COP 4610 - CPU scheduler Programming Assignment

Project objective: To learn more about OS CPU scheduling through a hands-on simulation programming experience

You do not need to implement Shortest Job First (SJF)

1. **SJF – nonpreeemptive (results provided for comparison) – add the results to your tables and graphs along with your own results for FCFS and MLFQ**

Implement the following CPU scheduling algorithms
(Use any programming language the executables must run on the CEECS desktop)–

- Simulate and Evaluate each with the set of processes below

1. **FCFS nonpreeemptive** ***(results provided to time 329)***
2. **MLFQ** ***(results provided to time 330)***

   Multilevel Feedback Queue (preemptive – absolute priority in higher queues)
   Queue 1 uses RR scheduling with Tq = 6
   Queue 2 uses RR scheduling with Tq = 12
   Queue 3 uses FCFS

   All processes enter first queue 1. If time quantum (Tq) expires before CPU burst is complete, the process is downgraded to next lower priority queue. Processes are not downgraded when preempted by a higher queue level process. Once a process has been downgraded, it will not be upgraded.

Assumptions:

1. All processes are activated at time 0
2. Assume that no process waits on I/O devices.
3. After completing an I/O event, a process is transferred to the ready queue.
4. Waiting time is accumulated while a process waits in the ready queue.

Process Data:

process goes {CPU burst, I/O time, CPU burst, I/O time, CPU burst, I/O time,…….., last CPU burst}

```
P1 {7,19,8,13,17,13,19,19,44,15,29,51,14,68,15,49,14}
P2 {9,52,12,42,24,31,24,21,26,43,14,31,23,32,15}
P3 {25,51,43,53,44,21,15,31,24,29,31,34,12}
P4 {6,29,5,22,6,24,8,27,5,25,6,24,8,26,9, 22, 8}
P5 {5,66,6,82,5,71,6,43,4,26,6,51,3,77,4,61,3,42,5}
P6 {9,35,8,41,11,33,13,32,8,41,16,29,11}
P7 {5,28,6,21,5,39,8,16,7,29,5,31,4,22,6,24,5}
P8 {20,26,19,23,18,42,27,43,19,37,26,43,35,55,21}
P9 {6,35,5,41,6,33,4,32,8,31,4,29,5,16,3,32,4}
```

Simulation has been completed for SJF (see results for guidelines):

Presentation of results:

Write the simulation program in a programming language (such as C, C++, C#, Java, or any other language).

WHAT TO SUBMIT (DO NOT ZIP THE FILES)

In Unit 6 – one Word Document

In Unit 8 – two Word Documents and two executable files

- document 1 - Report with TOC, Introduction, discussion with tables and graphs, output, and source code
- document 2 - Instructions on how to run the executable files for the simulator
- two executable files (FCFS and MLFQ)

Unit 6: General flow chart (logic) of the simulation program and/or GANTT Charts

- **For both FCFS and MLFQ (word Document format)**

Unit 8: REPORT : Write a well-organized report, which will include:

- ***Table of Contents and Introduction***
- ***Discussion***
  - **Well-presented final results including tables, graphs, and discussion**
  - **For all processes and averages for each algorithm**
    - **Compare results SJF, FCFS, MLFQ**
      - **U (CPU utilization)**
      - **WT (waiting times)**
      - **TT (turnaround times),**
      - **RT(response times)**
- ***Program Output* (added to the Word Document)**

  (a) Dynamic execution (program output – see example provided)

  ---This information should be displayed for each context switch

  - Current Execution time
  - Running process
  - The Ready queue, with the CPU burst time for each process
  - The Processes in I/O with the remaining time for every process for its I/O burst completion
  - Indicate if a process has completed its total execution.

  (b) Results printed on the screen at the end of each simulation (see SJF results provided)

  ---This information should be displayed at the end of each simulation

  - Total time needed to complete all 7 processes.
  - CPU utilization - [%] (U).
  - Waiting times for each process and the average waiting time for all processes (WT)
  - Turnaround time for each process and the average turnaround time.(TT)
  - Response time for each process and the average response time (RT).
- ***Well commented Source code* - (Gantt chart if done by hand) – (added to Word Document)**

UNIT 8 - Executable files with clear instructions (Word document) on how to run the simulator -

Executables to test run and compare hardcopy to the simulation

MUST RUN on CEECS Desktop

Remote Connection - http://tsg.eng.fau.edu/software/vmware-remote-desktop-access/

The grading will be based on the following
(1) Program structure and organization
(2) Overall report
(3) Final results and discussion

Example of a Table and a graph that can be used for results comparison of algorithms (SJF, FCFS, MLFQ):

	First Come First Serve (FCFS)				Shortest Job First (SJF)				Multi-Level Feedback Queue (MLFQ)			
	WT	TT	RT	CPU (%)	WT	TT	RT	CPU (%)	WT	TT	RT	CPU (%)
P1												
P2												
P3												
P4												
P5												
P6												
P7												
P8												
P9												
Average