

Exercise 9

Date of issue: 2nd May 2017

Deadline: 9th May 2017

1 Constructing an ER Model

The detailed description of a database to store information about a ski resort is given below:

The database stores the first and last name of persons, who are identified by their social security number (SSN). Every person is either a customer or an instructor (but not both). A customer can have many credit cards. Every instructor has a certificate. A certificate has a description and is identified by its title. Each instructor teaches one or more one-day courses and each one-day course is taught by exactly one instructor. A one-day course is identified by its name, takes place on a specific date and has a number of participating customers. A customer that participates in a one-day course pays a certain price (can vary between customers) and is awarded with a trophy. The database stores the sold season tickets, which are identified by a combination of the date when they are issued and an incrementing counter (e.g. the fifth ticket on 14.04.17). Moreover, the price of a season ticket is stored. A season ticket grants free participation in one one-day course. A customer can own several season tickets.

Tasks:

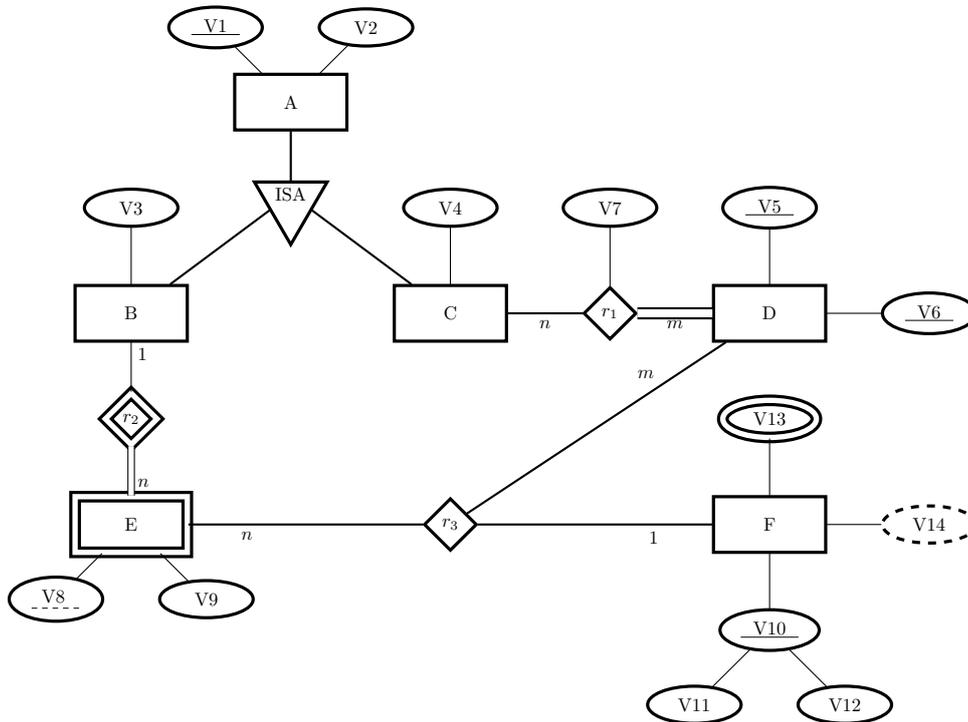
1. Draw an ER model for the given database description. Make sure to include **keys**, **cardinalities**, and **participation constraints**.
2. For each relationship type in the resulting ER model *explain* your choice of the cardinality *and* participation constraint. An explanation should consist of *references* to the description and *assumptions*, which do not contradict the database description.

For example:

- (a) {Instructor:Certificate = M:N}
Reference: “Every instructor has a certificate”
Assumption: Many instructors can have the same certificate. There is no instructor without a certificate (thus total participation).

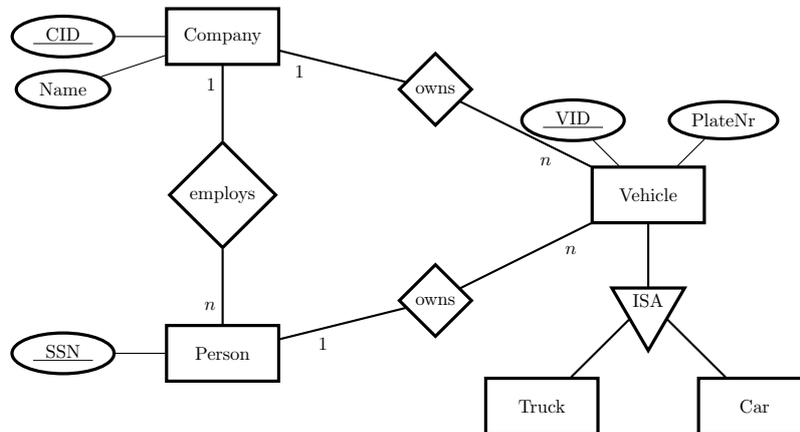
2 Converting an ER Model

Map the following ER model, including primary *and* foreign keys, to a corresponding relational database schema. Avoid NULL values and redundancy as much as possible.



3 Extending an ER Model

Consider the following ER model about vehicles and their owners.



Task:

For each of the following constraints decide if it can or cannot be represented in the ER model (using the notation taught in the lecture). For those that can be represented, adapt the ER model and clearly state how you changed the model. For the remaining constraints state why it is not possible to represent them.

1. A company employs at least one person.

2. Every vehicle is either owned by a company or a person (but not both).
3. A company owns at least ten vehicles.
4. Every vehicle is either a truck or a car (but not both).
5. A person can have multiple SSNs.
6. Functional dependency: PlateNr \rightarrow VID