ER diagram-

- ER diagram or **Entity Relationship diagram** is a conceptual model that gives the graphical representation of the logical structure of the database.
- It shows all the constraints and relationships that exist among the different components.

Components of ER diagram-

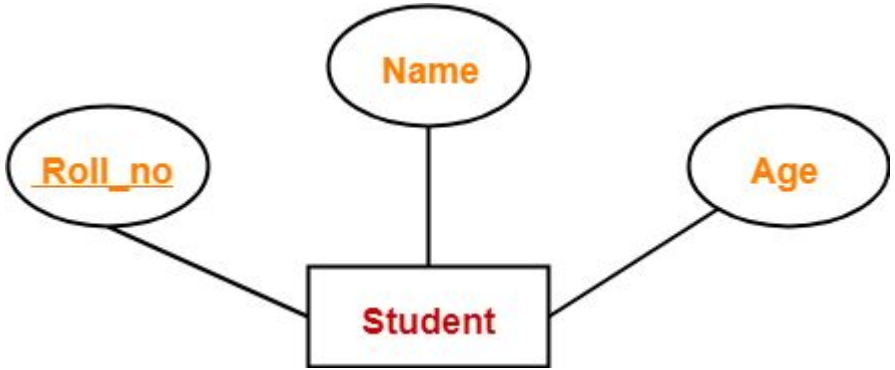
An ER diagram is mainly composed of following three components-

1. Entity Sets
2. Attributes
3. Relationship Set

Consider the following Student table-

Roll_no	Name	Age
1	Akshay	20
2	Rahul	19
3	Pooja	20
4	Aarti	19

Representation as ER Diagram-



Here,

- Roll_no is a primary key that can identify each entity uniquely.
- Thus, by using student’s roll number, a student can be identified uniquely.

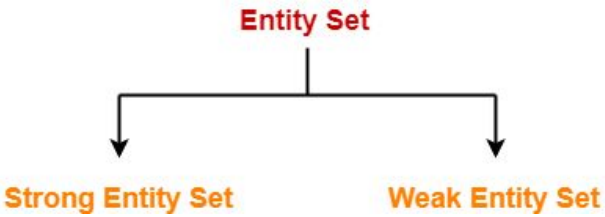
For Entity Sets-

Entity : An Entity is a thing or object in the real world that is distinguishable from other object based of the value of the attributes is possess

An entity set is a set of same type of entities.

An entity refers to any object having-

An entity set may be of the following two types-



Strong Entity Set-

- A strong entity set possess its own primary key.
- It is represented using a single rectangle.

Weak Entity Set-

- A weak entity set do not possess its own primary key.
- It is represented using a double rectangle.

Strong Entity Set Weak Entity Set

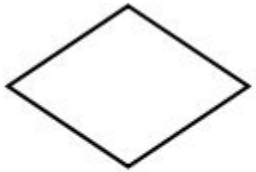
For Relationship Sets-

- Relationship defines an association among several entities.
- A relationship set is a set of same type of relationships.

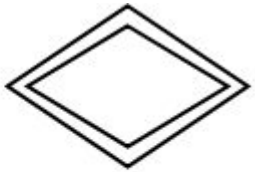
A relationship set may be of the following two types-

Strong Relationship Set-

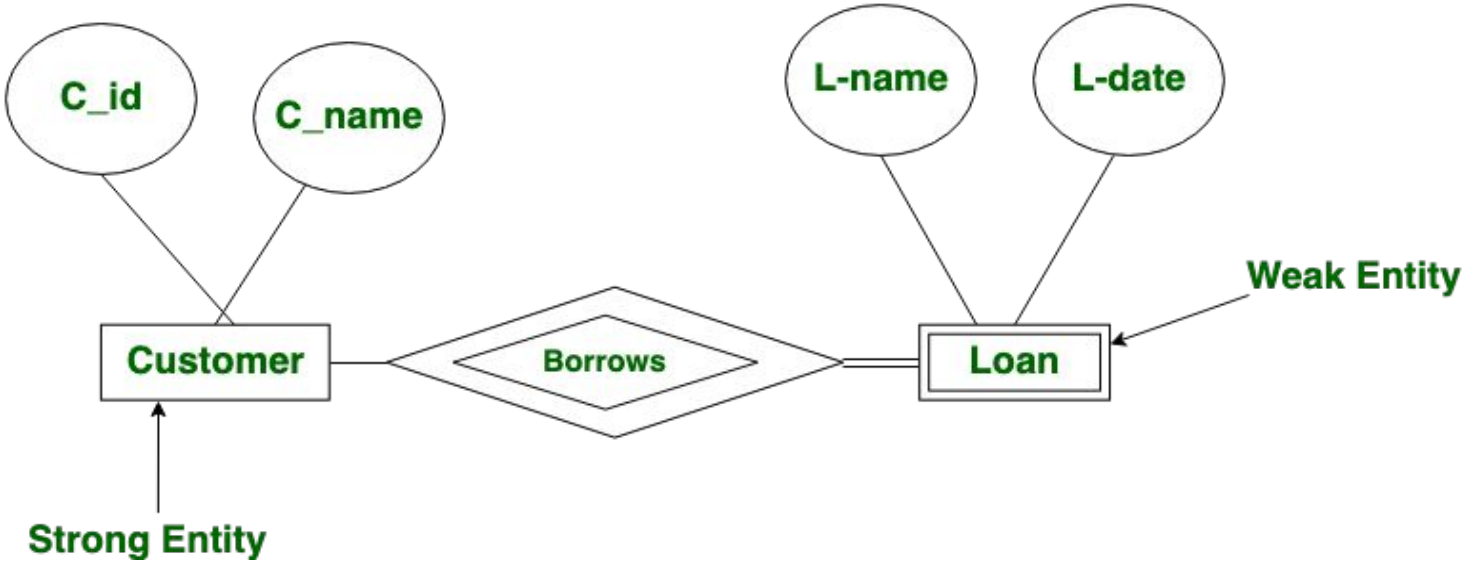
- A strong relationship exists between two strong entity sets.
- It is represented using a diamond symbol.
-

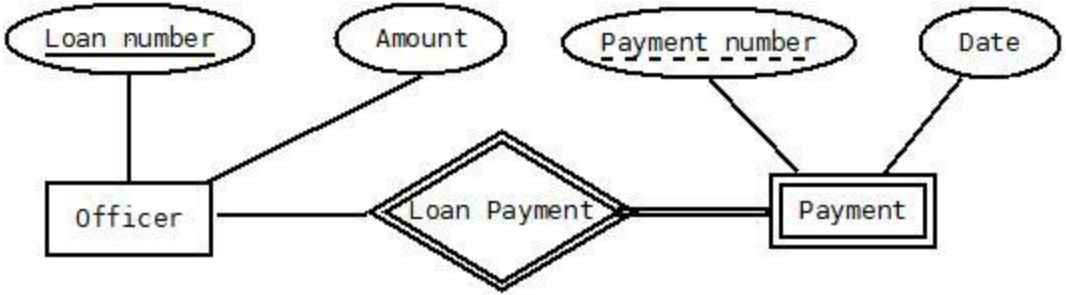


Strong Relationship Set



Weak or Identifying Relationship Set

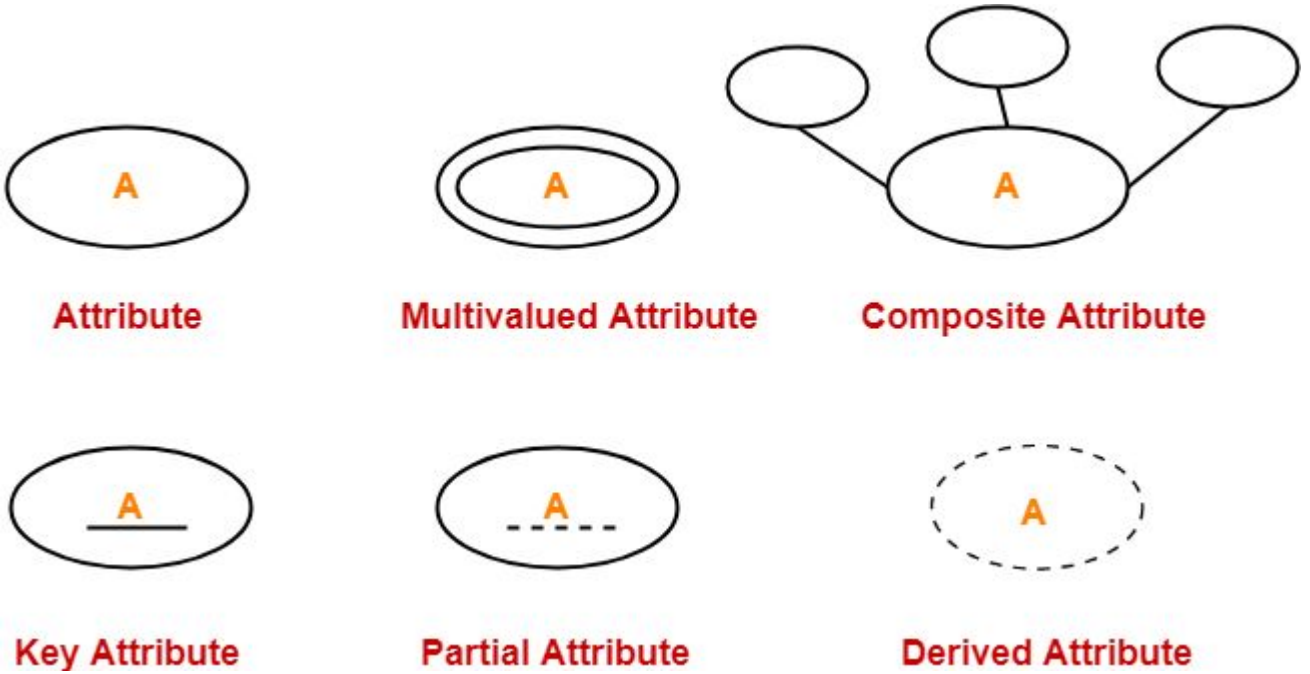

C_id
C_name
L-name
L-date
Weak Entity
Customer
Borrows
Loan
Strong Entity


Loan number
Amount
Payment number
Date
Officer
Loan Payment
Payment

Weak Relationship Set-

- A weak or identifying relationship exists between the strong and weak entity set.
- It is represented using a double diamond symbol.

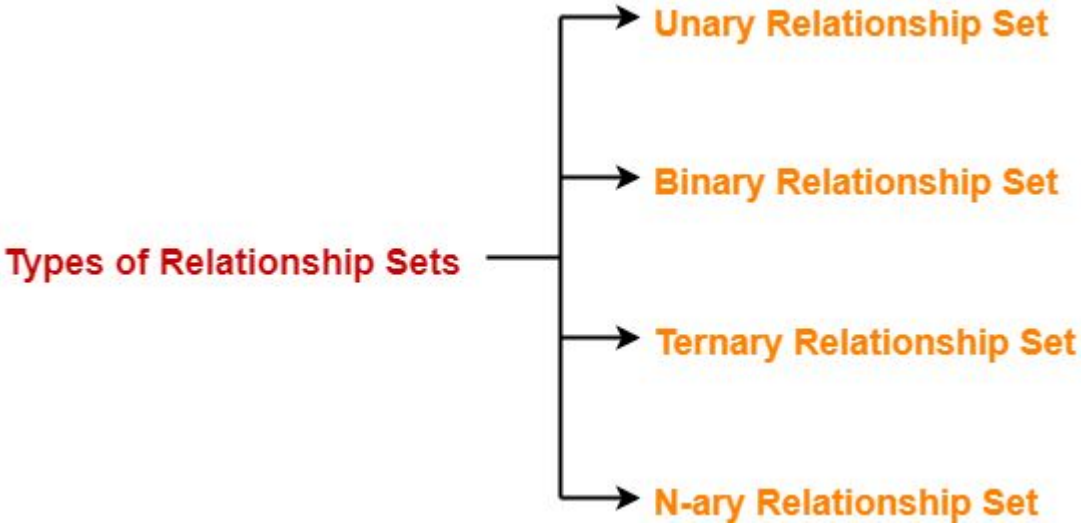
For Attributes-



Relationship in DBMS-

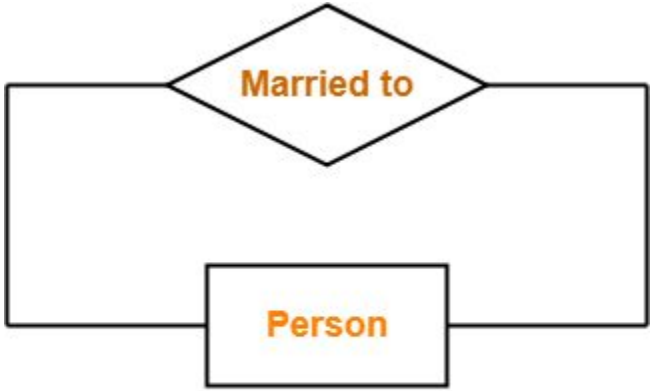
‘Enrolled in’ is a relationship that exists between entities **Student** and **Course**.

Types of Relationship Sets-



Unary Relationship Set-

Unary relationship set is a relationship set where only one entity set participates in a relationship set.

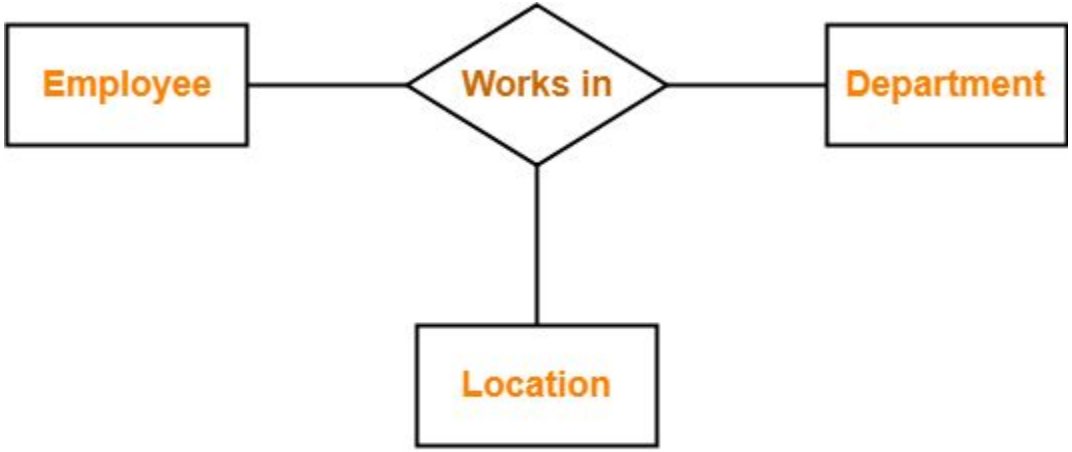


Unary Relationship Set

Binary Relationship Set-

Binary Relationship Set

Ternary Relationship Set-

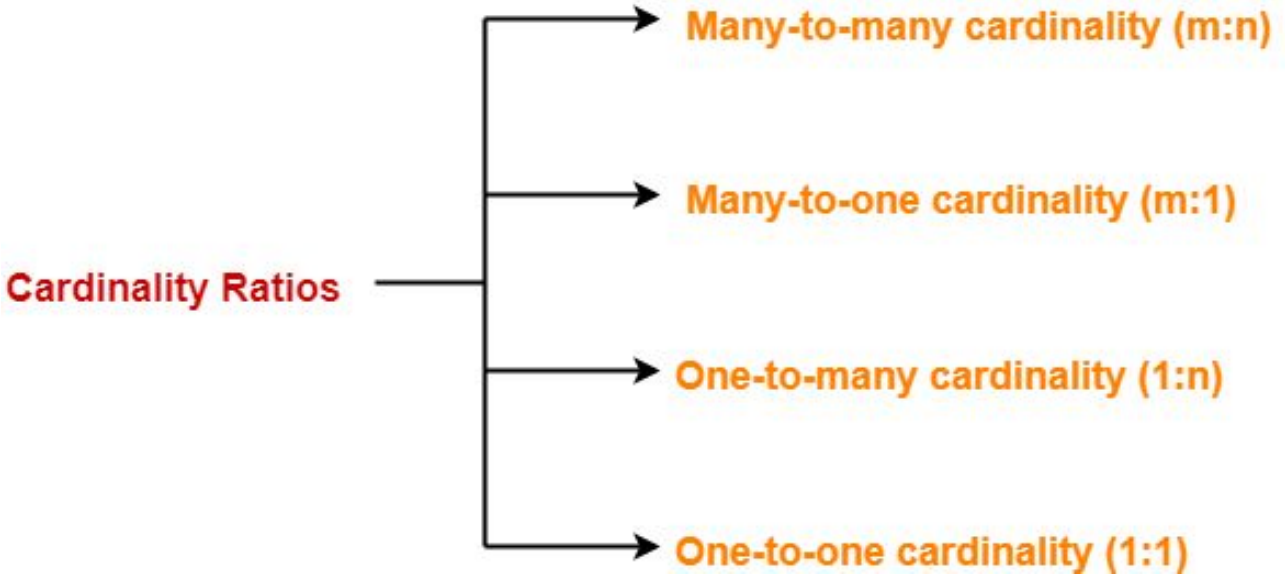


Ternary Relationship Set

Ternary relationship set is a relationship set where three entity sets participate in a relationship set.

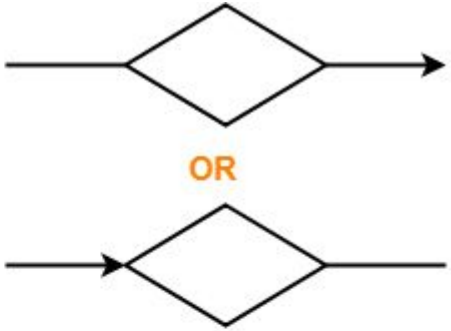
N-ary Relationship Set-

For Cardinality Constraints / Ratios-



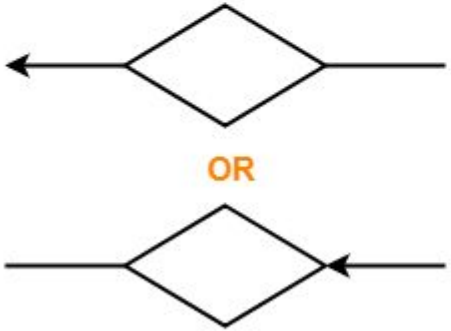
Many-to-Many relationship

(m:n)



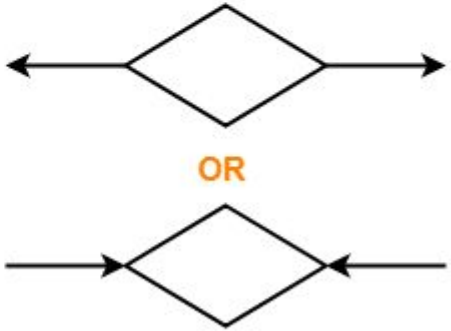
Many-to-One relationship

(m:1)



One-to-Many relationship

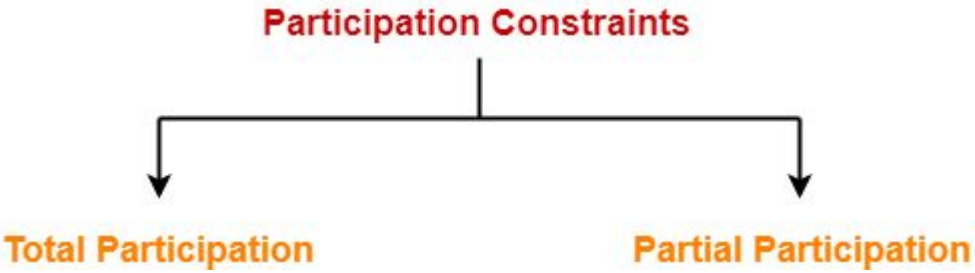
(1:n)



One-to-One relationship

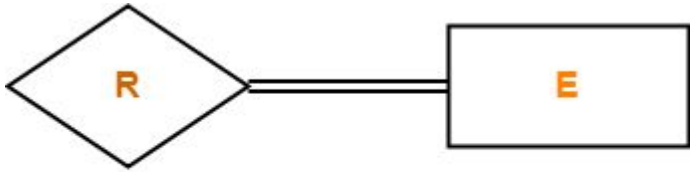
(1:1)

Participation Constraints-



Total Participation-

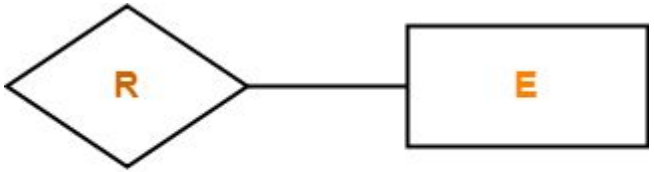
- It specifies that each entity in the entity set must compulsorily participate in at least one relationship instance in that relationship set.
- That is why, it is also called as **mandatory participation.**
- Total participation is represented using a double line between the entity set and relationship set.



Total Participation

Partial Participation-

- It specifies that each entity in the entity set may or may not participate in the relationship instance in that relationship set.
- That is why, it is also called as **optional participation.**
- Partial participation is represented using a single line between the entity set and relationship set.



Partial Participation

For Strong Entity Set With Only Simple Attributes-

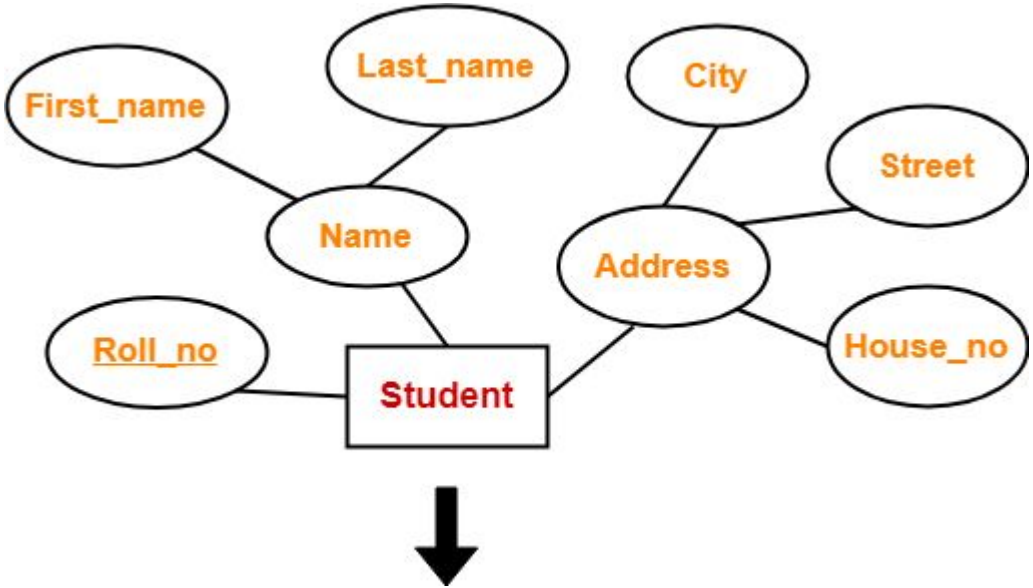
A strong entity set with only simple attributes will require only one table in relational model.

Attributes of the table will be the attributes of the entity set.

The primary key of the table will be the key attribute of the entity set.

For Strong Entity Set With Composite Attributes-

- A strong entity set with any number of composite attributes will require only one table in relational model.
- While conversion, simple attributes of the composite attributes are taken into account and not the composite attribute itself.



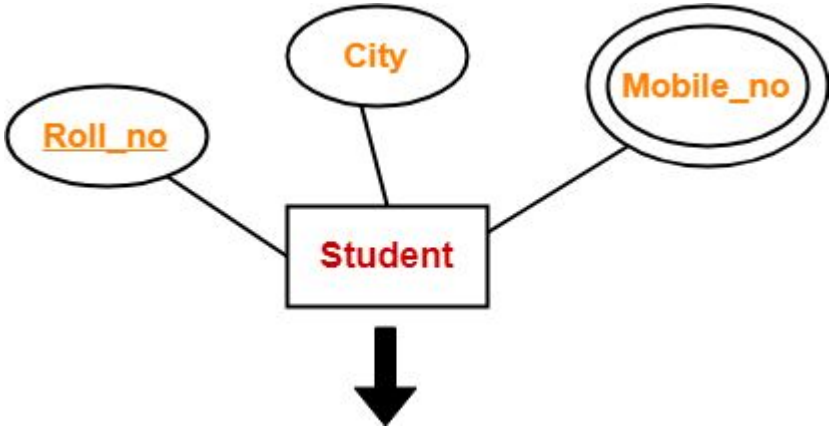
Schema : Student (Roll_no , First_name , Last_name , House_no , Street , City)

Roll_no	First_name	Last_name	House_no	Street	City

For Strong Entity Set With Multi Valued Attributes-

A strong entity set with any number of multi valued attributes will require two tables in relational model.

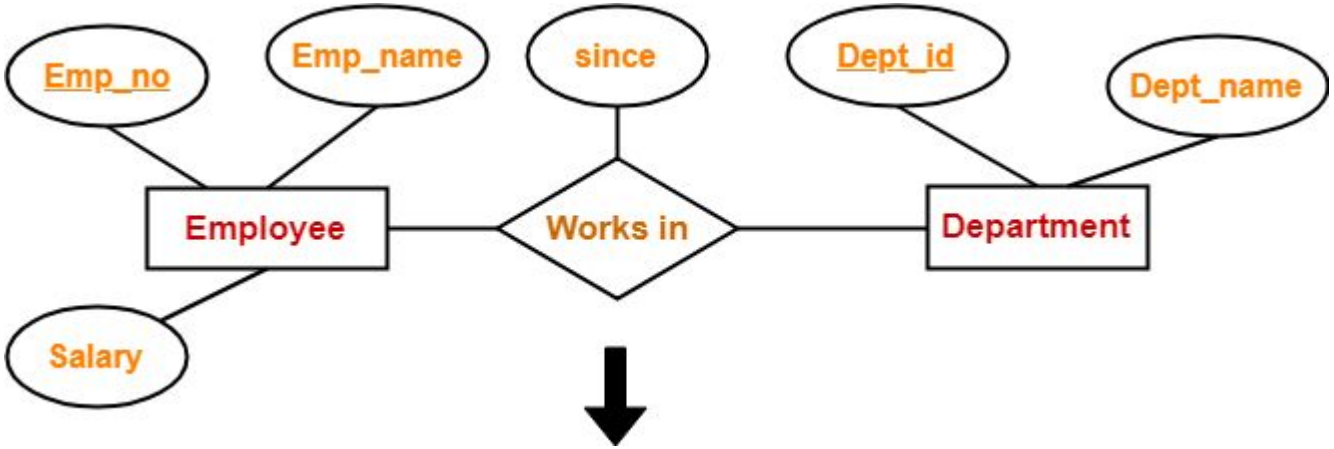
- One table will contain all the simple attributes with the primary key.
- Other table will contain the primary key and all the multi valued attributes.



Roll_no	City

Roll_no	Mobile_no

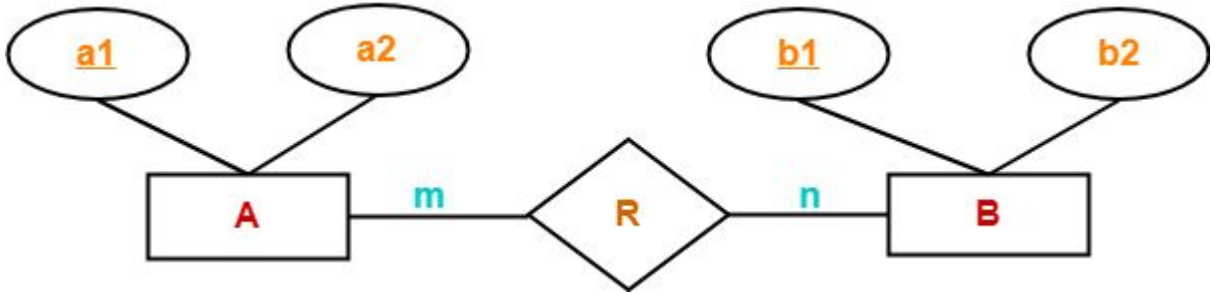
Translating Relationship Set into a Table-



Emp_no	Dept_id	since

For Binary Relationships With Cardinality Ratios-

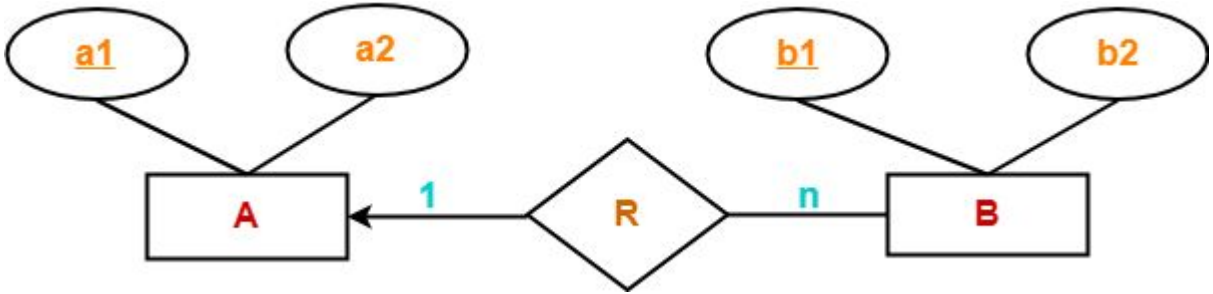
Case-01: For Binary Relationship With Cardinality Ratio m:n



Here, three tables will be required-

1. A (a1 , a2)
2. R (a1 , b1)
3. B (b1 , b2)

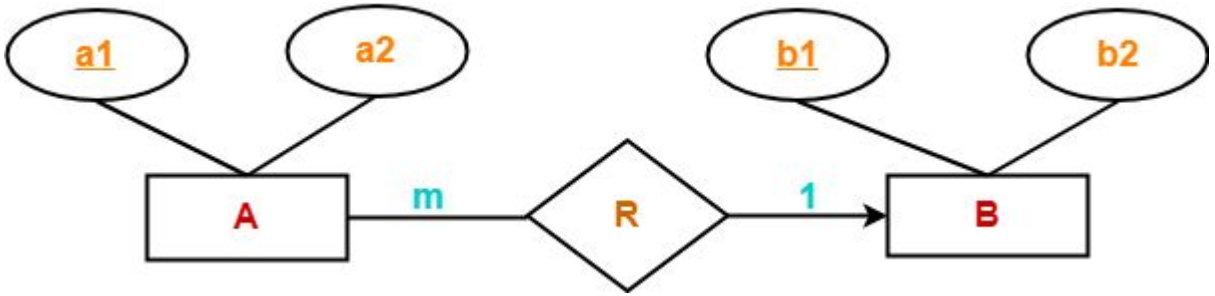
Case-02: For Binary Relationship With Cardinality Ratio 1:n



Here, two tables will be required-

1. A (a1 , a2)
2. BR (a1 , b1 , b2)

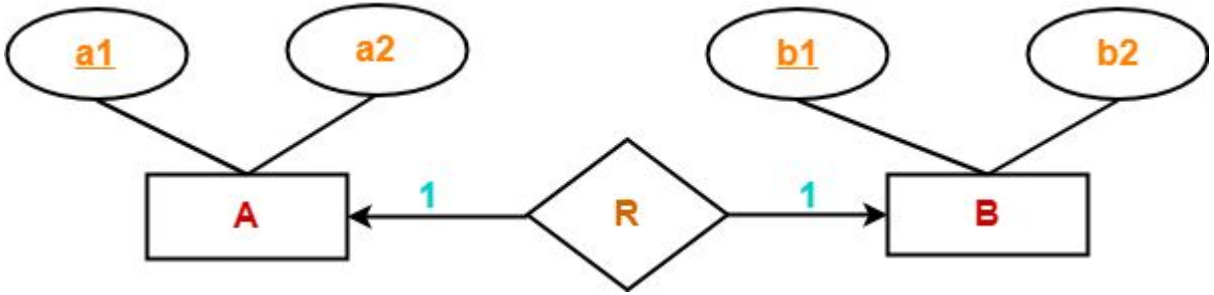
For Binary Relationship With Cardinality Ratio m:1



Here, two tables will be required-

1. AR (a1 , a2 , b1)
2. B (b1 , b2)

For Binary Relationship With Cardinality Ratio 1:1



Here, two tables will be required. Either combine ‘R’ with ‘A’ or ‘B’

Way-01:

1. AR (a1 , a2 , b1)
2. B (b1 , b2)

Way-02:

1. A (a1 , a2)
2. BR (a1 , b1 , b2)