COLLEGE OF MANAGEMENT & INFORMATION TECHNOLOGY
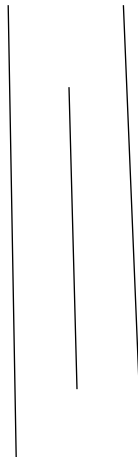
BACHELOR IN INFORMATION TECHNOLOGY

Assignment On: Real Time system

Submitted by: **Submitted to:**

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1. State whether the following statements are TRUE or FALSE. Justify your answer.

   a. A hard real time application consists of only one hard real-time system.
      In hard real time application it may contain many non-real time task. So, it is **FALSE** statement.

   b. Every safety critical real time system contains a fail-safe state.
      Having fail-safe state safety critical real time system is meaningless because the failure of safety critical system can lead the lives of people. Example: navigation system on board an aircraft. So, it is **FALSE** statement.

   c. A deadline constraint between two stimuli is a behavioral constraint on the environment of the system.
      It is **TRUE** because it is behavioral constraint where it says that since the constraint is imposed on the basis of 2nd stimulus event.

   d. A good algorithm for scheduling of hard real time task tries to.
      A scheduling algorithm for hard real-time task is only concerned with completing the task before the deadline. SO, it is **FALSE** statement.

   e. All hard real time system usually are safety critical in nature.
      This statement is **FALSE** because in real time system it says that not all hard real time system are safety critical in nature.

   f. Soft real time tasks do not have any associated time bounds.
      This statement is **FALSE** because soft real time task also have time bounds associated with them.

2. What is the difference between a performance constraints and a behavioral constraint in a real-time system?

S.N.	Performance constraint	Behavioral constraint
1	The constraints that are imposed on the response of the system is known as Performance constraint.	The constraints that are imposed on the action of the system is known as Behavioral constraint.
2	It defines and tell about the ensures whether the computer system perform satisfactory.	It define and ensures that how the environment should well behaved.
3	This constraint describes and shows the system is responding accurate or not.	This constraint generally describe about the behavior of the environment.

3. What is understood by jitter associated with a periodic task? Mention techniques by which jitter can be overcome.

Jitter is defined as the derivation of task given to a period and from its strict periodic behavior. It can be caused by using other factors as network congestion.

The techniques that which can be overcome by the jitter are:
- If only one or two action (tasks) have tight jitter requirement these actions are assigned very high priority.

- This method works well only when there are very small number of actions.

- While using in application task are rarely scheduled while it may result the given task missing the deadline or not.

- It involves in the setting task priority to high values while its period be the same as first task.

4. Explain real time application with its working mechanism and use if any block diagram (it must include one each of soft and hard real time system).

Real time system is a system that is put through real time which means response is obtained within a specific timing constraints or system meets the specific deadlines. It is of two types:

a) **Hard real time system**:

It is used in where even the delay of some Nano or Micro second are not allowed. It is used in different case in real time system.

b) **Soft real time system**:

It provide some relaxation in time expression. IT is used in different cases used in real time system.

The real time system has following application which are mentioned below:

- ✓ **Airplane System.**

- ✓ **Air Traffic System.**

- ✓ **Traffic Control System.**

- ✓ **Command Control System.**

- ✓ **Tele Communication.**

5. Give two different explanation of why the periodic task (2, 1), (4, 1), and (8, 2)
    are schedulable by the rate monotonic algorithm.

    The priority of task are assigned statically, before the execution actual execution
    of task set. The rate of task is inverse of its period. So higher its rate, the higher its
    priority. It is primitive. It is an optimal scheduling algorithm among fixed priority
   algorithm. It can be scheduled by any fixed algorithm.

    $$U = \sum_{i=1}^{n} \frac{C_i}{D_i} \leq n(2^{1/n} - 1)$$

    The term U is said to be processor utilization factor. N is the number of task.

    In our cases: $1/2 + 1/4 + 2/8 = 1$ which is not less than 0.78.

    The above condition is not necessary, we can do a somewhat more involved
    sufficient and necessary condition test, as follows. We have to guarantee all the
    task that can be scheduled in possible instances. In particular if a task can be
    scheduled in its critical instances, then the schedulability guarantee condition
    holds. (Dhanraj, 2021)

6. Consider a set of jobs J(r, d) with the release time and the deadline. The precedence constraints are shown as in the graph below. Derive the formula of calculating the effective release time and deadline. Calculate the effective release time and deadline for each job in the set.
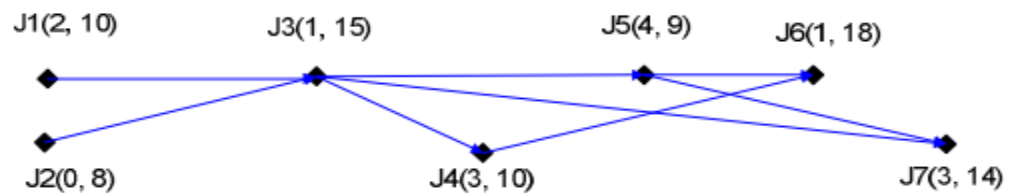
We can derive the according to following rules:

- **Effective Release time:**

     The effective release time of job without predecessors is equal to its given release time. The effective release time of job with predecessors is equal to the maximum value among its given release time and the effective release time of all of its predecessors.

- **Effective Deadline:**

     The effective deadline of a job without a successor is equal to the given deadlines. The effective release time of all the jobs can be computed in one pass.

Job	Effective Release Time(r)	Effective Deadline(d)
J1	2	9
J2	0	8
J3	2	9
J4	3	10
J5	4	9
J6	4	18
J7	4	14