LIS-542: Database Applications Development

Autumn 2006
Master of Library and Information Science
Information School
University of Washington

Introduction to relational database theory and technology from an information science perspective. Focus on traditional transactional database theory, architecture and implementation in a user-centered systems context. Introduces set and graph theory, relational algebra and introduces data warehouses.
Prerequisite: LIS 511 or 540

Course website & Listserv

http://courses.washington.edu/lis54206/

lis542a_au06@u.washington.edu
(Archive: https://mailman1.u.washington.edu/mailman/listinfo/ lis542a_au06
Registered students are subscribed automatically using their UW mail account.

Credit Hours

5 (3 lecture hours; 2 lab hours; 10 outside hours) – credit/no credit

Meeting times

Lecture	Tuesday/Thursday 1130-0120 – MGH 238
Lab	Thursday 0130-0220 – MGH 4230

Instructor

David Hendry, Assistant Professor
330J Mary Gates Hall
dhendry@u.washington.edu | http://faculty.washington.edu/dhendry

Office hours: Thursdays, 0230 – 0330 or by appointment.

Student services

Marie Potter, Academic Advisor
470E Mary Gates Hall
mardup@u.washington.edu
Tel: (206) 616-2544

Overview

Relational Database Management Systems are an enabling technology. In business, they underlie mission critical systems for inventory control, order processing, and decision support. On the web, they underlie much of what we do when we consume and produce information. While they don't solve all the problems related to information storage and access, their importance in commercial and civic institutions is hard to overestimate.

The aim of this course is to develop an understanding for how relational database systems are used to store and access information. To do this we shall examine the functions that relational databases provide, how information systems are built using relational databases, how SQL is used to specify and query databases, and how database systems can be designed by following a methodology of stepwise refinement. Most of all, we shall develop a technical foundation so that we can think and talk like a database designer – at the same time, we shall reflect upon what we learn as information professionals who, in the future, are likely to be members of teams that are developing database applications.

Textbooks and readings

The textbook for this is course is:

> Connolly, T. M. & Begg, C. E. (2005). *Database Systems: A Practical Approach to Design, Implementation, and Management* (4th Edition) New York: Addison-Wesley Publishing. [ISBN: 0321210255]

Why this book? This book is primary designed for undergraduate students in computer science. Nevertheless, I've used this book with good success with Informatics students and I believe it will work well for LIS-542 because it gives a very thorough treatment of the technical topics that we shall cover. And, because it takes an engineering orientation, I believe it will help us think like engineers and appreciate the elegance – and complexity – of database systems.

To give perspective, additional readings may be assigned from time to time.

Learning

Aims

The general aims of this course are to:

1. Develop a conceptual understanding for relational database systems
2. Develop skills in designing, implementing and testing database systems.

Objectives

On the successful completion of this course, you should be able to:

1. Describe the functions and organization of database management systems
2. Describe the relational model, including the data structure and algebra
3. From problem statements, derive SQL statements for querying, updating and creating databases
4. Create Entity-Relationship and Enhanced-Entity Relationship models for small systems
5. Read an ER diagram as a specification and implement a database system for it

6. Describe the problems of data redundancy and update anomalies and be able to normalize a database to 3NF to avoid these problems
7. Describe a three-tier information system
8. Outline and follow a methodology for designing database applications
9. Be comfortable with interacting with databases from the command line and from graphical user interfaces.

Assessment

This five credit course will be graded as credit/no-credit. Over the quarter, you will complete 10 exercises. To receive credit for the course, each exercise must be satisfactorily completed. Work that is graded needs improvement can be resubmitted for a second level of review.

Exercise	Due	Week
A1 - SQL Queries I	Oct 12	#3
A2 - Relational algebra	Oct 19	#4
A3 - SQL Queries II	Oct 26	#5
A4 - SQL Data Definition	Nov 2	#6
A5 – Reflections on System-Centric Methodologies	Nov 9	#7
A6 - Entity Relationship Modeling I	Nov 16	#8
A7 - Entity Relationship Modeling II	Nov 28	#9
A8 - Database Normalization	Nov 30	#10
A9 - Reflections of Learning	Dec 6	#11
A10 - Database Design	Dec 11	#12

Exercise "A9-Reflections on Learning" is special. This exercise takes place throughout the quarter. For this exercise, you are to keep a personal journal and document the technical, skills-oriented, and conceptual blacks that you encounter in learning this material. The goal is to document these difficulties and to reflect upon why they occurred and how you overcame them. On the last day of class we shall drawn upon these documented experiences and our reflections of them to discuss what we've learned and what remains to be learned. We might, for example, discuss our reflections under the theme "Thinking like an engineer".

Exercise handouts will be available on the course website and distributed in class.

Standard cover sheet

To protect your privacy when exercises are returned and to facilitate communication, submitted work must have a cover sheet. The cover sheet must include the following information and be formatted nicely:

- Course name
- Quarter, program, department, and university
- Assignment name
- Your name and e-mail address
- A date
- A web site address (if relevant).

Staple the exercise pages to the cover sheet.

Late policy

If you will miss the deadline for a piece of work, you should inform the instructor as soon as you can, indicating when you will submit the work. The instructor will seek to accommodate your needs.

Right to revise

The instructor reserves the right to revise this syllabus.

Guidelines on using e-mail

When communicating with the instructor, please follow these guidelines:

- You are welcome to give feedback to the instructor about the course, to ask a question about an assignment, to share an interesting article or resource, to report that you will be absent from a class/lab, to request additional time for an assignment (because of significant health, personal, or educational matter), or similar communication ;
- Whenever appropriate, please copy the class listserv with your question or comment;
- E-mail concerning assignments might not be replied to if it is sent within 36hr of the assignment due date;
- If your e-mail concerns your grade, please follow the re-grading policy (see above);
- E-mail that is sent on Friday afternoon or over the weekend is not replied to until Monday or Tuesday of the following week;
- If you don't receive a reply within 2 days or so, please resend your e-mail or ask about it during class or lab.

Class Schedule

Week 1: Overview (Sept 25 – 29)

No readings
L1 *** No class meeting
L2 Greetings and introduction
Lab Introduction to tools

Week 2: Database systems – why do we need them? (Oct 2 – 6)

Read Chapters 1 – 2
L1 Functions & components
L2 Data models & three-tier architecture
Lab Introduction to SQL and Postgresql

Week 3: Relational model (Oct 9 – 13)

Read Chapters 3 – 4 (4.2 optional)
L1 Relational data model
L2 Relational Algebra
Lab SQL Practice

(continued …)

Week 4: SQL, I (Oct 16 – 20)
Read Chapters 5 – 6 [*please read for basic overview*]
L1 "Simple" queries (*** Dave to miss class ***)
L2 Grouping queries
Lab SQL Practice

Week 5: SQL, II (Oct 23 – 27)
Read Chapter 7
L1 Queries on multiple tables
L2 Database definition
Lab SQL and MS Access

Week 6: Database planning and design (Oct 30 – Nov 3)
Read Chapters 9 – 10
L1 Modeling systems
L2 Systems-centric and human-centric design
Lab Requirements Gathering Exercise

Week 7: Entity-relationship modeling (Nov 6 – 10)
Read Chapter 11
L1 Entities, attributes, relationships
L2 Structural constraints
Lab Drawing and modeling tools

Week 8: Enhanced entity-relationship modeling (Nov 13 – 17)
Read Chapter 12
L1 Modeling object structures
L2 Generalization/specialization and aggregation
Lab Modeling practice

Week 9: Normalization (Nov 21 – 24)
Read Chapter 13
L1 The normalization process and 3rd normal form
L2 *** No class meeting – Thanksgiving
Lab *** No class meeting – Thanksgiving

Week 10: Database design methodology, I (Nov 27 – Dec 1)
Read Chapters 15 – 16
L1 System-oriented methodologies – The conceptual, logical & physical
L2 Conceptual database design
Lab —

(continued …)

Week 11: Database design methodology, II (Dec 4 – 8)

No readings
L1 Logical database design
L2 Reflections on "Thinking like an engineer" and good-byes
Lab —

Students with Disabilities

To request academic accommodations due to a disability, please contact Disabled Student Services: 448 Schmitz, 206-543-8924 (V/TTY). If you have a letter from DSS indicating that you have a disability which requires academic accommodations, please present the letter to me so we can discuss the accommodations you might need in the class.

Academic accommodations due to disability will not be made unless the student has a letter from DSS specifying the type and nature of accommodations needed.

Grading Criteria

General grading information for the University of Washington is available at:
http://www.washington.edu/students/gencat/front/Grading_Sys.html

The iSchool has adopted its own criteria for grading graduate courses. The grading criteria used by the iSchool is available at:
http://www.ischool.washington.edu/resources/academic/grading.aspx

The UW undergraduate grading guidelines, used by the iSchool and available at http://depts.washington.edu/grading/practices/guidelin.htm, may be used in this class.

Academic Integrity

The essence of academic life revolves around respect not only for the ideas of others, but also their rights to those ideas and their promulgation. It is therefore essential that all of us engaged in the life of the mind take the utmost care that the ideas and expressions of ideas of other people always be appropriately handled, and, where necessary, cited. For writing assignments, when ideas or materials of others are used, they must be cited. The format is not that important–as long as the source material can be located and the citation verified, it's OK. What is important is that the material be cited. In any situation, if you have a question, please feel free to ask. Such attention to ideas and acknowledgment of their sources is central not only to academic life, but life in general.

Please acquaint yourself with the University of Washington's resources on academic honesty (http://depts.washington.edu/grading/issue1/honesty.htm).

Students are encouraged to take drafts of their writing assignments to the Writing Center for assistance with using citations ethically and effectively. Information on scheduling an appointment can be found at: http://depts.washington.edu/iwrite/

Copyright

All of the expressions of ideas in this class that are fixed in any tangible medium such as digital and physical documents are protected by copyright law as embodied in title 17 of the United States Code. These expressions include the work product of both: (1) your student colleagues (e.g., any assignments published here in the course environment or statements committed to text in a discussion forum); and, (2) your instructors (e.g., the syllabus, assignments, reading lists, and lectures). Within the constraints of "fair use", you may copy these copyrighted expressions for your personal intellectual use in support of your education here in the iSchool. Such fair use by you does not include further distribution by any means of copying, performance or presentation beyond the circle of your close acquaintances, student colleagues in this class and your family. If you have any questions regarding whether a use to which you wish to put one of these expressions violates the creator's copyright interests, please feel free to ask the instructor for guidance.

Privacy

To support an academic environment of rigorous discussion and open expression of personal thoughts and feelings, we, as members of the academic community, must be committed to the inviolate right of privacy of our student and instructor colleagues. As a result, we must forego sharing personally identifiable information about any member of our community including information about the ideas they express, their families, life styles and their political and social affiliations. If you have any questions regarding whether a disclosure you wish to make regarding anyone in this course or in the iSchool community violates that person's privacy interests, please feel free to ask the instructor for guidance.

Knowing violations of these principles of academic conduct, privacy or copyright may result in University disciplinary action under the Student Code of Conduct.

Student Code of Conduct

Good student conduct is important for maintaining a healthy course environment. Please familiarize yourself with the University of Washington's Student Code of Conduct at: http://www.washington.edu/students/handbook/conduct.html