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CS 405/605-01: Introduction to Database Management Systems

Guozhu Dong

Wright State University - Main Campus, guozhu.dong@wright.edu

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CS 405/605 01

Introduction to Database Management Systems

Winter 2012

Description: Logical and physical aspects of database management systems are surveyed. Data models including entity-relationship (ER) and relational models are presented. Physical implementation (data organization and indexing) methods are discussed. Query languages including SQL, relational algebra, relational calculus, and QBE are studied. Students will gain experience in creating and manipulating a database, and gain knowledge on professional and ethical responsibility and on the importance of privacy/security of data.

Prerequisite: CS 400/600 Data Structure and Software Design

Instructor: Professor Guozhu Dong

Office: Joshi 383

Phone No.: (937)-775-5066

Email: guozhu.dong@wright.edu

Office hours: 12:50-1:50 and by appointment. Use e-mail for short questions.

Class time: 10:25-11:40, TR

Class venue: Russ Engineering Center 355

Course materials: Slides and other relevant materials will be available on pilot. Handouts will be distributed in class; students are responsible for collecting them in the classes.

Required Textbook: R. Elmasri and S. B. Navathe, Fundamentals of Database Systems, 6th edition, Addison Wesley.

Reference texts:

- R. Sunderraman, Oracle 9 (or 8) Programming: A Premier, Addison Wesley.
- Raghu Ramakrishnan, and J. Gehrke, Database Management Systems, McGraw Hill. Any recent edition.
- Silberschatz, Korth, and Sudarshan, Database System Concepts, McGraw Hill. Any recent edition.
- J.D. Ullman, and J. Widom, A First Course in Database Systems, Prentice-Hall.

Topics: 1. DBMS concepts and architecture (Chap 1, 2) [1 week]
2. Entity-Relationship model and enhancements (Chap 7, 8) [1 week]
3. Relational data model and relational algebra (Chap 3, 6) [1.5 weeks]
4. SQL - a relational database language (Chap 4, 5, 13) [1.5 weeks]
5. ER and EER to relational mapping (Chap 9) [0.5 week]
6. Relation storage and file organizations, index structures (Chap 17, 18) [1 week]
7. Other relational languages (the relational calculus, QBE -- brief discussion) [0.5 week]
8. Functional dependencies and relational design/normalization (Chap 15, 16) (if time permits) [1 week]

We plan to cover these topics in this order.

Grading: A:[90,100], B:[80,90), C:[70,80), D:[60,70), F:[0,60)

Midterm 30%, Project 20%, Final 40%, Homeworks 10%.

No late homeworks or projects will be accepted except for documented medical reasons. The professor *may* curve the final letter grades based on the overall distribution of scores.

All exams are closed book and closed notes, except that you can use one sheet of notes for the midterm, and two sheets of notes for the final. There will be no make-up exams except for documented medical reasons.

Project: The project is about database design, relational algebra, and SQL programming. You will be given a project specification, with details about the application and the problems. You will design the ER schemas (3%) and the relations schemas (3%) for the application, initialize your database with some given relations, implement the given queries in SQL (8%), and implement some of the given queries in relational algebra (3%). You can use MS-Access, Oracle, or other DBMS to implement your database and to test your SQL queries. The SQL queries must be entirely done by hand (without machine translations) to ensure understandability; they should also follow the SQL standard as discussed in the text.

You need to write a report, which will be used to mark your project. In the report you should include your ER and relational schemas, your SQL codes of the queries, your relational algebra expressions of the queries, and results of test runs of your SQL queries. It is important that this final report be nicely presented; 3% marks will be allocated to the clarity and organization of the report.

Independent work: All project and examination work must be your own. Academic dishonesty will be "rewarded" with a grade of "F".

Important dates:

- 1/31: in class midterm.
- Project specification will be handed out around midterm.
- 3/8: project will be due at the start of the class.
- 10:45-12:45, Thursday, 3/15: Final.

Graduate students: Graduate students may be asked to do more than undergraduate students in the home works, projects and exams.