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
>>4) Schedule processes with SRT algorithm
>>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 **[auto-generated, starting from 1—do not input from the user]**
  - *arrival*: the point in time when the process enters the ready list to be executed by the CPU **[input from the user]**
  - *total_cpu*: the amount of CPU time the process will consume between arrival and departure **[input from the user]**
  - *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:
- 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, ChatGPT, etc.) or submitted from you or another student from a previous semester—the test cases from this semester will not work on a previous semester's assignment.
- Do NOT turn in your assignment coded in another programming language (C++, C#, Java).

What to turn in:
- The source code as a C file uploaded to Canvas by the deadline of 11:59pmPST. Please check the syllabus for the late submission policy.—note 1-minute late counts as a day late, 1 day and 1 minute late counts as 2 days late, etc.)
- 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
If it does not compile with the above compiler, the default grade is 0 points since I cannot run it.

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 arrival cycle for process 1: 0
Enter total cycles for process 1: 6
Enter arrival cycle for process 2: 1
Enter total cycles for process 2: 3
Enter arrival cycle for process 3: 3
Enter total cycles for process 3: 2

PID     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

PID     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

PID     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

PID     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
```