

CS 4400 Introduction to Database Systems - GTL Summer 2015

Instructor

- Christopher Simpkins, chris.simpkins@gatech.edu

IMPORTANT: Include [CS4400] in the subject of course-related email, e.g., "Subject: [CS4400] Exam 2 Question." Professors are deluged with email. If we don't respond, don't take it personally. Just resend your email with a friendly reminder.

Course Description

We introduce the fundamental concepts necessary for the design and use of modern database systems in today's large scale enterprise applications. We examine the concepts in the order that we typically encounter them in the actual database design process. We start with the problem of conceptually representing data that is to be stored in a database. From there, we see how the data in a conceptual data model can be converted to a database specific model (e.g., the relational data model). We also discuss various forms for relations that possess good properties. We see how to use the relational database language SQL to define the relations and to write SQL statements to insert, delete, retrieve and update the data. We also examine some of the fundamental storage structures and indexing schemes that are used in relational database systems. We end the course with a discussion of some advanced topics in the database management area.

Learning Outcomes

By the end of this course students will be able to:

- list and explain basic concepts - data independence, 3 level database architecture, database system components
- explain conceptual database level and the Entity-Relationship Model
- design a database using DBMS Design Methodology
- model data using the Relational Data Model, relational Algebra and relational Calculus
- write correct data definition and data manipulation queries in SQL Query Language
- map concepts from ER Model to Relational Model
- design relational database schemas with Normal Forms using Functional Dependencies
- use a professional relational database management system such as MySQL, SQL queries that are compatible with the RDBMS system, and write database access programs in an application programming language such as PHP
- explain internal database level storage structures, files and indexing

Requirements

Grading

- Quizzes: 60%
- Project:
 - Phase I: 10%
 - Phase II 10%
 - Phase III, Heavy option: 20%
 - Phase III, Light option: 10%
- Final Exam : 10%

Note: the final exam is only for those who choose to do the light option of the project in Phase III. (Those who do the heavy option in Phase III CANNOT take the Final).

Grade Cutoffs: A: 90, B: 80, C: 70, D: 60

Assignments

One semester-long project completed in teams: You will design and implement a database application using the

MySQL/PHP relational database system available via CoC (College of Computing). The Project must be done in groups of 3 or 4 students. Groups of more than 4 or less than 3 will not be allowed. You are allowed to form groups across the two sections (A & B) of the class. We will follow a typical database design methodology for this project. Notes describing the methodology are available via the class web page on T-Square. The project will consist of 3 phases (deliverables) as well as a final demonstration to the TA. Phase I and Phase II of the project are each worth 10% credit. Phase III of the project is worth 10% credit without the GUI – implemented as queries only, and 20% credit with GUI, so that it runs as a full-fledged application. All members of a group get the same grade for each phase of the project. If a member of a group does not carry his/her weight (in terms of an equitable distribution of work), then the group may kick out that member at the end of phase I or Phase II, only. The course professors and head TA should be notified of this immediately when this takes place.

Academic Integrity and Collaboration

We expect academic honor and integrity from students. Please study and follow the academic honor code of Georgia Tech: <http://www.policylibrary.gatech.edu/student-affairs/code-conduct>. You may collaborate on the project (see below). You may not collaborate on in-class quizzes or exams.

Rules For Project Collaboration

Students within each project group are strongly encouraged to split each phase of the project into smaller tasks and collaborate closely with each other to accomplish that phase. No collaboration of any kind whatsoever is allowed between students in different project groups. Any violation of this policy will be reported to the Dean of Students without exception.

Due Dates, Late Work, and Missed Work

- Programming quizzes are due by the end of class. Homework assignments are due at 23:59 on the due date. Multiple resubmissions are allowed, so submit early and often so you aren't in a rush on the due date. Late submissions receive a 0.
- There are no makeup exams. Exceptions are only considered under special circumstances such as serious illness, hospitalization, death in the family, judicial procedures, military service, or official school functions. Provide us with a copy of your letter from the registrar in advance for official school functions. For other excused absences you must provide documentation to the Dean of Students **within one week of your return from illness/activity**. The Dean of Students will verify your excuse and send us a notice. Excusal from coursework or make-up opportunities are granted at the sole discretion of your instructor.

Grade contest

To contest any grade you must submit an official regrade form **within one week of the assignment's original return date**. The original return date is the date the exam was first made available for students to pick up or the grade was posted online in the case of homework assignments and programming quizzes.

Class Participation

Lecture and workshop/recitation attendance is required and assumed.

Course Outline

- Week 1 - Week 3: DB Concepts & ER/EER Model
- Week 4 - Week 5: Relations, Algebra & Calculus, and QBE
- Week 6 - Week 8: SQL and ER to Relational Mapping
- Week 9 - Week 11: Normalization and Physical Design

Prerequisites

At least one of:

- Undergraduate Semester level CS 1301 Minimum Grade of C
- Undergraduate Semester level CS 1315 Minimum Grade of C
- Undergraduate Semester level CS 1321 Minimum Grade of C
- Undergraduate Semester level CS 1371 Minimum Grade of C

Course Materials

- Required Text: Fundamentals of Database Systems, 7th edition, Elmasri & Navathe, Addison-Wesley, 2015. [Sixth edition is OK to use. Please make sure to consult the right chapters. See Quiz Table below.]
- Chapter by Chapter Slides for Textbook: Posted on T-Square (They are posted as Edition 5 and Edition 6 slides. Edition 5 slides were prepared by authors and will be modified as the course progresses. Edition 6 slides were prepared by the publisher. Edition 7 chapters that we will cover mostly are in the same order as Ed.5. We are modifying Ed. 5 slides and posting them as the course progresses.).
- Database Design Methodology Notes (by Prof. Leo Mark): Posted on T-Square.
- MySQL and PHP Documentation: Posted on T-Square.
- Sample Quizzes: Posted on T-Square.
- Class Project: Posted on T-Square.

Non-Discrimination

The Institute does not discriminate against individuals on the basis of race, color, religion, sex, national origin, age, disability, sexual orientation, gender identity, or veteran status in the administration of admissions policies, educational policies, employment policies, or any other Institute governed programs and activities. The Institute's equal opportunity and non-discrimination policy applies to every member of the Institute community.

For more details see <http://www.policylibrary.gatech.edu/policy-nondiscrimination-and-affirmative-action>
(<http://www.policylibrary.gatech.edu/policy-nondiscrimination-and-affirmative-action>)