IT360: Applied Database Systems

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www.usna.edu/Users/cs/adina/teaching/it360/spring2013

Outline

- Class Survey
- Why Databases (DB)?
- This Class?
- Admin
Database Systems

- How does Wal-Mart manage its 200 TB data warehouse?
- What is the database technology behind Amazon’s website?
- How do you build an Oracle 9i, MySQL or Microsoft SQL Server database?

ICE: Mids Store

- Create a system to keep track of inventory, record sales, query the inventory
Problems

- Changes to data - Data model
- “on the fly” queries
- Data inconsistencies
- Security of information (views)
- Performance
- Partial processing
- Concurrency

What is a Database?

- A very large, integrated collection of data
- Models real-world enterprise.
  - Entities (e.g., students, courses)
  - Relationships
- A *Database Management System (DBMS)* is a software package designed to store and manage databases.
Why Use a DBMS?

- Data independence and efficient access
- Reduced application development time
- Data integrity and security
- Performance and scalability
- Concurrent data access
- Recovery from system crashes

Why Study Databases?

- Used everywhere
  - Universities (MIDS), military, enterprises
- Datasets increasing in diversity and volume.
  - Digital libraries, interactive video, Facebook, YouTube, Google
  - ... need for DBMS exploding
- DBMS encompasses most of CS
  - OS, languages, theory, data mining, multimedia, logic
Best Jobs!

Course Main Topics

- Use a relational database
  - Relational model
  - SQL
- Create a relational database
  - Normalization
  - Database design using Entity-Relational Model
- Create web applications with db backend
  - PHP
- More on database management and implementation
  - Database administration and security
  - Database programming
  - Transaction processing
  - Indexing
Course Goals

- Explain the main advantages of modern database management systems over file systems.
- Design, create, and query relational databases to satisfy user requirements.
- Design, build and deploy database-backed applications with dynamic website front-end.
- Implement data access control mechanisms for database and application security.
- Analyze the ethical issues and responsibilities related to records management

Create applications that USE a Database Management System

Things We Will NOT Cover

- Relational algebra and calculus
- Implementation of index structures
- Query evaluation and optimization
- …

How to BUILD a Database Management System
Success in IT360

- Lecture – stay engaged
  - Take notes – provided slides are not enough!
  - Ask & answer questions
- Make the most of in-class lab time
  - Read lab in advance
  - Think before you start typing
  - Don't stay stuck!
- Don't fall behind
  - Finish lab early and leave time for reading
  - See me for help and/or talk to friends
  - Course material builds on itself and gets more complex

Academic Integrity - Honor

- Collaboration on labs/ hws is allowed, but submitted work should be your own
  - Cite any assistance, from any sources
- Collaboration on projects, quizzes and exams is prohibited
- http://www.usna.edu/cs/resources/honor.htm
Resources

- Your class notes /online notes
- Database Processing by Kroenke and Auer
- PHP and MySQL Web Development by L. Welling and L. Thomson
- Tegrity recordings