CS 445
Introduction to Database Design
E-R Diagrams

Chapter 2

Aug 30, 2007

Design Steps

- Read Chapter 2
  - homework: page 52: 2.2 (1-5) (Due Sept 13)
- How do we model the data?
  - what do we need to identify?

Design Steps

- Requirement Analysis
  - talk to the user!
- Conceptual Database Design
  - E-R Diagram
- Logical Database Design
  - logical schema
- Schema Refinement
  - normalization
- Physical Database Design
  - performance tuning
- Application and Security Design
  - GUI / end user software

Bits of Data

- Entity
  - some particular object in the real world
- Entity Set
- Attribute
  - domain
  - key
  - candidate key
  - primary key

Doing interesting things with data

- Relationship
  - association among two or more entities
- Relationship Set
- Descriptive attribute
- Roles

Constraints

- What limits are placed on how entities are involved in a relationship
  - Key Constraints
    - One to many
    - Many to many
    - One to one
  - Participation Constraints

Weak Entities

- Entities without keys!
- Identifying owner

- Identifying relationship

Class Hierarchy

- Some entities may be related
  - similar to Object Oriented class hierarchy
  - C++/Java
  - superclass
  - specialized subclasses
- Inheritance
  - ISA
- Overlap constraints

Aggregation

- View a set of entities/relationships as one big entity
  - meta-entity

How do we use all this?

- When do we use an entity vs an attribute to represent data?
  - it all depends on how you want to use the data
  - how many other bits of data will reference it?
  - how will they reference it?
    - will our model allow that?
- Example: Name and Address

How do we use all this?

- When do we use an entity vs a relationship?

Tool Support

- E-R diagram builders
  - Microsoft Visio
  - MySQL Workbench (alpha, buggy, promising)
- Unified Modeling Language (UML)
  - used to model all kinds of data interactions
  - Object Oriented code design
  - database design
    - think of entities and relationships as classes
  - Use cases (process flow)
  - http://argouml.tigris.org/

Key Constraints

- emp MANAGES dept
- each emp can manage more than one dept
- each dept is managed by only one emp
  - Each dept key appears in ONE MANAGES relationship
  - ONE TO MANY
  - one employee can be associated with MANY depts
  - each dept associated with ONE emp
  - what if each emp ONLY managed ONE dept? (ONE TO ONE)
- emp WORKSIN dept
  - each emp can work in several depts
  - each dept has several emp
  - MANY TO MANY
  - what is each emp worked in only one DEPT?