CS5306 Fall 2015	Assignment 3 Due 11-01-2015	10-21-2015

Submission Instructions:

1. **The grade of this assignment will take over the grade of assignment 2 if it is higher than the grade of assignment 2**.
2. Please submit your work directly in TRACS (using the TRACS editor) or as a text/MS-word/PDF attachment by the due date/time. Please use only zip for compression.
3. Please write your name in the assignment header and as a part of the file name of the attachment.
4. Please submit the source code of your program in C/C++/Java/Python/PhP or Matlab along with any file needed for compilation. Your source code should be submitted in text format. Additionally, it has to be compliable on VS or the CS UNIX server.
5. The code should include remarks that explain any non-trivial part of the program.
6. Please do not submit your assignment via email. If you miss the deadline, then please submit it on the TRACS drop-box and send me an email notification. Note, however, that late work will result in a penalty and it will be graded only at the end of the semester.

Background:

In this assignment you are expected to simulate Intra-core scheduling using preemtive Round Robin with priority of HRRN and HECN. For further information consult with the lecture notes (available on TRACS), with the relevant text in the book, and the relevant slides.

For $HRRN_i$, the priority of task T_i , use: $HRRN_i = \frac{W_i+S_i}{S_i}$. For $HECN_i$, the power aware priority of task T_i, use: $HECN_i = \frac{W_i+S_i \times PT_i}{S_i \times PT_i}$. Where: S_i is the remaining execution time of T_i, W_i is the total wait time (time spent in the ready Que and in the I/O Queue) of T_i, and PT_i is the average power consumption of T_i,

Please make the following assumptions:

1) The scheduling policy is HRRN (run 1) and HECN (run 2).
2) The state of the system can change at any tick (end of a tick).
3) OS decisions and actions are done only at the end of a slice. A slice is 20 ticks.
4) Tasks are generated (at any tick) with a probability P_1.
5) The remaining execution time of a task is denoted by R_3. If $R_3 = 0$, the task terminates.
6) The average power consumption of a task is denoted by R_4.
7) The running task can incur an I/O event (at any tick) with a probability P_2
8) The length of an I/O event is denoted by R_5. If $R_5 = 0$, the I/O event is completed.

Assignment Instructions:

Write a simulation of the HRRN/HECN scheduling policy.

Your program should use a random number generator that generates random numbers $\{R_1, R_2, R_3, R_4, R_5\}$ in the range [0, 1] and augment the number as needed to get the ranges specified below.

- $P_1 = 1$ if $R_1 > 0.97$; otherwise $P_1 = 0$
- $P_2 = 1$ if $R_2 > 0.97$; otherwise $P_2 = 0$
- $R_3 \in [10,50]$; $R_4 \in [10,30], R_5 \in [5,15]$.
- The simulation should run for 1500 ticks for HRRN (run 1) and 1500 ticks for HECN (run 2) and for each of the runs produce a screen-shot of the system throughput (number of completed tasks divided by the simulation length), total energy dissipated ($E = P \times t$), and the average latency per task (in ticks).