

## On-Line Algorithms – F10 – Lecture 5

### **Lecture, April 23**

Kim Skak Larsen covered chapter 3 in the textbook and through Theorem 4.1 of chapter 4.

### **Lecture, April 29, in U49**

Kim Skak Larsen will finish chapter 4 in the textbook and I will finish chapter 2 and begin on chapter 6 (introducing chapters 6, 7, and 8).

### **Lecture, May 6**

We will cover chapter 6 in the textbook and possibly begin looking at the paper: “The relative worst order ratio applied to paging”, by J. Boyar, L.M. Favrholdt, and K.S. Larsen, in *Journal of Computer and System Sciences*, volume 73, pages 817–843, 2007. You get this through the electronic journals SDU’s library has. In section 2, we will initially only consider definitions 1 and 2 and skip the others. Next we will cover up through Corollary 3 of section 4, and then section 6.

### **Problems for May 7**

1. Do Exercise 4.2 in the textbook.
2. Do Exercise 4.3 in the textbook (for  $h = k$ ).
3. Do Exercise 4.5 in the textbook.
4. Do Exercise 4.6 in the textbook.

5. Consider an optimal offline paging algorithm. Find arbitrarily long request sequences with more than  $k$  pages for which OPT faults an arbitrary number of times, but it does not help OPT if it has more than  $k$  pages in its fast memory (i.e. OPT should have the same number of page faults with  $k$  pages as it would have with more pages).
6. Consider an algorithm with look-ahead  $s$ , meaning that when deciding what to do about the current page request, the algorithm can see the next  $s$  requests before deciding what to do.
  - Prove that any such deterministic algorithm has competitive ratio at least  $k$ .
  - Consider LRU( $s$ ), the algorithm which uses the LRU rule, ignoring (and never evicting) any page in the next  $s$  requests. Show that it does at least as well as LRU on any request sequence (assuming they start with the same pages in fast memory). This is not so easy.