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