

Scheduling algorithms

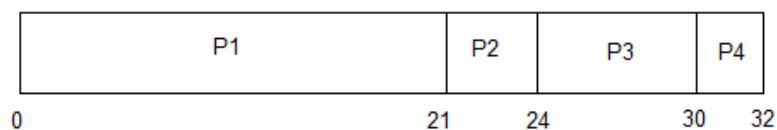
First Come First Serve (FCFS)

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

PROCESS	BURST TIME
P1	21
P2	3
P3	6
P4	2



The average waiting time will be = $(0 + 21 + 24 + 30) / 4 = 18.75$ ms



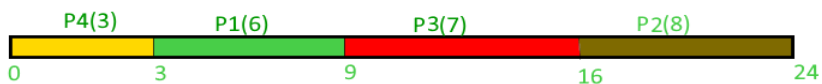
This is the GANTT chart for the above processes

Shortest Job First (SJF)

This is a non-preemptive, pre-emptive scheduling algorithm. Best approach to minimize waiting time. Easy to implement in Batch systems where required CPU time is known in advance. Impossible to implement in interactive systems where required CPU time is not known. The processor should know in advance how much time process will take.

Non Preemptive SJF (Example)

Process	Duration	Oder	Arrival Time
P1	6	1	0
P2	8	2	0
P3	7	3	0
P4	3	4	0



Process	Waiting Time
P1	0
P2	3
P3	9
P4	16

The total time : 24

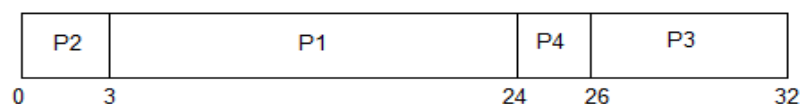
The average waiting time (AWT):
 $(0+3+9+16)/4=7$

Priority based

Priority scheduling is a non-preemptive algorithm and one of the most common scheduling algorithms in batch systems. Each process is assigned a priority. Process with highest priority is to be executed first and so on. Processes with same priority are executed on first come first served basis. Priority can be decided based on memory requirements, time requirements or any other resource requirement.

PROCESS	BURST TIME	PRIORITY
P1	21	2
P2	3	1
P3	6	4
P4	2	3

The GANTT chart for following processes based on Priority scheduling will be,



The average waiting time will be, $(0 + 3 + 24 + 26)/4 = 13.25$ ms

Round Robin (RR)

Round Robin is the preemptive process scheduling algorithm. Each process is provided a fix time to execute, it is called a quantum. Once a process is executed for a given time, it is preempted, and other process executes for a given time. Context switching is used to save states of preempted processes.

Round Robin Example:

Process	Duration	Order	Arrival Time
P1	3	1	0
P2	4	2	0
P3	3	3	0

Suppose time quantum is 1 unit.

P1	P2	P3	P1	P2	P3	P1	P2	P3	P2
0									10

P1 waiting time : 4

The average waiting time(AWT) : $(4+6+6)/3=5.33$

P2 waiting time: 6

P3 waiting time: 6

To-do

1. Write a program to implement following scheduling algorithms
 - a. FCFS
 - b. SJF
 - c. Priority
 - d. Round Robin
2. Write a menu-driven program to implement above scheduling algorithms in a single program.