

COMP9120 Database Management Systems

Tutorial Week 2: Conceptual Design with Entity-Relationship Diagrams

Exercise 1. ER Diagrams Analysis

Consider a real-estate company, which manages rental properties. Each property has an address, a number of bedrooms, bathrooms, and car spaces. A rental property may have a number of rental agreements. A rental agreement details the weekly rent that is agreed upon with one or more tenants for a property for a given period of time. For each of these tenants, the details that need to be recorded include first name, last name, and date of birth. At any point in time, each staff member must be responsible for managing at least one property, where a property can be managed by multiple staff members and must be managed by at least one staff member at any point in time. Staff members also have a first name, last name, and date of birth. At any point in time a property is owned by one or more land-lords. The ownership of each property may also change over time.

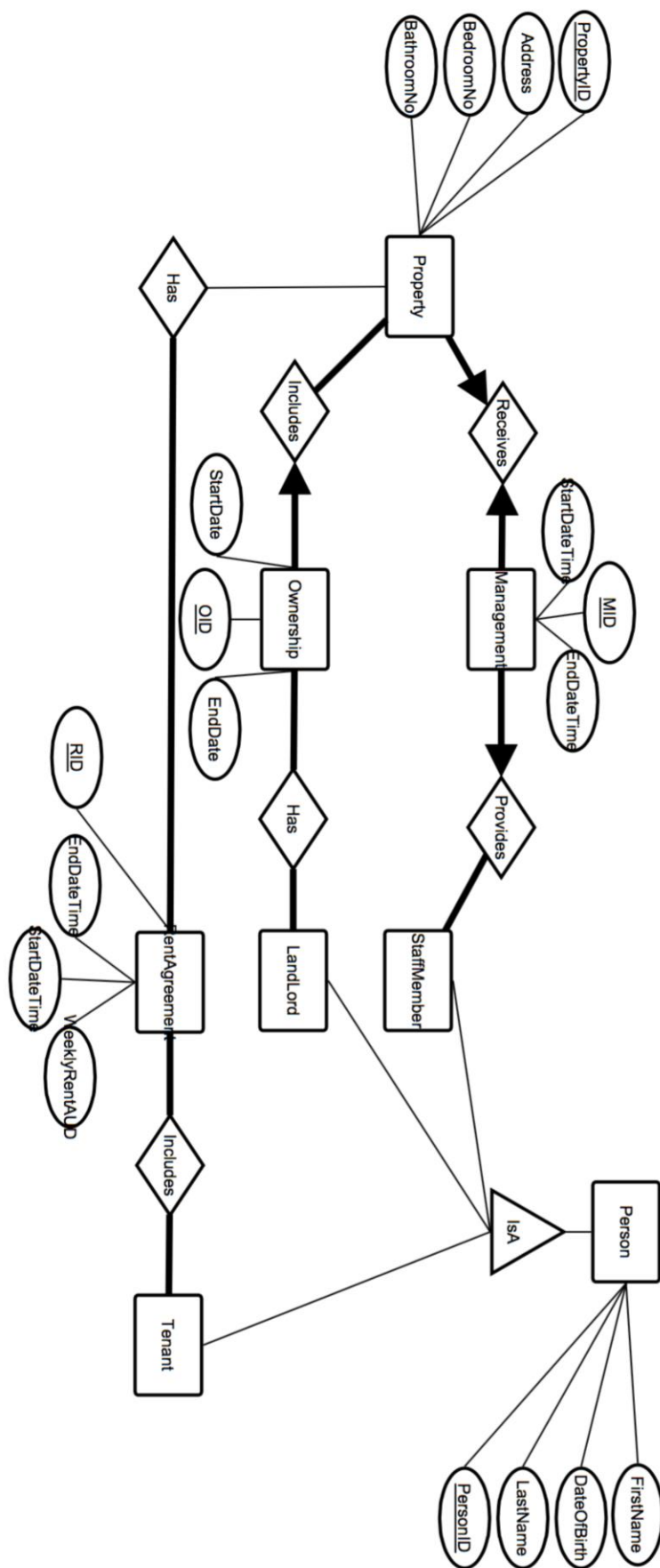
The E-R diagram shown below is one attempt at modelling this domain. Consider what errors you can identify in this model.

Solution:

Some errors in the model:

- No car space number recorded for a property
- A rent agreement must be associated with one and only one property, not many.
- Persons within the real-estate company must be staff members, landlords, or tenants. They can be overlapping, but they cannot be none of these (there should be full participation on the inheritance)
- Since a property can be managed by multiple staff members over time, there should be no key-constraint between property and the receives relationship.

For this exercise, it will also be good if you can discuss with the students why Management and Ownership are represented as entities rather than relationships. One reason is that the same staff member may management the same property at different time point; thus, if Management is represented as relationship, then the key of Management cannot be determined from the keys of StaffMember and Property. The same holds for Ownership.



Exercise 2. ER Diagrams Creation

This question asks you to develop an ER diagram from the narrative below.

The information system, which you will analyse, aims to assist a student recreational skiing society, which needs to deal with members and to organise events for members. At present the system is paper-based, but in future it is hoped to develop a computer-based system.

The society secretary uses the system to record information when a new member joins the society: the information includes the member's name, term-time address, vacation address, phone number, email, and the different varieties of skiing in which they are interested (for example, Peter Williams may have interest in the beginner's cross-country, the intermediate downhill, and the expert bobsled). Usually members join for a period of one winter season by paying a fee, and at the end of that time the secretary can extend their membership if they pay another fee; alternatively, some members choose to join for longer periods (the fee they paid is then reduced, compared to paying for seasons one by one). The event manager uses the system to arrange a ski trip, which occurs over a particular period (such as the long weekend of October 4 to October 6 inclusive), includes accommodation at a particular address, and also has one or more sessions of various varieties of skiing, each located on a particular area of a ski slope; for example, one meeting may involve three sessions of intermediate downhill held on Piste X, Piste Y and Piste Z respectively, and one session of beginner's downhill held on Piste X. The event manager schedules each session with the appropriate number of participants from among the members who are interested in that variety of skiing. The cost of a meeting for the society depends on the number of members who are involved (as the accommodation fee is charged per person) as well as on the number of sessions, and the variety of each (because each different session requires booking an appropriate area of the ski slope). The club treasurer uses the system to obtain reports on the total cost of the trips held during each season, and on the total fee income from memberships for that season.

Solution:

One possible solution is given on the next page:

