Department of Mathematics and Computer Science
University of Southern Denmark, Odense

May 18, 2005
LMF

DM69 — Lecture 16

Problems for May 25

1. **Concurrent reads help.**
   Give an $O(1)$ depth CREW algorithm solving the same problem as the algorithm POINT_TO_ROOT on page **47**-17.
   Argue that any EREW algorithm has $\Omega(\log n)$ depth.

2. **Concurrent writes help.**
   Consider the problem of finding the maximum element in an array of n numbers. Give a CRCW algorithm of depth $O(1)$ and work $O(n^2)$ that solves this problem. Any CREW algorithm needs $\Omega(\log n)$ depth to solve the problem, so this shows that the concurrent write model is more powerful than the exclusive write model (though the CRCW algorithm is not work-efficient).

3. **How much do concurrent reads/writes help?**
   Prove that a p-processor (common/arbitrary/priority) CRCW algorithm can be no more than $O(\log p)$ times faster than the best p-processor EREW algorithm for the same problem.
   Hint: A p-processor EREW algorithm can sort p numbers in $O(\log p)$ time. How can a concurrent read/write be emulated in the EREW model with the use of sorting p numbers?

4. Explain the section "Connected Components" on pages **47**–24 to **47**–30.

Exam questions

1. Shortest paths in weighted graphs
2. The maximum (s,t)-flow problem and the minimum (s,t)-flow problem
3. Polynomial algorithms for maximum flows
4. Minimum cost flows
5. Matchings: characterizations and algorithms
6. The primal-dual algorithm for the transportation and the assignment problem
7. The RSA cryptosystem
8. Matroids and the greedy algorithm
9. Matroid intersection and partitioning
10. Scheduling: basic concepts and examples of proofs
11. Parallel algorithms
12. Sorting networks

IMADA orienteringsmøde

IMADA
orienteringsmøde
for alle studerende
i datalogi og matematik
torsdag d. 26. maj kl. 16.15 i lokale U49

Program

16:15. Generel information om speciale-/bachelorstudiet. Desuden orientering om den forestående studiereform; specielt mhp. instruktor-ansættelser.

16:45. Orientering om planlagte valgfri kurser i matematik og datalogi samt om mulige speciale- og bachelorprojekter. Endvidere eventuelle "ønsker" fra de studerende

18:00. Gratis forfriskning: Pizza, øl og sodavand.