Institut for Matematik og Datalogi
Syddansk Universitet

June 2, 2009
JFB

On-Line Algorithms – F09 – Lecture 10

Lecture, May 27

We finished the proof of Theorem 8.7, covered sections 10.1 through 10.4 and 10.6 of chapter 10 in the textbook, and began on chapter 12.

Lecture, June 3

At 10:15, we will cover sections 12.1 and 12.2 in the textbook. Then we will work on the problems, continuing at 14:15 in U49B. If there is time, more measures for the quality of on-line algorithms will be introduced.

Problems for June 3

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. (Easy) Show that the makespan problem for identical machines is NP-hard.
5. 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.

6. 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.)

7. 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.