Databases and Database Users

CS157A

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Aug. 24, 2005.

Outline

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- People connected with a database
- Advantages of using a DBMS
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Introduction

- Databases are now commonly used in banking, airline reservation, on the web,etc.
- But what is a database?
- For us, a **database** is a collection of related data. **Data** for us is a collection of known facts with some explicit meaning.
- For example you might have collections of facts about Employees, music files, etc.

Properties of Databases

- Represent some aspect of the real world (a miniworld) which is called the **universe of discourse**. (Say bank account info) Changes in the information are reflected in the database.

- A database is a logically coherent collection of data. A random assortment of data collected together is not a database.

- A database has an intended purpose, an intended group of users, and some preconceived uses. (For example, manage amounts of money in people's accounts in a bank.)

Database Management Systems

- These are collections of programs that enable users to create and maintain a database.
  - To create a database involves tools for **defining** the data types, structures, constraints on the data. It involves **constructing** the database by having programs to store data in it. It also involves tools to **manipulate** data that has been previously stored, and finally involves tools to **share** the database among multiple users.
  - To maintain the database involves protecting the data for long periods of time. This involves protecting against software or hardware malfunctions as well as to protect the data from malicious or clumsy users.

An Example Database

Notice data in a given column might have a fixed datatype.

Student	Name	StudentID	Class	Major
	Brown	8	2	CS
	Smith	17	1	CS

Course	CourseName	CourseID	Credits	Dept
	Intro CS	CS46a	3	CS
	Discrete Math	MA42	3	MATH
	Databases	CS157a	3	CS

Grades	StudentID	CourseID	Grade
	8	CS46a	A
	8	MA42	C
	17	CS157a	B

Characteristics of Databases

- Self describing nature of the database system
- Insulation between programs and data, and data abstraction (conceptual representation of the data).
- Support for multiple views of the data.
- Sharing of data and multiuser transaction processing

People connected with Databases

- Database Administrators (DBAs)
- Database Designers
- End user
  - Casual end users (managers)
  - Naïve or parametric users (data entry)
  - Sophisticated End-Users (engineers, scientists)
  - Stand-alone users
- And more
  - DBMS designers
  - Tool developers
  - Operators and maintenance personnel

Advantages of DBMS

- Controlling redundancy
- Restricting unauthorized access
- Providing persistent storage on some secondary medium
- Providing efficient query processing
- Providing back-up and recovery
- Providing multiple user interfaces
- Representing complex relationships between the data
- Enforcing integrity constraints,etc.

A Short History Lesson

- 60's and 70's Network and Hierarchical Models
- 70's Relational Model
- 80's OO databases
- 90's and 00's Web apps and XML