Introduction to Data Management  
CSE 414

Lecture 2: Data Models & SQL  
(Ch. 2.1-2.3)

Announcements

• Office Hours are listed on the calendar  
  – one every day, M-F

Data Models

• language / notation for talking about data

• models we will use:
  – relational: data is a collection of tables
  – semi-structured: data is a tree

• other models:
  – key-value pairs: used by NoSQL systems
  – graph data model: used by RDF (semi-structured can also do)
  – object oriented: often layered on relational, J2EE

Relational Model

• Data is a collection of relations / tables:

  Name Country Employees For_Profit
  GizmoWorks USA 20000 True
  Canon Japan 50000 True
  Hitachi Japan 30000 True
  HappyCam Canada 500 False

  columns / attributes / fields

  rows / tuples / records

• mathematically, relation is a set of tuples
  – each tuple appears 0 or 1 times in the table
  – order of the rows is unspecified

Keys

• Key = subset of columns that uniquely identifies tuple
• Another constraint on the table
  – no two tuples can have the same values for those columns
• Examples:
  – Movie(title, year, length, genre): key is (title, year)
  – what is a good key for Company?
• Part of the schema (book notation is underline):

  Company(Name: string, Country: string,  
  Employees: int, For_Profit: boolean)
Keys (cont.)

• Can have multiple keys for a table
• Only one of those keys may be “primary”
  – DBMS often makes searches by primary key fastest
  – other keys are called “secondary”
• “Foreign key” is a column (or columns) whose value is a key of another table
  – i.e., a reference to another row in another table

SQL (“sequel”) – Cont.

• Provides standard types. Examples:
  – BOOLEAN
  – DATE, TIME,_TIMESTAMP
    • DATE: Stores year, month, and day values
    • TIME: Stores hour, minute, and second values
    • TIMESTAMP: Stores year, month, day, hour, minute, and second values
• Additional types differ by vendor:
  – SQLite: http://www.sqlite.org/datatype3.html

SQL statements

• create table ...
• drop table ...
• alter table ... add/remove ...
• insert into ... values ...
• delete from ... where ...
• update ... set ... where ...

Demo on Sqlite

• E.g., type sqlite3 in Cygwin
• .exit - exit from sqlite3