CS5352.0501/0502, Summer I, 2009
Distributed Computing

Time: 7:30 − 9:40pm MTWH
Classroom: ALK 147 of San Marcos & 366 AVERY of RRHEC

Instructor: Wuxu PENG
Office: 210 Nueces & 464X Avery
Office Hours: 3:00pm - 4:15pm, MTWH
Or by appointment
Phone: 512-245-3409 (San Marcos) & 512-716-4562 (RRHEC)
Email: wuxu@txstate.edu
Web: http://nueces21000.cs.txstate.edu/teaching/cs5352/sum-I-09/
WebPage Username/Password: cs5352/DistComp09

Prerequisites:

Completion with a grade C or above of both CS3358 (Data Structures) and CS4328 (Operating Systems).

Textbooks:

1. Required:
   - George Coulouris, Jean Dollimore, and Tim Kindberg, *Distributed Systems – Concepts and Desgin*, (4th ed.). Addison-Wesley, 2005. ISBN: 0-321-26354-5.
2. Optional (strictly optional):
   - Deitel, Deitel & Santry, *Advanced Java 2 Platform: How to Program*. Prentice-Hall, 2002, ISBN 0-13-089560-1.

Course Description:

This will be a very exciting course. Hardware advances during the last decade have made distributed systems a natural extension and alternative to the conventional centralized systems. Many computer scientists believe that the 1990s will be the decade of distributed systems. Distributed systems have several crucial advantages over their centralized counterparts. Among them most notably are fault tolerance, parallelism, and resource and load sharing. However, the emerging of distributed systems has also posed many difficult challenges to computer scientists. In this course we will study the most important and fundamental problems in distributed systems.

Grading Policy:

Home assignments are due on time. For programming assignment, a copy of your program is required to be uploaded through *anonymous ftp* on time. As always, I will try my best to maintain fairness in grading. You are encouraged to bring any discrepancy in grading to me and I will try to resolve it promptly and fairly.

Course Evaluation:

There are three to four written homework assignments, plus the final exam. Your final grade for the course will be calculated as follows:

3-4 homework assignments:	60%
Final exam:	40%

Date/Time of Final Exam (tentative):
8:00 − 10:30pm, Thursday, July 09, 2009

Attendance and Incomplete Policies:

As a graduate level course, there is no roll call at the beginning of each meeting session. However, it is your responsibility to attend the class and follow the course progress. Regularly missing class meetings may adversely affect your final grade.

The CS Department has a strict policy and procedure for granting incomplete grades. The instructor has to provide convincing information in writing to the department Chair to get approval. Therefore incomplete will not granted unless convincing reasons are provided. Reasons such as too much workload are not acceptable for requesting an incomplete grade.

Dropping Classes (Extracted from http://www.gradcollege.txstate.edu/Grad_Cats/2007-2009.html)

Dropping a class is an official action whereby a student drops one or more courses, yet remains enrolled in at least one other course. Refer to the Registration Instructions at http://www.registrar.txstate.edu for details on dropping a class.

Deadlines. The deadline for dropping classes or withdrawing from the University is listed on the Registrar's web site at http://www.registrar.txstate.edu. When a student drops one or more classes or withdraws from the University, either a "W" or an "F" grade will be assigned for each course as follows:

1. A "W" grade will be assigned automatically if a student officially withdraws from the University or officially drops one or more classes by the "automatic W" Drop/Withdraw deadline.
2. After the automatic "W" period, faculty assign grades to students who officially drop classes or withdraw from the University. Faculty assign a "W" grade only to those students who have a passing average at the time the drop/withdraw action is officially completed. Otherwise, faculty assign an "F" grade.

Academic Calendar for Summer I, 2009:

Schedule changes	June 8-9, 2009
Last day to drop a course with refund	June 11, 2009 (ends midnight 06/11/2009)
Deadline for graduation application	June 15, 2009
Last day to drop a class	June 29 (ends 5:00pm 06/29/2009)
Last day to drop with "W" assigned	June 29 (ends 5:00pm 06/29/2009)
Last class day	July 8

Academic Integrity:

Academic integrity is an integrated part of high education. Please consult appropriate Texas State documents for university's academic integrity requirements and policies.

Main Topics:

1. Introduction: history of computing and distributed computing
   (1) History of computer systems
   (2) Characteristics of distributed systems
   (3) Advantages of distributed systems

(4) Distributed systems vs. distributed computing
(5) General issues in distributed computing
(6) Goals of distributed computing

2. Review: Elements of operating systems and computer networks (Ch. 1)
   (1) Sequential Processes
   (2) Concurrent Processes
   (3) Specification of Concurrency
   (4) Relationships among the Processes
   (5) Deadlocks
   (6) The Critical Section Problem
   (7) Semaphores
3. Concepts and architectures of distributed systems (Ch. 1, 2, 3)
   (1) Computer networks
   (2) Architecture models
   (3) Major challenges
   (4) System architectures
   (5) Fundamental models
4. Distributed time and global state (Ch. 11)
   (1) Time
   (2) Clocks, events, and process states
   (3) Synchronizing physical clocks
   (4) Logical time and clocks
   (5) Global states
5. Interprocess communications (Ch. 4, 5)
   (1) Introduction
   (2) TCP/IP API and Java UDP/TCP API
   (3) External data representation and marshalling
   (4) Client-server communication
   (5) Remote procedure call
   (6) Distributed objects and RMI (remote method invocation)
   (7) Group communications
6. Case Studies of High-Level IPC Facilities
   (1) SUN RPC
   (2) Java RMI
   (3) DCE RPC
7. Distributed coordination and agreement (Ch. 12)
   (1) Nature of the problem
   (2) Centralized synchronization algorithms
   (3) Distributed synchronization based on timestamps
   (4) Distributed synchronization based on token passing
   (5) Election algorithms
   (6) Distributed consensus problem (Byzantine generals problem)
      a. Problem definition and its implications
      b. The first solution
8. Security (Ch. 7) [1]
   (1) Factors affecting security in DSs
   (2) Encryption and security techniques
   (3) Cryptographic algorithms
   (4) Digital signatures
   (5) Cryptography pragmatics

[1] Depending upon the progress, this portion may not be covered