

On-Line Algorithms – F03 – Note 8

Lecture, March 21

We finished chapter 6, covered chapter 7 quickly and covered up through Lemma 8.2 of chapter 8.

Lecture, March 28

We will finish chapter 8 and begin on chapter 9.

No lecture, April 4

Lecture, April 11

We will finish chapter 9.

Problems for Wednesday, April 9

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.