ADVANCE COURSE IN DISTRIBUTED COMPUTING

Winter 2003 (Academic year 2002/2003). Prof. Y. Afek (afek@tau.ac.il).

Course Home Page www.cs.tau.ac.il/∼ afek/dc.html

A graduate course exploring topics from the current literature in distributed computing, focusing on theoretical issues: models, upper and lower bounds, and proof methods. Two major topics:

1. Distributed algorithms for data communication networks
2. synchronization algorithms for *asynchronous* shared memory parallel machines.

In addition we will discuss the connections and relations between these two models. Hopefully we will also go over a real distributed algorithm such as BGP.

Schedule:

Date	Topic and references used	Additional references
Feb 16	Models, broadcast and echo [1, 2].	[1, 3, 4, 6, 7, 2].
Feb 23	Termination Detection, Snapshot [2, 9] Synchronizers [14].	[10, 11, 12, 13, 2], [14, 15].
March 2	Electing a Leader in a Ring Network, Chapter 3 in [8]	[].
March 9	Electing a leader in general graphs [16, 17].	[16, 18, 19, 20, 21, 6, 22, 23, 24, 25].
March 16	Computing the maximal independent set, rings and general graphs, upper and lower bounds [26].	[27, 28, 29, 30, 33].
March 23	Data link protocols, the sequence transmition problem, and End-to-end protocols [34, 35, 36].	[35, 37, 38, 39, 40, 41, 42, 36]
March 30	The Consensus problem. Algorithms and lower bounds [43, 44, 45].	
April 6	The shared memory model [46].	[46, 47, 48, 49]
April 27	The consensus problem, and its impossibility in asynchronous networks with one faulty processor [44] or in the shared memory model [46].	[44, 50, 45, 51, 52, 53].
May 4	Wait-free synchronization, the shared memroy hierarchy, and universal constructions [46].	[52, 31, 32]
May 11	Atomic snap-shots of shared memory [**?**], Immediate snap-shots [55] .	[56]
May 18	Simulating shared memory in message passing [57].	
May 25	Distributed Shortest Path algorithms and the BGP algorithm.	
June 1	Lower bound techniques [58, 26].	[58, 22, 59, 6, 38, 60, 61, 26]

Grade: Homeworks 35%, Take home exam 65%.

(This outline will be subject to modification as the semester progresses.)

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