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**Exercise 1.** Design an ER conceptual schema for the management of a real estate agency.

The agency has a set of houses available, either for rent or for sale, although some of them can be both bought or rented. Each house is characterized by its address, composed of street name and street number, that uniquely identifies it within a city. Moreover, it has a series of characteristics such as its surface in square meters, the total value, the number of rooms, and the area of the garden, if there is one. For the houses that are for rent we want to keep track also of the monthly rent rate.

Each city is uniquely identified by a code, and is characterized by a name and some attributes that are of interest for the agency, such as the pollution index and the crime rate.

Houses may be bought or rented by customers. Each customer is uniquely identified by its social security number, and characterized by a name, surname, phone number and, possibly, an e-mail address. For each house that has been sold we want to keep track of the date of sale and the actual selling price. Finally, for each rented house we want to keep track of the start and end date of the rental contract.

Build an ER schema that describes the above mentioned requirements, clearly explaining any assumptions you make. In particular, for each entity, identify its attributes, candidate keys, and carefully specify the constraints associated with each relation. Also, make sure to correctly specify generalization relationships, if any.

**Exercise 2.** Let us consider the following relational schema about students and courses:

*student(code, name, surname, date_of_birth)*
*course(title, year, credits)*
*follows(student, course_title, course_year)*

Each student is uniquely identified by a code, and characterized by a name, a surname, and a date of birth. Each course has a title, a year and a number of credits. A course with a same title can be taught on different years but there cannot be two courses on the same year with the same title.

Define preliminary primary keys, other candidate keys (if any), and foreign keys (if any). Then, formulate an SQL query to compute the following data (exploiting aggregate functions only if they are strictly necessary):

*The student(s) that have followed the highest number of courses.*