

Real-Time and Embedded Systems: Problem Set 1

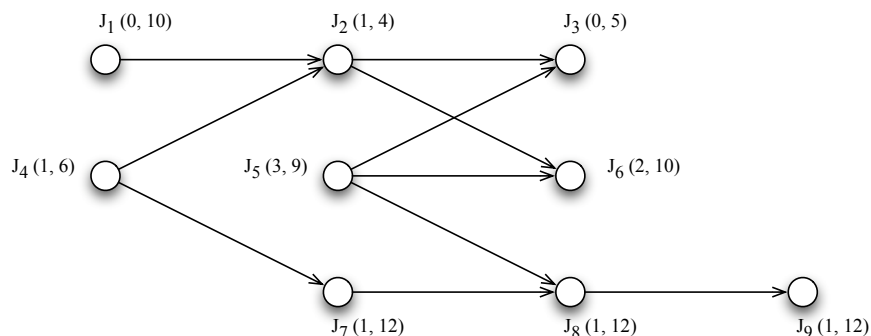
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The first week of the module has outlined the concepts behind real-time and embedded systems, introduced some terminology, and provided an overview of some real-time scheduling techniques. This problem set seeks to test your understanding of that material, and your ability to draw new conclusions based on material provided. You should answer all questions.

Question 1: In not more than 100 of your own words, explain what is a real-time system and describe the difference between hard real-time and soft real-time.

Question 2: The task diagram below shows a set of jobs with the feasible interval for each listed next to the job name. The arrows in the diagram indicate the precedence relations between the jobs. Find the effective release times and deadlines of the jobs, and demonstrate whether they can be scheduled using the EDF algorithm.



Question 3: The lecture and book outline a proof that earliest deadline first (EDF) scheduling is optimal on a single processor, as long as preemption is allowed and jobs do not contend for resources (section 4.6 of Liu's book, slide 15 of lecture 3). Using a similar method, prove that least slack time (LST) scheduling is optimal, and explain the constraints under which it is optimal.

Answers must be submitted by 5pm on 25th January 2005. A drop box will be available for submissions in Lilybank Gardens and submissions will only be accepted via that drop box. This problem set is worth 5% of the mark for this module. The usual rules apply for late submissions: 20% of the mark will be deducted for each day late. Ensure your name and matriculation number are included on each submission, and attach a pink statement of originality form.