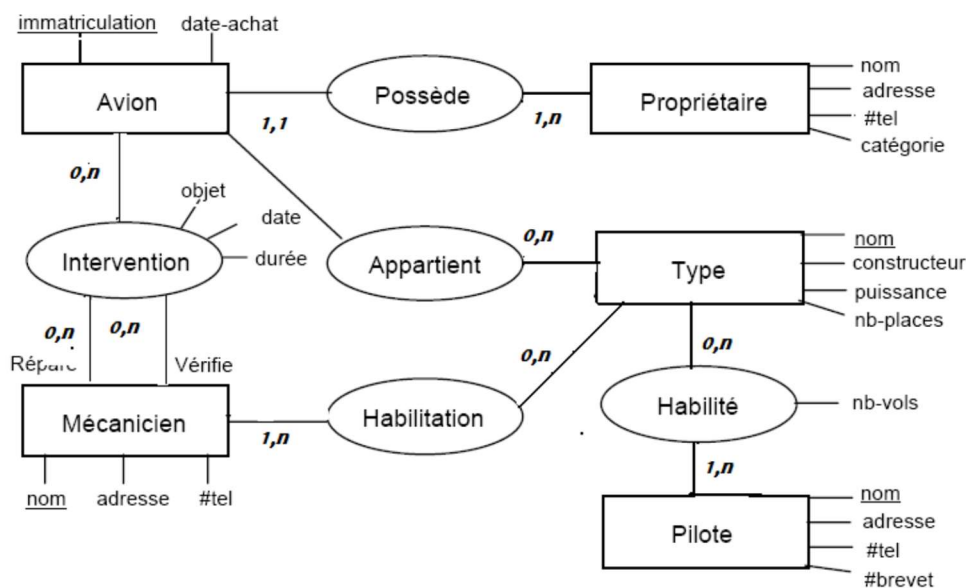


Tutorial 1 : Conceptual model entity relationship (extension)

Exercise 1: Airport

Let us consider the entity-association diagram describing the management of an airport. We want to store in a database the information necessary to describe the following facts:

- each managed aircraft is identified by a registration number. It is owned either by a company or by an individual: in both cases we must know the name, address and telephone number of the owner, as well as the date of purchase of the aircraft;
- each aircraft is of a certain type, this being characterized by its name, the name of the manufacturer, the power of the engine, the number of seats;
- aircraft maintenance is provided by the airport mechanics. For safety reasons, interventions are always carried out by two mechanics (one repairs, the other checks). For any intervention carried out, the purpose of the intervention, the date and the duration are kept;
- for each mechanic we know his name, address, telephone number and the types of aircraft on which he is authorized to intervene;
- a number of pilots are registered with the airport; for each pilot we know his name, address, telephone number, pilot's license number and the types of aircraft he is authorized to fly with the total number of flights he has made on each of these types.



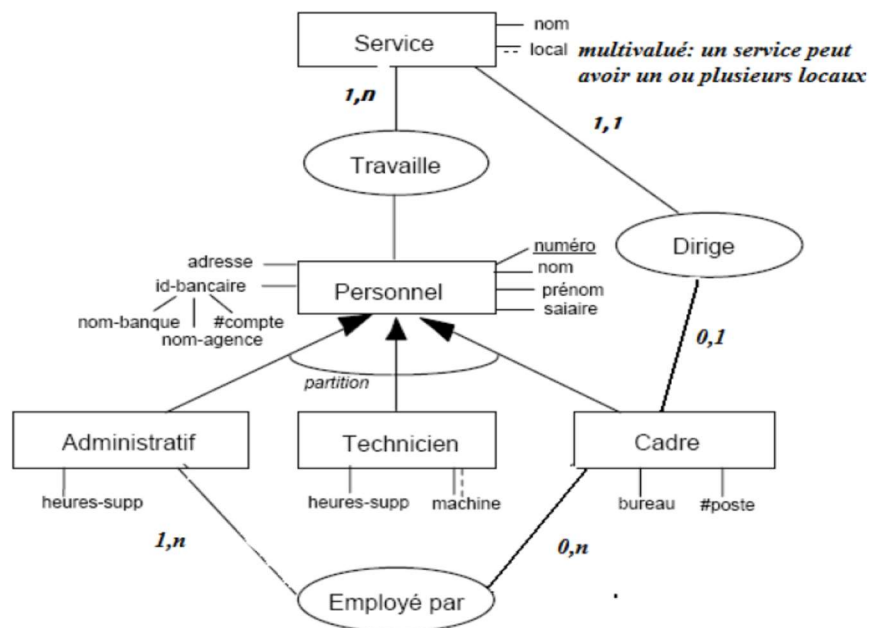
1) give the integrity constraints that cannot be described by the concepts of the E/A schema. By what means can we implement these integrity constraints?

2) apply the rules of passage from the E/A schema to the relational schema. For each relation indicate the primary and foreign keys.

Exercise 2: Personnel

Let the entity association schema for the management of the personnel of a company and its allocation. The company is organized into departments to which the personnel is assigned. Each department is described by its name, its head (who is necessarily a manager of the company) and the list of its premises. The personnel is divided into three categories, the administrative, the technicians and the managers. All

have an employee number, a name, a first name, an address, a bank identification (bank name, name agency, account number), a salary and are attached to a department. Each category also has its own information:



- 1) Give the integrity constraints described in the diagram. Are there any cis not described by the E/A concepts?
- 2) what type of association is represented between the staff entity and the administrative, technician and executive entities.
- 3) specify the attributes and associations inherited by the specific entities. What are the specific attributes and associations for each specific entity.
- 4) translate the E/A diagram into a relational diagram by applying the transformation rules. Specify the primary and foreign keys for each relationship.

Exercise 3:

The Library of an intercommunal union consists of 5 loan points. These centers have interconnected personal computers that must allow loans to be managed.

The interview of the librarians allows the following facts to be determined:

- a customer who registers at the library pays a deposit. Depending on the amount of this deposit, he will have the right to make 1 to 10 borrowing at the same time;
- borrows last a maximum of 8 days;
- a book is characterized by its library number (identifier), its publisher and its author(s);
- we want to be able to obtain, for each customer, the borrows they have made (number, number and title of the book, date of the borrow) over the last three months;
- every week, we edit the list of overdue borrowers: name and address of the customer, date of

borrowing, number(s) and title of the book(s) concerned;

- finally, we want to be able to know for each book its date of purchase and its condition.

1) Develop an entity-relationship diagram for the Library database. Specify

the integrity constraints. For example: for each book the date of purchase must be before the borrowing dates.

2) Transform the E/A diagram into a relational diagram.