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

Note this is really a one-to-one relationship.
This is ERStudio notation. Our text (section 5.1) uses something else. We mention it since you may see it.
Generalization

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

• **company** has key **compId** (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 owner_id 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.