VITMAB04 – Databases – Tutorial 1

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Exercise 1. Your task is to design a database for prescription monitoring. The requirements are as follows:

- Patients are defined by a unique identity number, a first name and a last name, and by a birth-date.

- Doctors are defined by a unique SSN, a first name, a last name, and a birth-date while additionally they will be characterised by a work start date and a speciality.

- Pharmaceutical companies will be defined by a unique name and a telephone number.

- Medicines will be defined by a unique commercial name and their active ingredient.

- Pharmacies will be defined by a unique name, an address and a telephone number.

Additionally you should take into account the following:

- Each patient has one doctor;

- Each doctor has at least one patient;

- A doctor can prescribe certain medicines to their patients;

- Each pharmacy sells several medicines, each at a specific price;

- Each medicine can be sold by several pharmacies possibly at different prices;

- Pharmaceutical companies have contracts with pharmacies;

- Each pharmaceutical company may have contracts with several pharmacies;

- Each pharmacy may have contracts with several pharmaceutical companies;

- A contract has a start date, an end date and the contract terms;

- A pharmaceutical company manufactures one or more medicines.

Note any unspecified requirements, and make appropriate assumptions to make the specification complete.

If there is no IS-A relationship above, use your imagination and come up with one!

Exercise 2. The Technical University of Dontaskmeland needs a database of student records. Consider the following set of requirements and help them build an ER model.

- The university keeps track of each student's (full) name, student number, social security number, address (building number, street, post code, city, country), phone number, date of birth, gender, current year of study (1st year, 2nd year etc). Both social security number and student number have unique values for each student.

- Each department is described by a name, department code, office number, office phone. Both name and code have unique values for each department.

- Each course has a course name, description, course number, number of semester hours, level, and offering department. The value of course number is unique for each course. Some courses may be offered by multiple departments.

- Each (course) section has an instructor, semester, year, course (that it is part of), and section number. The section number distinguishes different sections of the same course that are taught during the same semester/year; its values are 1, 2, 3, ...; up to the number of sections taught during each semester.

- Sections are only identified through the course offering them.

- Each student has a major department affiliation and (optionally) a minor department affiliation.

- A student follows multiple courses every semester.

Design an ER schema for this application, and draw an ER diagram for that schema. Specify key attributes of each entity type and structural constraints on each relationship type. Note any unspecified requirements, and make appropriate assumptions to make the specification complete.

If there is no IS-A relationship above, use your imagination and come up with one!

Exercise 3. Consider the design of the database of the Department for Education on Figure 1. This DB stores data about schools, teachers, students, classes and subjects.

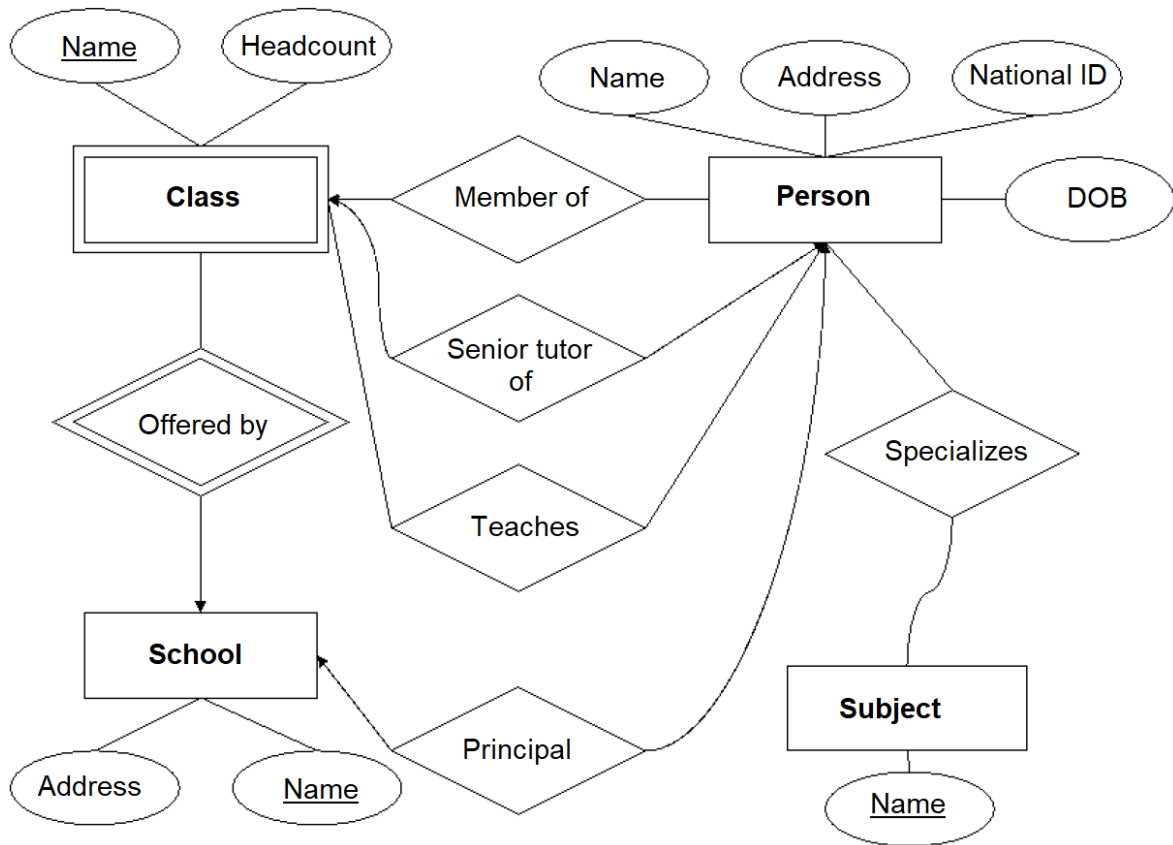Make your own deductions of the design and share it with the group.

Figure 1: SchoolDB, version 1.

Can a database designed like this store the fact that a particular teacher teaches a particular subject to a particular class? Why?

Now, take a look at version 2 of the same database on Figure 2.

What do you deduce now?

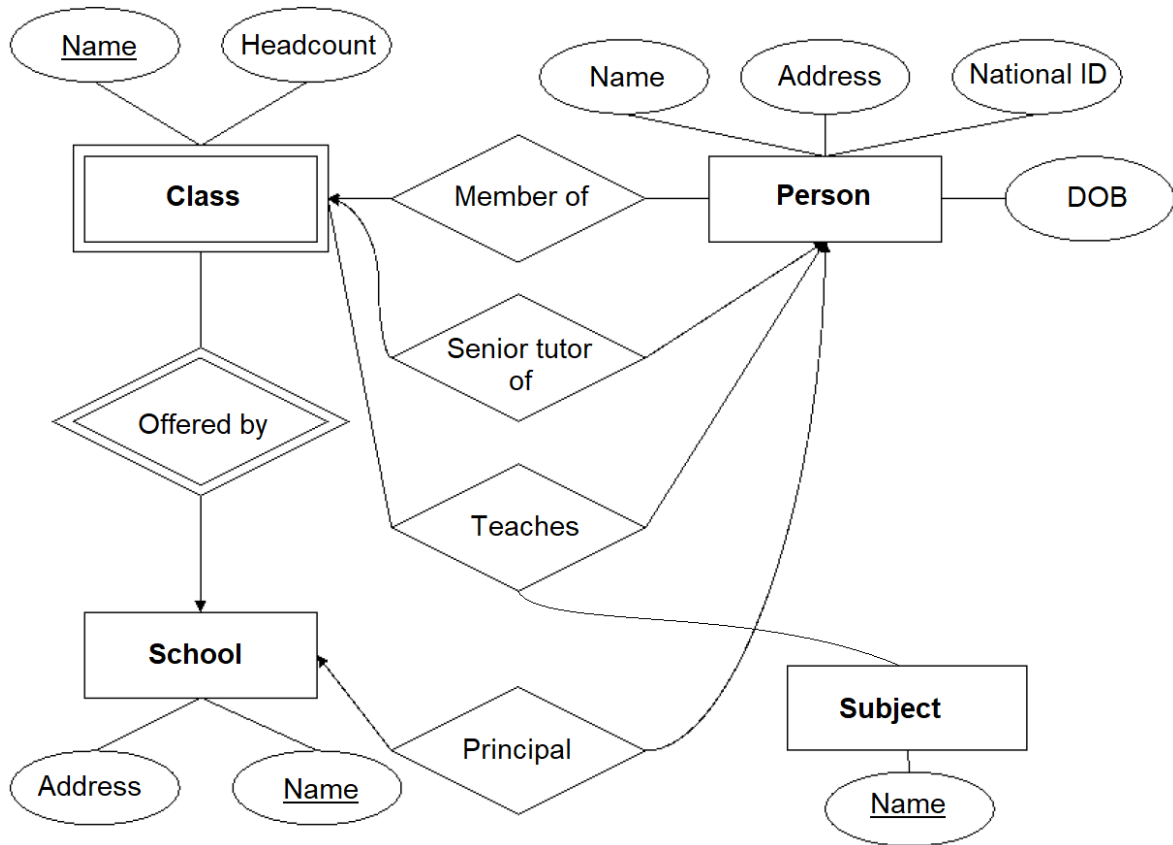Can a database designed like this store certified but currently not actively taught special-izations of a teacher?

Figure 2: SchoolDB, version 2.