Master Course Syllabus
School of Engineering and Computer Science
Washington State University Vancouver
CS 351
Introduction to Database Systems
3 Semester Hours
(3 lecture hours)

Catalog Description

Introduction to database concepts, data models, database languages, database designs, implementation issues.

Prerequisite Courses

- CS 215 with a C or better, or
- CS 223 with a C or better, or
- CS 224 with a C or better

Prerequisite Topics

- Proficiency with C and Java programming languages
- Sorting and searching algorithms
- Object-oriented concepts and modeling
- Use of Unix environment for coding, compilation, debugging and testing
- Function, relation and set theory
- Basic logic

Measured Course Outcomes

Students taking this course will:

1. Analyze system/user requirements to prepare relational schema from a conceptual information model developed using the Entity-Relationship method. (Contributes to performance criterion 1-a.)
2. Evaluate the merits of multiple indexing designs and query operations with respect to space and time complexity. (Contributes to performance criterion 1-b.)
3. Implement programs that perform query and update transactions on a database, demonstrating the use of relational algebra operations. (Contributes to performance criterion 2-b.)
4. Analyze problems related to external memory data structures and algorithms using suitable mathematics. (Contributes to performance criterion 6-a.)

Other covered course outcomes but not measured

1. Select appropriate normal forms in the design and implementation of a relational database (contributes to performance criterion 1-c).
2. Test and debug complex SQL queries (contributes to performance criterion 2-c).

Required Textbooks

Silberschatz, Korth, and Sudarshan. *Database System Concepts*, McGraw-Hill.

Reference Material

None Specified.

Major Topics Covered in the Course

1. Introduction to information modeling and information systems
2. Conceptual design of database systems
3. Relational data modeling
4. Structured query language (SQL)
5. Physical data organization
6. Relational database design and implementation

Projects

Programming Project Area	Weeks
Design and implementation of a relational database	2
Performing normalization on a poorly designed database	2
Implementation of a user interface for a relational database	2

Design, Implementation and Analysis

Students are guided through the several design phases in the development of a database. The first phase is a conceptual design (an ER model). Students then map a conceptual design to a logical design (database schema). The logical design is optimized via normalization. The final step is to convert the logical design to a physical design (a sequence of CREATE TABLE statements in SQL). Part of the physical design consists of specifying appropriate data structures (e.g., indices) to improve database performance for the required transactions. Students analyze their solution to identify weaknesses in the design and implementation.

Students take real-world database problems and implement efficient solutions in a DBMS. The problem analysis has two related components. The first component is development of an adequate conceptual design. The conceptual design, an ER model, is an abstract, formal specification of the database schema. Students learn the capabilities and limitations of ER modeling by its application. The second component is an analysis of the practical limitations of a DBMS.

CC2013

This course provides coverage of CS2013 knowledge areas. Values listed are minimum course hours dedicated to the topic, percentages indicate the fraction of CS2013 knowledge area topics covered (acceptable values are: <25%, 25-75%, >75%, or 100%).

Area	Tier 1	Tier 2	Elective
IM/Information Management Concepts	1 (<25%)	1 (25-75%)	
IM/Database systems		3 (>75%)	

Area	Tier 1	Tier 2	Elective
IM/Data modeling		4 (25-75%)	
IM/Indexing			2 (25-75%)
IM/Relational databases			9 (25-75%)
IM/Query languages			9 (25-75%)
IM/Transaction Processing			2 (100%)

Course Coordinator:	Ben McCamish
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