Principles of Database Systems (CS 6083) - INET

Course Prerequisites: Good programming skills, familiarity with basics of operating systems (incl. file systems, caching, concurrency), and knowledge of basic algorithms and data structures (such as sorting, search trees, and hashing). Formally, you need to have taken a course on data structures or algorithms, and a course on operating systems, at the graduate or undergraduate level, or have permission from the instructor.

Instructor: Prof. Paul Giura, `pg860@nyu.edu`

Course Communication: All announcements will be sent via the course mailing list to your student email account.

Required text book: A. Silberschatz, H. Korth, S. Sudarshan, *Database System Concepts*, 6th Edition, McGraw-Hill, 2009. Book website: http://www.db-book.com (You may also use the 4th or 5th edition if those are cheaper or easier to get.)

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General Information: The course aims to give a broad introduction to database systems, including the relational data model, query languages, index and file structures, query processing and optimization, transaction management and concurrency control, and database design. The course material will be delivered in the format of interactive learning modules, made available at the beginning of every week.The examination will use homeworks, a midterm exam, a comprehensive project and a final exam.

Grading Policy: Homeworks: 20%(4 x 5%). Midterm: 25%. Project: 25%(10% + 15%). Final: 30%.

Project Design and Implementation: In addition to homeworks, midterm and final exams, there will also be a project that will contain two parts

1. Project Part I: Designing a complex schema and queries for a given application scenario. (See the suggested scenario or create one of your own)

2. Project Part II: implement a web-based application, typically with PHP and Oracle, mySQL, or another database system, based on the schema and scenario from Part I.

Course Outline

1. Introduction and Basics (Chapters 1 to 2 and Chapter 6) *(weeks 1-2)*

   (a) Overview

   (b) Relational Model

   (c) Relational Algebra

   (d) Relational Calculus

2. Basic Relational Queries, Basic SQL(Chapter 3) *(weeks 3)*

3. Entity-Relationship Model (Chapter 7) *(week 4)*

4. Intermediate and Advanced SQL (Chapters 4 and 5) *(weeks 5-6)*

   (a) Integrity Constraints

   (b) Views and Triggers

   (c) Application Programming

5. Relational Design and Normal Forms (Chapter 8) *(week 8)*

6. Storage and Indexing (Chapters 10 and 11) *(weeks 9-10)*

   (a) Disk Models

   (b) External Sorting

   (c) Disk and File Organization

   (d) Indexing

7. Query Processing (Chapters 12 and 13) *(week 11-12)*

   (a) Query Evaluation

   (b) Query Optimization

8. Transaction Management (Chapters 14 to 16) *(weeks 13-14)*

   (a) Transactions

   (b) Concurrency Control

01/22/18	Week 1	Introduction to Basics
01/29/18	Week 2	Introduction to Basics
02/05/18	Week 3	Basic Relational Queries, Basic SQL
02/12/18	Week 4	Entity-Relationship Model
02/19/18	Week 5	Intermediate SQL
02/26/18	Week 6	Advanced SQL
03/05/18	Week 7	MIDTERM EXAM
03/12/18		SPRING BREAK
03/19/18	Week 8	Relational Design and Normal Forms
03/26/18	Week 9	Storage
04/02/18	Week 10	Indexing
04/09/18	Week 11	Query Evaluation
04/16/18	Week 12	Query Optimization
04/23/18	Week 13	Transactions and Concurrency Control
04/30/18	Week 14	PROJECT DEMOS
05/07/18	Week 15	FINAL EXAM