Lecture 1
08/24/15

Instructor: Yu-San Lin
yusan@psu.edu

Course Website: http://www.cse.psu.edu/~yul189/cmpsc431w
Slides based on McGraw-Hill & Dr. Wang-Chien Lee
Outline

• Overview of this course
• Motivation for studying database management systems
• Three types of data models
Course Emphasis

• How to *design* a database application
• How to *use* a DBMS effectively
• How a DBMS *works*
Course Organization

I Foundations
1 Introduction
2 ER model Conceptual Design
3 Relational Model
4 Relational Algebra and Calculus
5 SQL

II Applications
6 Database Application Development
7 Internet Applications
8 Storage and Indexing
9 NoSQL

III Systems
12 Query Evaluation

IV Systems
16 Transaction Management

V Systems

VI Applications
19 Schema Refinement, FDs, Normalization
CHAPTER 1: OVERVIEW OF DATABASE SYSTEMS
What is a DBMS?

• Database
  – is storage of _____;
  – Maintains a very _____, _________ collection of data.

• A database models a real-world enterprise.
  – _________ (e.g., students, courses)
  – ____________ (e.g., John is taking CMPSC 431W)

• Database Management System (DBMS) is a software package designed to store and manage databases.
Database Applications

• **Banking**: all transactions
• **Airlines**: reservations, schedules
• **Universities**: registration, grades
• **Sales**: customers, products, purchases
• **Manufacturing**: production, inventory, orders, supply chain
• **Human resources**: employee records, salaries, tax deductions

... The list goes on!
File System v.s. DBMS

• **File system**: a collection of individual _____ accessed by application programs
• **DBMS**: a computerized record-keeping system
• Drawbacks of file systems:
  — ________________________________
  — ________________________________
  — ________________________________
  — ________________________________
  — ________________________________
  — ________________________________
Why Use a DBMS? 

- _________________________________________
- _________________________________________
- _________________________________________
- _________________________________________
- _________________________________________
- _________________________________________
- _________________________________________
- _________________________________________
- _________________________________________
Data Models

• A data model is a collection of high-level constructs for describing stored data that hides low-level storage details.

• Three major data models are
  – ___________ data model
  – ___________ data model
  – ___________ data model
Network Data Model

Data records are linked as _______.

Hayes    Main     Harrison    A-102    400

Johnson  Alma    Palo Alto  A-101    500

Smith    North    Rye       A-215    700
Hierarchical Data Model

The hierarchical model organizes data records as collections of ______.
Relational Data Model

• The relational data model is the most widely used data model today.
  – Main concept: _______, basically a table with rows and columns.
  – Every relation has a ________, which describes the columns, or fields.

• Example:

  Students ( sid: string, name: string, login: string, age: integer, gpa: real)
Don’t Forget

• Sign up the two accounts:
  – GitHub
  – Asana

• Submit your team information, along with account information, by this Friday (8/28)

• Reading:
  – Project description: prepare any question to discuss on Friday
  – Section 1.1 ~ 1.5