Institut for Matematik og Datalogi
Syddansk Universitet

May 3, 2006
JFB

On-Line Algorithms – F06 – Lecture 14

Lecture, May 3

We cover up through section 10.4 of chapter 10, and cover the algorithms (but not the proofs) in sections 10.6 and 10.7. Then we covered up through section 12.2.1 of chapter 12.

Lecture, May 10

We will finish section 12.2 of chapter 12 and begin on section 12.3.

Lecture, May 17

We will finish section 12.3 and cover the Robin Hood algorithm of section 12.4. We may have time to go on to section 13.5.

Problems for May 9

1. What is the complexity of the dynamic programming procedure used for computing the cost of an optimal offline algorithm for the k-server problem when the request sequence is of length n. For the special case of a uniform metric space a faster algorithm exists. What is its complexity?

2. Define and analyze a lazy version of DC for paging.

3. Exercise 10.1.

4. In section 10.2.2, there is an example where the Greedy algorithm does miserably. How does the WFA perform on this example?

5. Exercise 10.8.

Problems for May 16

1. (Easy) Show that the makespan problem for identical machines is NP-hard.

2. Suppose that GREEDY is allowed n identical machines, while OPT is only allowed to use $m < n$ machines. Give a sequence showing that the ratio of GREEDY's performance to OPT's can be at least $1 + \frac{m-1}{n}$ for the makespan problem. Then show that GREEDY can always achieve this ratio against such a bounded OPT.

3. Consider remark 12.1 on page 208. What is meant here? Why is there no problem if the loads can be greater than 1? (Do not try to prove the desired result for loads of at most 1.)

4. Define POST-GREEDY with release dates as the algorithm which assigns a new job (given at its release date) to the first processor which becomes free. (Jobs have processing times which may be unknown, and only one job may be running on a processor at a time. There are m processors.) Show that POST-GREEDY is $(2 - \frac{1}{m})$-competitive.

5. Prove Corollary 12.8.

6. Exercise 12.5.