

Introduction to Databases

CS4444: DBMS

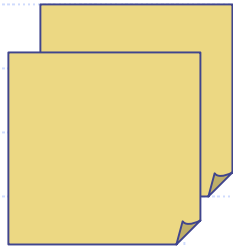
C-Term, Fall 2002

Course Instructor: Aparna Varde

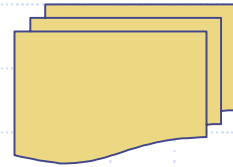
Data in various domains

- ◆ Give examples of data you deal with on a day-to-day basis...
 - ◆ Doctors: Patient diagnostics
 - ◆ Lawyers: Client histories
 - ◆ Managers: Employee records
 - ◆ Teachers: Student profiles
 - ◆ Students: Course information

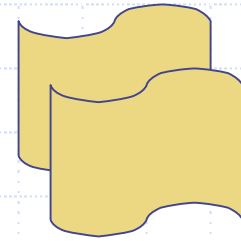
Data Storage



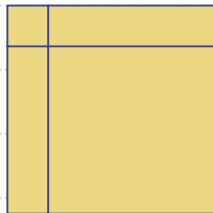
Documents
(e.g. Word)



Flat files
(Handwritten)



Raw Data
(Scattered)



Simple Tables
(statistical info)



Images
(photos etc.)



Human Mind
(too much data)

Need for integration

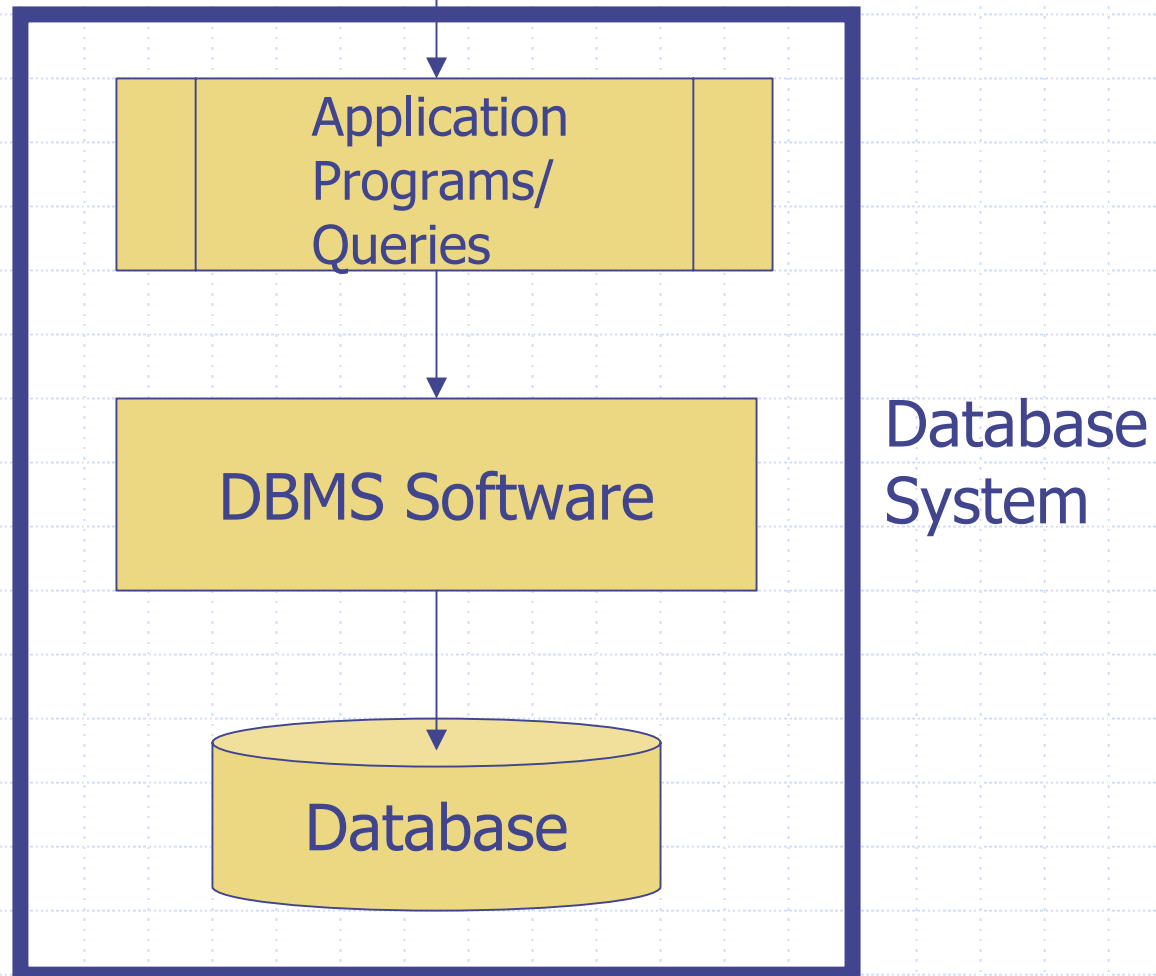
- ◆ Have all the data in one place
- ◆ Easy storage
- ◆ Fast retrieval
- ◆ Simple to change information
- ◆ Security esp. with multiple users
- ◆ Recovery from failures

Databases

- ◆ **Database:** a collection of data that is organized so that its contents can easily be accessed, managed, and updated.
- ◆ **DBMS (DataBase Management System):** a collection of programs that enables users to create and maintain a database
- ◆ **Database System:** Database + DBMS + application programs/queries

Database System Environment

End-Users



Types of DBMS

- ◆ Relational (RDBMS): Tables with Rows & columns
- ◆ Object-Oriented(OODBMS): Objects and Classes like OO-Programming
- ◆ Object-Relational(ORDBMS): Combination of the two
- ◆ Most common today is RDBMS

Example of Relational Database

Book

ISBN	Title	Author	Price
AA333	Networks	J.White	420.00
TH111	Metals	K.Dalton	150.00

Author

SSN	Name	Address	Phone
111 67 8999	J.White	San Jose, CA	(408) 777 9898
456 12 7869	K.Dalton	Worcester, MA	(508) 554 6754

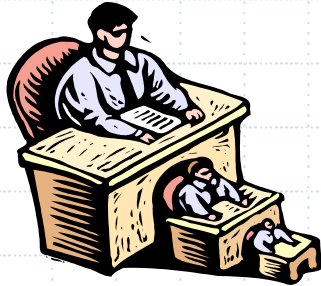
Terminology

- ◆ Table: Database representation of an entity in real world, e.g. book table.
- ◆ Schema: Structure of DB, not content e.g. the tables without entries.
- ◆ Tuple: Instance of entity, row in DB e.g. each book in the book table.
- ◆ Attribute: Property of entity, column in DB e.g. author, title.

Terminology (contd...)

- ◆ Primary Key: Attribute(s) that uniquely identify a tuple, e.g. ISBN number
- ◆ Foreign Key: Attribute(s) connecting two or more tables, e.g. author
- ◆ View: Subset derived from database e.g. view of authors and titles only.
- ◆ Meta-Data: Data about data e.g. in library, books form data, catalog forms meta data

Roles in the database world (You could be one of these)



Database Administrator



Database Designers

End-Users



System Analysis &
Application Developers



In-class Assignment (15 minutes)

- ◆ Make groups of four (people next to you)
- ◆ Think of one sample application where you may need databases
- ◆ Design on paper the tables needed for this application (at least two tables) and populate them with sample data
- ◆ Identify the following in your tables
 - Primary keys, foreign keys
 - Tuples and attributes
 - Meta data

Advantages of DBMS

- ◆ Control redundancy
- ◆ Restrict unauthorized access
- ◆ Provide persistent storage for data
- ◆ Represent relationships among data
- ◆ Enforce integrity constraints
- ◆ Provide backup and recovery
- ◆ Allow Concurrency Control

Popular DBMS packages

- ◆ Oracle: Developed by Oracle, provides relational and OR features
- ◆ Sybase: Developed by Sybase Inc., has offshoots like Websql
- ◆ MS Access: Developed by Microsoft, good for PCs.

Summary

- ◆ Need for data integration
- ◆ Database, DBMS, Database system
- ◆ Types of DBMS
- ◆ Terminology w.r.t. relational
- ◆ Database roles
- ◆ Advantages of DBMS
- ◆ Popular DBMS packages

Home-work 1 (to be turned in hard copy at beginning of class 2)

◆ Part 1 (to be done individually)

- Collect and store data for a sample application in your domain without using databases. Run simple retrieval tasks on your data.

◆ Part 2 (teams of four)

- Discuss the difficulties involved in the above task. Record difficulties of each member in your team including yourself.

Lab 1 (to be turned in electronically in the week after class 2)

- ◆ Get an account on Oracle from the CCC
- ◆ Then do the following
 - Login to wpi.wpi.edu
 - At prompt, say "source coraenv"
 - Then enter, "sqlplus"
 - System will prompt you for Oracle username and password. Enter that.
- ◆ Refer to Chapter 1 of the Oracle handbook.
 - Create the simple database with 3 tables as explained in the example there.
 - Populate the table with sample entries from the manual
 - Turn in an electronic screen dump of created, populated tables in the database.