Northwestern University | Jan. 30, 2002
Electrical and Computer Engineering | Handout #1
ECE459: VLSI Algorithmics, Winter 02 | Due: Feb. 6
Prof. Hai Zhou

Homework 2

You may discuss the assignments with your classmates but need to write down your solutions independently. Be careful with your handwriting. Unclear solutions will be assumed to be wrong.

1. The activity selection problem we discussed in class is defined as follows.

   Given n activities, each with a start time and finish time (s_i, f_i) for $0 \leq i < n$, select a maximum number of activities to be processed on one processor.

   (a) (20 pts) Prove that the greedy strategy, that is, selecting the activity with the minimal finish time when that is possible, will always give the optimal solution.

   (b) (20 pts) Now we increase the number of processors from one to m. Does the following algorithm give the optimal solution? Give a proof or a counterexample.

      Iteratively fill each of the m processors by the greedy strategy.

   (c) (20 pts) Does the following algorithm give the optimal solution for m processors? Give a proof or a counterexample.

      Sort the activities in non-decreasing order of their finish time, always select an activity if the thickness of the selected activities including the current one is not larger than m. The thickness of a set of activities is defined as the maximal number of active activities at any moment.

2. (20 pts) Rewrite the pseudo-code of the list scheduling algorithm LIST_L (ALGORITHM 5.4.2 in the book) to make its running independent of the latency λ.

3. (20 pts) Problem 5.3. Use either Bellman-Ford or Liao-Wong algorithm.