Operating Systems (11335)
Fall 2022
Term Project

General Requirements

1. The project accounts for 10 points of the total course grade.
2. The project can be done in groups of up to 3. However, discussions will be individual and covering the whole project.
3. Grades may vary among the group depending on their effort, contribution and discussion.
4. Every team member should contribute to all aspects of the project and be ready to present and answer anything about any part of the project.
5. Submit the following onto e-learning:
    a. A fully working application zipped into the project's assignment
    b. Source code to be placed in the project's Turnitin-assignment. One text file containing all source codes.
6. Any violation of PSUT's ethics/honour code will have severe consequences.
7. Submission deadlines and discussion dates will be announced on e-learning

Scheduling Algorithms: (Reference: OS Book – Chapter 6)

Write a program in any programming language to implement the Multilevel Feedback scheduling using 3 levels/queues, each one implementing the following:

1. **Level 1/Queue 1: Round Robin scheduling** algorithm with quantum (q=8).
2. **Level 2/Queue 2: Round Robin scheduling** algorithm with quantum (q=16).
3. **Level 3/Queue 3: First Come First Serve scheduling**

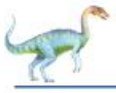
a) The user should be able to enter the number of processes, their arrival times and their burst times in time units. Data entry can be through console or graphical interfaces.

b) Your program should find, select and display the order in which the processes are executed (it will be nice if you can draw the Gantt chart) and the start and end of each execution cycle (you can add the length of the execution cycle).

c) Add an option to specify the percentage of the CPU time for each queue as follows:
    1. Level 1/Queue 1: 60%
    2. Level 2/Queue 2: 25%
    3. Level 3/Queue 3: 15%

At the end, do the following calculations and display them:

1. the average waiting time
2. the average response time
3. the average turnaround time



Example of Multilevel Feedback Queue

- Three queues:
  - Q_0 – RR with time quantum 8 milliseconds
  - Q_1 – RR time quantum 16 milliseconds
  - Q_2 – FCFS
- Scheduling
  - A new job enters queue Q_0 which is served RR
    - When it gains CPU, job receives 8 milliseconds
    - If it does not finish in 8 milliseconds, job is moved to queue Q_1
  - At Q_1 job is again served RR and receives 16 additional milliseconds
    - If it still does not complete, it is preempted and moved to queue Q_2