TD N°3: Scheduling

Exercise n°1

We consider 4 processes P_1, P_2, P_3, and P_4, whose execution time and arrival date are given in the following table:

Process	Execution time	Arrival date
P_1	3	0
P_2	4	1
P_3	3	3
P_4	1	4

1) Give the Gantt diagram (the execution diagram) for these 4 processes according to the following schedules:
   a) FCFS scheduling (First Come, First Served).
   b) LIFO scheduling (First In, First Out).
   c) SJF scheduling (Shortest Job First).
   d) SRTF scheduling (Shortest Remaining Time First).
2) Calculate the average response time and the average waiting time for the 4 types of scheduling: FCFS, LIFO, SJF and SRTF.

Exercise n°2

Three processes P_1, P_2 and P_3 were loaded into a data processing system on the dates shown below:

Processus	Execution time	Arrival date	Static priority
P_1	3	0	3
P_2	3	0	1
P_3	2	2	2

1) Give the Gantt diagram (the execution diagram) for these processes using the following scheduling algorithms:
   a) R-R (round robin) with quantum = 2.
   b) Static priority (priority is given to the process with a low priority value).
2) Calculate the average response time for these 2 types of scheduling.
3) Compare them according to the response time criterion.

Exercise n°3

Consider three processes P_1, P_2 and P_3, whose execution time and arrival date are given in the following table:

Processus	Execution time	Arrival date
P_1	6 cpu	0
P_2	5 cpu + 2 I/O + 3 cpu	3
P_3	4 cpu + 1 I/O	5

1) Give the execution diagram (Gantt diagram) of these processes according to the following scheduling algorithm: R-R (round robin) with a quantum = 3 units and a context switch = 1 unit.
2) Indicate the number of context switches.
3) Calculate the average response time.

Exercise n°4

Consider a single-processor architecture on which you wish to run a set of 4 programs whose behaviour is defined as follows:

Process	Time cpu + time I/O	Arrival date
P_1	6cpu + 3 I/O + 3cpu + 4 I/O + 2cpu	0
P_2	2cpu + 5 I/O + 2cpu + 2 I/O + 1cpu	3
P_3	2 cpu + 4 I/O + 1 cpu	5
P_4	1cpu + 1 I/O + 1cpu	8

It is assumed that a single channel is available to manage a disk, and that the order of service of input/output (I/O) requests for this disk is based on an FCFS policy. Scheduling on the processor is done using an SRTF (Shortest Remaining Time First) strategy.

1) For each program, complete the Gantt diagrams shown below:

I/O																											
Waiting																											
Ready																											
Running																											

2) Calculate:
   a) The number of context switches.
   b) The response time of each program.