Djilali Boonaama University Khemis-Miliana

Faculty of Matter Sciences and Computer Science-DBKM

Computer Science Department

Matter: Information Systems (IS)

Chapter 4: MERISE

Conceptual Data Model (CDM)

Level Students:2nd year bachlor's degree in Computer Science

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Year university:
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MERISE


M Méthode
E d'Étude
R et de Réalisation
I Informatique
S des Systèmes
E d'Entreprise

Abstraction levels of MERISE

The abstraction levels with their resulting models are summarized in the following table:

LEVEL	DATA	TREATMENTS
Conceptual *Management choice: What?*	Conceptual Data Model (CDM)	Conceptual Model of Treatments (CTM)
Organizational *Organizational choice: Who? Where? When?*	Logical Data Model (LDM)	Organizational Model of Treatments (OMT)
Physical *Technical choices: How?*	Physical Data Model (PDM)	Physical Model of Treatments (PMT)

Data Dictionary purification

1. After establishing the dictionary, it must be purified by eliminating synonyms and polysemes.

Synonyms: Different names designate the same reality.

Ex: - Order_Num and Order_Ref.
Agent and employee.

Polysemes: The same name designates 2 or more distinct realities.

Ex: - Num : to designate the customer number and the order number

Data Dictionary purification

Calculated Value: it must be purified by eliminating theses values

EX: Avg_Std=(((TD+TP)/2)*0.4)+EXAM*0.6

In this exemple the calculated value is Avg_Std □deleted from DD

Concatenated value: it must be purified by eliminating theses values

EX: Adress is composed

□ Adress deleted and replaced with its components.

Detailed study

7.1. Conceptual Level

7.1.1. Data: CDM (Conceptual Data Model)

The objective of the MCD ("Conceptual Data Model") is to provide a static representation in schematic form of the data related to the management domain concerned. This model is based around the following concepts:

A. Property (Attribute)

This is a basic piece of information that characterizes an **entity** or an **association**.

Entity

It is a representation in an information system of a material or immaterial object with its own independent existence. The entity is diagrammed as follows:

Association:

It is a relationship that represents a link between entities. It has no independent existence; its existence is tied to the existence of the entities it connects.

Example: Consider the following management rule:

"A student **belongs** to a section."

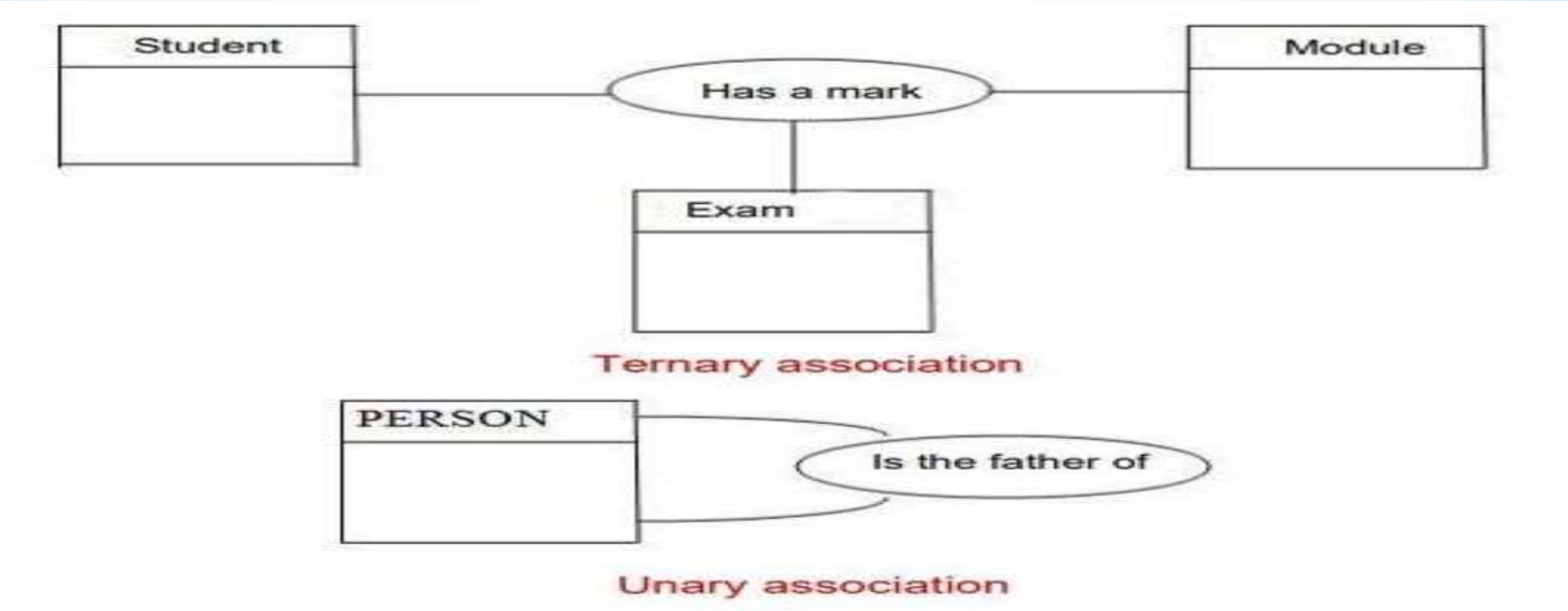
From this, we deduce the following association: "***belonging***" between the entities Student and Section.

Association Dimension:

The dimension of an association refers to the ***number of entities*** that participate in that association.

Examples:

1. Consider the relation ”***has a mark***” which involves interaction between 3 entities. It is called ***ternary***.



Cardinalities:

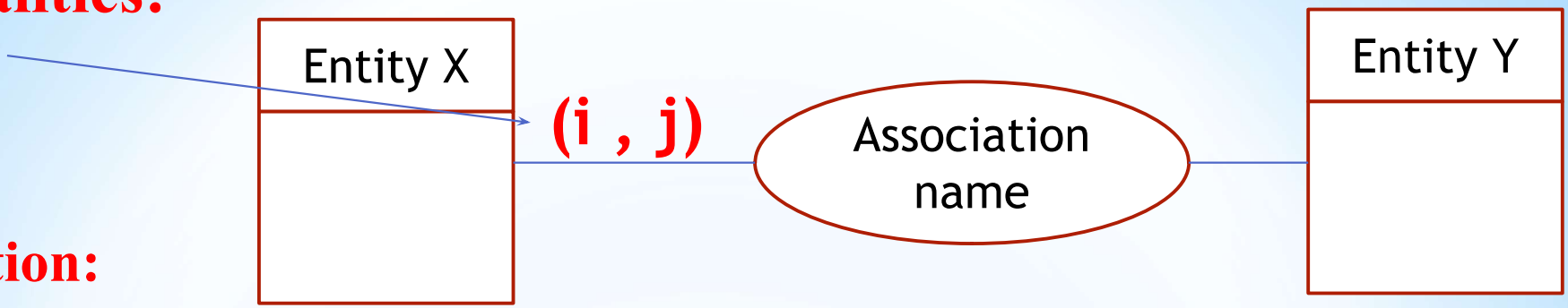
The cardinality between entity X in relation to an association with entity Y expresses **the number of occurrences** of Y that can be associated with one occurrence of entity X.

Cardinality is expressed by a **pair (i,j)** such that:

- i is the **minimum** number of occurrences of Y that can be associated with one occurrence of X
- j is the **maximum** number of occurrences of Y that can be associated with X

The possible cases of cardinality are: **(0,1), (0,n), (1,1), (1,n)**

Cardinalities:



Explanation:

(0,1): Optional one-to-one (zero or one Y per X)

➡ **Example: A student may or may not have a scholarship.**

(0,n): Optional one-to-many (zero or many Y per X)

➡ A **customer** might not have placed any order yet (0).

(1,1): Mandatory one-to-one (exactly one Y per X)

➡ **Example: Each person has exactly one passport.**

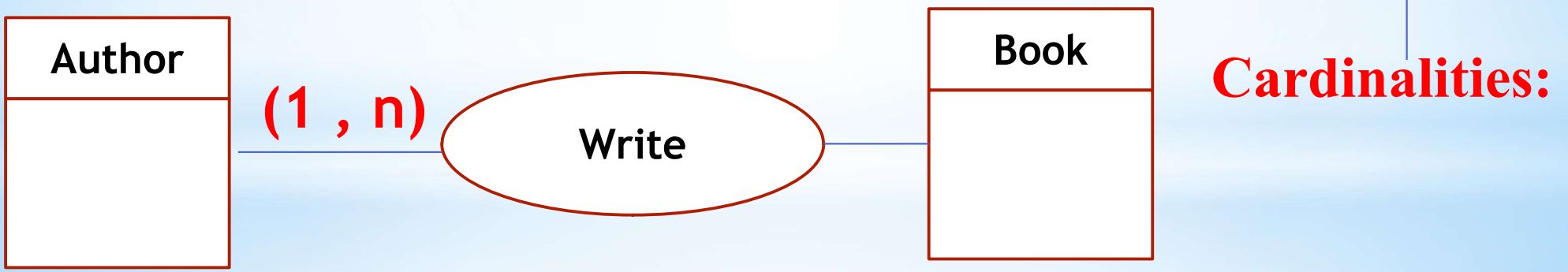
(1,n): Mandatory one-to-many (at least one Y per X, potentially many)

➡ **Example: A teacher must teach at least one course.**

Cardinalities:

"Author writes Book"

This association links the "Author" and "Book" entities and captures the business rule that an author can write **one or more** books.



Occurrence of an entity:

Let's consider the following two students:

Numéro : 001 Nom :Aloui Prénom :Ali Date de N : 09/12/80	Numéro : 002 Nom : Mokhtar Prénom :Salaha Date de N : 05/02/81

These two students are two specific individuals from the set of all students; they belong to the **Student entity** and are therefore called **occurrences of the Student entity**.

By definition, an **occurrence of an entity** is an individualized element belonging to that entity, obtained by assigning values to the various properties that characterize this entity.

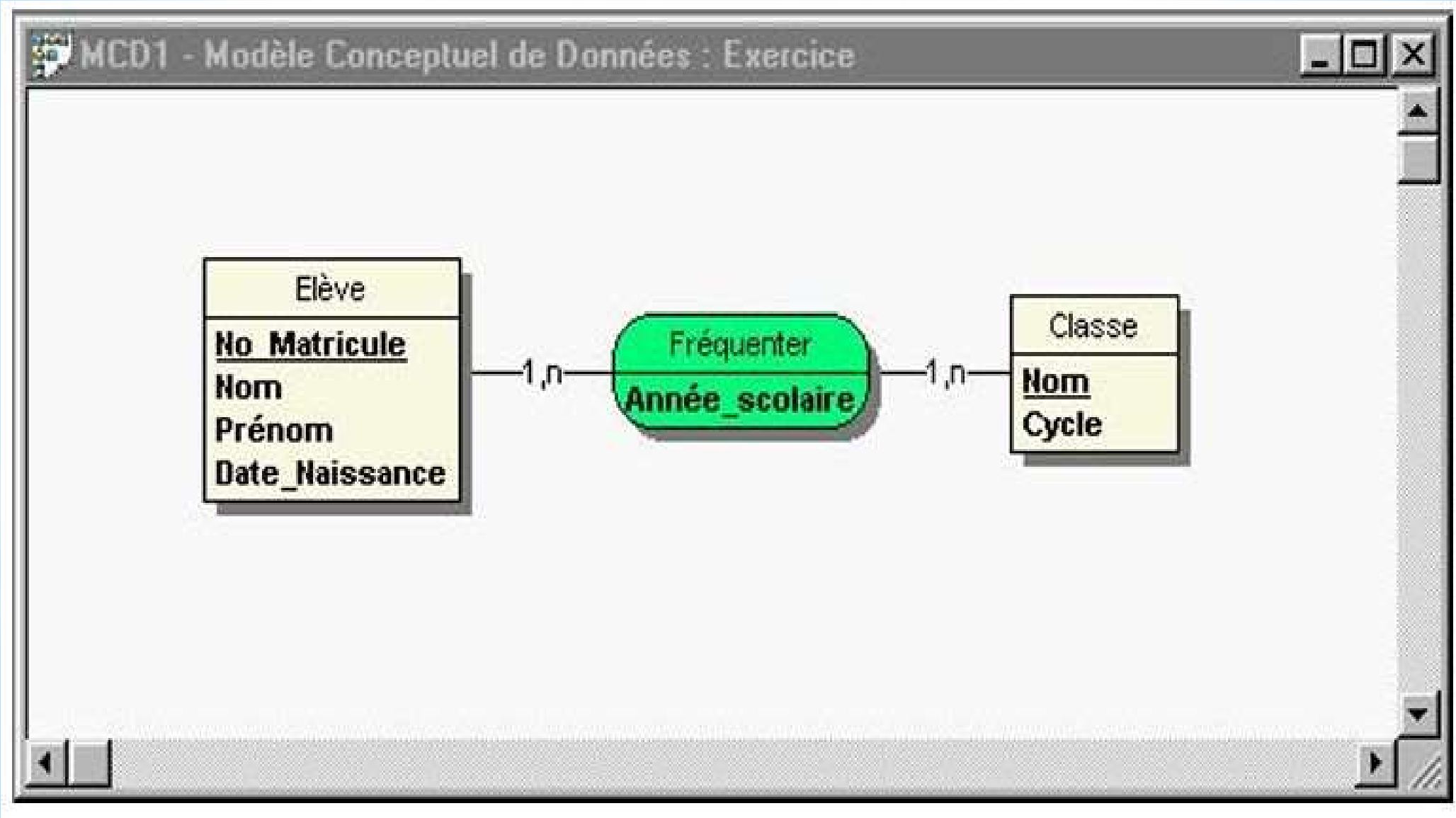
Example School Management

PART 1

In a school, we want to computerize the information system that manages the classes. Develop a MCD knowing that: · A student is characterized by their registration number, first and last name, and date of birth. · A class is characterized by the class name (e.g. 13CG2) and by an indication of the cycle (possible values: "lower", "medium", "upper"). · It will be necessary to plan to know the students' class attendance over several consecutive years. · A student registered in the system attends at least one class over the years.

Example School Management

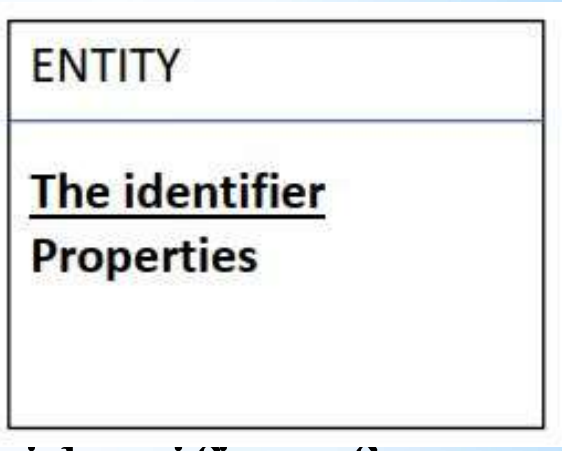
PART 1
PART 1: solution



The term identifier

- An identifier is a set of properties (one or more) **allowing one and only one entity to be designated**.
- The original definition is as follows:

The identifier is a special property of an object.



- Formalism: The property(ies) that constitute the identifier of an entity are underlined.
- The choice of a correct identifier is very important for modeling

Key Characteristics of an Entity:

1. Unique: Each entity must be unique identifiable within its context, typically through a unique attribute called the **identifier** or **primary key**.

2. Attributes (properties) : An entity is described by a set of attributes, which are characteristics or properties of the entity.

3. Occurrences: An entity can have multiple instances (or occurrences), each representing a specific instance of the object it models.

4. **Relationships (associations):** Entities can be linked to one another through **associations** or **relationships** to define interactions between them.