CS122 Using Relational Databases and SQL
Introduction to Relational Databases and SQL
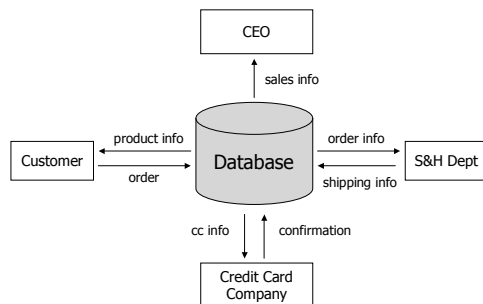
Chengyu Sun
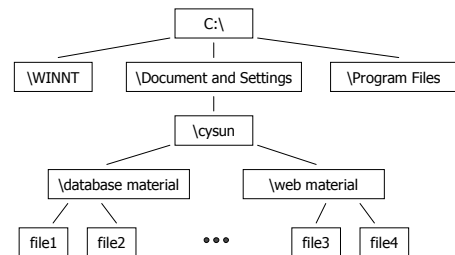California State University, Los Angeles

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Ubiquity of Databases

◆ Anywhere where a large amount of information needs to be managed safely and efficiently
- Utility companies, grocery stores
- Schools
- Doctor's offices, hospitals
- Government agencies
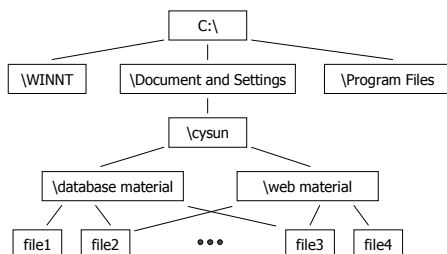- Web sites
- ...

An Example of a Database Application

Hierarchical Model

What about material related to both web and database??

Network Model

Relational Model
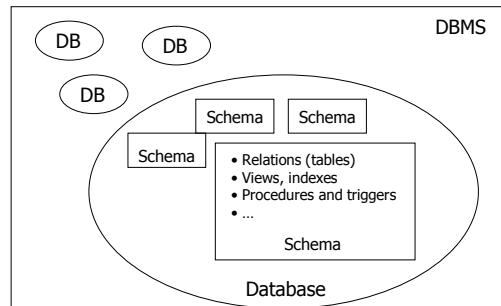
◆ Proposed by Edgar F. Codd in early 1970's
◆ Data is stored in tables
◆ All major database systems these day are relational

student_id	first_name	last_name	birthday
2000001	John	Doe	1970-1-1
2000002	Jane	Doe	1971-1-1
2000003	Tom	Smith	1962-2-2

So how do we store the directory structure in a table??

The Big Picture

- DBMS
- DB
- DB
- DB
- Schema
- Schema
- Schema
  - • Relations (tables)
  - • Views, indexes
  - • Procedures and triggers
  - • ...
  - Schema
- Database

DBMS

- ◆ Database Management System (DBMS) is a software that manages databases
- ◆ Common DBMS
  - Commercial – Oracle, IBM DB2, MS SQL Server, Access
  - Open source – MySQL, PostgreSQL

Database and Schema

- ◆ A database is a collection of data managed by a DBMS
- ◆ A database contains one or more *schemas*
- ◆ A schema contains a number of *schema elements*, such as tables, indexes, stored procedures, and so on.

More Terminology

Table (relation)   Attributes (fields)

student_id	name
1001	John Doe
1002	Jane Doe

students

Rows (Records) (Tuples)

Table (relation) schema:
  students(student_id, name)

Database schema: database name + table schemas

Attribute Type

- ◆ Determines the storage required for a field
- ◆ Common attribute types
  - String types
  - Numeric types
  - Date and time types
  - Other types

SQL

- ◆ Structured Query Language
- ◆ A standard query language for relational databases
- ◆ Supported by all major DBMS (with some variations)

Some SQL Examples

◆ Create a table
◆ Populate the table
◆ Find some information
◆ Delete the table

Database Development

CS 122

Design	Given an application scenario, design the database schema.
Implementation	Implement the schema in a specific DBMS with constraints, indexes, stored procedures ….
Access	Input and retrieve data.