CSE 444 Database Systems Internals

Credits
4.0 (3 hrs lecture, 1 hr section)

Lead Instructor
Magdalena Balazinska

Textbook

- *Database Systems*, Garcia-Molina

Course Description
The rational data model and the SQL query language. Conceptual modeling: entity/relationships, normal forms. XML, XPath, and XQuery. Transactions: recovery and concurrency control. Implementation of a database system. A medium sized project using a rational database backend.

Prerequisites
CSE 332; CSE 344.

CE Major Status
Selected Elective

Course Objectives
Databases are at the heart of modern commercial application development. Their use extends beyond this to many applications and environments where large amounts of data must be stored for efficient update and retrieval. The purpose of this course is to provide an introduction to the design and use of database systems, as well as an appreciation of the key issues in building such systems. We begin by covering the relational model and the SQL language. We then study methods for database design, covering the entity relationship model. Next, we discuss XML as a data model, and present languages for querying it. We see how XML is used for sharing data among different applications in a distributed environment. We then inspect the architecture of a database system, and discuss efficient storage of data, execution of queries and query optimization. Finally, we touch on some advanced topics in database systems.

ABET Outcomes
(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

(e) an ability to identify, formulate, and solve engineering problems
(i) a recognition of the need for, and an ability to engage in life-long learning
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Course Topics

- data models
- conceptual design
- query languages
- system components
- data storage
- query optimization
- transaction processing.