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. .*

☞ *Understand what is a link.*

☞ *Understand the meaning of cardinalities.*

☞ *Practice designing a database using hierarchical model.*

☞ *Practice designing a database using network model.*

Exercise 01:

We want to modeled a database is using the hierarchical model to represent a company. The database stores:

- *Company (root)*
- *Departments*
- *Employees*
- *Projects*

The links are:

- *A Company has several Departments*
- *Each Department has several Employees*
- *Each Employee may work on several Projects*
- *Each Project belongs to only one Employee*

Questions:

1. *Draw the hierarchical tree structure (Based on the description, draw the hierarchy showing all parent–child nodes).*
2. *Identify the type of links.*

For each pair below, specify: One-to-one, One-to-many, Many-to-many

Pairs:

Company → Department

Department → Employee

Employee → Project

3. *Explain the limitation of this model*

Exercise 02:

*We want to design a library database by using the **hierarchical model**.*
The system stores:

- *Library (root)*
- *Sections (e.g., Science, Literature, History)*
- *Books*
- *Borrowers*

The links are:

- *A **Library** contains several **Sections***
- *Each **Section** contains several **Books***
- *Each **Book** may be borrowed by **only one Borrower at a time***
- *A **Borrower can borrow several Books***

Questions:

1. *Draw the hierarchical structure (tree form). Show all parent → child levels.*
2. *Identify the type of links.*

For each pair below, specify: One-to-one, One-to-many, Many-to-many

Pairs:

Library → Section
Section → Book
Borrower → Book
3. *Explain one weakness of representing Borrowers in this hierarchy*

Hint: *consider what happens if:*

Two borrowers need to borrow the same book at different times

Exercise 03:

*We want to model a university database by using the **network database model**.*
The system stores:

- *Students*
- *Courses*
- *Departments*
- *Instructors*

The links are:

- *A Student can enroll in multiple Courses*
- *A Course can be taken by multiple Students*
- *A Course is offered by one Department*
- *A Department can offer multiple Courses*
- *An Instructor can teach multiple Courses*
- *A Course may be taught by multiple Instructors*

Questions:

1. *Draw the network structure schema.*
2. *Identify the type of links between the following pairs:*

Student ↔ Course
Department ↔ Course
Instructor ↔ Course
3. *What is the limitation of this model.*