1DV013 – Database Theory

Theoretical Assignment 1 (25 p)

Deadline: September 21, 2014

1 Land Cadastre

Create an ER-Diagram that models the following mini-world. Also add cardinalities to the relations (please be consistent with your notation!).

There is a set of plots, each plot is a part of at most one block and consists of one or more estates. Each block, plot and estate is described by one polygon. Polygon, in its turn, is described by a set of points (at least three points). At the same time, each point must be contained at least in one polygon. Each plot must have at least one owner and may have one or more tenant persons. But there are persons who don't own or don't rent any plots. A plot can have at most one lease contract, and that lease contract is concluded between one of the owners of this plot and one or more tenant persons.
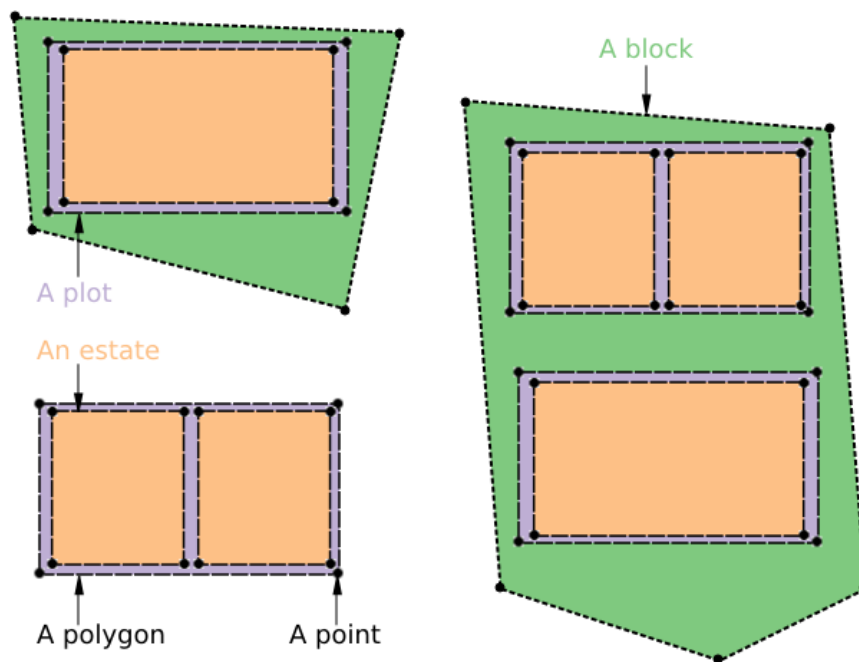

Figure 1: An example of land cadastre drawing

If there are things that you cannot model, or would leave out in order to get a "cleaner" design, argue why.

2 Database Design

Solve the following exercise (Exercise 4.2.1, page 145 in the DBCB (2nd edition) as well as the FCDB book): in Fig. 2 is an E/R diagram for a bank database involving customers and accounts. Since customers may have several accounts, and accounts may be held jointly by several customers, we associate with each customer an "account set", and accounts are members of one or more account sets. Assuming the meaning of the various relationships and attributes are as expected given their names, criticize the design. What design rules are violated? Why? What modifications would you suggest?

3 Weak Entity Sets

Solve the following exercise (Exercise 4.4.4a, page 156 in the same books): draw E/R diagrams and indicate keys for entity sets for the following situation involving weak entity sets *Courses* and *Departments*. A course is given by a unique department, but its only attribute is its number. Different departments can offer courses with the same number. Each department has a unique name.
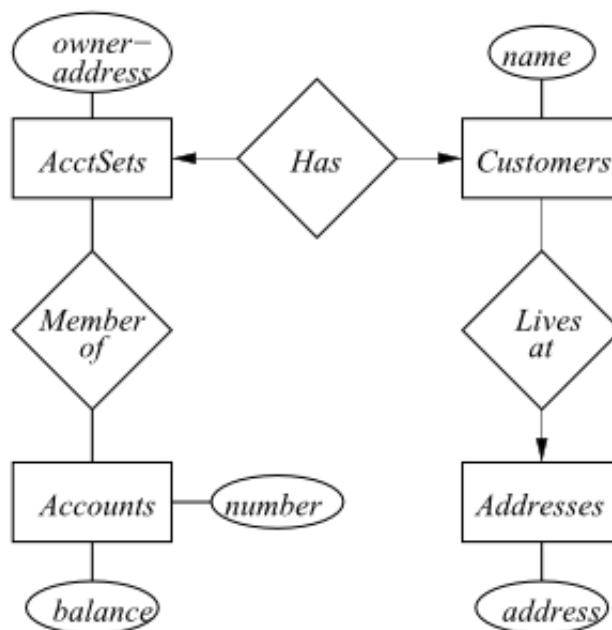

Figure 2: A poor design for a bank database

Hand in a single PDF document with the answers. For this assignment, you may either draw diagrams in an editor (e.g., yEd) or by hand (make sure your drawings and text are readable and unambiguous). Assignment must be submitted via the Moodle submission system. Email submission attempts will be ignored.