arrival
FCFS (id)

Type of Algorithm: ⟹ Preemptive

Quantum / time slice :- Max. amount of time for which a process runs on CPU at a time.

Topic : Round Robin (RR)

$Q = 2$

Process	Arrival Time	Burst Time
P1	0	3
P2	0	6
P3	0	4
P4	0	5

time	Ready Queue
0	~~P1~~, P2, P3, P4
2	~~P2~~, P3, P4, P1
4	~~P3~~, P4, P1, P2
6	P4, P1, P2, P3
8	P1, P2, P3, P4

P1	P2	P3	P4	P1	P2	P3	P4	P2	P4

0   2   4   6   8   9   11   13   15   17   18

no. of context switches = 9

Topic : Round Robin (RR)

Q = 2

Process	Arrival Time	Burst Time
P1	0	6
P2	1	5
P3	2	4
P4	3	3
P5	4	2
P6	5	4

time	Ready Queue
0	P̶1̶
2	P̶2̶, P3, P1
4	P̶3̶, P1, P4, P5, P2
6	P̶1̶, P̶4̶, P̶5̶, P̶2̶, P̶6̶, P̶3̶

P1	P2	P3	P1	P4	P5	P2	P6	P3	P1	P4	P2	P6

0 2 4 6 8 10 12 14 16 18 20 21 22 24
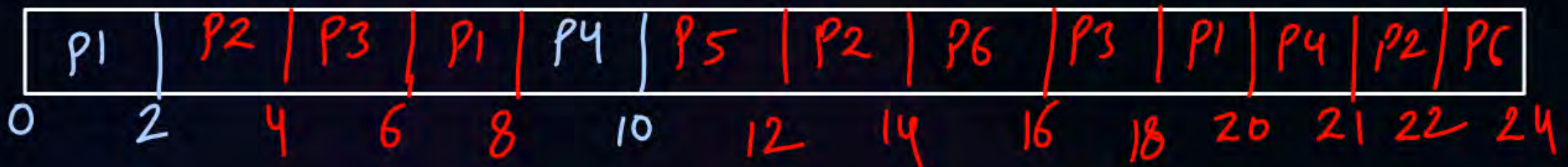
	AT	BT
P1	0	6
P2	1	3
P3	2	3
P4	4	2
P5	5	4

$Q = 2$

time	Ready Queue
0	~~P1~~
2	~~P2~~, P3, P1
4	~~P3~~, P1, P4, P2
6	~~P1~~, ~~P4~~, ~~P2~~, ~~P5~~, ~~P3~~

P1	P2	P3	P1	P4	P2	P5	P3	P1	P5

0   2   4   6   8   10   11   13   14   16   18

Topic : Round Robin (RR)

Q = 3
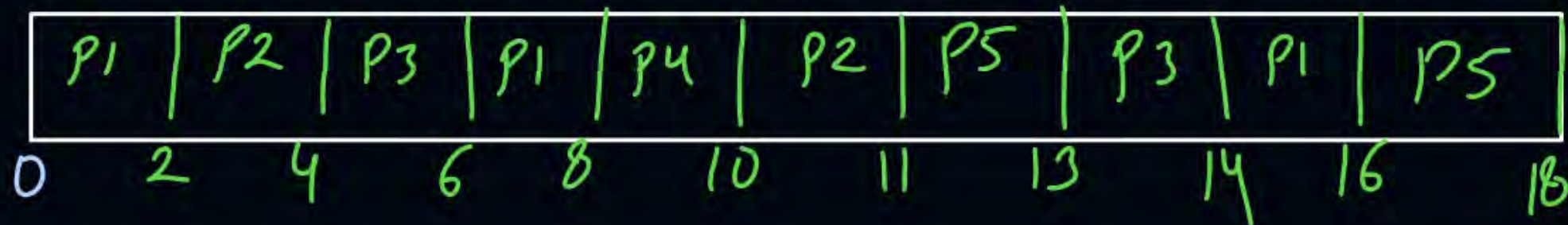
Process	Arrival Time	Burst Time
P1	5	6
P2	8	7
P3	3	8
P4	6	3
P5	2	2
P6	4	4

Time	Ready Queue
0	—
2	P5
4	P3, P6
7	P6, P1, P4, P3
10	P1, P4, P3, P2, P6

	P5	P3	P6	P1	P4	P3	P2	P6	P1	P3	P2	P2

0 2 4 7 10 13 16 19 22 23 26 28 31 32

Topic : Round Robin (RR)

Q = 3
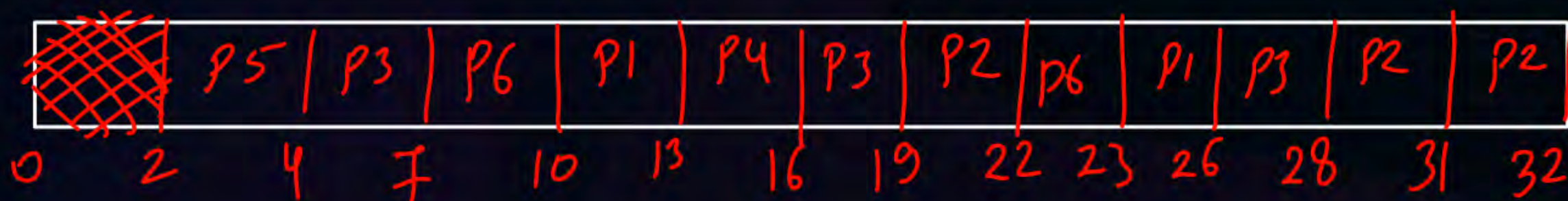
Process	Arrival Time	Burst Time
P1	0	12
P2	0	5
P3	3	9
P4	5	6
P5	2	8
P6	4	2
P7	1	7

time	Ready Queue
0	P1, P2
3	P2, P7, P5, P3, P1
6	P7, P5, P3, P1, P6, P4, P2

P1	P2	P7	P5	P3	P1	P6	P4	P2	P7	P5	P3	P1	P4	P7	P5	P3	P1

0 3 6 9 12 15 18 20 23 25 28 31 34 37 40 41 43 46 49
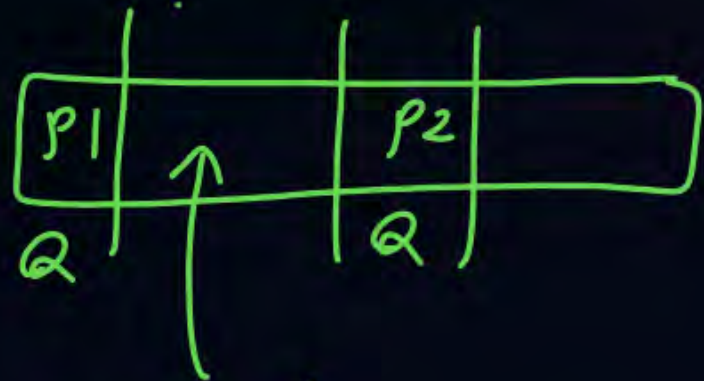
Not prefered   Most prefered   Q   Not prefered

very-very small   small   large   very-very large

High interactivity   Low interactivity   Round - Robin degrades to FCFS

P1	P2	
Q	Q	

Context switch time

CPU efficiency $\simeq 0$