Excercise from last class

Inform yourself about unary – binary – ternary relationships

Discussion / new examples next class!
Design criteria

Rules for Classification of Entities and Attributes:

- Entities should contain descriptive information
- Multi valued attributes should be classified as Entities
- Attribute should be assigned to that Entity which describes it most directly
- Redundant relationships should be avoided

It is dependent on the application how to represent an information
Example: Order

As Entity:

- Client
- place
- Order
- for_a

As Relationship:

- Client
- order
- Product

As Attribute:

- Client
- buy
- Product

Database System Concepts for Non-Computer Scientists WS 2017/2018

6-Nov-17
Modeling a small example application: E/R

Real World: University

Conceptual Modeling

Students

Lectures

StudNr
Name

Students

attend

Lectures

LectureNr
Title

6-Nov-17

Database System Concepts for Non-Computer Scientists WS 2017/2018
Modeling a small example application: UML

- **Students**
  - StudNr : int
  - Name : String
  - Semester : int
  - GPA() : float
  - SumWeeklyHours() : short

- **Lectures**
  - LectureNr : int
  - Title : String
  - WeeklyHours : int
  - NumberAttendees() : int
  - FailureRate() : float

- **Attends**
  - 1..*
  - attend

- **Successor**
  - *
  - requires
Data modelling with UML

UML: Unified Modelling Language
De facto standard for object orientiated software design
Centrales construct: class, models similar objects according to
  • Structur (~Attributes)
  • Behavior (~Operations/Methods)

Associations between classes correspond to relationships
  Generalisation
  Aggregation

Cheat sheet Class Diagram:
UML Notation

Association:

Generalisation:

Aggregation: (Part-of)

Composition: (Special case of Aggregation)
**Multiplicty**

Every element of ClassA is associated with at least i elements of ClassB

... and with at most j elements of ClassB

Analogously for the intervall k..l

Multiplicity is analogously to the functionalities in the ER-Model **Not** to the (min,max)-Notation: **Watch out!**
Association class

Class A
+Att1
+Att2
+ op()

Class B
+Att1
+Att2
+ op()

Class C
+Att1
+Att2

… for attributes of the association
Klassen und Assoziationen

<table>
<thead>
<tr>
<th>Students</th>
<th>+Attendee</th>
<th>1..*</th>
</tr>
</thead>
<tbody>
<tr>
<td>+StudNr : int</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+Name : String</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+Semester : int</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+GPA() : float</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+SumWeeklyHours() : short</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Arrows: Navigation (Implementation)

No statement on navigation

Navigation from A to B allowed

Navigation from A to B forbidden

+: public

Implementation
Komposition

Students
- StudNr: int
- Name: string
- Semester: int
- GPA(): float
- SumWeeklyHours(): short

Exams
- Grade: decimal
- Date: date
- move()

Examinee
- 1
- pass

Subject
- 1

Compositor
More useful Diagrams

- Use Case Diagram
- Interaction Diagram
- Sequence Diagram

Search for examples in the internet
Quiz UML

From the Stanford MOOC:


Quiz Q2 + Q5 – Q7