Instructor(s): Prof. Sharma Chakravarthy

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Section Information: CSE 4331-001 and 5331 - 001

Time and Place of Class Meetings: Tu/Th 12:30pm to 1:50pm, ERB 131

Course URL: https://wweb.uta.edu/faculty/sharmac/courses (for Lecture notes)

Research URL: http://itlab.uta.edu/sharma

Blackboard URL: https://elearn.uta.edu (for projects, grades, discussion)

Description of Course Content: DBMS system implementation techniques include query optimization, transaction processing, concurrency control, buffer management, and recovery. Introduction to advanced database models, such as cloud computing, NoSQL DBMSs will be covered. Prerequisite: CSE 3330/CSE 5330, or consent of instructor.

Objective: The objective of this course is to understand the theoretical underpinnings as well as design and implementation of various components of a relational database management system. Through a series of projects, students will understand and appreciate the implementation techniques used for various modules, such as query processor/optimizer, B+ tree index, buffer manager, transaction manager and recovery subsystems. We will introduce newer paradigms of data processing such as map/reduce and NoSQL to contrast it with relational DBMSs.

Course Outline: This course will cover various components of a Database Management system mainly from the systems/implementation viewpoint (as opposed to the users’ viewpoint as in Database I). Topics will be covered under four modules:

Module I: storage and indexing (File types, B+ trees, Hash indexes, access analysis),

Module II: Transaction Management and concurrency control (ACID properties and their need, two-phase commit, ARIES recovery, relationship between this and the rest of the system),

Module III: Cloud computing and Big Data (need for new paradigm, map/reduce details, big data applications), and
Module IV: Query optimization (cost model, system R query optimization).

Student Learning Outcomes: A clear understanding of the inner-workings of a relational DBMS. A detailed Understanding of different modules as well and implementation of some of the modules of a relational DBMS. Ability to use these approaches/techniques to new problems encountered.


Descriptions of major assignments and examinations: Project: Since the emphasis of this course is on implementation techniques, there will be a number of hands-on implementation projects in Java/C++ as part of this course. I plan on using Minibase for implementing Heap files, join algorithms, B+ trees, components of a transaction manager, buffer pool manager, and/or access methods. Students may be asked to present the details of their implementation in the class. Evaluation of the project will have an optional discussion session with the students to discuss the approach taken.

Attendance: At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students’ academic performance, which includes establishing course-specific policies on attendance. I will take attendance in the class aperiodically. If you are serious about learning and doing well in the course, you should not only attend lectures but participate during the lectures by asking questions in the class. The class presentation on your projects will constitute 5% of overall grade.

Grading: There will be 3 hands-on projects that will constitute approximately 45% of the grade. There will be 3 in-class tests that will constitute approximately 50% of the grade. This is an initial proposal. Class attendance and presentation will carry 5% of the grade. The instructor reserves the right to re-distribute the percentages if deemed necessary. The students may be asked to make an in-class presentation on the project experiences. Attendance and class participation is important for doing well on the course. Grading for undergraduates will be done separately from graduates in a combined offering. Based on past observations, typically, class average corresponds to a B grade. One standard deviation above the class average is guaranteed to earn an A; Passing grade is 50%. Note that you have to do consistently well on all projects and exams to earn an A grade. Where applicable, undergraduate and graduate classes will be graded separately.

Make-up Exams: The class schedule, exam, and project due dates are tentative. Project deadlines and exam dates may be changed (with sufficient notice) based on the progress made in the class. No makeup tests or exams will be given unless there is a justifiable, documented reason.

How to Do Well in This Course: Based on the feedback I have received over the years, Students who get the most out of this course will be the ones who put in the most effort. If you want to do well, attend all the lectures, read the assigned sections of the book/papers, and start early on your projects. Working out the assigned sample questions and questions from book chapters will immensely help in doing well on quizzes/exams. If you are having difficulty, you owe it to yourself to get help. We will be more than happy to help you. Don't be afraid to come and see us. We will hold extensive office hours. If you can't make it to office hours but really need help, contact one of us for an appointment. I sincerely want all of you to do well. It is your responsibility to check the web site at least twice a week.

NOTE: The class schedule, exam, and project due dates are tentative. Project deadlines and exam dates may be changed (with sufficient notice) based on the progress made in the class. The course officially ends on the day of the final exam. No makeup quizzes or exams will be given unless there is a justifiable, documented reason. Wanting to go home early is not a justifiable reason!