Distributed Systems

Fall 2010

TBD

URL: http://hatswitch.org/~sn275/ds/index.shtml

Location: TBD

Time: TBD

Instructor: Shishir Nagaraja
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Overview: The aims of this course are to study the fundamental characteristics of distributed systems, including their models and architectures; the implications for software design; some of the techniques that have been used to build them; and the resulting details of good distributed algorithms and applications.

The course consists of lectures, homeworks, and a semester-long project. Possible projects types include:

- building and verifying a “real” system, e.g., with the Google Android platform,
- measuring and improving an existing system like Tor or BitTorrent,
- coming up with new paradigms of distributed communications, e.g. by combining ideas from social computing and mobile communication.

Some project ideas and related hardware/software packages will be provided. In particular a number of Google Android Droid smartphones will available to students. You are also welcome to design a project around your own idea.

Prerequisites: A basic course in Operating Systems or Networking, or consent of instructor. Familiarity with systems programming concepts will be useful but isn’t essential. Email the instructor to express
interest, for questions and suggestions.

Material:


  An excellent reference that’s highly recommended especially for the graduate students attending this course.

Grading:

1. Class participation 5% (Asking questions is encouraged!)
2. Homework 20%
3. Programming assignments 35%(MP0 - 3%, MP1 - 7%, MP2 - 10%, MP3 -15%)
4. Midterm 10%
5. Final 30%

Class participation is important. You are expected to have read reading material for the lecture (e.g., sections of the textbook, papers) before the lecture. Grading for undergraduate and graduate students will be separated. Grades will be assigned on a curve (relative grading). Note that your performance in the homework and programming assignments will determine more than 50% of your grade, so please do not ignore them.

Syllabus: Syllabus (tentative)

1. Clock Synchronization
2. Mutual Exclusion
3. Global Snapshot
4. Distributed graph algorithms
5. Coordination: leader election, synchronizers
6. Consensus: Synchronous, asynchronous systems, with failure detectors
7. Transactions
8. Group communication
9. Replication
10. Distributed shared memory
11. Peer-to-peer networks
12. Anonymous communication networks
13. Sensor networks and vehicular networks
14. Distributed file systems