CS122 Using Relational Databases and SQL
Introduction to Relational Databases and MS Access

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Overview

- Introduction to databases
- Relational Model
- Using MS Access

Ubiquity of Databases

- Anywhere where a large amount of information needs to be managed safely and efficiently
  - Web sites
  - Phone, cable, and gas companies
  - Schools
  - Hospitals
  - Government agencies
  - …

Two notions of Database

- Database software
  - Oracle, DB2, MS SQLServer, MySQL, PostgreSQL, MS Access
- Collection of data
  - "create a *database* in Access"

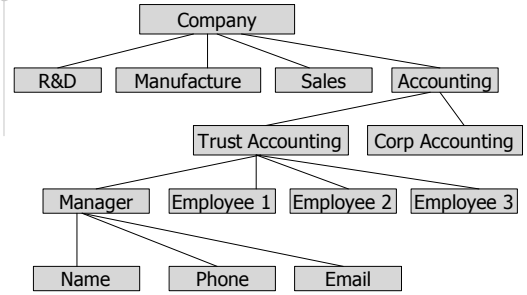
Database vs. File

- More efficient search
- ACID
  - Automicity
  - Consistency
  - Isolation
  - Durability

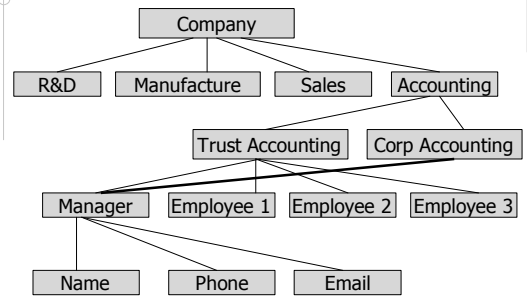
Data Organization

- Physical Model – how data is stored on disk
- Logical Model – conceptual organization of data
  - Hierarchical
  - Network
  - Relational

Hierarchical Model



Network Model



Relational Model

- Proposed by Edgar F. Codd in earlier 1970's
- All major databases are relational

Name	Phone	Email	Title	Dept
Susan	626-1234567	susan@some.company	Manager	Trust Accouting
Susan	626-1234567	susan@some.company	Manager	Corp Accounting
Jane	626-7654321	jane@some.company	Employee	Sales

Some Relational Database Terminology

- Database
- Table, relation
- Attribute, field
- Record, tuple, row
- Column

Attribute Type

- Or field type, or data type
- Determines the storage required for a field
- Common attribute types
  - Text, Text(n)
  - Integer, Real
  - Currency, Date, Time
  - Image

Schema

- "Definition" of a database
  - Names of the tables
  - Attributes and attribute types in each table
  - Constraints on each tables
  - Dependencies between tables

SQL

- Standard query language of relational database
- Supported by all relational databases (with minor variations)
- Pronunciation

Using MS Access

Create a New Database

- `Blank Access database`
- File → New … → Database

- Note: save the database to somewhere you can find

Create a New Table

- Select `Tables` in the `Objects` list
- `Create table in Design view`
- Save the table and give it a name
- Click no when asked for a primary key

EmployeeInfo <ID, Name, Title, Dept, Salary>

View Table Information

- View table design
- View table data

Input a Query

- Select `Queries` in the `Objects` list
- Click `New` then `Design View`
- Close the `Show Table` window then select `SQL View`

SQL Queries

General form:

select field_name(s) from table_name(s) where some_condition;

Get all employee information:
```
select * from EmployeeInfo;
```

Get all employee names:
```
select name from EmployeeInfo;
```

Get the names of the employees whose salaries are higher than $55,000
```
select name from EmployeeInfo where salary > 55,000;
```

A Few Notes about SQL

- Command, field, and table names are case-insensitive
- Number of white spaces does not matter
- A string is enclosed between a pair of ”
- String comparison using = is case-insensitive

Exercise

- Download `student.mdb`
- Run following queries:
  1. Find all student names
  2. Find the names of the students whose major is MATH
  3. Find the pre-requisites of COSC3380
- Save your queries as `Query1`, `Query2`, `Query3`