ECE 4550/5550G Project 1

Due Friday March 16, 2018 at 11:59pm (300 points)

Objective

To gain experience in writing and debugging a simulator
that implements the most used real-time scheduling algorithms.

1 Logistics

You are to work in a team of 1-2 members. You and your teammate should be able to independently describe the solutions.

2 RM and EDF Simulator

Using your favorite programming language, write a simulator that generates a schedule for the following scheduling algorithms: RM and EDF. Your program should read from an input file, which contains the following information.

- Number of tasks
- Simulation time length
- For each task, the following attributes are specified
  - ID
  - Execution time
  - Period (with implicit deadline)

To an output file, your program will show the corresponding RM and EDF schedules, clearly indicating when a job is being preempted and when a job misses its deadline. Jobs that miss their deadlines should be dropped at their respective deadlines. The output format of the schedule is up to you but should be easy to understand. At the end of the simulation, your program will also include a summary, indicating the number of preemptions and deadline misses per task and in total.

3 Handling Aperiodic Tasks

Extend your RM simulator to include a deferrable server to handle aperiodic requests. Output the average response time of the aperiodic requests in addition to the original printouts.

4 Implementation of a Real-Time Scheduling Algorithm on an RTOS (Optional + Extra Credits)

Instead of writing a simulator, you have the option to select a real-time scheduling algorithm seen in class and implement it on an RTOS. Obviously, the scheduling algorithm you pick must not already been implemented in your RTOS of choice. This is a risky, time-consuming, but rewarding experience. If you wish to take this option, please email me first.

5 Submission

Upload the following files as a single zip file on Canvas.

- The source code (plus any other files necessary for compilation such as a makefile)
- Example input and output files (5 tasks with different periods and a total system utilization of at least 0.9)
- One or two paragraphs discussing the differences in the schedules generated using RM and EDF in terms of preemptions and deadline misses
- Modified example input and output files that include 5 aperiodic tasks

6 Honor Code

Please remember that you must turn in your own work. Failure to do so will result in a zero for the assignment, as well as in you being reported to the Office of Undergraduate Academic Integrity.

7 Rubrics

- (100 points) Correct RM functionality
- (100 points) Correct EDF functionality
- (20 points) Ease of use, e.g., formatting and user-friendliness
- (10 points) Discussion comparing and contrasting RM against EDF
- (70 points) Correct deferrable server functionality