Outline

- Class Survey
- Why Databases (DB)?
  - A Problem
  - DB Benefits
- This Course?
- Admin

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

Information is one of the most valuable resources in this information age
How do we effectively and efficiently manage this information?
- Relational database management systems
  - Dominant data management paradigm today
- Search engines
  - 10+ billion dollar a year industry
    - You will see this in the job market!
ICE: The Mid Store

- Create a system to keep track of inventory

Problems

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

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!

[Image: CNNMoney.com]

IT Analyst

Outline

- Class Survey
- Why Databases (DB)?
  - A Problem
  - DB Benefits
- This Course?
- Admin
Prerequisites

- SI321 Advanced Data Structures,
- Strong programming skills (C++)

Course Grading

- Three components
  - Assignments, quizzes (20%)
  - Projects (25%)
  - Exams (55%)

Class Lectures

- Textbook: “Database Management Systems”
  - By Raghu Ramakrishnan and Johannes Gehrke
  - Required textbook
- Syllabus
  - Defined by class lectures
  - Not defined by textbook

Course Topics

- Database design
- Relational model
- Relational algebra
- SQL
- Indexing
- Query evaluation and optimization
- Transaction processing: concurrency, crash recovery
- Normalization
- Database security
Course Goals

- Query relational databases using SQL;
- Design, and create relational databases to satisfy user requirements;
- Build parts of a real database management system;
- Explain the main functionality provided by modern database management systems: query optimization, concurrency control, crash recovery;
- Analyze the ethical issues and responsibilities related to records management.

Things We Will NOT Cover

- Database applications
- Web interface
- PHP

Create applications that USE a Database Management System

How to BUILD a Database Management System

Success in SI440

- Lecture – stay engaged
  - Take notes – provided slides are not enough!
  - Exams closed-book – but open-note!
  - Ask & answer questions
- Complete assignments / projects
  - Think before you start writing/typing
  - Don’t stay stuck!
- Don’t fall behind
  - Finish assignments 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 hws is allowed, but submitted work should be your own
  - Cite any assistance, from any sources
- Collaboration on exams/quizzes is prohibited
- Projects will be done in groups. Collaboration between groups is prohibited.
  - [http://www.cs.usna.edu/academics/honor.htm](http://www.cs.usna.edu/academics/honor.htm)
Resources

- Lecture slides / your notes
- Textbook: Database Management Systems by R. Ramakrishnan and J. Gehrke

Is SI440 a lot of work?

- It depends!
  - Much of the material is probably new to you
  - There is at least one substantial programming project
- Then why on earth should I take this course?
  - Intellectual argument
    - Big conceptual ideas
    - Meeting of theory and practice
  - Utilitarian argument
    - Many, many real applications
    - Job market!

Instructor

- Asst. Prof. Adina Crainiceanu
- Ph.D. Cornell University
- Area of Specialization: Databases
- Research: Search in Peer-to-Peer Systems
  - Lots of military applications
  - Internship possibilities for students