Data Modelling and Databases

Exercise Session 1:
Entity-Relationship Modelling
Interactive Session Format

„You can watch others swim as often as you want. In the end, you can only learn it by doing it yourself.“


– Do the exercises – yourself!
– Ask questions during the exercise sessions
– Present your solution on the black board (we will help you!)
Administrative Aspects

Exercise Sheets

– Not graded, not mandatory.
– Hand them in if you want feedback.
  • At the end of the session
  • By e-mail as indicated on the sheet
– Handout published a week before discussed.
– Solutions published after the Friday exercise session.

Questions: sg-dmdb17@lists.inf.ethz.ch
Course Website

https://www.systems.ethz.ch/courses/spring2017/data_mod_db

– Exercise sheets and solutions
– Lecture slides
– Announcements
– Contact information
Exercise 1: Understanding ER
Ex. 2: Min/Max Notation

For the given cardinality in the form “$F_1 : F_2$”, give the equivalent cardinality in the min/max notation.

Can we do the same for ternary relationships?
Ex. 2: Min/Max Notation

\[ \begin{array}{c}
E_1 \xrightarrow{F_1} R \xrightarrow{F_2} E_2 \\
(min_1, max_1) \quad (min_2, max_2)
\end{array} \]

<table>
<thead>
<tr>
<th>( F_1 : F_2 )</th>
<th>( (min_1, max_1) )</th>
<th>( (min_2, max_2) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 : 1</td>
<td>(0, 1)</td>
<td>(0, 1)</td>
</tr>
<tr>
<td>1 : N</td>
<td>(0, * )</td>
<td>(0, 1)</td>
</tr>
<tr>
<td>N : 1</td>
<td>(0, 1)</td>
<td>(0, * )</td>
</tr>
<tr>
<td>N : M</td>
<td>(0, * )</td>
<td>(0, * )</td>
</tr>
</tbody>
</table>
Ex. 4: Modelling Miniworlds

Model the following relationships in ER.

1. An apartment is located in a house in a street in a city in a country.

2. Two teams play football against each other. A referee makes sure the rules are followed.
Ex. 4: Modelling Miniworlds
Ex. 4: Modelling Miniworlds
Ex. 5: Wholesale Supplier

Model the following miniworld of an international wholesale supplier in ER.

• The wholesale supplier has customers that place orders, which are placed on a particular date and have a total price, current status, and an order number (starting from 1 for each customer).
• In each order, a customer can order several parts (products), each in a different quantity and at a custom price.
• We also want to model the date on which each of the parts has been sent.
• The parts are provided by suppliers.
• Each part may be provided by several suppliers and customers may order the same part of different suppliers in the same order, but in this case, they may have different prices.
• Customers and suppliers have a name, an address, a phone number, and a customer/supplier number and they come from a certain nation, which in turn is from a particular region (of the world).
• Parts have a brand, a size, and a retail price.
Ex. 5: Wholesale Supplier
Exercise 6: Model ER in ER

Entity
- Name
  - Has
    - Name
    - IsPartOfKey
- Is-a Weak Entity
- Participates in Relationship
  - Min
  - Max
  - Cardinality
  - Role
  - Name
- Attribute of Entity
  - Name
- Weak Relationship
  - Is-a
  - Min
  - Max
  - Cardinality
  - Role
  - Name
- Attribute of Relationship
  - Name

Relationship
- Name
- Has
  - Name
- Min
- Max
- Cardinality
- Role
- Weak Entity
- Participates in Relationship
Resources

• *Datenbanksysteme: Eine Einführung.* (Kemper, Eickler)
  – Chapter 2: Datenbankentwurf

• *Database Systems: The Complete Book.* (Garcia-Molina, Ullman, Widom)
  – Chapter 2: The Relational Model of Data (2.1-2.2)