CS 425 Database Organization – Summer 2016

6:00pm – 9:10pm, Tuesdays & Thursdays, SB204

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Course Webpage: www.cs.iit.edu/~cs425/

Course Description

Databases management systems are a crucial part of most large-scale industry and open-source systems. This course familiarizes students with important concepts of database systems and design. We will learn how to design a database using the Entity-Relationship model, how to query and modify a database using the declarative SQL language, and study APIs for writing application programs that use a database system to persist data. Furthermore, the course gives an overview of important database systems techniques such as indexing, query optimization, execution, concurrency control, and recovery.

Course Material

The following textbook is required reading material for the course:

Silberschatz, Korth, and Sudarshan, Database System Concepts, 6th Edition, McGraw Hill, 2010

Other recommended introductory books on databases are:

Elmasri and Navathe, Fundamentals of Database Systems, 6th Edition, Addison-Wesley, 2003
Ramakrishnan and Gehrke, Database Management Systems, 3nd Edition, McGraw-Hill, 2002
Garcia-Molina, Ullman, and Widom, Database Systems: The Complete Book, 2nd Edition, 2008

The slides will be made available on the course webpage.

Prerequisites

Courses: One of CS 331, CS 401, or CS 403

Students with Disabilities

Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources. The Center for Disability Resources (CDR) is located in 3424 S. State St., room 1C3-2 (on the first floor), telephone 312 567.5744 or disabilities@iit.edu.

Course Details

The following topics will be covered in the course:

- The relational data model

- Database modeling and design

    - The Entity-Relationship (ER) model

    - Database design and normalization

- SQL

    - Data-definition language (DDL)

    - Data-manipulation language (DML)

- Formal relational languages

    - Relational algebra

- Database Architecture

- Database System Concepts

    - Transactions processing and concurrency control

    - Recovery

    - Indexing

    - Query processing and optimization

    - Security and access control

Workload and Grading Policies

Course Project:

During the second half of the semester, you will have a project assignment. The purpose of the project is for you to gain experience with physical implementations of databases. You will be taking a well-known SQL benchmark and trying to tune your database to improve performance. This is an individual project assignment.

Midterm and Final Exam:

There will be a midterm and final exam covering the topics of the course.

Homework:

There will be several homework assignments during the course. The main objective of these assignments is for you and the instructor to evaluate how well you internalized the topics covered in the course.

Grading Policies

See the course webpage for policies regarding late assignments and plagiarism.

- Course Project: 25%
- Midterm Exam: 25%
- Final Exam: 25%
- Homework Assignments: 25%

Course Objectives

After attending the course students should:
- Understand the underlying ideas of database systems
- Understand the relational data model
- Be able to write and understand SQL queries and data definition statements
- Understand relational algebra and its connection to SQL
- Understand how to write programs that access a database server
- Understand the ER model used in database design
- Understand normalization of database schema
- Be able to create a database design from a requirement analysis
- Know basic index structures and understand their importance
- Have a basic understanding of relational database concepts such as concurrency control, recovery, query optimization, and access control