On-Line Algorithms – F06 – Lecture 10

Lecture, March 29

We will covered sections 3, the definitions for relatedness and weakly comparable in section 2 of "The relative worst order ratio applied to paging", and Theorem 7 of section 5.

Lecture, April 5

We will finish "The relative worst order ratio applied to paging". quickly.

Lecture, April 19

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

Problems for April 4

1. In the definition of RLRU, in the case where p is requested, but there is not fault, the algorithm only marks the next page if it is different from the previous. What happens to the results on RLRU if this check is removed and the page is always marked. What if it is never marked?

2. In the definition of RLRU, what if you change the condition starting a new phase to be "the $k + 2$nd different page since the start of the last phase was found" or "this was the $k + 2$nd fault since the start of the last phase"? What happens to the results on RLRU?

3. Compare MTF and TRANS for the list processing problem, using the relative worst order ratio.

4. How would you define a "strict relative worst order ratio"?

5. Try to find the competitive ratio of LRU-2. Try finding a sequence showing that it is better than LRU, according to the relative worst order ratio.

Problems for April 18

1. Work out an example showing how to change a worst case ordering for LRU to a worst case ordering for PERM_π.

2. Find a sequence where RAND's expected performance is better than LRU's, according to the relative worst order ratio. How does RAND compare to MARK on this sequence?

3. Compare First-Fit and Worst-Fit for the classical bin packing problem (trying to minimize the number of bins used). Worst-Fit is the algorithm which places an item in the most empty open (already used) bin, if it fits in any open bin. Otherwise it opens a new bin.

4. If we get this far in lecture, do exercise 7.3 in the textbook. See page 122 for the coupon collector's problem. Assume that there are $k + 1$ pages in all.