Introduction to Databases


Tutorial Session „0“
Outline

- Some Organizational Notes
- „My Personal Database Literature Favourites“
- Some Short ER Remarks
- Some ER Modelling Extensions
  - Weak entities
  - Higher-degree relationships
Course Tutorials

- Date/Place:
  - Monday: 10.00 - 11.30, AH I  start: November 7

- Distribution of exercise sheets during the tutorial sessions

- Hand in after one week

- Presentation of correct solutions in the following week

- Exceptions from this schedule will be announced

- First exercise sheet will be available online on October 31 and has to be handed in November 7.

- Homework can (and should) be done in groups of up to 3 students
Requirements for Certificate

- To obtain a certificate for the exercises/homework to the course *Introduction to Databases Systems* all of the following requirements must be fulfilled:
  - Score at least 50% of the overall points for the homework/exercises
  - Active participation in tutorials (presentation/conversation)
  - Score at least 50% in the written exam at the end of semester (Feb. 15, 2006)

- Grade of Certificate depends only on the written exam

- Some study courses may have different rules
  - Has to be checked and confirmed by us!

- General Recommendation:
  
  *Use Tutorials for self-evaluation and „motivation“ to distribute database learning over the semester!*
Course Material

- Course Material is available online
- Printed copies of the course material will be distributed in multiple parts
- Vouchers are available for € 3 after lecture or from the office of Informatik V (Mo-Fr, 9.00 - 11.00)
- Copies of the course material can also be obtained at the office of Informatik V
- Online-Access:
  - Username: edb05User
  - Password: edb4All
Introduction to Database Systems

Literature (Some Personal Recommendations)

- **General**
    - German Translations available; do not use the „Grundstudiums Ausgabe“

- **Databases and XML**
  - Georg Lausen: *Datenbanken – Grundlagen und XML-Technologien*, Spektrum, 2005
  - Web und Datenbanken (Konzepte, Architekturen, Anwendungen), dpunkt-Verlag, 2003

- **Miscellaneous**
  - M. Hitz, G. Kappel: *UML @ Work – Von der Analyse zur Realisierung*, dpunkt 1999
    (besides many others...)
Some Short ER Remarks

- Conceptual Modelling vs. Physical Modelling
  - CM: Do not consider how DB is (or will be) realized
  - A Conceptual Model should support communication with the DB’s users

- Be aware of the correct position of cardinality constraints in (min,max) and 1:n notation

- Be aware of different expressivity of (min,max) and 1:n
  - How to constrain minimal number of participating entities in 1:n notation?

<table>
<thead>
<tr>
<th>1:n</th>
<th>(min,max)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(0,1)</td>
</tr>
<tr>
<td>N</td>
<td>(x,n)</td>
</tr>
</tbody>
</table>

Do not forget to switch the sides!
Instances and Types

- ER-Diagram depicts conceptualisation of the domain in terms of Entity-Types and Relationship-Types

- Informal notation for instances:
Weak entities (I)

- Example of geographical DB:

- Regions in different countries can have the same name, Cities in different regions can have the same name.

- What to use as keys for entity types Region and City?
  - Assumption: System-generated ID is not available

- Idea: Bind existence of entity to entity of another type and identify entity by its partial key and the owner’s key
Weak entities (II)

- Implies total participation constraint (opposite direction is not always true)
- Think of using a multi-value composite attribute as an alternative!
- Note: Similar to composition construct in UML
Higher-Degree relationships

Motivation

- So far: **Binary** relationship types:
  One Entity type is related to another one

- Consider course schedule DB:

  ![Course diagram]
  
  - Information that a particular course is held by an instructor in a particular semester can be most naturally understood as a **ternary** relationship
Higher-Degree relationships
Cardinality constraints (I)

- Extend cardinality ratios (1:n notation):

  x: How many $B$ instances are related to one $A$ instance?

  x: How many $B$ instances are related to one $(A,C)$-instance pair?
Higher-Degree relationships
Cardinality constraints (II)

- Extend (min, max)-notation:

\[ x: \text{In how many } r \text{ instances is one } B \text{ instance involved in?} \]
\[ = \text{How many } A \text{ instances are related to one } B \text{ instance?} \]

\[ x: \text{In how many } r \text{ instances is one } B \text{ instance involved in?} \]
\[ = \text{How many } (A, C) \text{ instance pairs are related to one } B \text{ instance?} \]
Higher-Degree Relationships
Course, Instructor, Semester example

- Note:
  - Different “notations” have different expressivity
  - Sometimes used in parallel