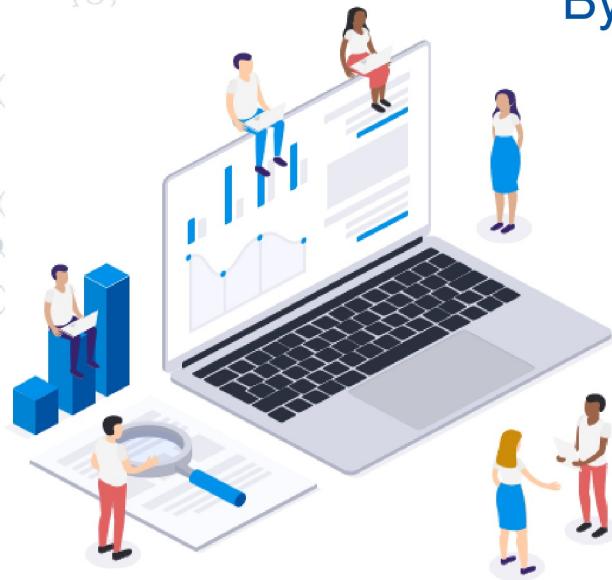


# Operating System: CPU Scheduling: FCFS

By: Vishvadeep Gothi



# VISHVADEEP GOTHI SIR

# AIR 19

in GATE 2010



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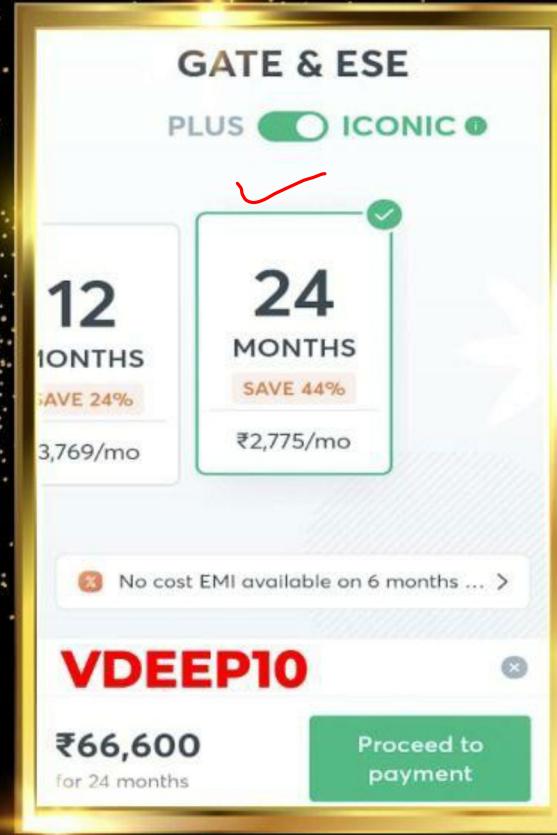
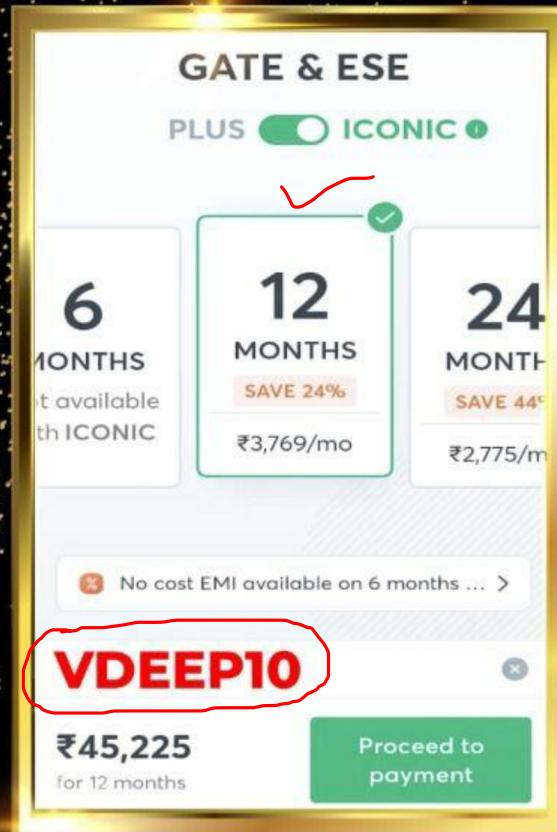
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# Scheduling Times

Assuming here is no IO devices for understanding of algorithm  
So now process has only two things to do :  
either terminated or  
preempted

1. Arrival Time (AT) :- The time at which the process arrives in the system.
2. Burst Time (BT) :- The amount of time for which process runs on CPU.
3. Completion Time(CT) :- The time at which process completes  
*(exit Time)*
4. Turnaround Time (TAT) :- Time from arrival to completion.
5. Waiting Time (WT)

$$TAT = CT - AT$$

$$WT = TAT - BT$$

# Scheduling Times

6. Response Time (RT): Amount of time from arrival till first time process gets the CPU.
7. ~~Deadline (D):~~
8. Scheduling Length (L):  $\max(CT) - \min(AT)$
9. Throughput: no. of processes executed per unit of time.

$$= \frac{n}{L} \quad n = \text{no. of process}$$

# CPU Scheduling: Types

CPU Scheduling:

1. Preemptive
2. Non-preemptive



Note:- Every process has no any I/O operation. [assumption in all algorithms]

# FCFS (First Come First Serve)

- ◎ Criteria: *Arrival Time (AT)*
  - Tie-breaker: smaller process id first
- ◎ Type: Non-preemptive



# FCFS (First Come First Serve)

Process	AT	Burst Time
P1	0	30
P2	0	5
P3	0	5

Giantt chart :- (always starts from zero)

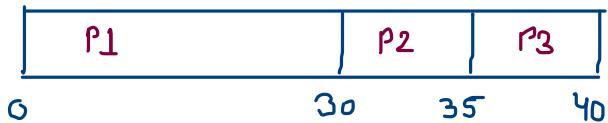
# FCFS (First Come First Serve)

$CT - AT$

$TAT - BT$

Process	Arrival Time	Burst Time	Completion Time	Turnaround Time	Waiting Time
P1	0	30	30	30	0
P2	0	5	35	35	30
P3	0	5	40	40	35

Gantt chart



$$\text{avg TAT} = \frac{30 + 35 + 40}{3} = 35$$

$$\text{avg WT} = \frac{0 + 30 + 35}{3} = 21.66$$

Ready Queue  $\Rightarrow$  P1, P2, P3

	<u>Response time</u>
P1	0
P2	30
P3	35

Note:- for non-pre-emptive algo's  
 RT of a process = WT of process

$$L = \max(C_T) - \min(A_T) = 40 - 0 = 40$$

$$\text{Throughput} = \frac{3}{40}$$

# FCFS (First Come First Serve)

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



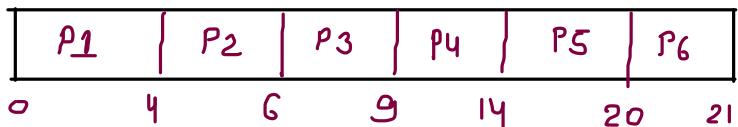
# FCFS (First Come First Serve)

CT - AT

TAT - BT

Process	Arrival Time	Burst Time	Completion Time	Turnaround Time	Waiting Time
P1	0	4	4	4	0
P2	1	2	6	5	3
P3	2	3	9	7	4
P4	3	5	14	11	6
P5	4	6	20	16	10
P6	5	1	21	16	15

Gantt chart



$$\text{avg TAT} = \frac{59}{6} = 9.833$$

$$\text{avg WT} = \frac{38}{6} = 6.33$$

$$L = 21 - 0 = 21$$

$$\text{Throughput} = \frac{6}{21}$$

# FCFS (First Come First Serve)

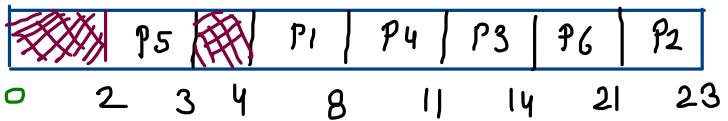
Process	Arrival Time	Burst Time
P1	4	4
P2	8	2
P3	6	3
P4	3	1
P5	2	6
P6	7	7



# FCFS (First Come First Serve)

Process	Arrival Time	Burst Time	Completion Time	Turnaround Time	Waiting Time
P1	4	4	8	4	0
P2	8	2	23	15	13
P3	6	3	14	8	5
P4	5	3	11	6	3
P5	2	1	3	1	0
P6	7	7	21	14	7

Gantt chart



$$\text{avg TAT} = \frac{48}{6} = 8$$

$$\text{avg WT} = \frac{28}{6} = 4.66$$

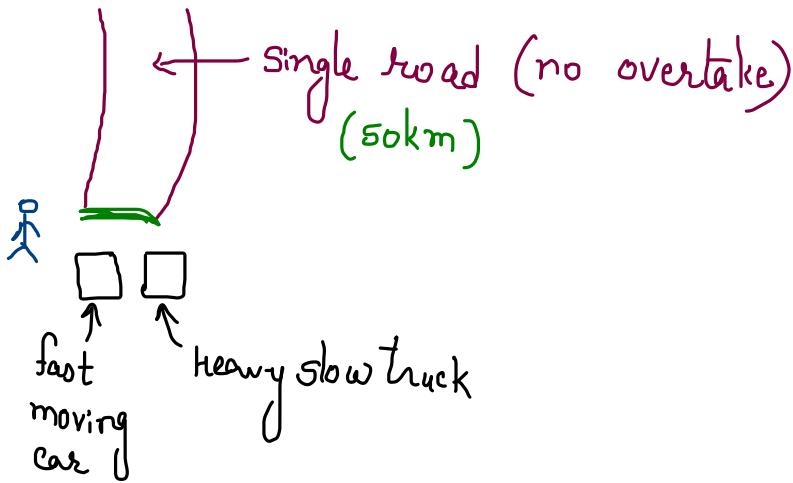
$$L = 23 - 2 = 21$$

$$\text{throughput} = \frac{6}{21}$$

# Convoy Effect

if a large process  
is scheduled first  
then it slows down  
system's performance.

only in FCFS



# Next Class

SJF ✓

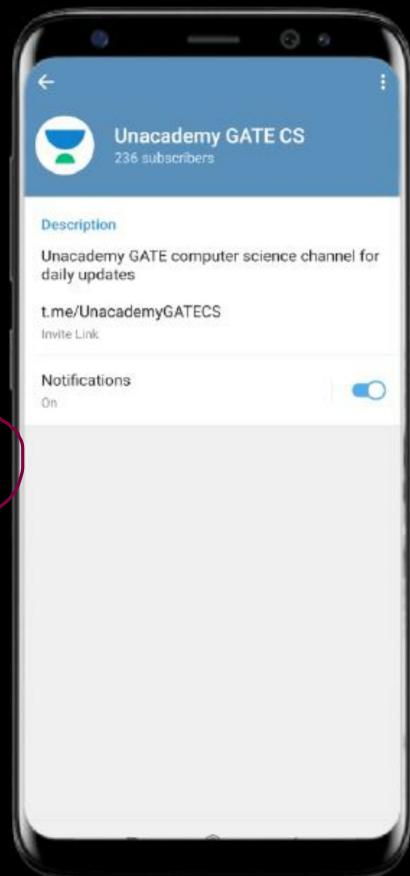


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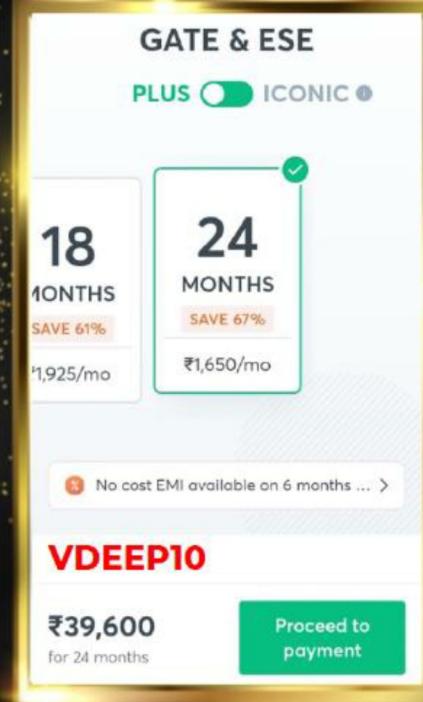
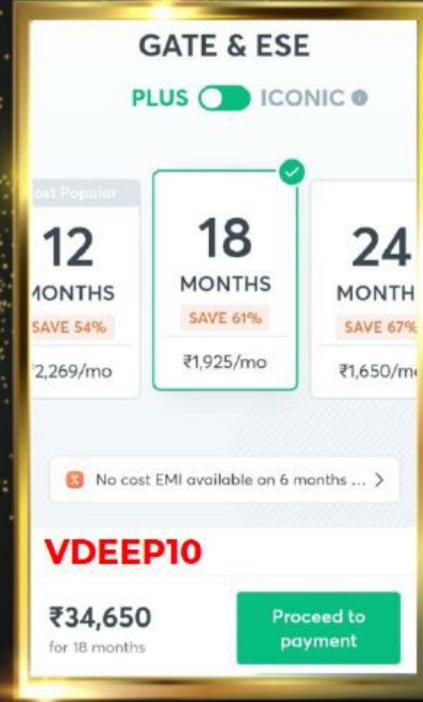
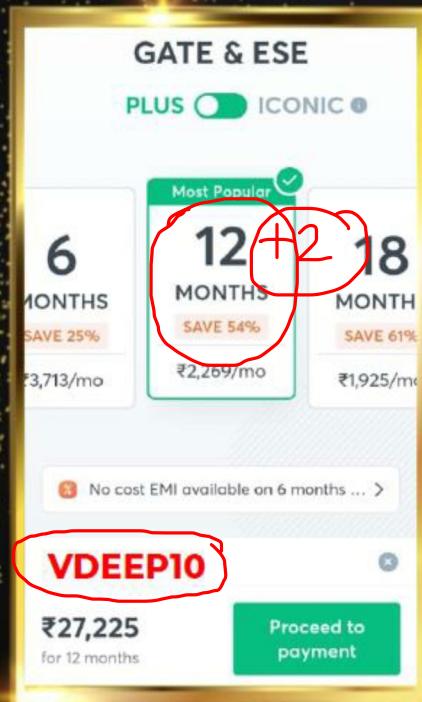
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