Massachusetts Institute of Technology | Handout 2
6.852: Distributed Algorithms
Prof. Nancy Lynch | September 8, 2005

Course Schedule, Version 1

Class 1 (Thursday, Sept. 8)
Course overview. Synchronous networks. Leader election in synchronous ring networks.
Homework 1a handed out

Class 2 (Tuesday, Sept. 13)
Basic computational tasks in general synchronous networks: Leader election. Breadth-first search. Shortest paths. Broadcast and convergecast.

Class 3 (Thursday, Sept. 15)
Spanning trees. Minimum spanning trees.
Homework 1b handed out

Class 4 (Tuesday, Sept. 20)
Fault-tolerant consensus. Link failures: the Two Generals problem. Process failures (stopping, Byzantine). Algorithms for agreement with stopping and Byzantine failures. Exponential information gathering.

Class 5 (Thursday, Sept. 22)
Number-of-processor bounds for Byzantine agreement. Weak Byzantine agreement. Time bounds for consensus problems.
Homework 1 due
Homework 2a handed out

Class 6 (Tuesday, Sept. 27)
Other kinds of consensus problems: k-agreement. Approximate agreement. Distributed commit.

Class 7 (Thursday, Sept. 29)
Asynchronous distributed computing. Formal modeling of asynchronous systems using interacting state machines (I/O automata). Proving correctness of distributed algorithms.
Homework 2b handed out

Class 8 (Tuesday, Oct. 4)
Non-fault-tolerant algorithms for asynchronous networks. Leader election, breadth-first search, shortest paths, broadcast and convergecast.

Class 9 (Thursday, Oct. 6)
Spanning trees. Gallager et al. minimum spanning trees.
Homework 2 due
Homework 3a handed out

Tuesday, Oct. 11
Columbus Day. No class.

Class 10 (Thursday, Oct. 13)
Synchronizers. Synchronizer applications. Synchronous vs. asynchronous distributed systems.
Homework 3b handed out

Class 11 (Tuesday, Oct. 18)
Time, clocks, and the ordering of events. State-machine simulation. Vector timestamps.

Class 12 (Thursday, Oct. 20)
Stable property detection. Distributed termination. Global snapshots. Deadlock detection.
Homework 3 due
Homework 4a handed out

Class 13 (Tuesday, Oct. 25)
Asynchronous shared-memory systems. The mutual exclusion problem. Mutual exclusion algorithms.

Class 14 (Thursday, Oct. 27)
More mutual exclusion algorithms. Bounds on shared-memory for mutual exclusion.
Homework 4b handed out

Class 15 (Tuesday, Nov. 1)
Impossibility of consensus in asynchronous, fault-prone, shared-memory systems.

Class 16 (Thursday, Nov. 3)
Atomic objects.
Homework 4 due
Homework 5a handed out

Class 17 (Tuesday, Nov. 8)
Atomic snapshot algorithms. Atomic read/write register algorithms.

Class 18 (Thursday, Nov. 10)
Wait-free computability. The wait-free consensus hierarchy.
Homework 5b handed out

Class 19 (Tuesday, Nov. 15)
Wait-free vs. f-fault-tolerant atomic objects.

Class 20 (Thursday, Nov. 17)
Asynchronous network model vs. asynchronous shared-memory model. Impossibility of consensus in asynchronous networks. Failure detectors and consensus. Paxos consensus algorithm.
Homework 5 due
Homework 6a handed out

Class 21 (Tuesday, Nov. 22)
Reliable communication using unreliable channels.
Homework 6b handed out

Thursday, Nov. 24
Thanksgiving. No class.

Class 22 (Tuesday, Nov. 29)
Self-stabilizing algorithms.

Class 23 (Thursday, Dec. 1)
Self-stabilizing algorithms.
Homework 6 due
Homework 7a handed out

Class 24 (Tuesday, Dec. 6)
Timing-based systems. Modeling and verification. Timing-based algorithms for mutual exclusion.

Class 25 (Thursday, Dec. 8)
Timing-based algorithms for consensus. Clock synchronization.
Homework 7b handed out

Class 26 (Tuesday, Dec. 13)

Atomic memory algorithms for dynamic networks. Rambo algorithms. GeoQuorums. Virtual nodes.
Homework 7 due