



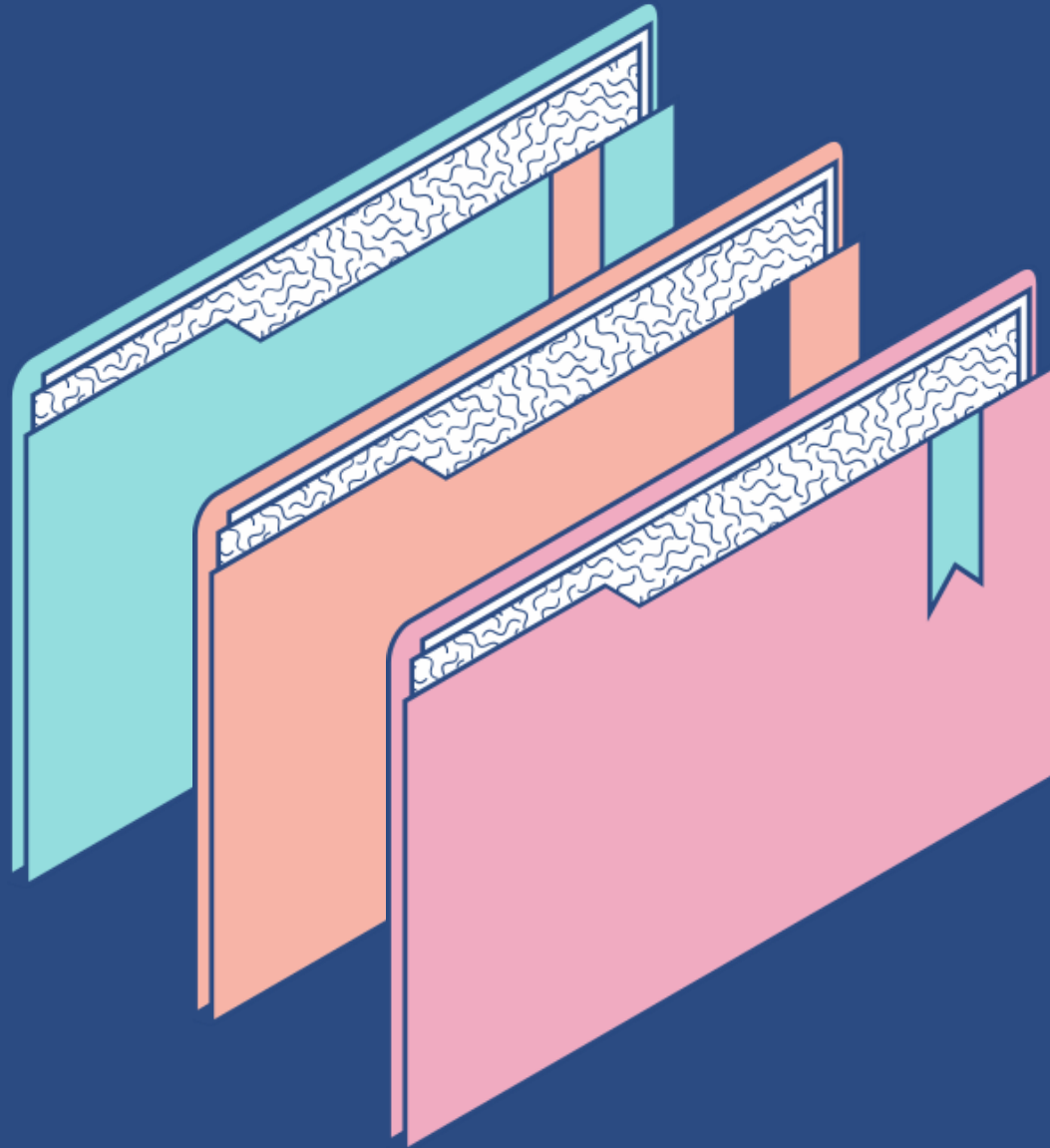
# Foundations of Information Systems

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# Agenda

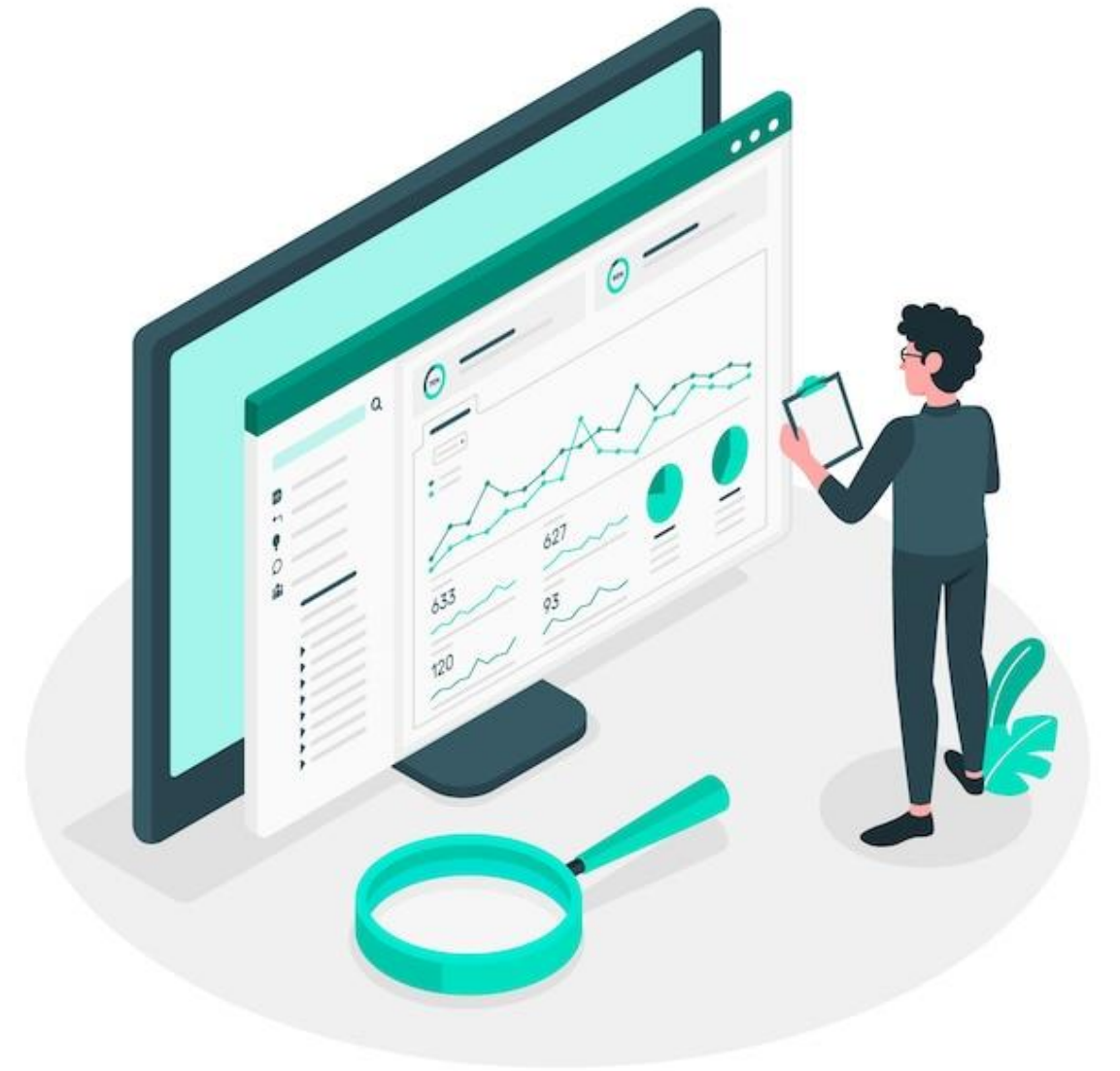
## KEY TOPICS DISCUSSED IN THIS PRESENTATION

- What is data & information?
- What is Database?
- DBMS
- Database Users
- Database Objects
- ERD



# 1- What is the meaning of data?

- we mean known facts that can be recorded and that have implicit meaning.
- can be in various forms such as numbers, text, audio, video, images, or any other format.



# What is the difference between Data & Information ?

DATA	INFORMATION
we mean known facts that can be recorded and that have implicit meaning.	The data that has been processed



## 2. What is database (DB) ?

- A database is a collection of related data.
- Databases are the backbone of modern information systems
- Examples: Telephone list, College, Banking, Cashier system.



# The characteristics of Database:-

- ❑ It is a logically coherent collection of data.
- ❑ It represents a mini world and should represent the state of that world accurately.
- ❑ It is designed for specific purpose.
- ❑ Support multiple data displays.
- ❑ Data Sharing and multi-user system.
- ❑ Transaction processing.

# The importance of Database

- Speed of access and retrieval of data.
- Reducing the spaces used
- Facilitate the process of modifying this data in the future.
- Help to answer any questions related to this database.
- Help to coordinate and collect huge data to facilitate its management and retrieval.
- Confidentiality and security of data.

# Database Examples:

- **Inventory Management Systems:** used to track and manage the inventory levels and stock movements of a business.
- **Financial databases:** used to store and manage financial data, such as accounting records and transactions.
- **Healthcare databases:** used to store and manage medical records, such as patient information, diagnoses, and treatments.
- **Government databases:** used to store and manage government-related data, such as census data, tax records, and voting records.
- **Library System :** used to store books name and details.

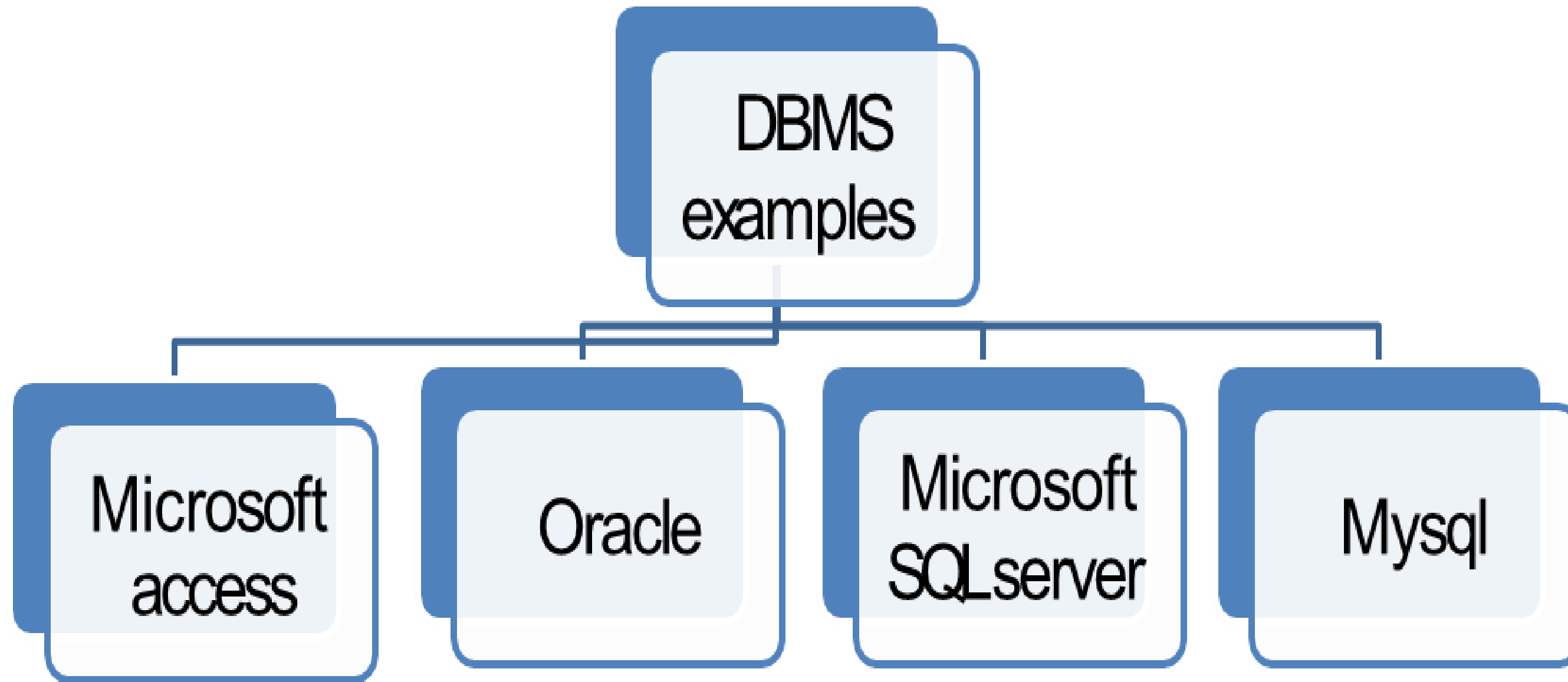


# 3. What is DBMS ?

- Database Management System.
- a computer software application that interacts with the user.
- software systems used to store, retrieve, and run queries on data.
- Database management systems are software systems used to manage and manipulate data in a database



# DBMS Examples:



## 4. Database Users :

### Actors on the scene :

- Database Administrator
- System Analyst
- Database Designer
- End user

### Behind the scene :

- Application Programmers
- Tool Developers
- Operators / Maintenance engineer

# Database Users :

- **Database administrators :** They create users access and apply limitation to maintain isolation and force security. Administrators also look after DBMS resources like system license, software application and tools required and other hardware related maintenance.
- **System Analyst :** A system Analyst is a user who analyzes the requirements of parametric end users. They check whether all the requirements of end users are satisfied.
- **Database designers :** This is the group of people who actually works on designing part of database. The actual database is started with requirement analysis followed by a good designing process. They people keep a close watch on what data should be kept and in what format. They identify and design the whole set of entities, relations, constraints and views.
- **End Users:** This group contains the persons who actually take advantage of database system.

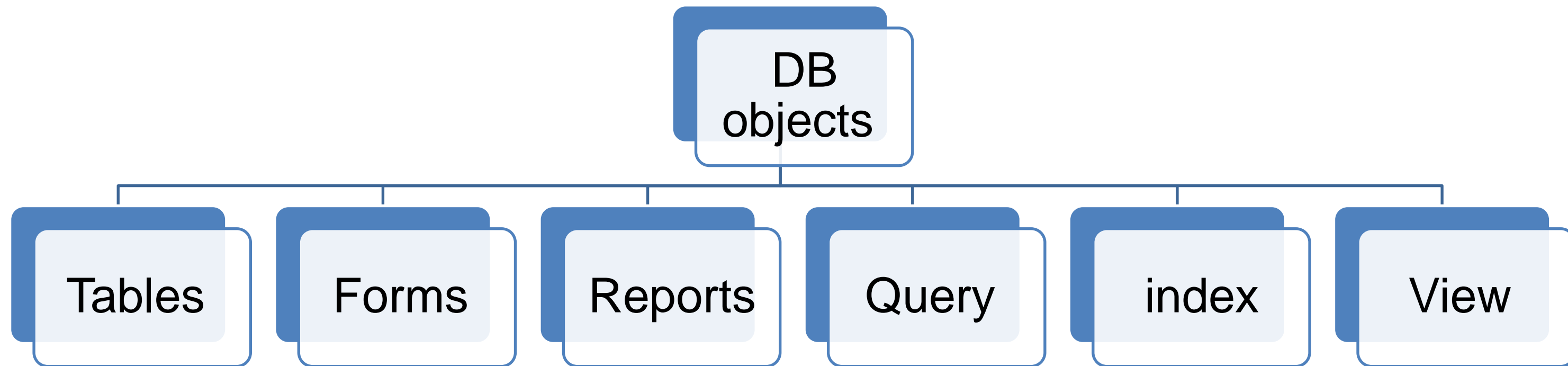
# Database Users :

- **Application Programmers :** are the back-end programmers who writes the code for the application programs. They are the computer professionals. These programs could be written in Programming languages such as Visual Basic, Developer, C, FORTRAN, COBOL etc. Application programmers design, debug, test, and maintain set of programs.
- **Tool Developers :** provides java J2EE and Angular design development of projects involving application development, migrations, and additions to existing applications.
- **Operators / Maintenance engineer :** undertake scheduled and breakdown maintenance of database.



# 5- Database Objects

A database object is anything that is used to store or manipulate data.



# 6- How to built Database ?

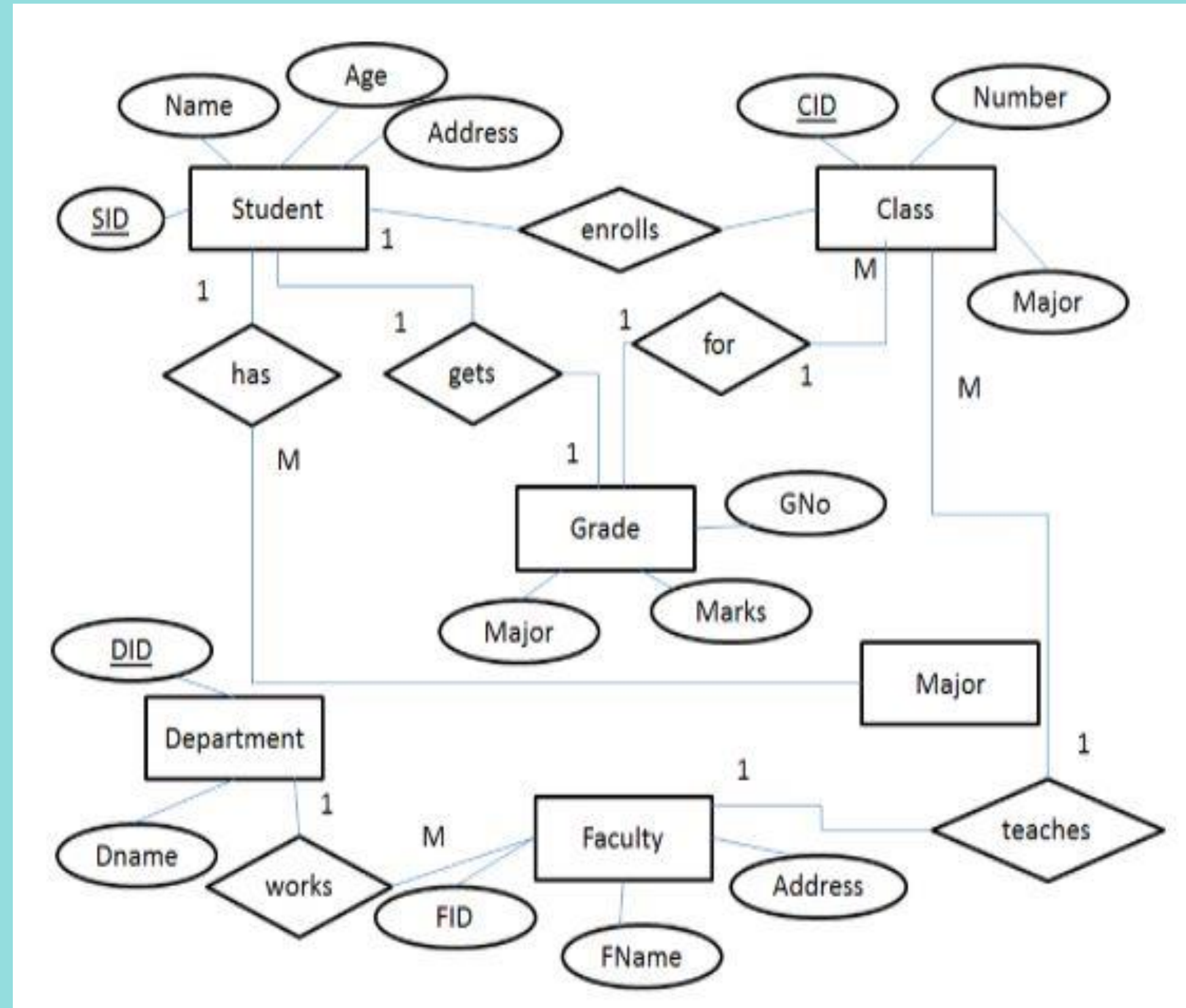
1- Define your target !!

**For example:** create database for faculty organization.

2- Database design using Entity Relationship data model (ERD)



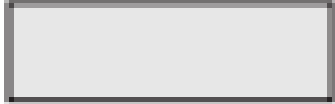
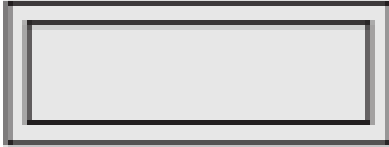
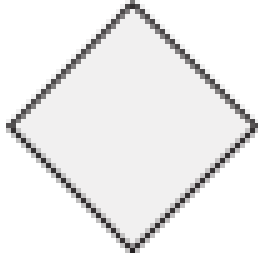
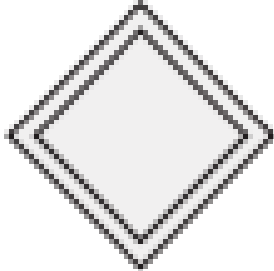
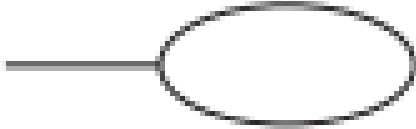
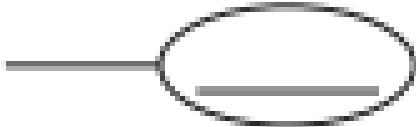
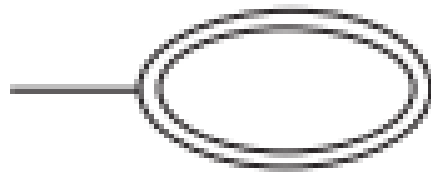
# Entity Relationship data model (ERD)



# Entity Relationship Diagram

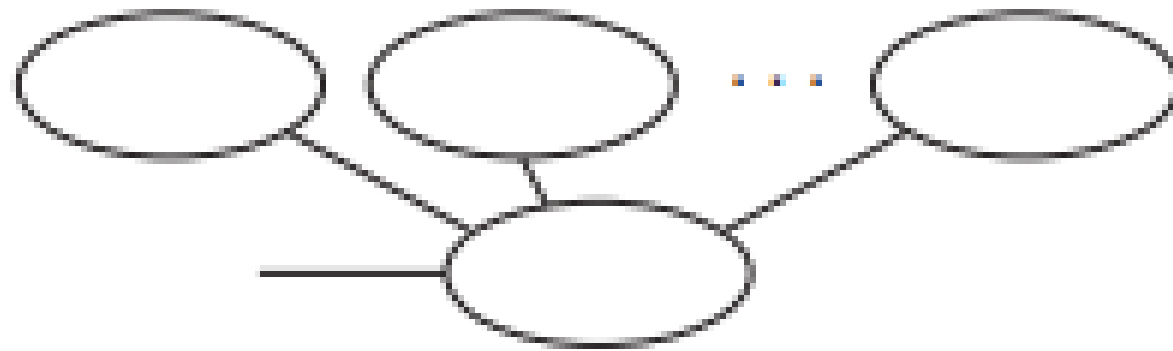
- Entity Relationship Diagram is a type of structural diagram for use in database design.
- Graphical representation
- An ERD contains different symbols and connectors that visualize two important information: The major entities within the system scope, and the inter-relationships among these entities.
- known as ERD, ER Diagram or ER model.

# Components of ERD :

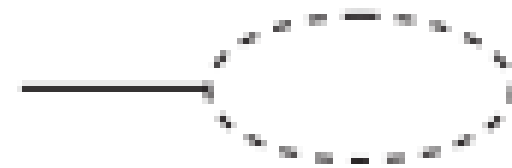
Symbol	Meaning
	Entity
	Weak Entity
	Relationship
	Identifying Relationship
	Attribute
	Key Attribute
	Multivalued Attribute



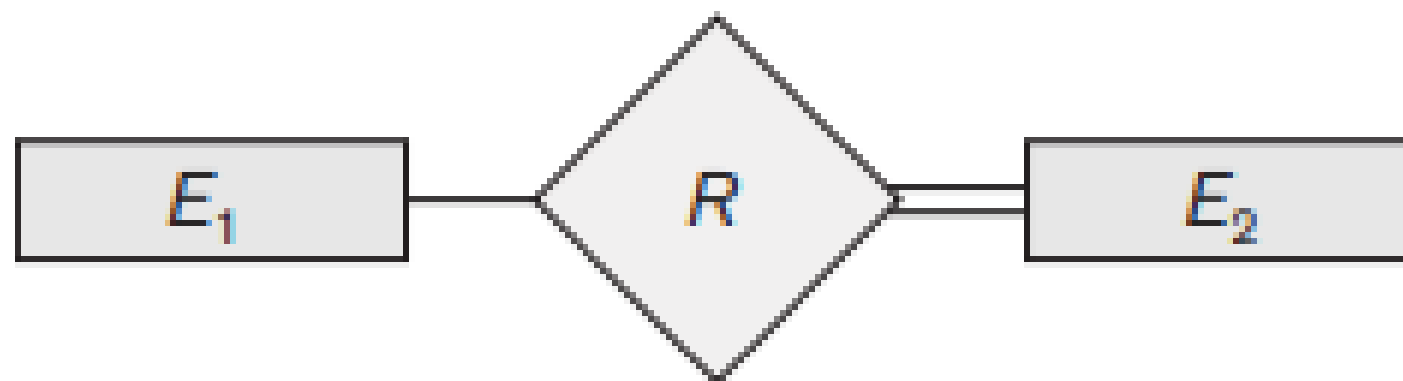
# Components of ERD :



Composite Attribute



Derived Attribute



Total Participation of  $E_2$  in  $R$

# Entity & Attribute

## Entity Examples :

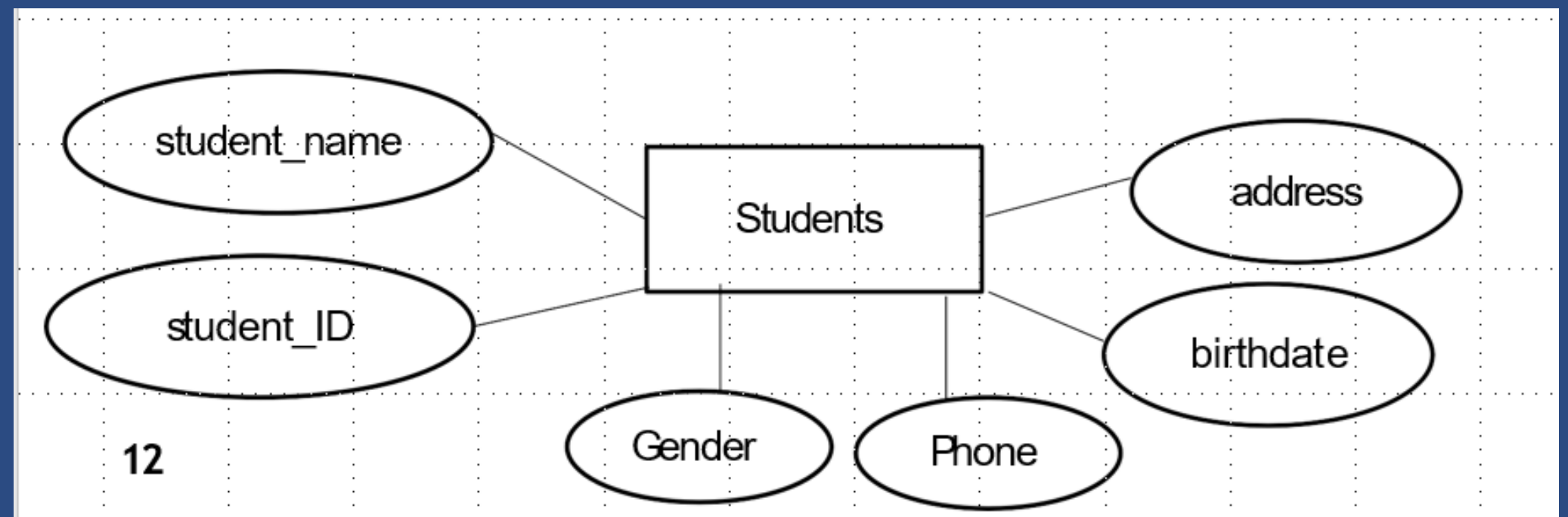
Student

Doctor

Courses

Department

## Attribute Examples :



# Attributes Types :

Simple

Professor

Start Date

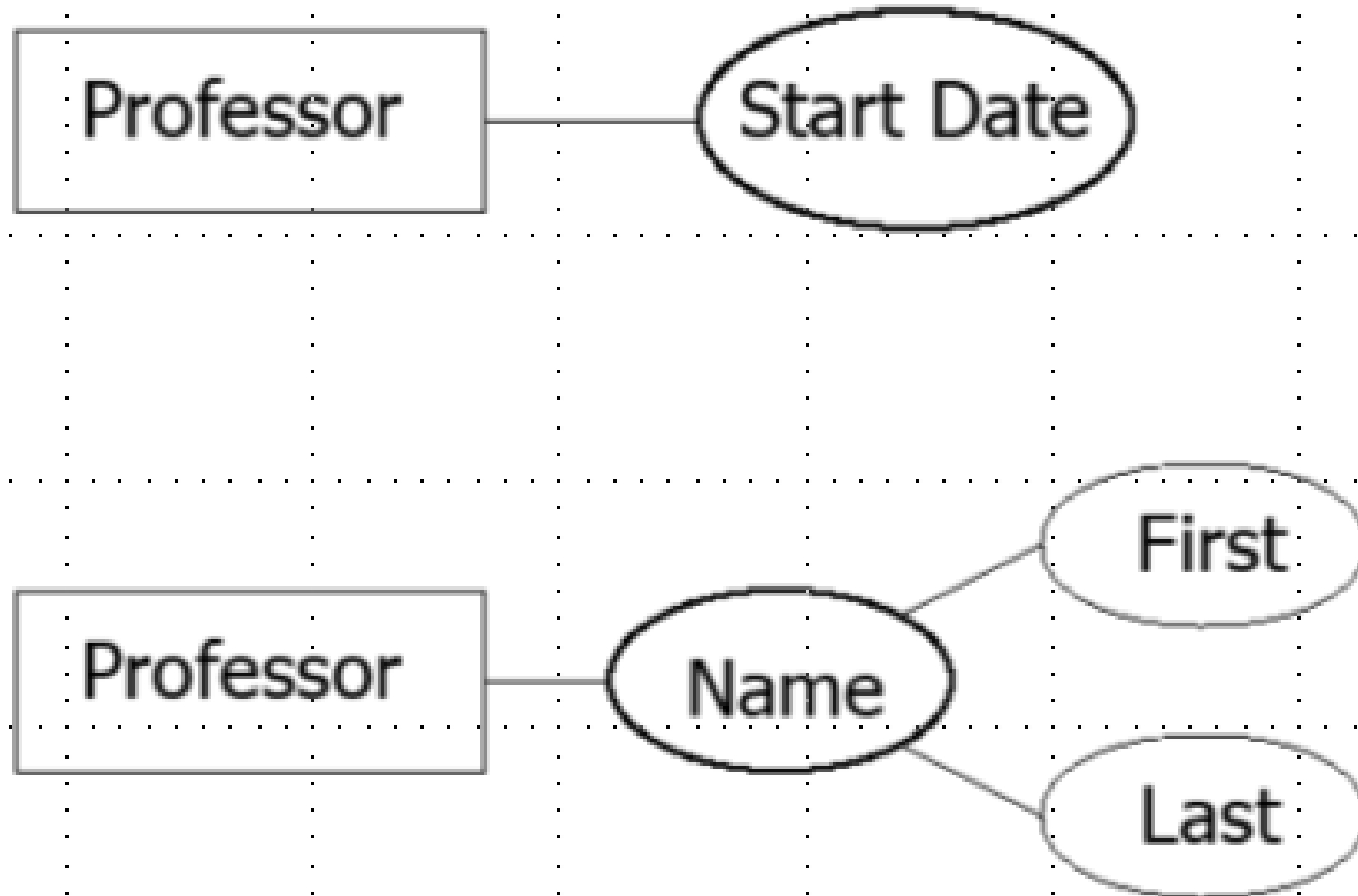
Composite

Professor

Name

First

Last



# Attributes Types :

Single

Professor

Employee ID#

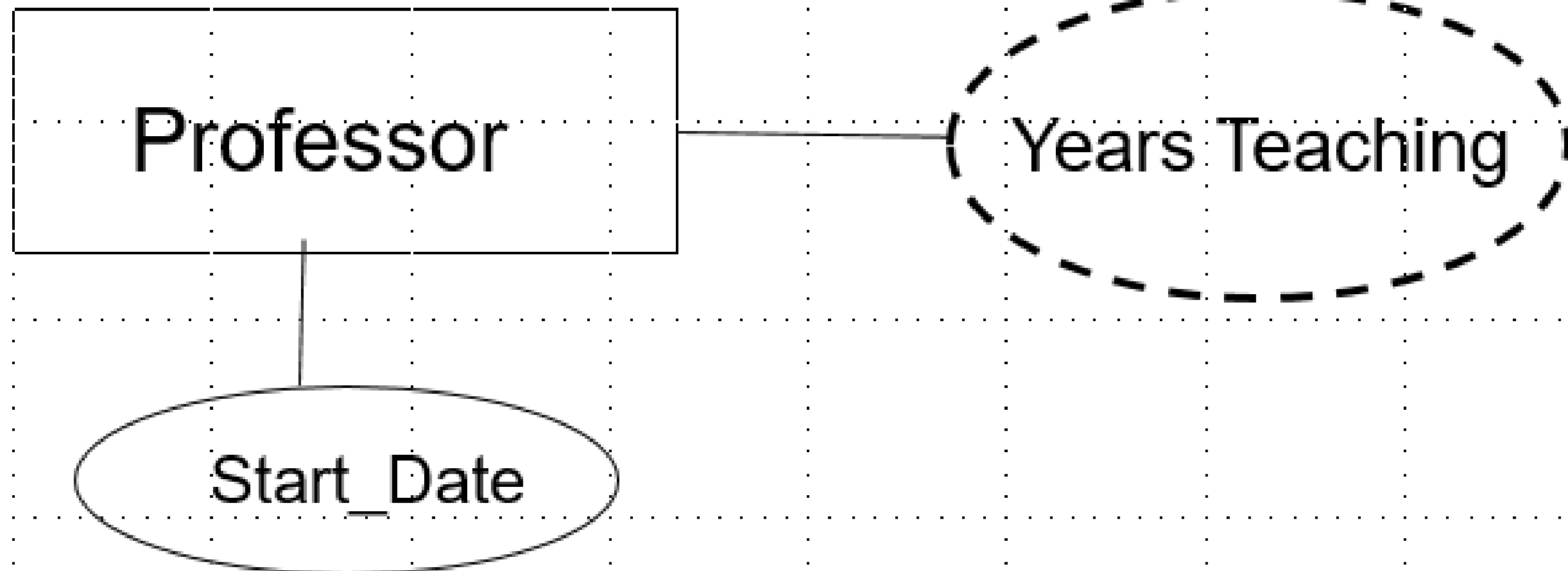
Multi-Valued

Professor

Email

# Attributes Types :

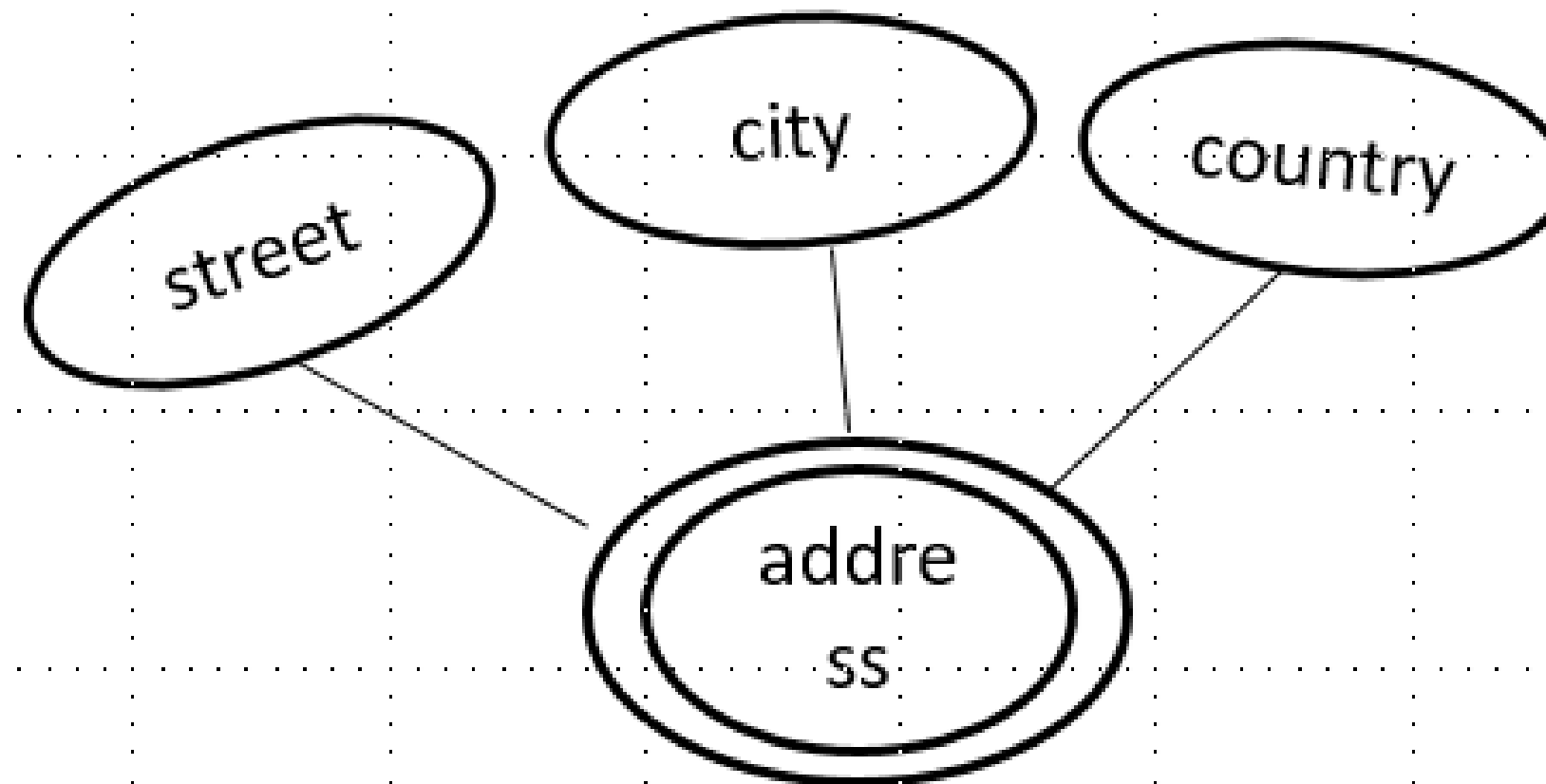
## Derived

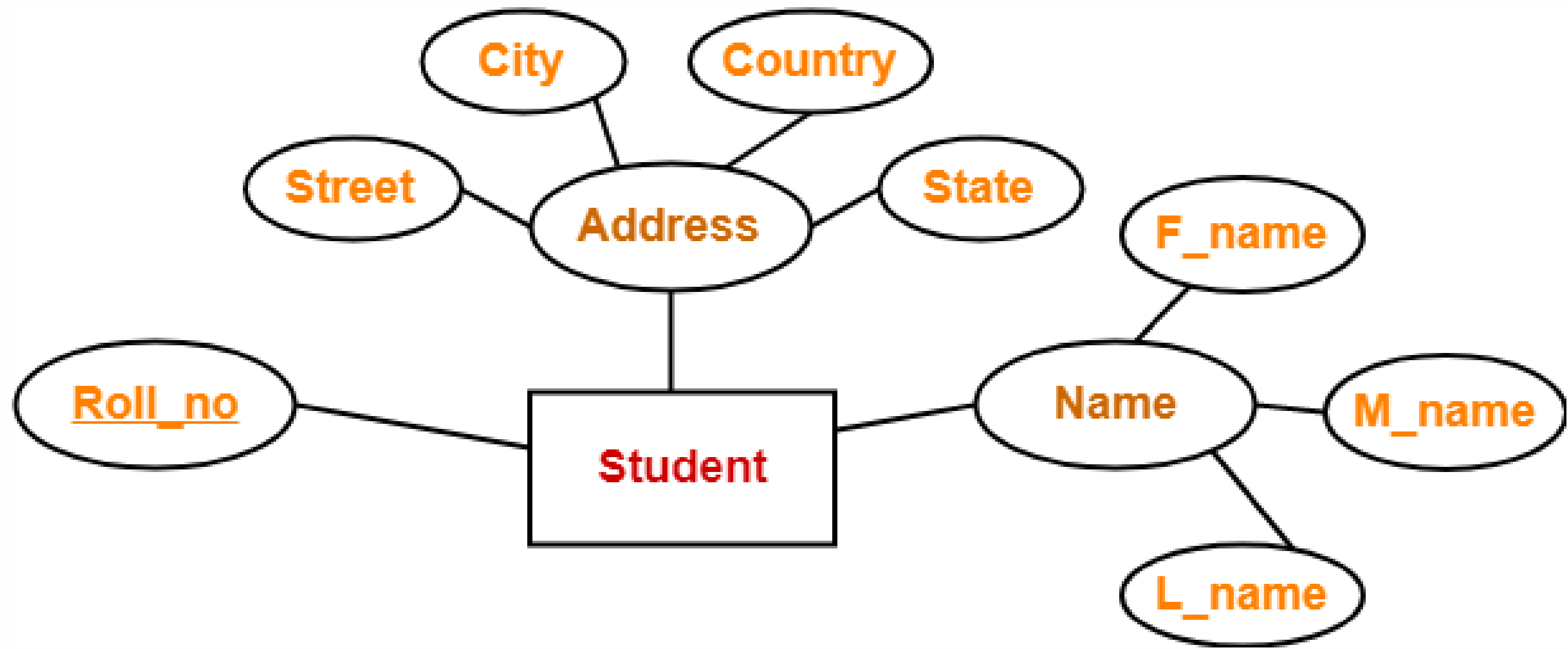




# Attributes Types :

- Complex attribute  
multivalued + composite





# Primary Key

- ❑ a primary key is a special kind of entity attribute that uniquely defines a record in a database table.
- ❑ In other words, there must not be two (or more) records that share the same value for the primary key attribute.

# Foreign Key

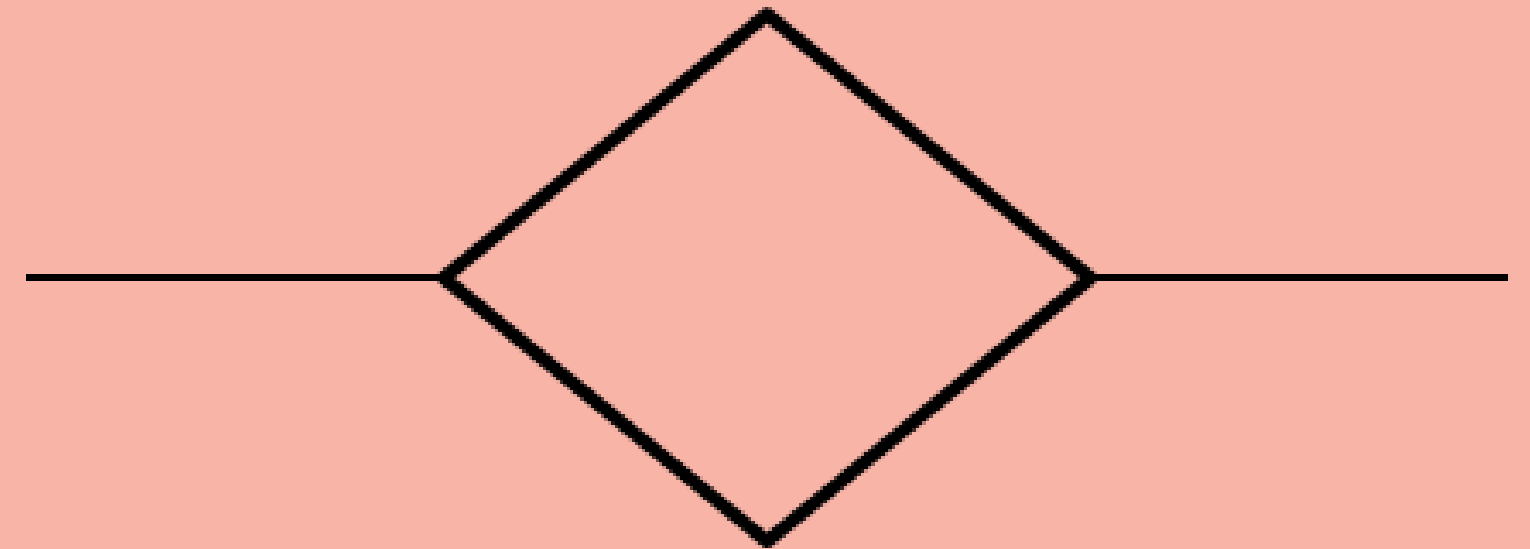
- ❑ a foreign key is a reference to a primary key in a table.
- ❑ It is used to identify the relationships between entities.
- ❑ Note that foreign keys need not be unique. Multiple records can share the same values.

# Relationships :

- A relationship between two entities signifies that the two entities are associated with each other somehow.
- We call it Cardinality of relationship.
- Note : Select verb to represent relationship

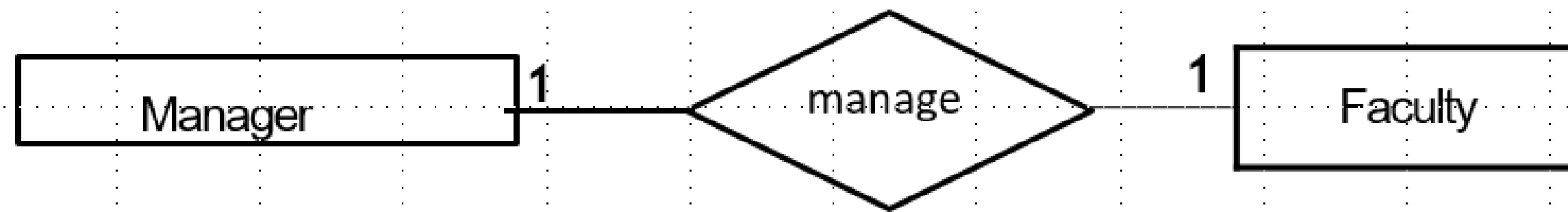
## Relationship Types :

- one to one
- one to many
- many to many

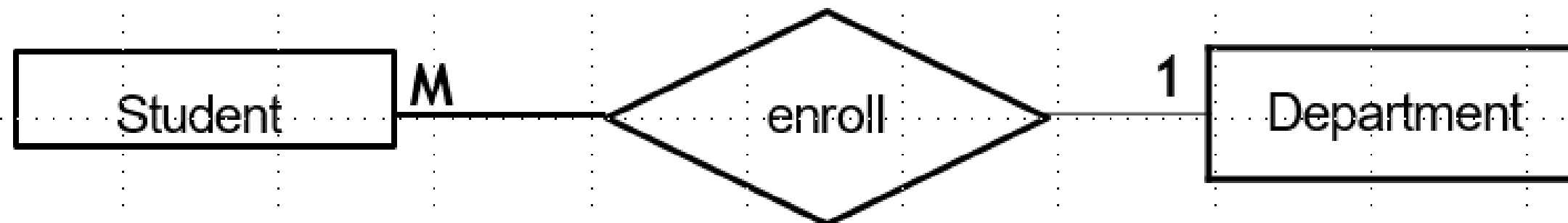


# Relationship Types Example :

1- one to one



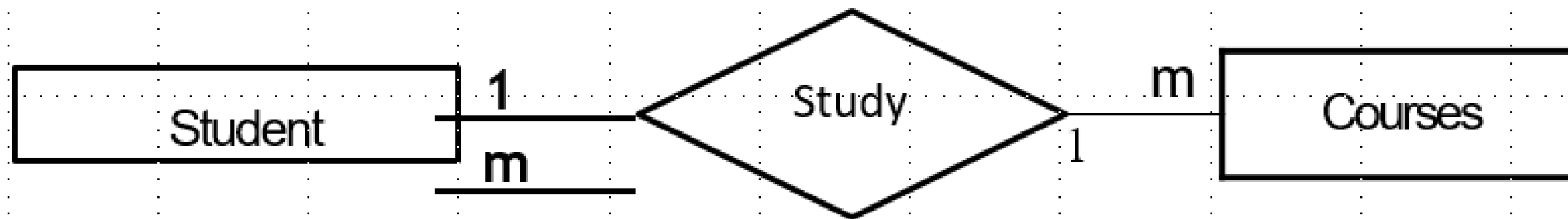
2- one to many





## Relationship Types Example :

3- many to many



# Participation of Relationship

- Partial —
- Total or full participation ==



Thank  
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