## CS & IT



## ENGINERING

OPERATING SYSTEMS

Process

Synchronization

Lecture No. 1



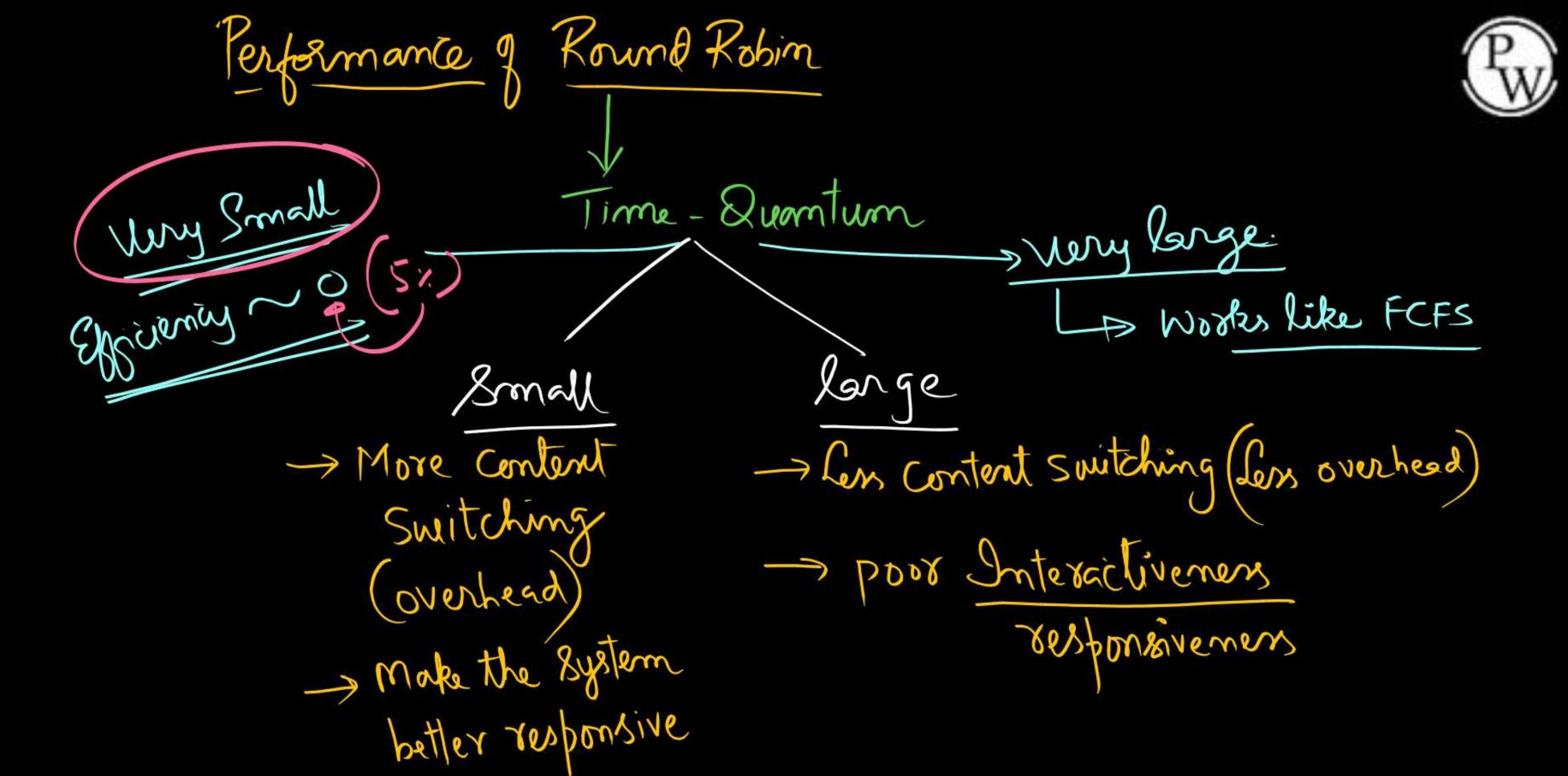
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TOPICS TO BE COVERED **Round Robin** 

Multi Level Queue Scheduling

**Process Synchronization** 



Q.

Consider a System with 'n' Processes arriving at time 0<sup>+</sup> with substantially large Burst Times. The CPU scheduling overhead is 's' seconds, Time Quantum is 'q' seconds. Using Round Robin scheduling, what must be the value of Time Quantum q such that each Process is guaranteed to get its turn at the CPU exactly after 't' seconds in its subsequent

$$(m*8)$$

$$(+-m8)=(m-1).9$$

$$\frac{t-ms}{m-1}$$

1) 
$$q = \frac{(t-ns)}{m-1}$$
: Process will get onto cpu enactly after t' see's;

2)  $q < \frac{(t-ns)}{m-1}$ : Process will get onto cpu atleast once within t' mulmore time?

3)  $q > \frac{(t-ns)}{m-1}$ : Process will get onto cpu atleast every t' sec Process will rown wait for 't' sec to run on cpu)

Q.

Consider the following set of Processes, assumed to have arrived at time 0. Consider the CPU scheduling algorithms Shortest Job First (SJF) and Round Robin (RR). For RR assume that the processes are scheduled in the order  $P_1, P_2, P_3, P_4$ .

Processes	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>
Burst time (in ms)	8	7	2	4

P3 P4 P2 P1

0 2 6 13 2 |

AV. TAT = 21+13+2+6

= 42 = 10.5

If the time quantum for RR is 4 ms, then the absolute value of the difference between the average turnaround times (in ms) of SJF and RR (round off to 2 decimal places) is

Q. Consider four Processes P, Q, R, and S scheduled on a CPU as per Round Robin Algorithm with a Time Quantum of 4 units. The Processes arrive



Robin Algorithm with a Time Quantum of 4 units. The Processes arrive in the order P, Q, R, S, all at time t=0. There is exactly one context switch from S to Q, exactly one context switch from R to Q, and exactly two context switches from Q to R. There is no context switch from S to

P. Switching to a ready process after the termination of another process is also considered a context switch. Which one of the following

A) 
$$P = 4$$
,  $Q = 10$ ,  $R = 6$ ,  $S = 2$ 

B 
$$P = 2$$
,  $Q = 9$ ,  $R = 5$ ,  $S = 1$ 

$$P = 4$$
,  $Q = 12$ ,  $R = 5$ ,  $S = 4$ 

D 
$$P = 3$$
,  $Q = 7$ ,  $R = 7$ ,  $S = 3$ 

Brute Force

Applyng rister appropriate







Consider Processes  $P_1 \& P_2$  arriving in the ready queue at time 0 with following properties.

- ii) P2 needs a total of 15 units of CPU time and no L/0. P2 arrives just after P1.

Compute the Completion times of  $P_1\&P_2$  using the following scheduling techniques:

1.SRTF

Ra | PI PZ

2.Round Robin with Time Quanta = 4 units



Which of the following statements (s) is/are correct in the context of CPU Scheduling? M > 2



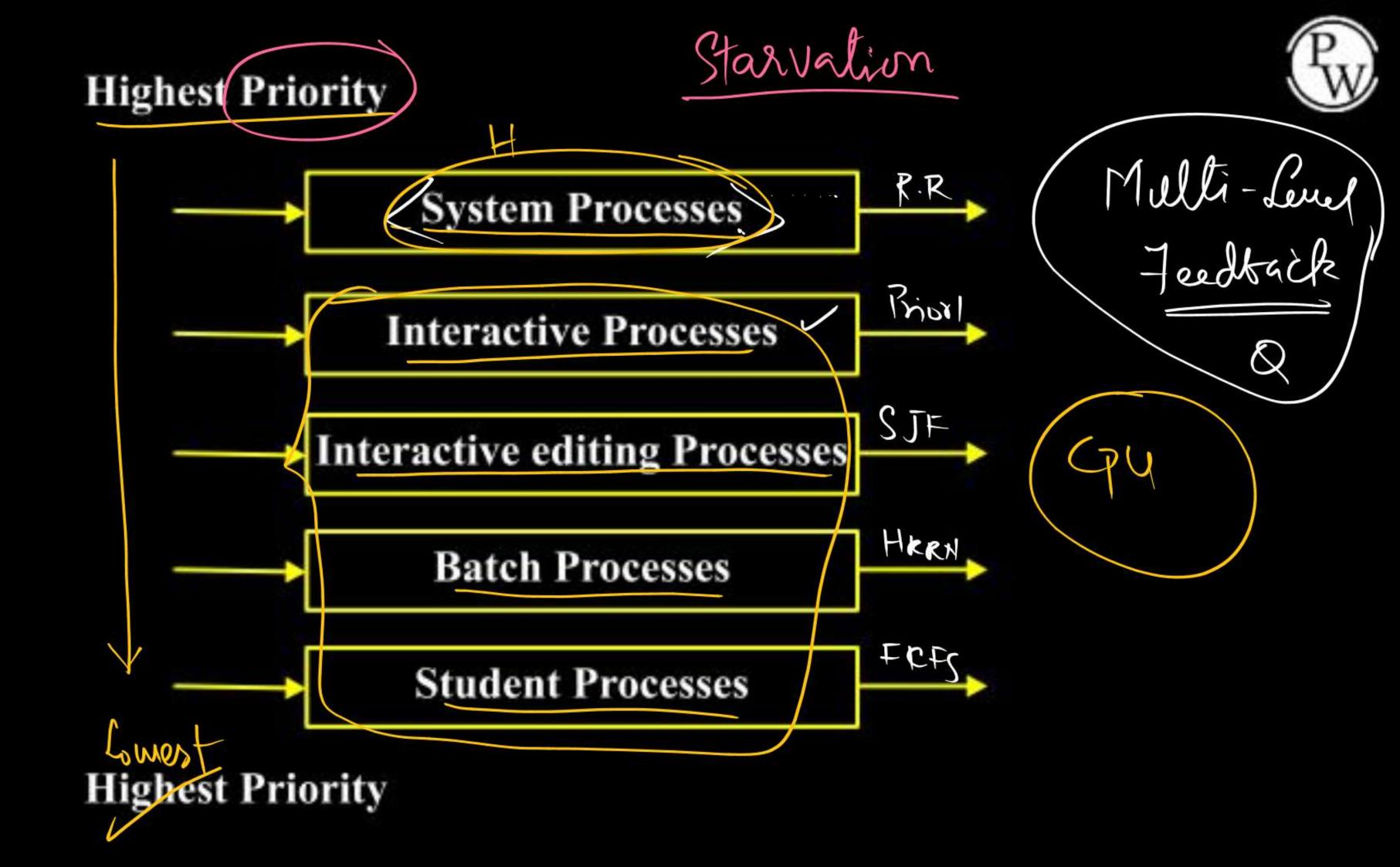
- The goal is to only maximize CPU utilization and minimize throughput
- sema (4/b)

- B Turnaround time includes waiting time
- C Implementing preemptive scheduling needs hardware support
- Round-robin policy can be used even when the CPU time required by each of the processes is not known Apriority.

Multi-Level Queve Scheduling W R.R Jypes of Fracers Wer > (foreground) Background

(i) Searching Time (ii) All processes will use Single Scheduling Jechnique

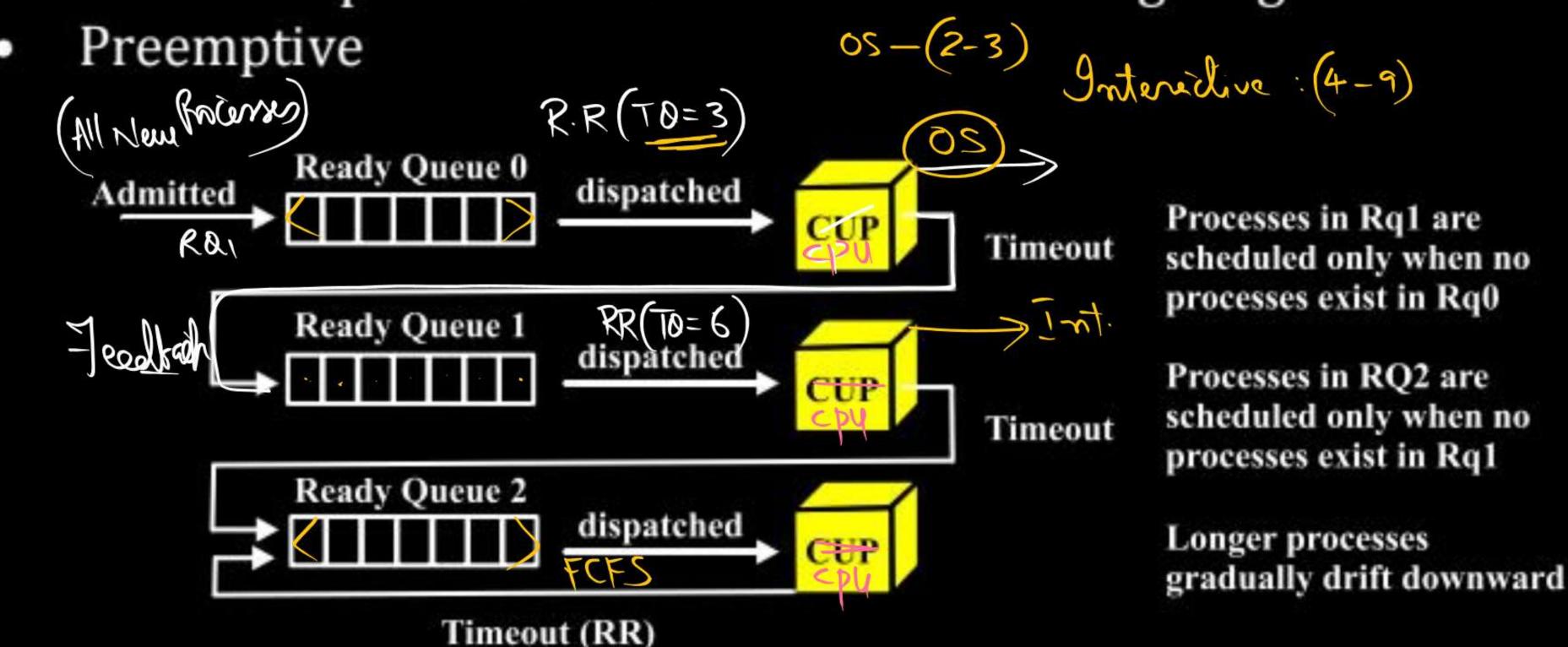
(Multiple - Queues)



## Multilevel feedback Queue Scheduling



- Another way to put a preference on short-lived processes
  - Penalize processes that have been running longer





Consider a system which has CPU bound process, which require the burst time of 80 seconds, the multilevel feedback queue scheduling algorithm is used and the queue time quantum is '4' seconds and in each level it is incremented by '10' seconds. Then how many times the process will be interrupted, and on which queue the process will terminate the



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execution?

B 3,5

C 4,5

D None



