E0 264 January-April 3:1

Distributed Computing Systems

Instructor

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Department: Department of Computer Science and Automation

Course Time: Mon-Wed 3:30-5:00 PM

Lecture venue: CSA Multimedia Class Room 252

Detailed Course Page:

Announcements

Brief description of the course

The course is intended for students who have taken undergraduate course in computer science, and needs to specialize in distributed systems. The course introduces the basic concepts of distributed systems. Then it describes distributed algorithms for solving various problems of dsitributed systems.

Prerequisites

BTech in Computer Science, and knwoledge of multithreaded network programming.

Syllabus

Fundamental Issues in Distributed Systems, Distributed System Models and Architectures; Classification of Failures in Distributed Systems, Basic Techniques for Handling Faults in Distributed Systems; Logical Clocks and Virtual Time; Physical Clocks and Clock Synchronization Algorithms; Security Issues in Clock Synchronization; Secure RPC and Group Communication; Secure Group Membership Protocols; Naming Service and Security Issues in Naming Service; Distributed Mutual Exclusion and Coordination Algorithms; Leader Election; Global State, Termination and Distributed Deadlock Detection Algorithms; Distributed Scheduling and Load Balancing; Distributed File Systems and Distributed Shared Memory; Secure

Distributed File Systems; Distributed Commit and Recovery Protocols; Security Issues in Commit Protocols; Checkpointing and Recovery Protocols; Secure Checkpointing; Fault-Tolerant Systems; Tolerating Crash and Omission Failures; Distributed Consensus and Agreement Protocols; Replicated Data Management; Self-Stabilizing Systems; Design Issues in Specialized Distributed Systems.

Course outcomes

At the end of the course, a student is expected to know the following:

1. Fundamental problems of distributed systems like clock synchronization, remote procedure call, group communication, etc, and techniques for solving these problems.

2. Imlementation of distributed algorithms solving a specific problem in Distributed Computing Systems

Grading policy

20% - Two midterm tests

30% - Three common programming assignments and one individual programming assignment

50% - Final examination

Assignments

Resources

Network of PCs running linux

Reference Texts

1. G. Coulouris, J. Dollimore, and T. Kindberg, "Distributed Systems: Concepts and Designs", Fifth Edition, Pearson Education Ltd., 2011.
2. Randy Chow, and Theodore Johnson, "Distributed Operating Systems and Algorithms", Addison-Wesley, 1997.
3. Sukumar Ghosh, â€œDistributed Systems: An Algorithmic Approachâ€•, CRC Press, 2006.
4. Kenneth P. Birman, â€œReliable Distributed Systems: Technologies, Web Services, and Applicationsâ€•, Springer New York, 2005.
5. Current Literature