CIT 381

ER Modeling Difficulties

- categories
- generalization
- three-way relationships
Categories and roles

• Suppose that we have employees with key ssn
• Some of the employees are staff and are paid hourly
• Other employees are paid a salary

• They can be handled easily using weak entities
Categories with weak entities

Example from bighitvideo database.

Note the implicit ‘Z’ - a one-to-one relationship.
Categories - more formal

You do not need to use this notation. We mention it since you may see it.
Generalization

• Suppose we have three entities: company, pilot, and aircraft

• company has key complId (an int)

• pilot has key license (a char)

• An aircraft can be owned by either a company or a pilot (but not both)

• How do we model this? It’s hard!
Aircraft owner problem

We need to ensure that one of the foreign keys is null and the other is not null.
An attempt: introduce an owner

Now how to connect owner to the owning entities?
Connect the owner

Still kind of strange, but maybe better? Must ensure that each ownerId appears just once as either a pilot or a company. (Can be modeled as a complete exclusive category.)
Subtleties with 3-way relationships

• Well, we don’t really have 3-way relationships, because we create bridge tables.

• But think of entities class, book, instructor
Three-way example

Consider where the books used for a class depend on the instructor:

<table>
<thead>
<tr>
<th>classNum</th>
<th>instrName</th>
<th>title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIT381</td>
<td>Chris</td>
<td>Big DB</td>
</tr>
<tr>
<td>CIT381</td>
<td>Craig</td>
<td>Good DB</td>
</tr>
<tr>
<td>CIT381</td>
<td>Craig</td>
<td>MySQL Bk</td>
</tr>
<tr>
<td>CIS313</td>
<td>Chris</td>
<td>Algorithms</td>
</tr>
</tbody>
</table>
Bridge table has three keys
Small change

• At most one book per class.
• Then title need not be part of key.

Question: Should the dotted line be mandatory or optional?
Another change

• Several books per class, but books used do not depend on the instructor.

This design avoids duplication. Why?