

# ER Model In DBS

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# ER model

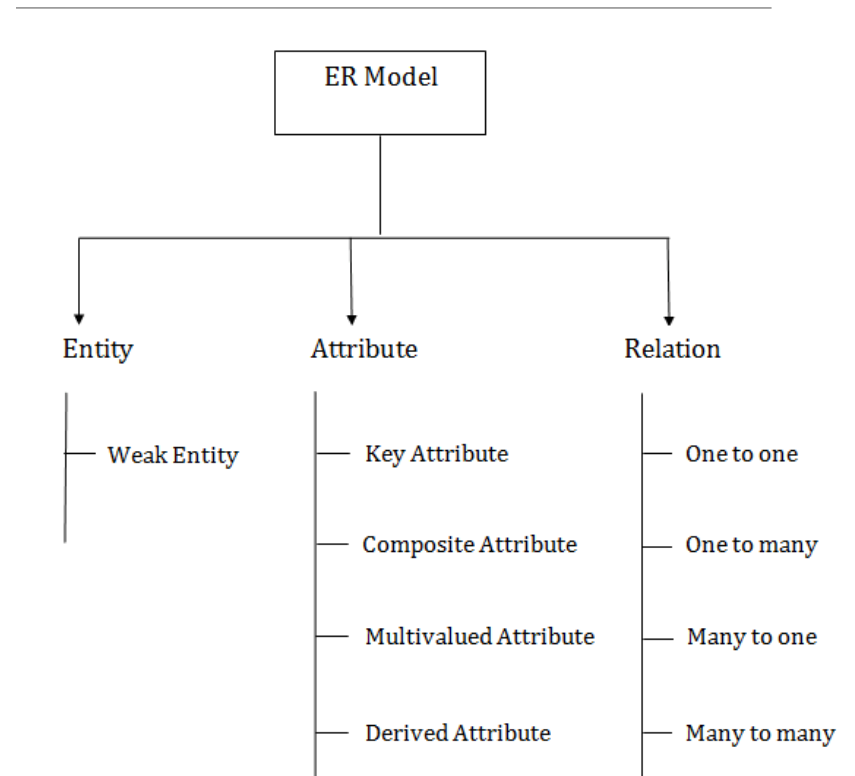
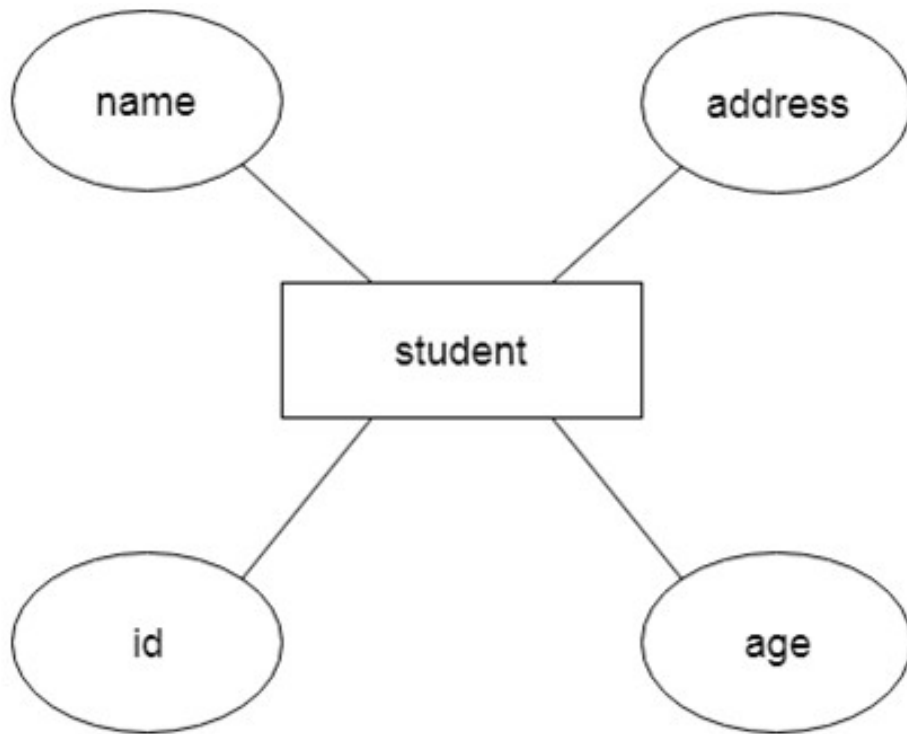
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ER model stands for an Entity-Relationship model. It is a high-level data model. This model is used to define the data elements and relationship for a specified system.

It develops a conceptual design for the database. It also develops a very simple and easy to design view of data.

In ER modeling, the database structure is portrayed as a diagram called an entity-relationship diagram.

**For example,** Suppose we design a school database. In this database, the student will be an entity with attributes like address, name, id, age, etc. The address can be another entity with attributes like city, street name, pin code, etc and there will be a relationship between them.



Component of ER Diagram

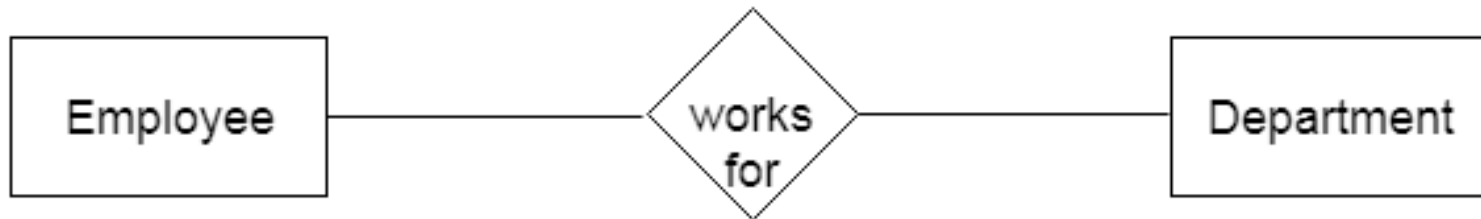


# Entity:

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An entity may be any object, class, person or place. In the ER diagram, an entity can be represented as rectangles.

Consider an organization as an example- manager, product, employee, department etc. can be taken as an entity.

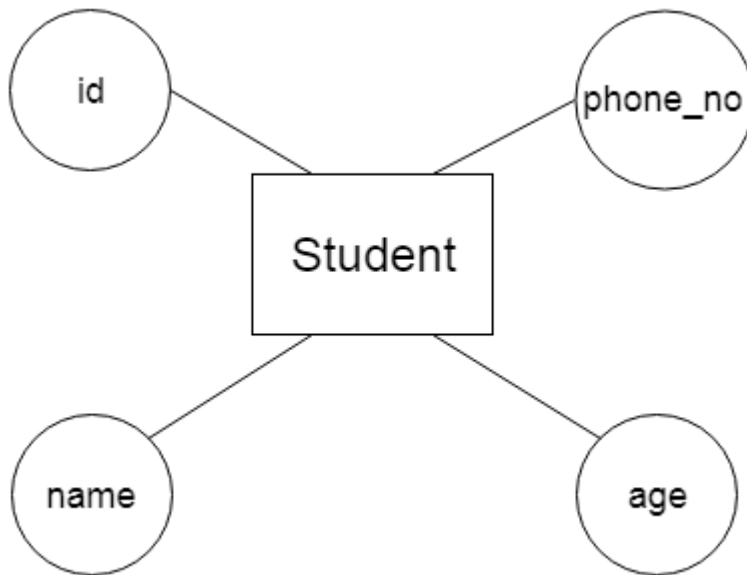


# 2. Attribute

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The attribute is used to describe the property of an entity. Eclipse is used to represent an attribute.

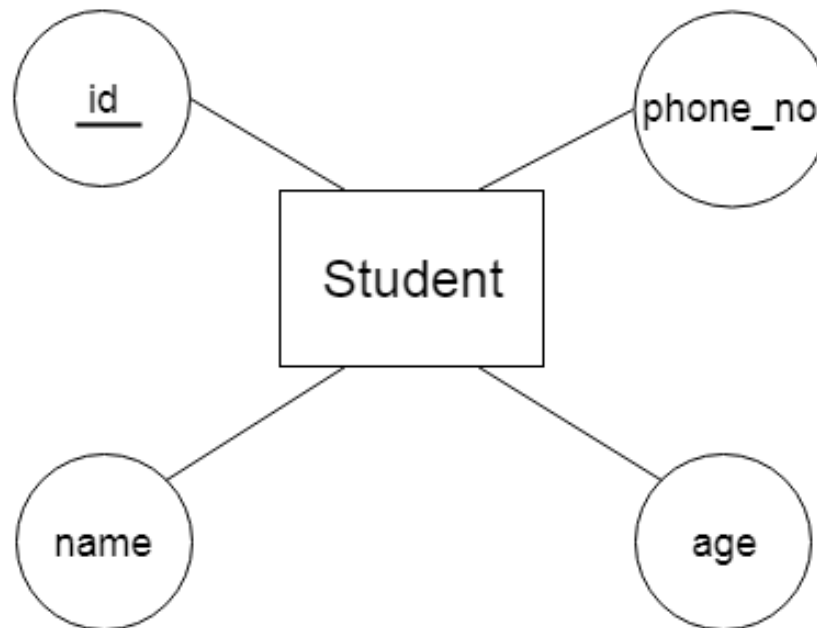
**For example,** id, age, contact number, name, etc. can be attributes of a student.



## □ Key Attribute

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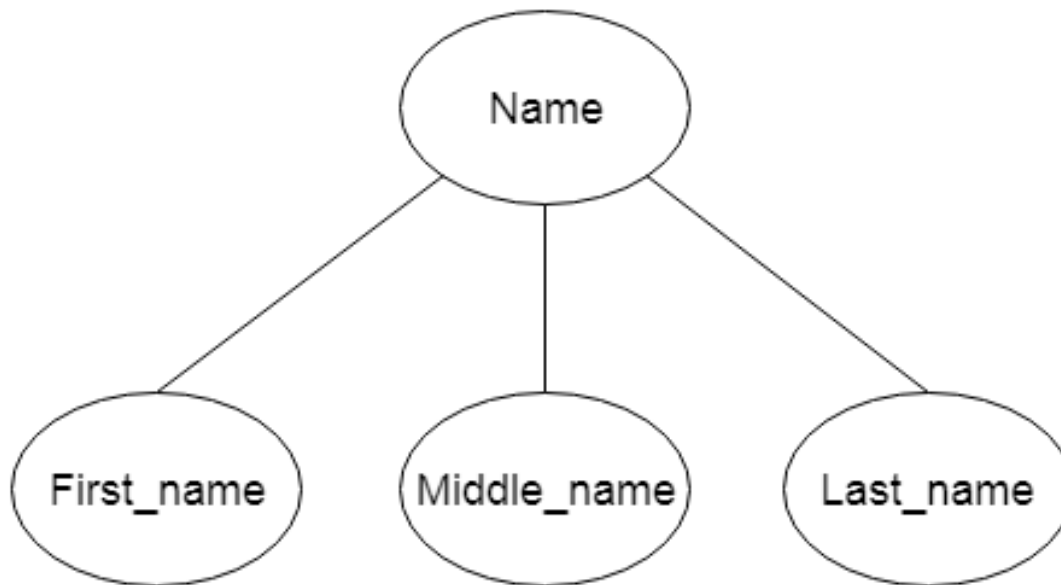
The key attribute is used to represent the main characteristics of an entity. It represents a primary key. The key attribute is represented by an ellipse with the text underlined.



# ❑ Composite Attribute

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An attribute that composed of many other attributes is known as a composite attribute. The composite attribute is represented by an ellipse, and those ellipses are connected with an ellipse.

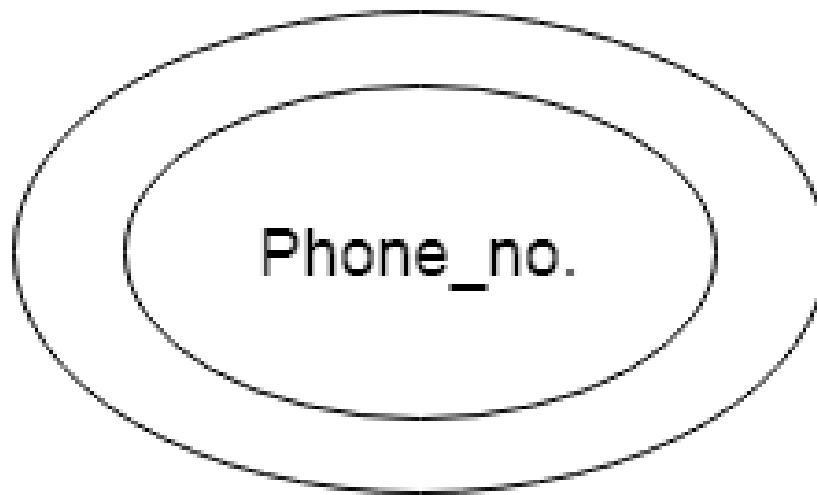


## ❑ Multivalued Attribute

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An attribute can have more than one value. These attributes are known as a multivalued attribute. The double oval is used to represent multivalued attribute.

**For example,** a student can have more than one phone number.

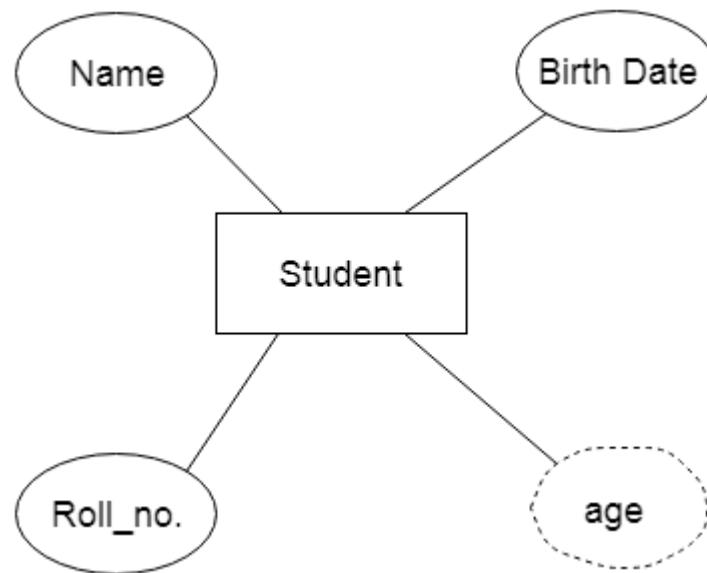


# ❑ Derived Attribute

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An attribute that can be derived from other attribute is known as a derived attribute. It can be represented by a dashed ellipse.

**For example,** A person's age changes over time and can be derived from another attribute like Date of birth.



# Mapping Constraints

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A mapping constraint is a data constraint that expresses the number of entities to which another entity can be related via a relationship set.

It is most useful in describing the relationship sets that involve more than two entity sets.

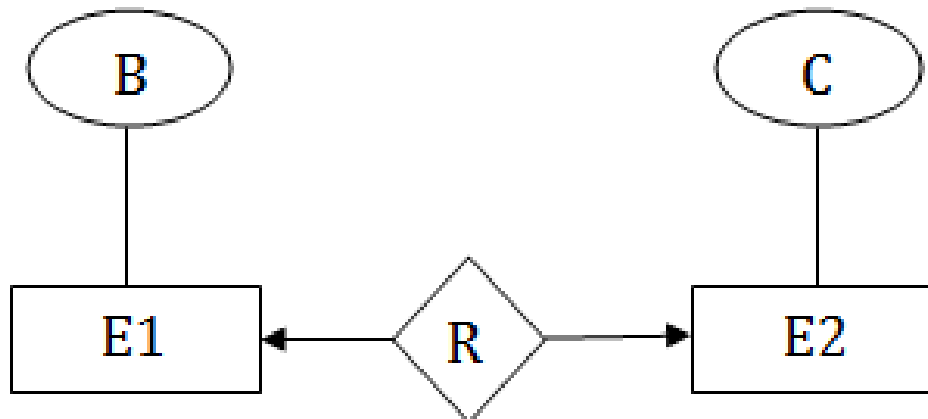
For binary relationship set  $R$  on an entity set  $A$  and  $B$ , there are four possible mapping cardinalities. These are as follows:

- i. One to one (1:1)
- ii. One to many (1:M)
- iii. Many to one (M:1)
- iv. Many to many (M:M)

# One-to-one

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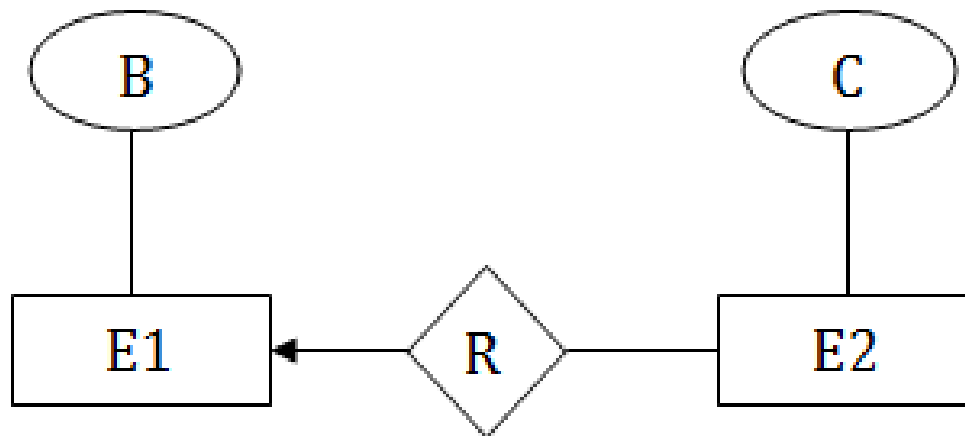
In one-to-one mapping, an entity in E1 is associated with at most one entity in E2, and an entity in E2 is associated with at most one entity in E1.



# One-to-many

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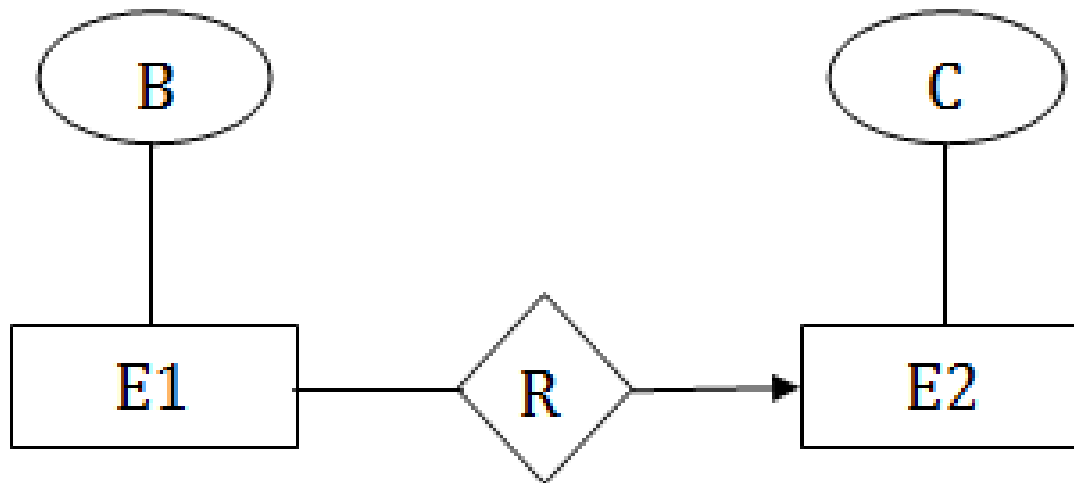
In one-to-many mapping, an entity in E1 is associated with any number of entities in E2, and an entity in E2 is associated with at most one entity in E1.



# Many-to-one

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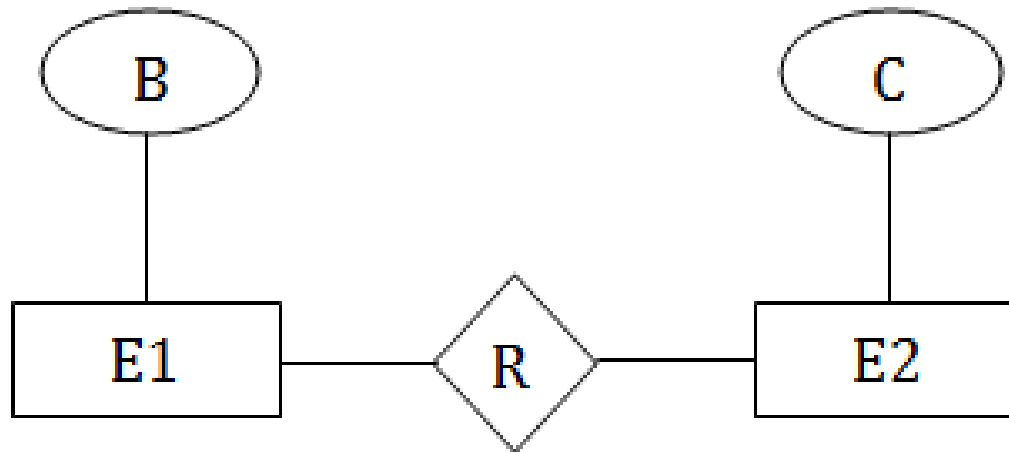
In one-to-many mapping, an entity in E1 is associated with at most one entity in E2, and an entity in E2 is associated with any number of entities in E1.



# Many-to-many

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In many-to-many mapping, an entity in E1 is associated with any number of entities in E2, and an entity in E2 is associated with any number of entities in E1.



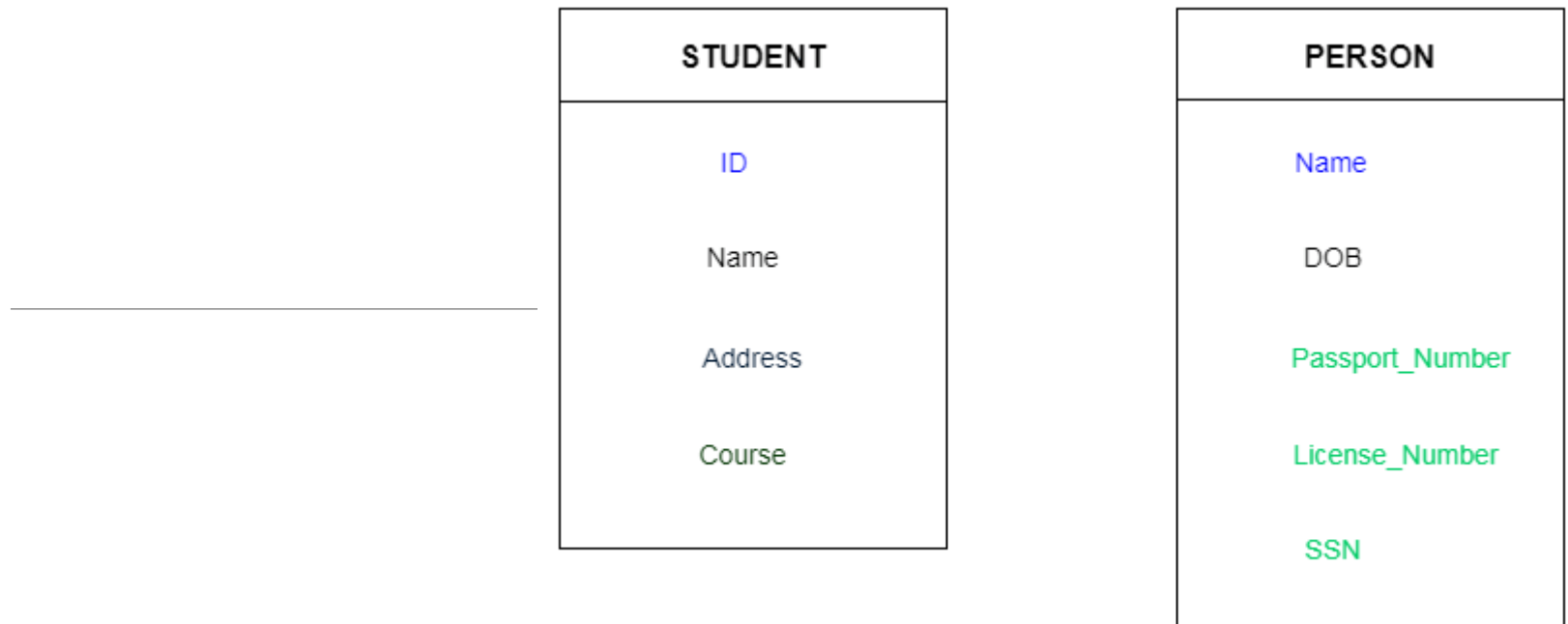
# Keys

Keys play an important role in the relational database.

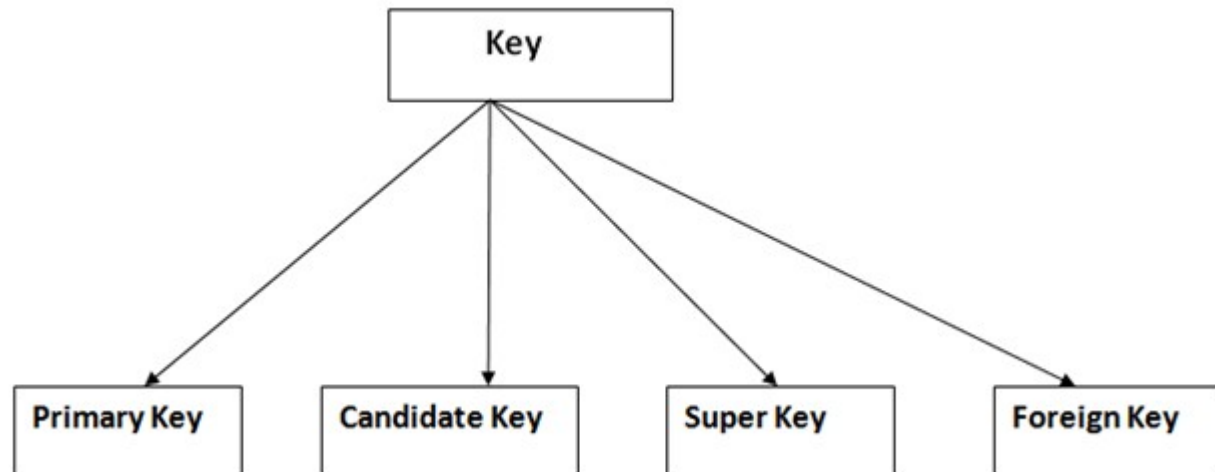
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It is used to uniquely identify any record or row of data from the table.  
It is also used to establish and identify relationships between tables.

**For example:** In Student table, ID is used as a key because it is unique for each student. In PERSON table, passport\_number, license\_number, SSN are keys since they are unique for each person.



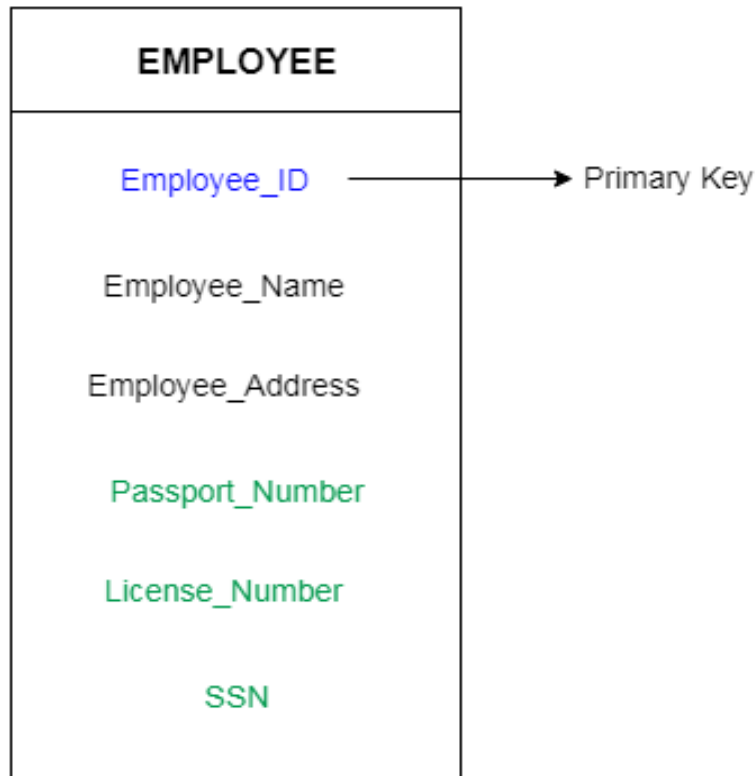
## Types of key:



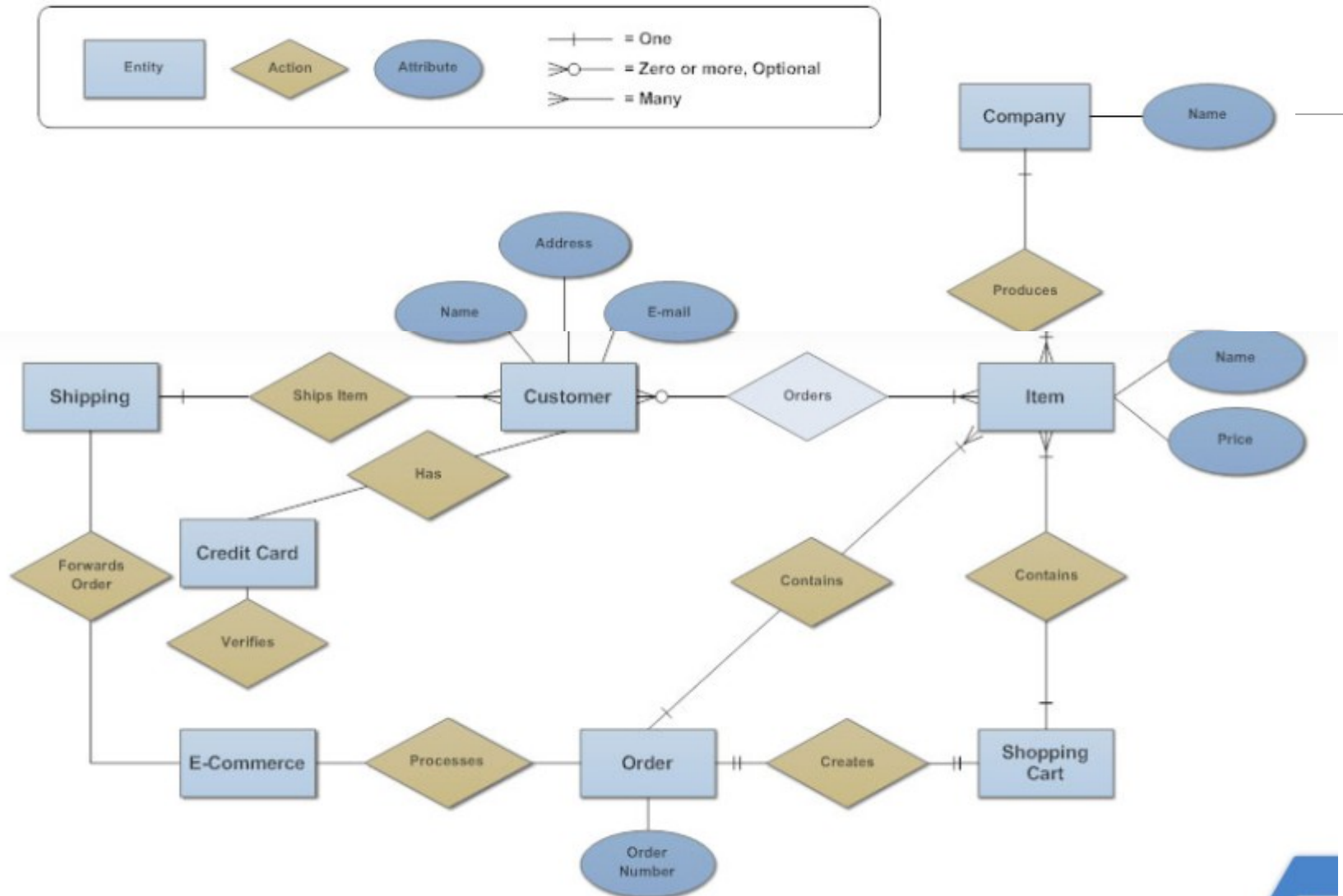
## ➤ Primary key

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It is the first key which is used to identify one and only one instance of an entity uniquely. An entity can contain multiple keys as we saw in PERSON table. The key which is most suitable from those lists become a primary key.



## Entity Relationship Diagram - Internet Sales Model



# What is an Entity Relationship Diagram (ERD)?

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An entity relationship diagram (ERD) shows the relationships of entity sets stored in a database. An entity in this context is an object, a component of data. An entity set is a collection of similar entities. These entities can have attributes that define its properties.

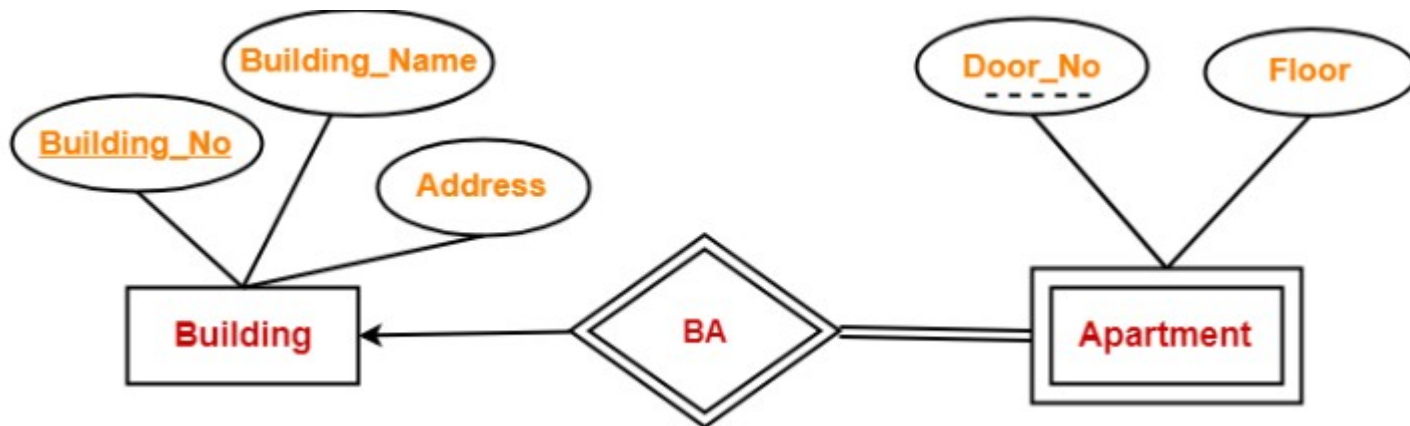
By defining the entities, their attributes, and showing the relationships between them, an ER diagram illustrates the logical structure of databases.

ER diagrams are used to sketch out the design of a database.

# Weak entity sets

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A **weak entity set** is an **entity set** that does not contain sufficient attributes to uniquely identify its **entities**. In other words, a primary key does not exist for a **weak entity set**. However, it contains a partial key called as a discriminator. Discriminator can identify a group of **entities** from the **entity set**.



# Extended E-R Features – Specialization

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An entity set may include **sub-groupings of entities** that are distinct in some way from other entities in the set. For instance, a subset of entities within an entity set may have attributes that are not shared by all the entities in the entity set.

As an example, the entity set person may be further classified as one of the following: *employee*, *student*.

Each of these person types is described by a set of attributes that includes **all the attributes of entity set person plus possibly additional attributes**.

The process of designating sub-groupings within an entity set is called **specialization**.

**For example, :** A university divides students into two categories: graduate and undergraduate. Graduate students have an office assigned to them. Undergraduate students are assigned to a residential college. Each of these student types is described by a set of attributes that includes all the attributes of the entity set student plus additional attributes.

An entity set may be specialized by **more than one distinguishing feature**. A distinguishing feature among employee entities is the job the employee performs.

In terms of an E-R diagram, specialization is depicted by a hollow arrow-head pointing from the specialized entity to the other entity. This relationship is the **ISA relationship**, which stands for “is a” and represents, for example, **that an instructor “is a” employee**.

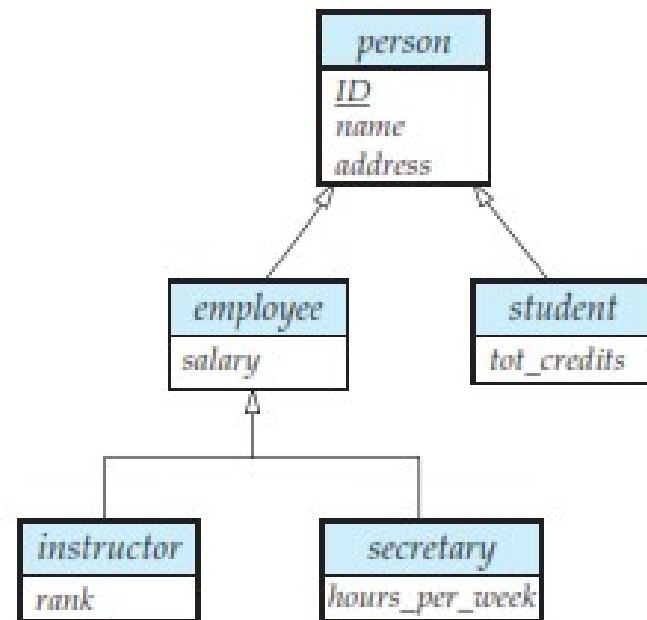
### Types of specialization :

- ❑ **overlapping specialization** : An entity may belong to multiple specialized entity sets.
- ❑ **disjoint specialization** : An entity may belong to at most one specialized entity sets.

### For an **overlapping specialization**

(as is the case for student and employee as specializations of person), **two separate arrows** are used. For a **disjoint specialization** (as is the case for instructor and secretary as specializations of employee), **a single arrow** is used.

The specialization relationship may also be referred to as a **superclass - subclass** relationship.



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Thank You

