ADVANCE COURSE IN DISTRIBUTED COMPUTING

Winter 1998/9 (Academic year 1998/99). Y. Afek.

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.

Schedule:

Date	Topic and references used	Additional references
Dec 8	Models, broadcast and echo [1, 2].	[1, 3, 4, 5, 6, 2].
Dec 15	Termination Detection, and Snapshot [2, 7].	[8, 9, 10, 11, 2].
Dec 22	Synchronizers [12].	[12, 13].
Dec 29	Leader election algorithms and spanning tree algorithms [14, 15].	[14, 16, 17, 18, 19, 5, 20, 21, 22, 23].
Jan 5	Computing the maximal independent set, rings and general graphs, upper and lower bounds [26].	[27, 28, 29, 30, 31].
Jan 12	Data link protocols, the sequence transmition problem, and End-to-end protocols [32, 33, 34].	[33, 35, 36, 37, 38, 39, 40, 34]
Jan 19	The Consensus problem. Algorithms and lower bounds [41, 42, 43].	
Jan 26	The shared memory model [44].	[44, 45, 46, 47]
Feb 2	The consensus problem, and its impossibility in asynchronous networks with one faulty processor [42] or in the shared memory model [44].	[42, 48, 43, 49, 50, 51].
Feb 9	Wait-free synchronization, the shared memroy hierarchy, and universal constructions [44].	[50, 52, 53]
Feb 16	Atomic snap-shots of shared memory [54], Immediate snap-shots [55] .	[56]
Feb 23	Simulating shared memory in message passing [57].	
Additional	Lower bound techniques [58, 26].	[58, 20, 59, 5, 36, 60, 61, 26]
Additional	Using algebraic topology to prove impossiblity results.	[62, 63, 64]
Additional:	The Mutual Exclusion problem with fast solutions in real time.	[**?**, **?**, **?**]
Additional:	Bounded round numbers [65].	

Grade: Homeworks 20%, Take home exam 80% ,or
Combination with project/paper TBA.

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

References

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