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## Operating Systems

### *The Scheduler Assignment Manual*

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2	1	الفصل

## FCFS Scheduling (First come First served)

CPU\_Scheduler

FCFS SJF Priority RoundRobin

Enter number of processes:  ok

enter burst time and arrival time of the process and click insert button:

enter burst time:  click to insert new process

enter arrival time:  0

NOTE: first process arrival time must be 0 and other processes must be greater than 0.Or all arrival times equal 0.

average waiting time=

### Steps to use

- Choose FCFS Tap
- Enter number of process
- Enter burst time and arrival time of each process and click insert after each one.
- The default value of arrival time is zero
- **Note: If you change number of process and quantum time , then click OK ,you can restart again the process.**

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:



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

CPU\_Scheduler

FCFS SJF Priority RoundRobin

Enter number of processes: 3 ok

enter burst time and arrival time of the process and click insert button:

enter burst time: 3 click to insert new process

enter arrival time: 8

NOTE: first process arrival time must be 0 and other processes must be greater than 0.Or all arrival times equal 0.

average waiting time= 17

Gantt Chart: P1 (0-24), P2 (24-27), P3 (27-30)

Process	Burst Time	Arrival Time
P1	5	0
P2	3	1
P3	8	2
P4	6	3

CPU\_Scheduler

FCFS SJF Priority RoundRobin

Enter number of processes, then click ok: 4 ok

Enter burst time and arrival time of the process and click insert button:

Enter burst time: 6 click to insert new process

Enter arrival time: 3

NOTE: first process arrival time must be 0 and other processes must be greater than 0.Or all arrival times equal 0.

average waiting time= 5.75

Gantt Chart: P1 (0-5), P2 (5-8), P3 (8-16), P4 (16-22)

## SJF Scheduling (Shortest Job First) Preemptive and non-preemptive

### Steps to use

#### **Incase non-preemptive**

- Choose SJF Tap
- Enter number of process
- Enter burst time of each process and click insert after each one.

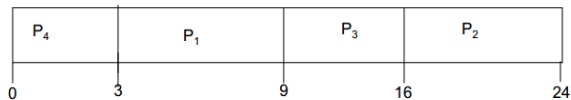
#### **Incase Preemptive**

The same steps as non-preemptive but check the Preemptive check box then enter arrival time of each process then click insert after each one.

**Note: If you change number of process you can restart again the process.**

Process	Burst Time
$P_1$	6
$P_2$	8
$P_3$	7
$P_4$	3

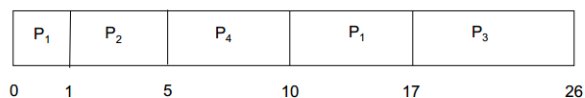
#### ■ Nonpreemptive SJF scheduling chart



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

Process	Arrival Time	Burst Time
$P_1$	0	8
$P_2$	1	4
$P_3$	2	9
$P_4$	3	5

#### ■ Preemptive SJF Gantt Chart



■ Average waiting time =  $[(10-1)+(1-1)+(17-2)+(5-3)]/4 = 26/4 = 6.5 \text{ msec}$

## Priority Scheduling - Preemptive and non-

### preemptive

#### Steps to use

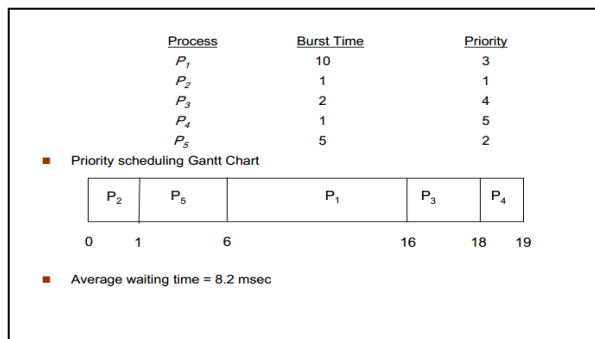
##### Incase non-preemptive

- Choose SJF Tap
- Enter number of process
- Enter burst time of each process
- Enter Priority of each process and click insert after each one.

##### Incase Preemptive

The same steps as non-preemptive but check the Preemptive check box then enter arrival time of each process then click insert after each one.

**Note: If you change number of process you can restart again the process.**



process	arrival	burst	priority
p1	0	5	2
p2	3	4	1
p3	4	7	3
p4	6	8	2

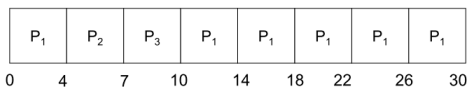
## RR Scheduling (Round Robin)

### Steps to use

- Choose RoundRobin Tap
- Enter number of process
- Enter Quantum time
- Enter burst time and arrival time of each process
- The default value of arrival time is zero
- **Note: If you change number of process and quantum time , then click OK ,you can restart again the process.**

Process	Burst Time
$P_1$	24
$P_2$	3
$P_3$	3

■ The Gantt chart is:



- Typically, higher average turnaround than SJF, but better *response*
- q should be large compared to context switch time
- q usually 10ms to 100ms, context switch < 10 usec

CPU Scheduler

FCFS SJF Priority RoundRobin

Enter number of processes and quantum time , then click ok:

Enter number of processes:

Enter Quantum time:

enter burst time and arrival time of the process and click insert button:

enter burst time:

enter arrival time:

NOTE: first process arrival time must be 0 and other processes must be greater than 0. Or all arrival times equal 0.

average waiting time=

Gantt chart: p1 p2 p3 p1 p1 p1 p1 p1  
0 4 7 10 14 18 22 26 30

Quantum=3

Process	Burst Time	Arrival Time
P1	5	0
P2	3	1
P3	8	2
P4	6	3

CPU Scheduler

FCFS SJF Priority RoundRobin

Enter number of processes and quantum time , then click ok:

Enter number of processes:

Enter Quantum time:

enter burst time and arrival time of the process and click insert button:

enter burst time:

enter arrival time:

NOTE: first process arrival time must be 0 and other processes must be greater than 0. Or all arrival times equal 0.

average waiting time=

Gantt chart: p1 p2 p3 p4 p1 p3 p4 p3  
0 3 6 9 12 14 17 20 22