Real Time and Embedded Systems: Problem Set 1

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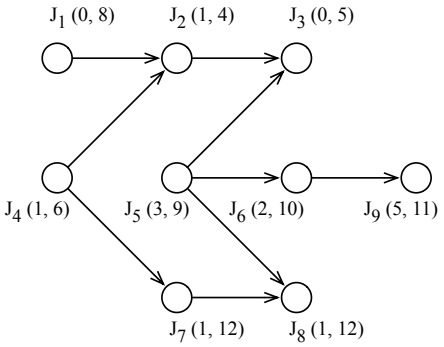
The first week of the module has outlined the concepts behind real time and embedded systems, introduced some terminology, and provided an overview of some real time scheduling techniques. This problem set seeks to test your understanding of that material, and your ability to draw new conclusions based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

Question 1: Briefly explain what is a real time system, and discuss the difference between hard and soft real time systems. Discuss, with examples, whether the distinction between hard and soft real time systems is always clear cut. [5 marks]

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. Calculate the effective release times and deadlines of the jobs, and demonstrate whether they can be scheduled using the EDF algorithm. Each job executes for 1 time unit. The system has one processor. [4 marks]



Question 3: Can the set of jobs from Question 2 be scheduled using the least slack time algorithm? Justify your answer. [2 marks]

Question 4: In systems with multiple processors, job scheduling can be either *static* or *dynamic* which regards to the mapping of jobs to processors. Discuss the trade-off between performance and ease of validation for these different approaches to scheduling hard real time systems. [4 marks]

This problem set is worth 5% of the mark for this module, and is expected to take an hour or two to complete. You must submit your completed exercise by 1:00pm on 26th January 2009 via the locked box outside the Teaching Office. You must include your pink declaration of authorship form with your submission. Any late submission will be awarded zero marks unless accompanied by a valid special circumstances form.

Marks will be returned in (or before) tutorial 2, along with some limited individual written feedback. Tutorial 2 will also include a review of the solutions to this exercise, along with time for a question and answer session on this material.