CSC-8980 Topics in Computer Science: Distributed Systems

Fall 2022
CRN: 93007
Meeting Time: TR 2:45 - 4:30 pm
Classroom: Langdale 231

Instructor: Armin R. Mikler
Office: 25 PP Suite 724
Office Hours: by appointment
E-Mail: amikler@gsu.edu
Teaching Assistant: Faris Hawamdeh, TBA
TA Office Hours: TBD
Textbook: *Distributed Systems: Principles and Paradigms* by Andrew Tanenbaum (not required but useful)
Other Material: Journal and Conference Papers as deemed appropriate

Course Web Page: iCollege
Expected prerequisite knowledge: Systems Programming, Operating Systems, or equivalent

I. Course Description:

Advanced Distributed Computing
After a review of traditional operating systems concepts such as processes, process coordination, and deadlock, we will be investigating a variety of problems that occur when multiple computers are cooperating (or not) to form what is known as a **distributed system**. The field of distributed systems encompasses almost every subject area in computer science from communication protocols to algorithm design. The system aspects, such as architectural characteristics, are intertwined with algorithmic methods to form a coherent distributed computing infrastructure. Hence, we will cover a broad array of topics, including distributed algorithms, grid computing, and distributed coordination.

II. Course Format:

This course follows an in-person lecture-based format. Lectures and Student Presentations are the primary mode of exploring the subject matter.

III. Useful References:

1. *Advanced Concepts in Operating Systems* by M. Singhal and N. G. Shivaratri
2. *Distributed Algorithms* by Nancy Lynch
3. Operating Systems Principles by Lubomir Bic and Alan Shaw,
4. *Operating Systems – Advanced Concepts* by Maekawa, Oldehoeft, and Oldehoeft
5. *Operating Systems* by J. Bacon and T. Harris
6. *Operating Systems* by W. Stallings
7. *Advanced Programming in the UNIX Environment* by W.R. Stevens
8. *Beginning Linux Programming* by R. Stones and N. Matthew

IV. Tentative List of Topics:

Week:	Topic:
1 (8/22)	Quick Overview of Distributed Systems
2 (8/29)	Review of Operating System Concepts: Processes
3 (9/5)	Review of Operating System Concepts: Process Synchronization
4 (9/12)	Review of Operating System Concepts: Deadlocks
5 (9/19)	Networking and Routing
6 (9/26)	Time (and why it matters)
	Exam-1
7 (10/3)	Distributed Mutual Exclusion
8 (10/10)	Distributed Mutual Exclusion
9 (10/17)	Distributed Deadlock Detection (SP)
10 (10/24)	Distributed Resource Management and Load Balancing (SP)
11 (10/31)	Agent-Based Systems and Decentralized Decisions (SP)
	Exam-2
12 (11/7)	Fault Recovery and Fault Tolerance (SP)
13 (11/14)	Distributed Databases and Transaction Coordination (SP)
14 (11/21)	Thanksgiving Break
15 (11/28)	Project Presentations
16 (12/5)	Project Presentations

V. Homework:

There will be about 4-5 homework assignments. Homework assignments are to be completed individually unless specified otherwise. Homework will consist of problem sets as well as small programming assignments. It is important to spend the time to experiment with the various program elements, so start your homework promptly. All assignment submissions must be typed. As there are potentially many different correct solutions, we will use class time to collectively assess and validate homework solutions. To do so, the instructor will randomly select one or more students to present their homework solutions in class.

VI. Projects:

There will be 2 projects. The projects must be accompanied by a detailed project proposal, a half-time progress report, and a comprehensive final report describing the problem, the implementation, experiments, and results as well as their interpretation.

VII. Paper Presentations:

Students will be presenting a classic paper covering a specific topic related to the field of Distributed Systems. Presentations may exceed a single class period depending on the discussion.

VIII. Exams:

There will be two exams but no Final.

IX. Grading:

Assessment	**Weight**
Homework and HW Presentation	**20%**
Paper Presentation	**20%**
Project and Project Presentation	**30%**
Exams	**30%**

Final Grades: A:100-90; B:89-80; C:79-70; D:69-60; F:60-0

X. Policies:

- All homework assignments and projects must be turned in at the beginning of class on their respective due date. Late assignments will be accepted with a 25% penalty per day. Assignments that are submitted more than two days past their deadline will not be accepted and not graded. All assignment submissions must be typed.

- Cheating will not be tolerated. Anyone found guilty of cheating on a test or assignment will be awarded an F grade for the course. Discussions of problems and assignments with your classmates are welcome and encouraged, however, sharing of solutions is not. If you need help, you should ask the TA or the instructor. Cheating includes, but is not limited to, all forms of plagiarism and misrepresentation.

- There will be NO "make-up" Exams. In case of verifiable emergencies, arrangements must be made with the instructor.

- As the course makes use of presentations and in-class discussions, attendance is expected. **Students may have up to two unexcused absences** without incurring a penalty.

XI. Disability Policy:

The Computer Science Department and this instructor cooperate with the Office of Disability Accommodation to make reasonable accommodations for qualified students (cf. Americans with Disabilities Act and Section 504, Rehabilitation Act) with disabilities. If you have not registered with ODA, we encourage you to do so. If you have a disability for which you will require accommodation please discuss with me after class and present a written accommodation request on or before the 2nd week of class.

Student Information Sheet
(Please submit this form at the end of the first class)

First Name: _____

Last Name: _____

Panther #: _____

E-MAIL : _____

Web Page: _____