DATABASE CONCEPTS

Computer Science 450/550
Course Topics

Database Survey Course

• Physical/Logical DB Structure
• Relational Databases, especially Oracle
• Database Design
• Transaction Issues: Concurrency, Recovery, ...
• High level survey: you are expected to learn, not just memorize.
Physical/Logical DB Structure

- Database Architecture
  - How data on disk connects to user
- How Queries are translated to database operations

Emphasis: Relational Databases

- Relational Data Model
  - Dominant Model: Data looks like tables
- Relational Algebra
  - Manipulation of tables procedurally
- Structured Query Language (SQL)
  - Manipulation of tables non-procedurally
- Query Optimization
- PL/SQL: Oracle's programming language includes SQL commands
- Using SQL in PHP
Relational Database Design

• **Entity Relationship Diagrams**
  – Widely used approach
  – Good for communication with customer
  – Design Relational Database from ER Diagram

Relational Database Design 2

• **Functional Dependencies (FDs)**
  – Supplementary technical approach to ensure:
  – Integrity of database maintained
  – Rules of database followed

• **Normalization**
  – Structuring of database
  – Derived from FDs
Transaction Issues

• **Transactions**
  – Collection of DB operations which must all be performed

• **Concurrency**
  – Multiple processes operating simultaneously on same database

• **Recovery**
  – Maintaining integrity despite crashes

What's left out?

• Hierarchical, Network, OO Databases
• Distributed Databases
• Client-Server Model
• Data Warehouses
• Data Mining
• Oracle tools: Designer, Developer
• XML, UML, Genome
• Database Administration
• NoSQL Databases