Unit 5 - Week 3

Week 3 Assignment 3

Due on 2020-10-15, 23:59 UTC.

1. Consider an embedded application in which a set of periodic hard real-time tasks are scheduled under EDF. Suppose a task needs three non-contiguous shared resources (CPU, DRAM, and I/O) during its execution. Under EDF (Highest Deadline First), once the task acquires one of its required resources, it is guaranteed not to block for acquiring the other required resources.
   a. True
   b. False
   
   (3 points to be awarded)

2. Under EDF (Highest Deadline First), the maximum blocking time for any periodic hard real-time task is
   a. Equal to the maximum usage time of all of its resources
   b. Equal to the maximum usage time of any of its higher priority tasks.
   
   (2 points to be awarded)

3. DMQ, Deadlock Monitors and D-Monitors Algorithm may produce a feasible schedule for a set of periodic hard real-time tasks, even when EDF fails to produce a feasible schedule.
   a. True
   b. False
   
   (2 points to be awarded)

4. Traditional resource sharing mechanisms such as semaphores and monitors are useful for sharing the access of several periodic hard real-time tasks to a single critical resource, neither uncontrolled priority inversions, nor deadlocks can occur.
   a. True
   b. False
   
   (3 points to be awarded)

5. RSVP (Resource Reservation Protocol) does not suffer from chain blocking.
   a. True
   b. False
   
   (2 points to be awarded)

6. Consider an embedded application in which a set of periodic hard real-time tasks are scheduled under RTMA. These tasks share a few critical resources among themselves. Unless a suitable resource sharing protocol is used, even the lowest priority real-time task in a system may suffer undesirable priority inversions.
   a. True
   b. False
   
   (3 points to be awarded)

7. Scheduling the access of a set of periodic hard real-time tasks to a set of non-preemptible resources does not suffer from priority inversion. RTMA (Resource Reservation Protocol) results in uncontrolled priority inversions for at least some of the tasks.
   a. True
   b. False
   
   (3 points to be awarded)

8. In a typical implementation of HLP (Highest Ladder Protocol), for each critical resource a separate queue is maintained for the waiting tasks.
   a. True
   b. False
   
   (2 points to be awarded)

9. When HLP (Highest Ladder Protocol) is used, for sharing three critical resources among a set of periodic hard real-time tasks, deadlocks among the concerned tasks occur on account of resource sharing can occur.
   a. True
   b. False
   
   (2 points to be awarded)

10. Suppose a real-time system has several periodic tasks and only two special tasks that require computation times of 10 units and 20 units and three deadlines of 30 units and 50 units, respectively. There is a possibility to have these special tasks should have a computation time of 60 units and period of 220 units.
    a. True
    b. False
    
    (2 points to be awarded)