**COMP 322/L—Introduction to Operating Systems and System Architecture**

**Assignment #2—Batch Process Scheduling**

**Objective:**

To calculate the timing parameters of batch processes based on different scheduling algorithms.

**Specification:**

The program mimics the execution of different processes under different scheduling algorithms. The simulation maintains a table that reflects the current state of the system, based on choosing from a menu of choices, where each choice calls the appropriate procedure, where the choices are:

1) Enter parameters

2) Schedule processes with FIFO algorithm

3) Schedule processes with SJF algorithm (non-preemptive)

4) Schedule processes with SRT algorithm (preemptive version of SJF)

5) Quit program and free memory

**Assignment:**

* Create a table to record the status of different processes based on the following parameters:
  + *id*: the unique identifier of the process
  + *arrival*: the point in time when the process enters the ready list to be executed by the CPU
  + *total\_cpu*: the amount of CPU time the process will consume between arrival and departure
  + *total\_remaining*: the amount of CPU time remaining for a process to complete {used for SRT scheduling only}
  + *done:* a flag that indicates whether the process has been successfully completed (1) or not (0)
  + *start\_time:* the time when the process has begun being executed by the CPU
  + *already\_started:*a flag that indicated whether the process has already begun (1) or not (0) {used for SRT scheduling only}
  + *end\_time:* the time when the process has been completed by the CPU
  + *turnaround\_time:* the sum of the total CPU time and the waiting time (alternatively: the difference between the end time and the arrival time)
* Calculate the values for the *start\_time*, *end\_time*, and *turnaround\_time* for each process based on the selected scheduling algorithm.

**What NOT to do (any violation will result in an automatic score of 0 on the assignment):**

* Do NOT modify the choice values (1,2,3,4,5) or input characters and then try to convert them to integers--the test script used for grading your assignment will not work correctly.
* Do NOT turn in an alternate version of the assignment downloaded from the Internet (coursehero, chegg, reddit, github, etc.) or submitted from you or another student from a previous semester.

**What to turn in:**

* The source code as a file uploaded to Canvas by the deadline of 11:59pm PST
* As a note, even though your code may compile on a compiler you have installed on your computer, I do not have access to your computer. I will be using the following free online compiler for testing, so make sure your code compiles with the following online C compiler before submitting: <https://www.onlinegdb.com/online_c_compiler>

**Sample output**

**Batch scheduling**

**----------------**

**1) Enter parameters**

**2) Schedule processes with FIFO algorithm**

**3) Schedule processes with SJF algorithm**

**4) Schedule processes with SRT algorithm**

**5) Quit and free memory**

**Enter selection: 1**

**Enter total number of processes: 3**

**Enter process id: 1**

**Enter arrival cycle for process P[1]: 0**

**Enter total cycles for process P[1]: 6**

**Enter process id: 2**

**Enter arrival cycle for process P[2]: 1**

**Enter total cycles for process P[2]: 3**

**Enter process id: 3**

**Enter arrival cycle for process P[3]: 3**

**Enter total cycles for process P[3]: 2**

**ID Arrival Total Start End Turnaround**

**--------------------------------------------------**

**1 0 6**

**2 1 3**

**3 3 2**

**Batch scheduling**

**----------------**

**1) Enter parameters**

**2) Schedule processes with FIFO algorithm**

**3) Schedule processes with SJF algorithm**

**4) Schedule processes with SRT algorithm**

**5) Quit and free memory**

**Enter selection: 2**

**ID Arrival Total Start End Turnaround**

**--------------------------------------------------**

**1 0 6 0 6 6**

**2 1 3 6 9 8**

**3 3 2 9 11 8**

**Batch scheduling**

**----------------**

**1) Enter parameters**

**2) Schedule processes with FIFO algorithm**

**3) Schedule processes with SJF algorithm**

**4) Schedule processes with SRT algorithm**

**5) Quit and free memory**

**Enter selection: 3**

**ID Arrival Total Start End Turnaround**

**--------------------------------------------------**

**1 0 6 0 6 6**

**2 1 3 8 11 10**

**3 3 2 6 8 5**

**Batch scheduling**

**----------------**

**1) Enter parameters**

**2) Schedule processes with FIFO algorithm**

**3) Schedule processes with SJF algorithm**

**4) Schedule processes with SRT algorithm**

**5) Quit and free memory**

**Enter selection: 4**

**ID Arrival Total Start End Turnaround**

**--------------------------------------------------**

**1 0 6 0 11 11**

**2 1 3 1 4 3**

**3 3 2 4 6 3**

**Batch scheduling**

**----------------**

**1) Enter parameters**

**2) Schedule processes with FIFO algorithm**

**3) Schedule processes with SJF algorithm**

**4) Schedule processes with SRT algorithm**

**5) Quit and free memory**

**Enter selection: 5**

**Quitting program...**