CS & IT ENGINEERING

OPERATING SYSTEMS

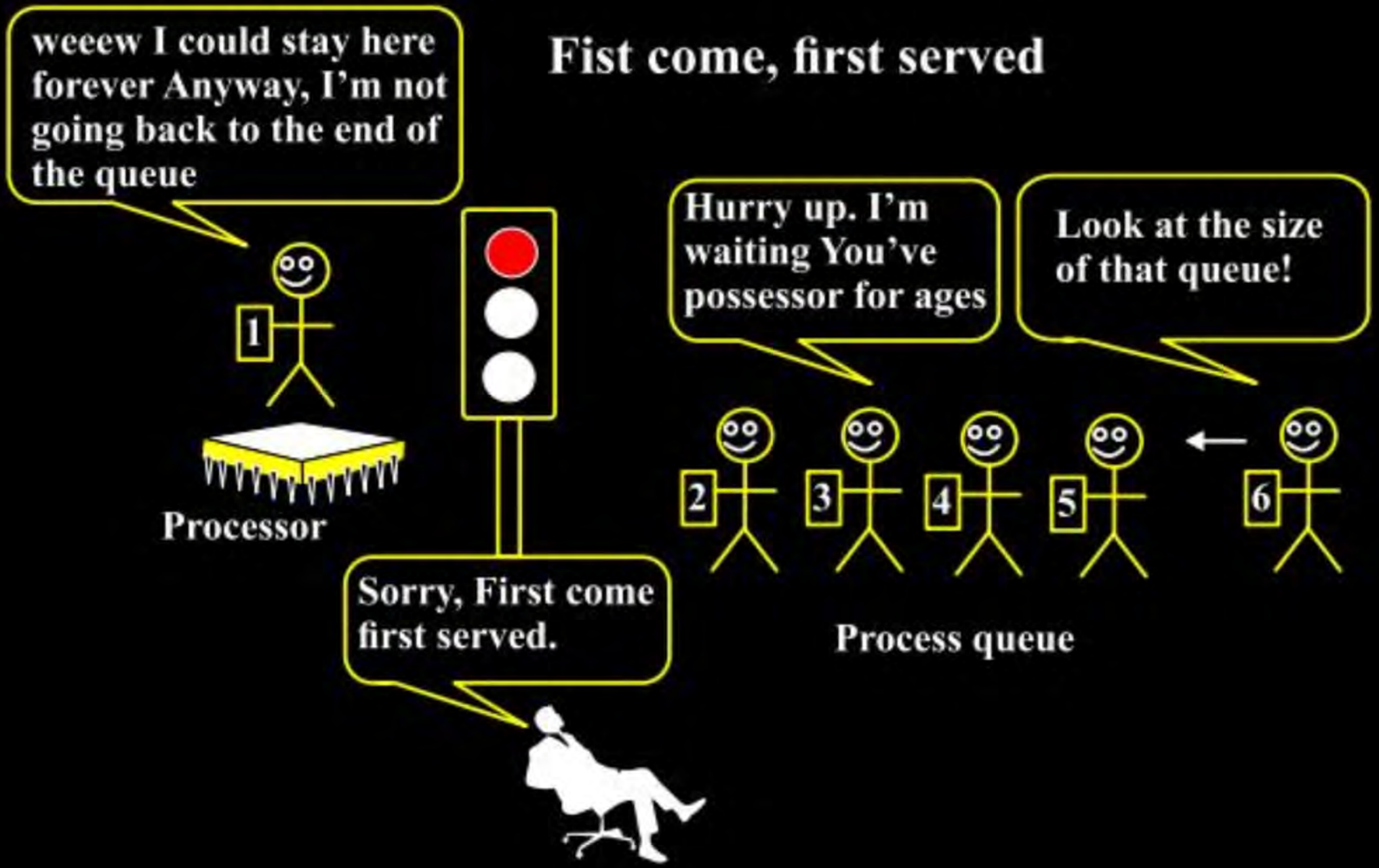
CPU Scheduling

Lecture No. 2

By- Dr. Khaleel Khan Sir

- CPU Scheduling Techniques
- FCFS
- SJF

Fist come, first served



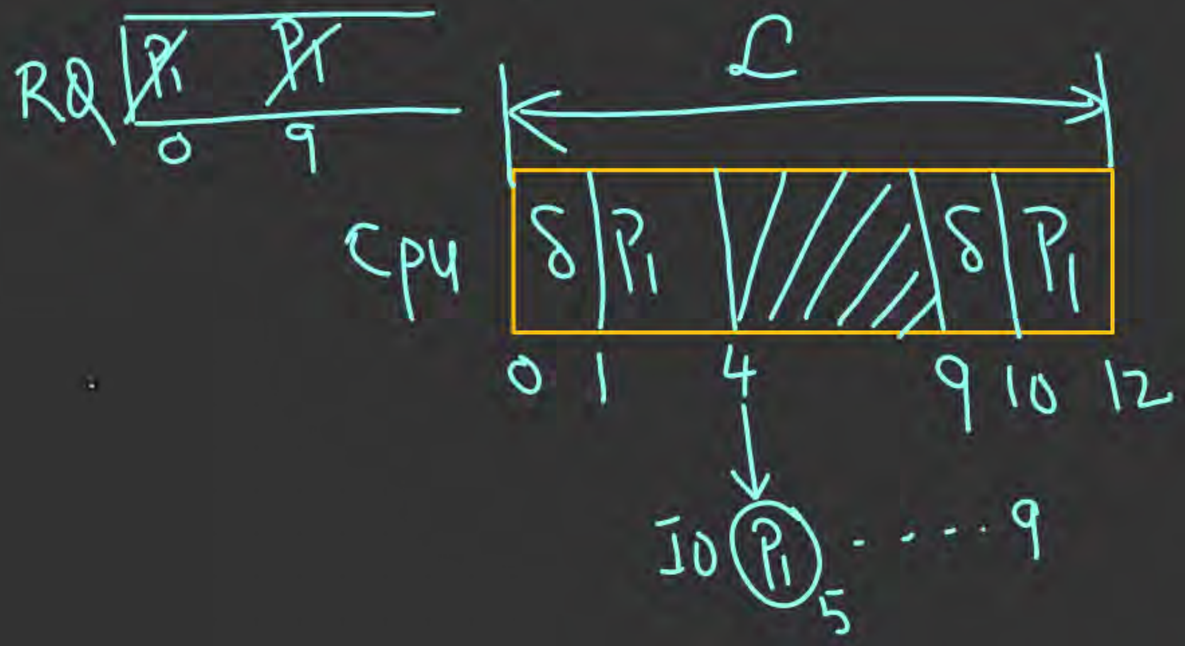
CPU Scheduling Techniques / Algorithms

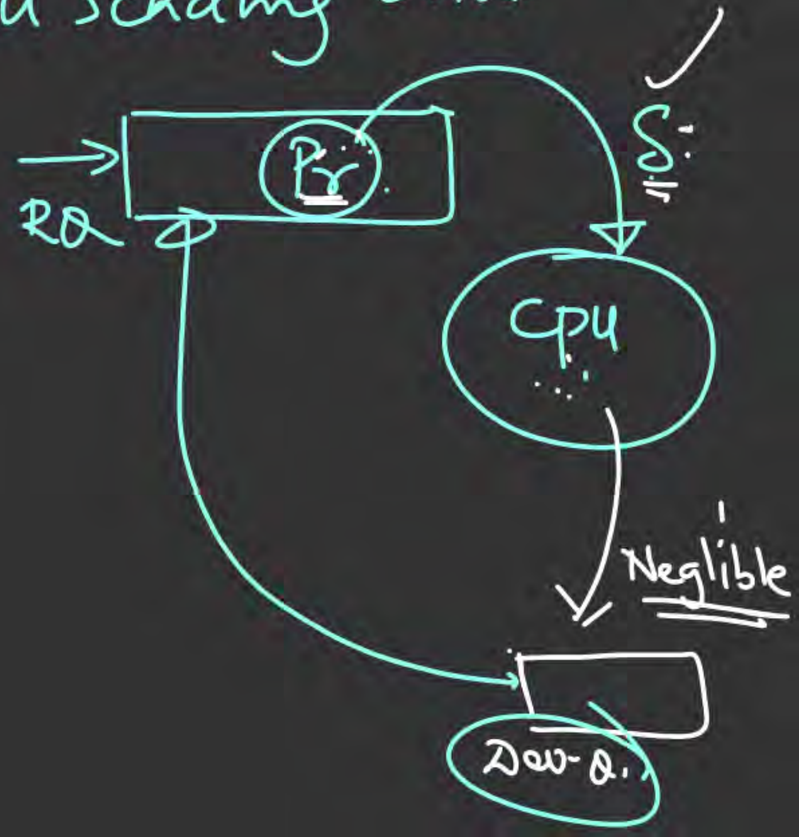
1) FCFS : Scheduling with IO-BT's and cpu Schdlng ovhd

S = 1

Lifecycle

P.NO	A.T	< BT ; IOBT ; B.T >
1	0	< ~~3~~ ; ~~5~~ ; 2 >





S=1

P.No	A.T	< B.T ; IO1B.T ; B.T >
1-	0	< 3 ; 7 ; 2 >
2-	2	< 5 ; 2 ; 3 >
3-	5	< 1 ; 4 ; 2 >

FCFS : System has multiple IO devices

RQ: P1 P2 P3 P1 P2 P3 (at 0, 2, 12)

2 + 3 = 5

17 - 12 = 5

L = 22 - 0 = 22

17 - (9) = 8

Av.TAT ; Av w.T

'L'

% cpu Idleness = 0%

Cpu: δ P1 | δ P2 | δ P3 | δ P1 | δ P2 | δ P3

0 1 4 5 10 11 12 13 15 16 19 20 22

IO: P1 (7), P3 (4), P2 (2)

TAT(P1) = 15 ; WT(P1) = 1

TAT(P2) = 17 ; WT(P2) = 5

TAT(P3) = 17 ; WT(P3) = 8

$$W.T = TAT - (BT + IOBT)$$

$$= 15 - (5 + 7) = 3$$

W.T = Time Spent by Process in R.Q

(With 'δ > 0' the Formula for W.T

* $$W.T = TAT - (BT + IOBT + n \cdot \delta)$$

'δ' is not considered in W.T

(n = No. of Times the Process gets Scheduled into CPU)

$$W.T\,(P_1) = 15 - (5 + 7 + 2 \cdot 1)$$

$$= 1$$

Q.

Consider three Processes P_1, P_2, P_3 arriving in the Ready Queue at time 0 in the order P_1, P_2, P_3. Their service time requirements are 10,20&30 units respectively. Each Process spends 20% of its Service time on I/O followed by 70% of its Service time on Computation at CPU and last 10% on I/O before completion. Assuming Concurrent I/O and negligible Scheduling Overhead. Calculate for FCFS Scheduling

(i) Average TAT of Processes

(ii) % CPU idleness

ST	P.NO	AT	20% IOBT	70% BT	10% IOBT
10	1	0	~~2~~	~~7~~	1
20	2	0	~~4~~	~~14~~	2
30	3	0	~~6~~	~~21~~	3

$\delta = 0$

0.0000000 1 ~ 0

0.0000000 2 ~ 0

$L = 47$

$\therefore$ cpu idleness $= 5/47$

R.Q: ~~P1~~ ~~P2~~ ~~P3~~ P1 ~~P2~~ ~~P3~~ P1 P2 P3

0 2 10

34

CPU: P1 P2 P3 // P1 P2 P3 P1 P2 // P3

0 0 0 0 2 9 23 44 44 44 47 47

IO: P1 (2) — P2 (4) — P3 (6) — P1 (10) — P2 (25) — P3 (47)

Av.TAT $= \frac{44+44+47}{3}$

W.T(P_1) = TAT − (BT + IOBT)

= 44 − (10)

= 34

$\delta = 1$

$\delta = 1$:

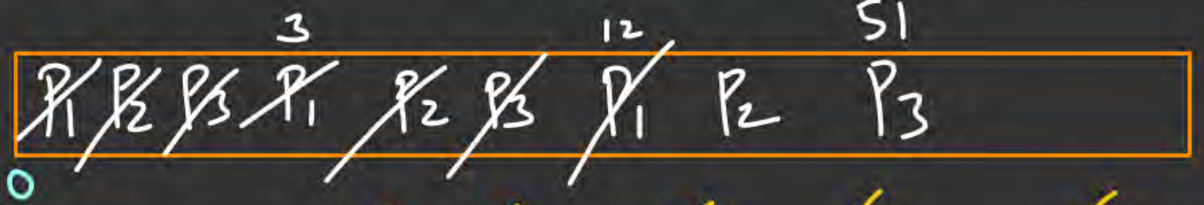
S.T	P.NO	A.T	IOBT	BT	IOBT
10	1	0	2	7	1
20	2	0	4	14	2
30	3	0	6	21	3

% cpu Idleness = $1/52 = x\%$

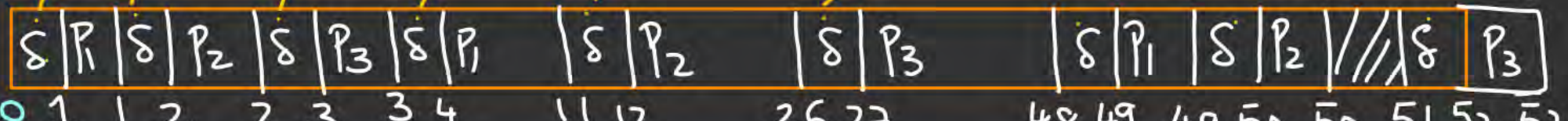
$L = 52 - 0 = 52$

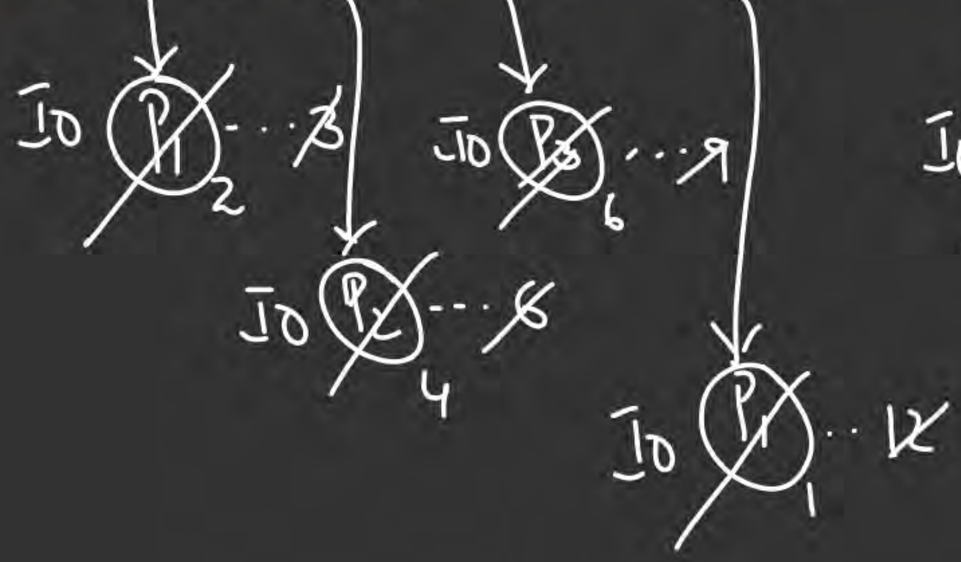
$\left(\% \text{ cpu-ovh'd activity} / L\right) = 9/52 = y\%$

RQ



cpu





% cpu eff = $100 - (x+y)$

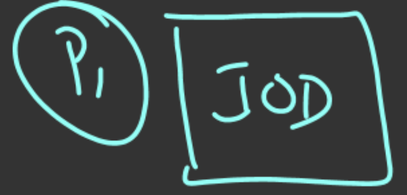
① S=2;

P.No	A.T	< BT ; IOB ; BT >
1	0	< 3 ; 4 ; 2 >
2	5	< 2 ; 0 ; 3 >
3	20	< 1 ; 15 ; 6 >

② S=1;

P.No	A.T	< IOBT ; BT ; IOBT >
1	3	< 5 ; 2 ; 3 >
2	8	< 2 ; 10 ; 4 >
3	12	< 6 ; 2 ; 1 >

③ "Repeat ① & ② & ③ Assuming System has only one IO-device"




THANK YOU
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