CPU scheduling algorithms

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CPU scheduling algorithms

- First in First out(FIFO)
- Shortest Job First (SJF)
- Shortest Remaining Time First
- Priority Scheduling
- Round Robin (RR)

First- Come, First-Served (FCFS) Scheduling

Process	Burst Time
P_1	24
P_2	3
P_3	3

- Suppose that the processes arrive in the order: P_1 , P_2 , P_3
  The Gantt Chart for the schedule is:

P_1		P_2	P_3

0   24   27   30

- Waiting time for P_1 = 0; P_2 = 24; P_3 = 27
- Average waiting time: (0 + 24 + 27)/3 = 17

FCFS Scheduling (Cont.)

Suppose that the processes arrive in the order:

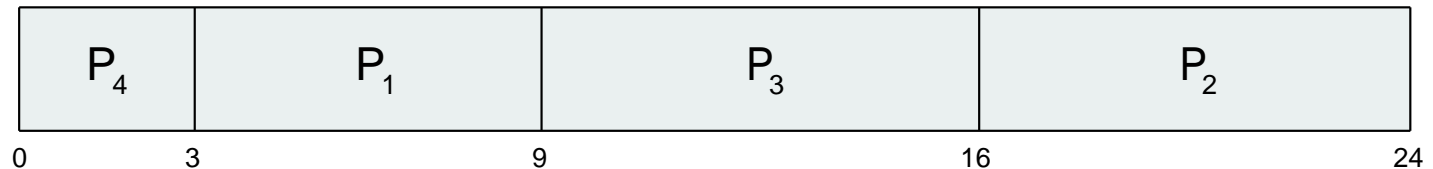$$P_2 , P_3 , P_1$$

- The Gantt chart for the schedule is:

P_2	P_3	P_1

0   3   6   30

- Waiting time for $P_1 = 6$; $P_2 = 0$, $P_3 = 3$
- Average waiting time: $(6 + 0 + 3)/3 = 3$
- Much better than previous case
- **Convoy effect** - short process behind long process
    - Consider one CPU-bound and many I/O-bound processes

Example of SJF

Process	Burst Time
P_1	6
P_2	8
P_3	7
P_4	3

- SJF scheduling chart

P_4	P_1	P_3	P_2
0 3	9	16	24

- Average waiting time = (3 + 16 + 9 + 0) / 4 = 7

Preemptive Scheduling	Non-preemptive Scheduling
A processor can be preempted to execute the different processes in the middle of any current process execution.	Once the processor starts its execution, it must finish it before executing the other. It can't be paused in the middle.
CPU utilization is more efficient compared to Non-Preemptive Scheduling.	CPU utilization is less efficient compared to preemptive Scheduling.
Waiting and response time of preemptive Scheduling is less.	Waiting and response time of the non-preemptive Scheduling method is higher.
Preemptive Scheduling is prioritized. The highest priority process is a process that is currently utilized.	When any process enters the state of running, the state of that process is never deleted from the scheduler until it finishes its job.
Preemptive Scheduling is flexible.	Non-preemptive Scheduling is rigid.
Examples: - Shortest Remaining Time First, Round Robin, etc.	Examples: First Come First Serve, Shortest Job First, Priority Scheduling, etc.
Preemptive Scheduling algorithm can be pre-empted that is the process can be Scheduled	In non-preemptive scheduling process cannot be Scheduled
In this process, the CPU is allocated to the processes for a specific time period.	In this process, CPU is allocated to the process until it terminates or switches to the waiting state.
Preemptive algorithm has the overhead of switching the process from the ready state to the running state and vice-versa.	Non-preemptive Scheduling has no such overhead of switching the process from running into the ready state.