Operating System Scheduling algorithms

1- First Come First Serve (FCFS)

It is an operating system scheduling algorithm that automatically executes queued requests and processes in order of their arrival.

- Jobs are executed on first come, first serve basis.
- It is a non-preemptive, pre-emptive scheduling algorithm.
- Easy to understand and implement.
- Its implementation is based on FIFO queue.
- Poor in performance as average wait time is high.

How FCFS Works?

1- Calculating Average Waiting time (WT)

Here is an example of five processes arriving at different times. Each process has a different burst time.

Process	Arrival time (AT)	Burst time(BT)	Waiting time (WT)
P1	2	6	?
P2	5	2	?
P3	1	8	?
P4	0	3	?
P5	4	4	?

Using the FCFS scheduling algorithm, these processes are handled as follows.

Step 1) The process begins with P4 which has arrival time 0

Step 2) At time=1, P3 arrives. P4 is still executing. Hence, P3 is kept in a queue.

Step 3) At time= 2, P1 arrives which is kept in the queue.

Step 4) At time=3, P4 process completes its execution.

Step 5) At time=4, P3, which is first in the queue, starts execution.

Step 6) At time =5, P2 arrives, and it is kept in a queue.

Step 7) At time 11, P3 completes its execution.

Step 8) At time=11, P1 starts execution. It has a burst time of 6. It completes execution at time interval 17.

Step 9) At time=17, P5 starts execution. It has a burst time of 4. It completes execution at time=21.

Step 10) At time=21, P2 starts execution. It has a burst time of 2. It completes execution at time interval 23.

❖ **Extract the start time value form Gantt chart below:**

P4	P3	P1	P5	P2

0   3   11   17   21   23

Gantt Chart

Process	Start time
P1	**11**
P2	**21**
P3	**3**
P4	**0**
P5	**17**

Waiting time = Start time – Arrival time

Process	Arrival time (AT)	Burst time (BT)	Waiting time (WT)
P1	2	6	9
P2	5	2	16
P3	1	8	2
P4	0	3	0
P5	4	4	13

Average WT = Total WT / Number of processes

$$= (9+16+2+0+13) / 5$$

$$= 40/5$$

$$= 8$$

2- Calculating Average Complete time (CT)

Process	Arrival time (AT)	Burst time (BT)	Waiting time (WT)	Complete time (CT)
P1	2	6	9	17
P2	5	2	16	23
P3	1	8	2	11
P4	0	3	0	3
P5	4	4	13	21

❖ **Extract the complete time value form Gantt chart below:**

P4	P3	P1	P5	P2
0 3	11	17	21	23

Average complete time= Total CT / Number of processes

$$= (17+23+11+3+21)/ 5$$

$$= 75/5$$

$$= 15$$

3- Calculating Average Turn Around time (TAT)

Process	Arrival time (AT)	Burst time (BT)	Waiting time (WT)	Complete time (CT)
P1	2	6	9	17
P2	5	2	16	23
P3	1	8	2	11
P4	0	3	0	3
P5	4	4	13	21

TAT = CT – AT

Process	TAT
P1	15
P2	18
P3	10
P4	3
P5	17

Average TAT = Total TAT/ number of processes

$$= (15+18+10+3+17)/5$$

$$= 63/5$$

$$= 12.6$$

Process	Arrival time (AT)	Burst time (BT)	Waiting time (WT)	Complete time (CT)	Turn around time(TAT)
P1	2	6	9	17	15
P2	5	2	16	23	18
P3	1	8	2	11	10
P4	0	3	0	3	3
P5	4	4	13	21	17