Databases - Getting Started

Week-6 - AE-510

A Counting Exercise -

- This is an exercise to get a sense of the magnitude of the number of data records one might realistically require.
- We want the storage requirements for 5 years for
  - Temperature Measurements
  - Video Camera Measurement
- Calculate the number of 1TB disks required - Answer

Variable	For Temp	For Video
Buildings at Drexel	70	70
Sensors per Building	100	10
Measurements / Hour	60	=30*60*60
Size each measurement - Bytes	3	10^6

The Scenario

You're an engineer in charge of planning the data acquisition and tracking of many variables for a large campus. How do you go about it?

The Task

- We're going to build up the ingredients for a database that will track readings from multiple sensors in multiple rooms in multiple buildings over time.
- First we'll think about the different variables, then we'll start putting them in pairs, and finally all together.

Our Variables (NOT complete)

First: identify all the characteristics (properties) for their variable. Use this spreadsheet

Group	Variable
A	Sensor Reading
B	Building
C	Sensor Models
D	Manufacturers
E	Rooms

What other variables might make sense?

What Can we say about these?

- Can we identify something that will uniquely identify each "instance" of a variable
  - e.g. Is Title a good choice for a book identifier?
    - Is there a better identifier for a book?
- Can we think about the relations between these variables
  - e.g. Does one publisher produce many books?

Let's put this in Database Terms

- What I've called a
  - "variable" is a "Table"
  - "property" is a "field"
  - "instance" is a "row" - also called an instance
- When you create a simple list you're creating a table
- When you create an Excel spreadsheet with row headings and data in each row you're creating a table with fields. Each row is an instance.

Next Step - Organizing Relations

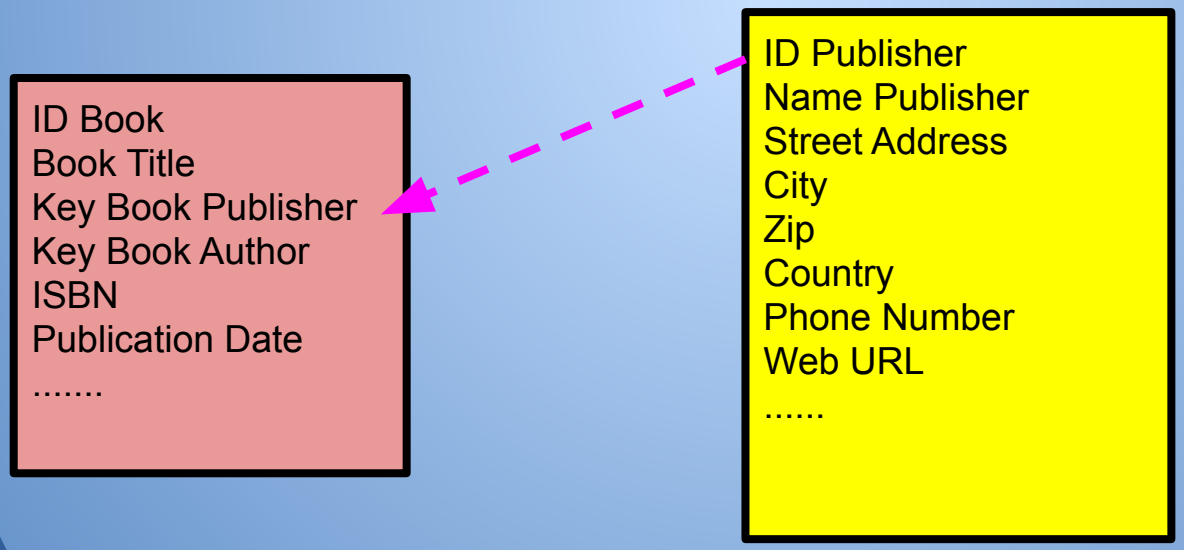
Now we'll work with pairs of tables

Group	Variables/Tables
A	Sensor & Rooms
B	Sensors & Readings
C	Sensor Models & Manufacturers
D	Rooms and Buildings
E	Particular Sensors and Sensor Models

This is far from a complete list. What other pairings seem logical to you, including ones that we haven't already considered.

Formalizing this - an example

Using our publisher-book example we can formalize the relation as is done with a relational database



Formalize Your Pairs

Use the Variable/Table Pairs and formalize the relationships

- Is there a relationship?
- Is there a one-to-many relationship?
- Why would we want to establish this kind of relationship

Putting a More Complex Relationship Together

Books & the Marketing World

- Tables
  - Book
  - Author
  - Author's Representative
  - Publisher
  - Printer
  - Vendor

Some Tricks of The Trade

- Use Integers for things that relate
  - e.g. Book ID = 34218 - NOT the title
    - This allows the title to change but still have the same book - e.g. correct a typo or perhaps have a different Title in a different country
  - One often creates a simple special table to bring together two major tables
    - e.g. If we have authors and publishers, a book is a table that brings together author & publisher
      - I'll agree that this isn't the ideal example, but it works with the prior examples.

Discussion About Database Use

Discuss in your groups

Group	Use
A	Design
B	Construction
C	Code Review
D	Tenant Managment
E	Demolition

How Many of these could interact with a BIM