Course Description: This course covers the foundations of distributed systems including models of computing, different types of communication (Layered Protocols, Remote Procedure Calls, Remote Objects, messages, streams), process models (threads, client/server, code migration and software agents), naming of entities, logical clocks and synchronization. We will review some of the popular applications of distributed computing including distributed file systems and web services. The course will include three programming assignments, one group project and one project presentation. The programming assignments will provide hands on experience in understanding different types of process models, communications, and synchronization in distributed systems. The project will help develop a reasonably sized distributed application based on research papers that will be discussed during the semester. The expectation is that students have mastered one or more programming languages. Specific language mastery is not important, though knowing one of C, C++, or Java will be helpful.

The textbook is A. Tanenbaum, M. V. Steen: Distributed Systems principles and paradigms. Prentice Hall ISBN 0-13-121786-0. It is a required text. Other readings will come mostly from papers referenced in this text.

Course Goals/Objectives
• Overview the basic hardware and software concepts, and the goals in designing a distributed system.
• Provide a good hands-on experience in understanding the (1) different types of communications in distributed systems (i.e. RPCs, RMI, Messages and Streams), (2) different process models (threads, client/server, code migration and software agents), and (3) Synchronization among objects/entities in distributed systems.
• Help students get a good appreciation of the various issues involved in (1) Naming of distributed entities and (2) Synchronization among entities in distributed systems.
• Help students develop the ability to read and appreciate concepts described in research papers.

Course Requirements
• Every week there will be three hours of lecture and two hours of lab. Approximately one topic will be covered every two weeks.
• The labs will consist of three problem sets. The problem sets are mainly programming assignments that will require students to design and develop components of a distributed system in C/C++ programs in LINUX environment using some standard C/C++ libraries. The problem sets will help students to apply and master key concepts in distributed computing. The problem sets can be solved in groups.
• There will be two-mid terms and a final exam.
• There will be a group project followed by a project presentation on the last class of the semester. Each project group may consist of up to four students. Each group will be required to design, analyze and implement algorithms for a problem in distributed systems chosen from among the research papers in the reading list. On completion of their project, each group will then submit a project report describing their system design and implementation. Finally, during the last class of the semester, the project groups will present their project findings.


IT351_Distributed_Computing

Reading List: The Reading List will be made available on the course web site and is subject to revision.

Course Schedule and Tentative List of Topics (Topics generally conform to the order in the primary required text)
Weeks 1-2: INTRODUCTION: Definition of a distributed system, goals, hardware concepts, software concepts, the client-server model.
Weeks 6-8: PROCESSES: Threads, Servers, Code Migration and Software Agents.
Week 14: Project Presentations

Grading: Everything for this class has (or will have) a point value. At the end of the semester your grade is determined by the percentage of points you earned compared to the total points possible.

Exams: All exams are cumulative. There will be 2 midterms (100 pts each) and a 2 part (100 pts each part) final exam. Your best 3 out of 4 scores will be used to determine your final grade (ex. 2 tests and pt 2 of final or 1 test and the whole final). There will be NO makeup exams, so take ALL exams on time.

Quizzes: Plan on few surprise quizzes before class "lecture" periods. The quiz will usually be on the lecture material of the previous lecture. The purpose of the quizzes is to encourage students to come to class prepared each day. Classes will begin with the quiz, and quizzes are forfeited if you are late or miss class. If you have a pre-excused absence from class, you may request the quiz early.

Homework/Projects: Turn assignments in on time, late submissions will result in loss of 20% of points /day for 2 days and after that 50%. NO email submissions, ONLY hardcopy submissions. Additional homework may be assigned to aid your comprehension of certain topics.

Attendance Policy: Students are expected to come prepared to each class session. To encourage this behavior, there will be surprise pre-class quizzes for many class sessions. These quizzes provide a measure of attendance and participation (i.e. preparedness). Missing class and therefore quizzes will have a direct effect on your grade.