Relational Databases

CPSC 315 – Programming Studio

Fall 2010

Project 1, Lecture 2

Slides adapted from those used by
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Relational Data Model

- Relations are stored in tables
    - e.g. Sponsor(Senator,Bill)

Sponsor	
Senator	**Bill**
Smith	Tax
Jones	Defense
Smith	Defense
Adams	Commerce

Atrributes

Tuples

Schemas

- A *relation schema* is a *relation name* and a *list of attributes*
    - Sponsor(Senator,Bill)
- A *database* is a collection of relations
- A *database schema* is the set of *all* the relation schemas in the database
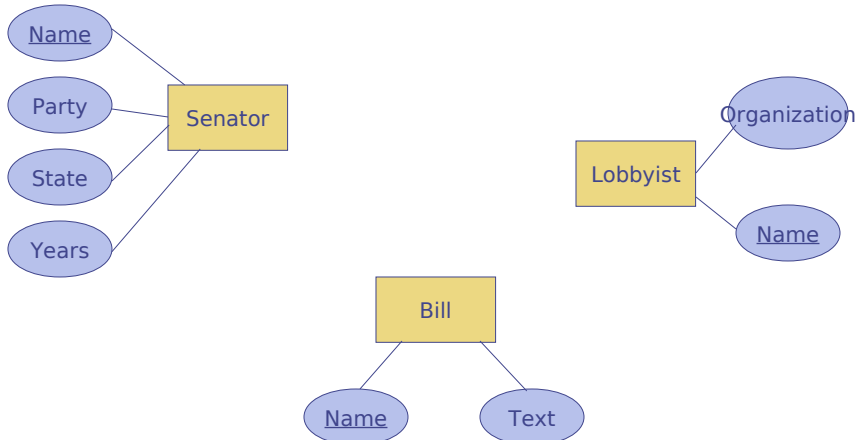
Converting from Entity-Relationship Model

- ER: Entity set -> relation
    - ER Attributes become Relational attributes
- ER: Relationship -> relation
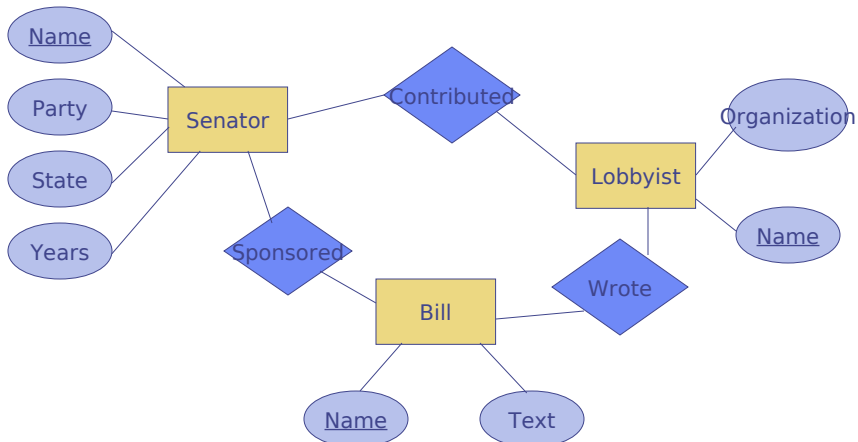   - Keys of connected ER entity sets become Relational attributes

ER Entity Sets

Relations

- Senator(Name,Party,State,Years)
- Bill(Name,Text)
- Lobbyist(Name,Organization)

ER Relationships

Relations

- Sponsored(Senator,Bill)
- Wrote(Bill,Lobbyist)
- Contributed(Senator,Lobbyist)

- Remember, each of these is expressed as a table (with the columns given by the "parameters")
- Notice that columns can refer to "bigger" items, with even more attributes

Combining Relations

- Relations can sometimes be combined.
- Assume a "base" entity set with its relation.
- If there is a many-to-one relation, that can be combined with the base entity set.
- Should **not** combine many-to-many
 - Redundancy – each of the many stored

Combining Relations

- Example (many-to-one):   (Good)
  - Person(Name, Birthdate, Height, Weight, Eye Color, Hair Color)
  - BornIn(Person,Town)
  - Person(Name, Birthdate, Height, Weight, Eye Color, Hair Color, Town)
- Example(many-to-many):   (Bad)
  - Senator(Name, Party, State, Years)
  - Sponsored(Senator, Bill)
  - Senator(Name, Party, State, Years, Bill)

Weak Entity Sets

- The relation for a weak entity set must contain all the elements of its key
- Supporting relationships are usually redundant (unless possibly multi-way)

Weak Entity Set Example
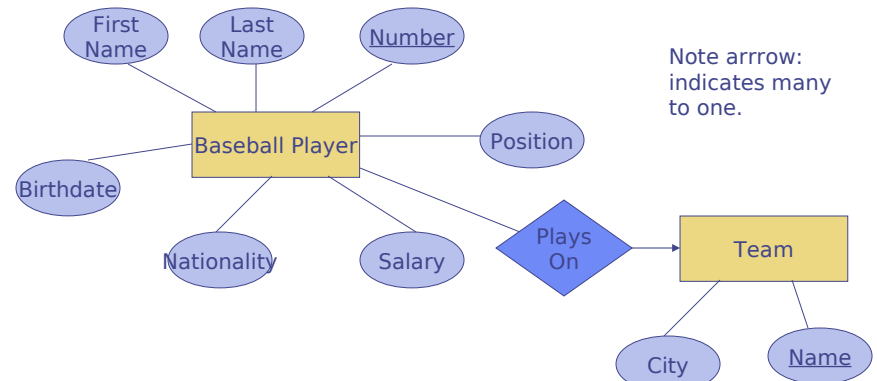
Note arrrow: indicates many to one.

Weak Entity Set Example

- Team(<u>Name</u>, City)
- Baseball Player(<u>Number</u>, <u>TeamName</u>, First Name, Last Name, Position, Birthdate, Nationality, Salary)

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- Note that we don't need PlaysOn(BaseballPlayer.Number, BaseballPlayer.TeamName, Team.Name)

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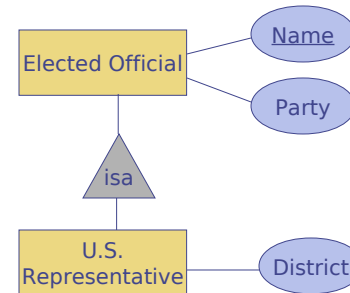
Redundant (same)

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Already Included

Subclasses
Different Options

- Different ways to represent subclasses

Object-Oriented Style

- One relation for each subset, including all "inherited" attributes

Elected Official

Name	Party
Chet Edwards	Democrat
John Cornyn	Republican
John Adams	Federalist
Ron Paul	Republican

U.S. Representative

Name	Party	District
Chet Edwards	Democrat	17
Ron Paul	Republican	14

Entity-Relationship Style

- One relation for each subclass (including key)

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U.S. Representative

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Using Nulls Style

- One relation total, with nulls for unknown information

U.S. Representative		
Name	**Party**	**District**
Chet Edwards	Democrat	17
John Cornyn	Republican	**NULL**
John Adams	Federalist	**NULL**
Ron Paul	Republican	14

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- Can save space, but problematic if multiple subclasses or lots of NULLs

Keys

- A Key "functionally determines" all other attributes of the relation
    - Given a relation and a key, there is only one tuple that corresponds to it

- There are subtle differences from an E-R key, which we won't go into.