Institut for Matematik og Datalogi
Syddansk Universitet

April 14, 2005
JFB

On-Line Algorithms – F05 – Lecture 10

Lecture, April 12

We finished section 6 and covered section 7 of "The relative worst order ratio applied to paging", and began covering chapter 7 in the textbook quickly (up through the theorem saying that randomized adversaries are not more powerful than deterministic adversaries.

Lecture, April 19

We will finish chapter 7 (no proofs) and cover chapter 8 in the textbook.

Lecture, April 26

We will cover up through section 9.4 of chapter 9 in the textbook (we will be skipping the remainder of the chapter).

Problems for April 25

1. Work out Example 8.5, and apply Yao's principle correctly to Example 8.4 in the textbook, using the distribution given there. You will not get as good a result for Example 8.4 as for Example 8.5.

2. Consider the following on-line problem: We have one processor. Jobs arrive over time; job J_j with processing time p_j arrives at time r_j. A job can be assigned to run on the processor when it arrives or any time after that. It can also be started on the processor, stopped at some point, and restarted at some later point. No two jobs may be running at the same time. The goal is to minimize total completion time. Let C_j denote the completion time of job j. The total completion time is $\sum C_j$.

Use Yao's principle to prove a lower bound on the competitive ratio of any randomized algorithm for this problem. Consider the following probability distribution on request sequences: At time 0, a job with processing time 1 arrives. At time $\frac{1}{3}$, two jobs with processing time 0 arrive. At time 1, all of the following jobs arrive with probability p (with probability $1 - p$ none of them arrive): 10 jobs with processing time 0 and four jobs with processing time 1.

3. Can Yao's principle be applied to the relative worst order ratio?