CS4310 Operating Systems
Assignment 1
(100 points)

The purpose of this project is to write a program that simulates an operating system scheduler and to compare each scheduler performance in a report. **You can use Java or C++ but please do not use package names or namespaces. Do not use 3rd-party libraries.**

The program implements the following CPU scheduling algorithms:

- First-Come-First-Serve (FCFS)
- Shortest-Job-First (SJF)
- Round-Robin with time quantum = 20
- Round-Robin with time quantum = 40
- Lottery with time quantum = 40

Your program will read the processes, their burst times and their priority from test data file. The process files are located on Blackboard with this document.
The input file will be in the following format :

pid
burst_time
priority

Where the first line is id of the process, the second is the burst time that the process requires, the third line will be the priority of the process. The priority is only to be used in the lottery scheduler.

****Note: the scheduler takes 3 units of CPU time to switch a process (context-switching cost). You will need to add this to the runtimes that you track. Assume that, if the same process continues to run after a context switch, there will still be a context-switching cost.**

Note: You can make the following assumptions:

- Processes arrive in the order in which are read from the file.
- All processes are in the queue at CPU time = 0

Requirements output data:

- Output the details of each scheduler's execution of each test file to a csv formatted file. You need to show The following columns:
  CpuTime, PID, StartingBurstTime, EndingBurstTime, CompletionTime
- The completion time should be zero unless the process has completed (EndingBustTime = 0).
- Name each output file: *scheduler_name-testfile_name.csv*

Requirements for each scheduler:

- When all of the processes of a particular file complete, calculate and output the average turnaround times (completion times) of all processes for each scheduling algorithm.
- Your output must be as a CSV file.

Report:

- Cover sheet
- Introduction
- Analysis
    - Compare and contrast using average turnaround time
        - FCFS vs SJF
        - RR20 vs RR40
        - RR40 vs Lottery40
- Conclusion

Note: this report is a large part of your grade for this assignment; please take it seriously. You should include graphs with your analysis to support your findings. Approach this assignment as an experiment.

What to submit:

- Your source code; include a README file to explain how to compile and run your program from the command line.
- The project report.
- Use average completion time for your comparisons. Your report should be in a PDF format.
- The output files (in a csv format with the labels of each column in the first row)
- Compress your submission into a single file named: YourFullName_p1.zip. Submit this file via blackboard.

How to submit it

- Move the source code, readme, report, and output files into a folder labelled: lastname_firstname_a1 (where “lastname” is your last name and “first hame” is your first name. Please do include binaries or metadata produced by your IDE.

- Compress the folder using a compression utility (e.g., winzip, pkzip, 7zip, tar, etc). This should produce a file named, lastname_firstname_a1.zip, or it may have a different file extension depending on the compression utility used. Submit only the compressed file via the assignment in BlackBoard.