

## Exercise Sheet 3: Data Modelling II (until Thursday, 09.11.2017) –40 Points

**Please note:** you need **50%** of all exercise points to receive the *Studienleistung* for this lecture. In order to pass the RDB I Module, you need both the *Studienleistung* **and** you need to pass the exam. Exercises have to be turned in until **Thursday before the lecture** either in the lecture hall or into our mailbox (Informatikzentrum 2<sup>nd</sup> floor). Please do not forget your **Matrikelnummer** and your **tutorial group number** on your solutions. Your solutions may be in German or English. Unless otherwise specified: **Always use your own words!**

### Exercise 3.1 – General questions (6 Points)

Decide if the following statements are false, true or possible true. Explain your answers.

1. Deleting an entity from a superclass deletes it from all subclasses.
2. A subclass has more attributes than a superclass.
3. In a lattice, there is at least one overlapping specialization.
4. Multi inheritance in an EER-Diagram causes problems.
5. The number of entities in a superclass is equal to the number of entities in its subclasses.
6. Union type is generalization type where a subclass inherits from exactly one superclass chosen from a set of potential distinct superclasses

### Exercise 3.2 – Inheritance (2 Points)

Give an example –different from the one provided in the lecture– where the use of inheritance can lead to a problem. Explain your answer.

### Exercise 3.3 (8 Points)

Model the following mini-world in EER. Insert suitable keys in your design.

In this case, you are asked to model a database for the company “El Café del Zorro”. The company has several coffee shops in different cities in Germany. For each coffee shop, we need to store the following information: name of the city, street, post code and telephone. Coffee shops can be one out of three different types: coffee shops with restaurant service, coffee shops “to go” or coffee shops with desserts service only. For coffee shops with restaurant service the company needs to store the number of dishes that can be served and cuisine type that the restaurant offers. Each coffee shop has a manager. For a manager, we need to store name, address, and years of experience as manager. Managers with more than ten years of experience are considered “specialists”, otherwise they are considered “beginners”. No coffee shop can exist without a manager. Moreover, a manager can manage more than one coffee shop within the same city.

### Exercise 3.4 (8 Points)

Model the following mini-world in EER. Insert suitable keys in your design.

The “Big ACID” company wants to store in a database the reviews of its products. Reviews can come from three different sources: Twitter, the company feedback website and emails from customers. For each review the company wants to store the date of the review, the text of the review, and whether

the review was positive or negative. For a tweet that reviews a product, the company wants to store all the hashtags used in the tweet; the IP address needs to be saved for a web review; for an email review both the user name and the domain of the sender must be saved. Products have a name and a description. Each product in the company has a product leader. Product leaders are responsible for at least one product. A product can only have one responsible product leader. A product leader can be either an employee or an external consulting company. For employees that are product leaders, the following information must be stored: name, street, city, zip code, and age. For a consulting company, Big ACID wants to store the name of the director of the company, the official email of the director of the company and the years of experience the company has as a product leader.

### Exercise 3.5 (16 Points)

In this mini-world, parts of the management system of the final round of the FIFA World Cup 2018 that will take place in Russia will be modeled. Model the scenario detailed below with an EER diagram in Chen notation. Please make a written note of non-expressible constraints in the diagram. Insert suitable keys.

Mini-world:

- The management system is intended to manage different people whose first names, surnames, and personal ID numbers are stored. Team members and their relatives (e.g. family members and friends (they do not have to be modelled explicitly)) are stored.
- All team members have a team card and are distinguished by players, coaches and other employees. For Players their age, their size and their club are saved. Coaches have a contract period.
- There are relatives who are also team members, but there are also relatives who are not part of the team. Regardless of whether they are team members at the same time, each relative gets a lot of free tickets.
- A national team is identified by their country and consists of a lot of team members: exactly 23 players, one coach and any number of other employees. Of course, each of these team members is only part of one national team.
- In each case two different national teams play in certain rounds (for example round of semifinals) in football matches against each other. Such a game can be clearly identified through the round and the countries of the two national teams. For each game, the resulting goal difference is saved.
- A game always takes place in a city that has a name and is located in a state. However, this name is not unique within a state.
- Each relative is assigned a hotel room. A hotel has a name and is located in a city.