CS3933 Assignment 7
Summer 2007

Due: Thursday, July 5, in class or by 10:00am in the box on E-level. Please try the questions before Tuesday, and ask questions then if you want to.

- Read the rest of chapter 5. We will not cover much more in this chapter, but you should at least see some of the variety of problems for which divide and conquer is used. We are not going to cover the convolution/FFT section, because it would take too long, but this is an important use.

  I will be starting dynamic programming in July.

- Consider question 13 in chapter 4 again. The answer that I was expecting for the problem was wrong, so any marks you got for this question last week was a bonus. The question is harder than I thought originally. There is a simple function of weight and time for each job that should be sorted, and the jobs done in that order. However it is not just by decreasing weight as I was thinking at first. So we have three parts to this question:

  1. Prove that choosing the jobs in decreasing weight does not work.
  2. Give a greedy algorithm that does work.
  3. Prove that your algorithm works. I recommend trying to find a proof using an exchange argument.

- Solve the recurrence $T(n) = 3T(n/3) + n$ asymptotically. Assume that $f(1) = 1$. That is, find a nice simple function $f(n)$ such that $T(n) = \Theta(f(n))$. I will give one mark for the correct function $f$, but I would like you to be able to derive $f$ in some way, or prove that your answer is correct. I suggest finding an exact solution for powers of 3, as I did in class. The text has other techniques.

- From chapter 5, do questions 1, 3 and 5 (pages 246-8).