University of Larbi Ben Mhidi Oum El Bouaghi
Faculty of Exact Sciences and Life and Natural Sciences
Department of Mathematics and Computer Science

Study stream : Computer Science
Level: 2nd Year Bachelor's Degree
**Module: DataBase**
Instructor: Dr. Bouneb M.

Tutorial N°01

Objectives :

☞ *Understand what is an entity and know how to define entities.*

☞ *Understand what is an association and know how to define associations.*

☞ *Understand the meaning of cardinalities and know how to express cardinalities.*

☞ *Know how to define the primary key of an entity.*

☞ *Understand what is a weak entity and know how to identify weak entities.*

☞ *Practice designing a database using the Entity-Relationship (E/R) model.*

Exercise 01:

A campsite manages the occupancy of its camping places with a **DBMS** *(Database Management System). The* **E-R model** *is presented below:*
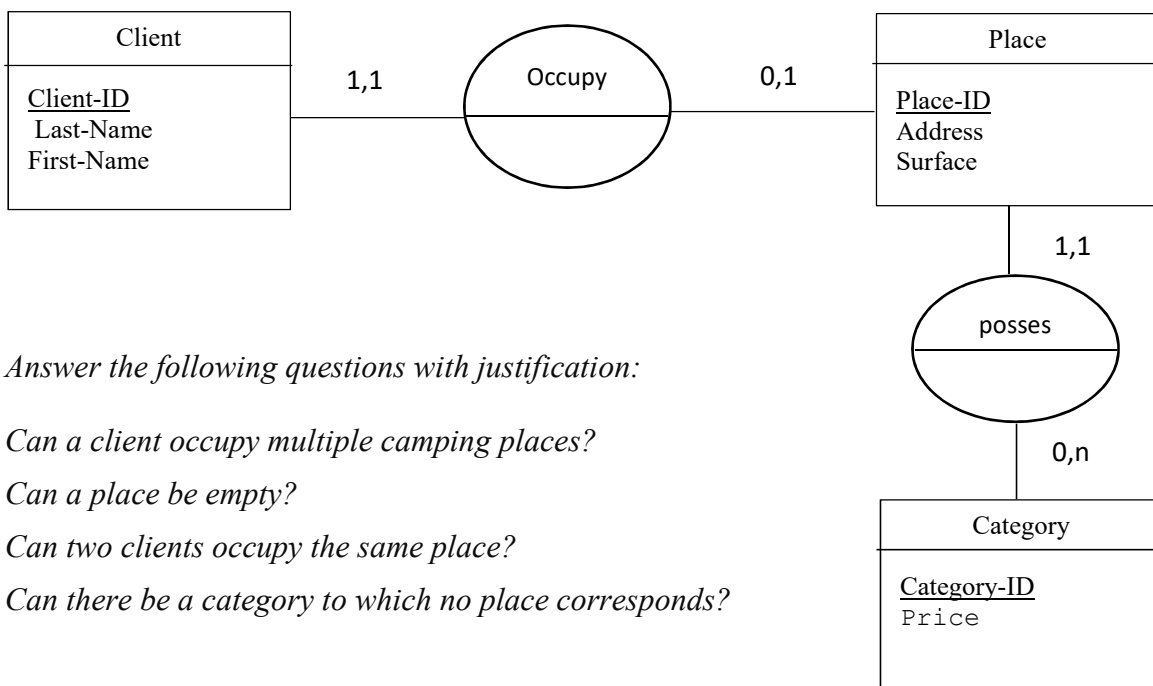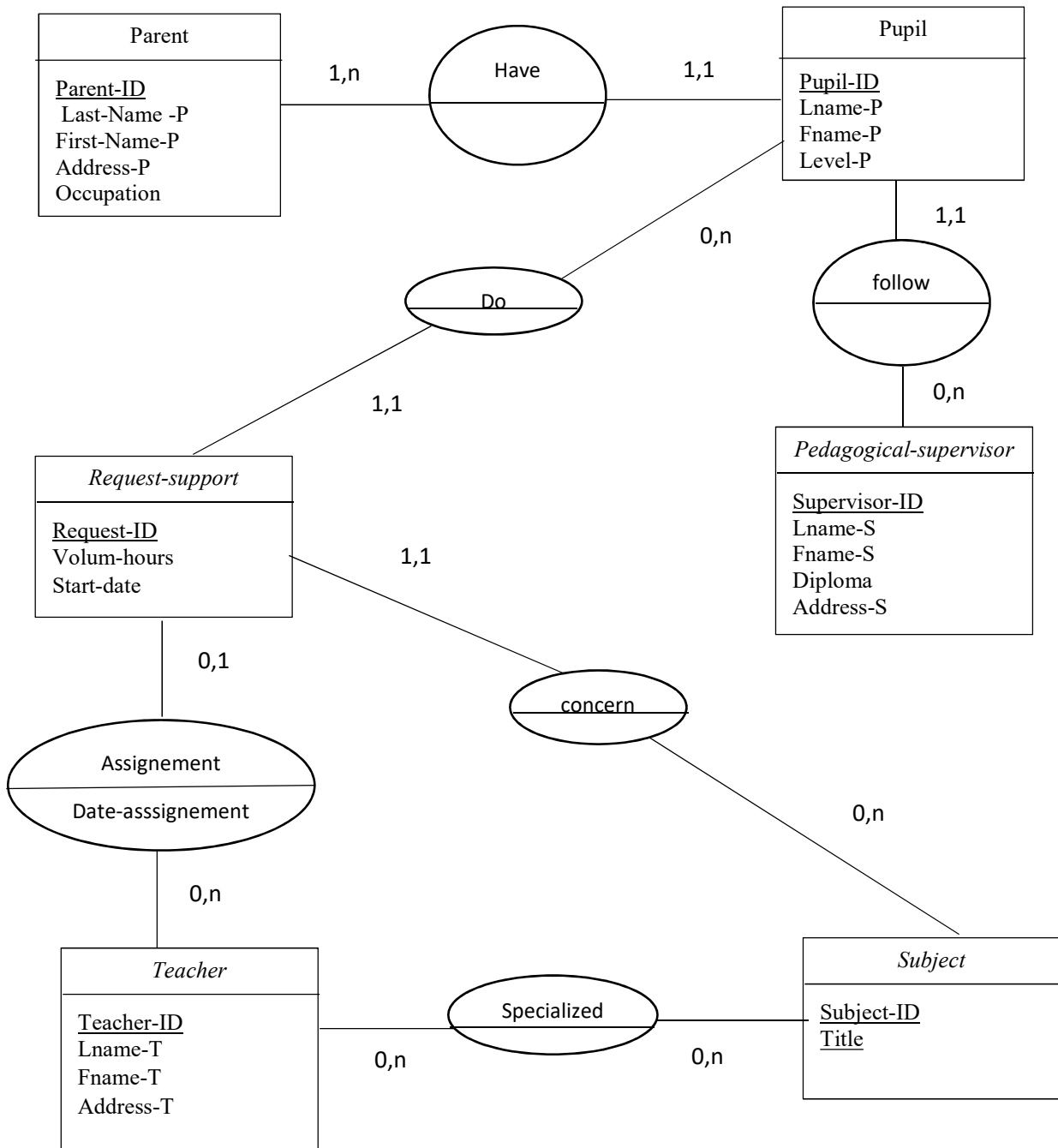

Answer the following questions with justification:

1. *Can a client occupy multiple camping places?*
2. *Can a place be empty?*
3. *Can two clients occupy the same place?*
4. *Can there be a category to which no place corresponds?*

Exercise 02:

Example of a tutoring course, we consider the E-R model provided below:

Parent

Parent-ID
 Last-Name -P
First-Name-P
Address-P
Occupation

1,n —— (Have) —— 1,1

Pupil

Pupil-ID
Lname-P
Fname-P
Level-P

0,n

(Do)

1,1

1,1

(follow)

0,n

Request-support

Request-ID
Volum-hours
Start-date

Pedagogical-supervisor

Supervisor-ID
Lname-S
Fname-S
Diploma
Address-S

1,1

0,1

(concern)

(Assignement
Date-asssignement)

0,n

0,n

Teacher

Teacher-ID
Lname-T
Fname-T
Address-T

0,n

(Specialized)

0,n

Subject

Subject-ID
Title

 Answer the following questions based on the characteristics of this model (indicate if the described situation it is represented with the given model).

1. Can a student follow multiple subjects?
2. Can a request support involve multiple subjects?
3. Can a pedagogical supervisor oversee multiple pupils at the same time?
4. Can a teacher be assigned to more than one support at the same time?
5. Can two pedagogical supervisors oversee a pupil at the same time?
6. Can two different teachers specialize in the same subject?

Exercise 03:

We want to model the management of a library. We need to represent:

✍ **Books** *with: book number, book title.*

✍ **Authors** *with: author's last name, author's first name.*

✍ **Publishers** *with: publisher code, publisher name.*

✍ **Depots** *with: depot code, depot name, city.*

Note: Here, a "book" is not a unique copy but may have multiple copies of the same book.

The investigation of the domain has defined the following rules:
A book can:

✍ *Be written by multiple authors.*

✍ *Be published by multiple publishers, but only once by each of them in a year. To differentiate the number of times a book is published by the same publisher, the **publication year** is recorded.*

✍ *Be stored in multiple depots, and this applies to each publisher.*

✍ *Each stored book is recorded with a specific quantity.*

Question: give the corresponding entity relationship schema.

Exercise 04:

A merchant wants to reorganize the management of orders from their suppliers, who are defined by a number, a name, and an address. Products have a number, a description, a name, a weight, and a price. The merchant wants to be able to know at any time when and how many products were purchased from a supplier, as well as differentiate between a "not delivered" and a "delivered" status for each order.

Determine the entity-relationship schema, the relation(s) with their attributes, specifying cardinalities and primary keys.

Exercise 05:

The university's computer system uses the following data:

- *For each student: their registration number, last name, first name, and address.*
- *For each course: the course code, title, and a brief summary.*
- *For each professor: their registration number, rank, last name, first name, and address.*
- *For each program: name and code.*

Students must choose a program, and each program is managed by a professor.
Students take courses, and each course is created by a professor.

Exercise 06:

We are considering a vehicle repair company. A repair company has several specialized departments, each comprising a certain number of employees. An employee works in only one department, has a role in the company, and a supervisor called the department head. Their salary depends on their role and their seniority within the company.

The repair company owns large equipment that requires specific qualifications for employees who might use it. Not all employees are qualified to use all equipment; each employee is skilled in operating specific equipment. Equipment is cataloged within the company. Complex equipment consists of multiple components.

A department may be involved in repairing pieces of multiple vehicles. Similarly, the repair of a vehicle may involve multiple departments.

*A repair intervention is always requested by a client and conducted under the supervision of a supervisor. For each repair intervention, a **report** is created. A report includes the name of each department involved, the pieces repaired, and the repair cost. It also contains the total cost of the vehicle repair, the vehicle's check-in date, and the vehicle's check-out date.*