

# **IDHAYA COLLEGE FOR WOMEN**

## **KUMBAKONAM**



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**Subject : Database Systems**

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**Topic : Database System  
Architecture**

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# THE ENTITY RELATIONSHIP MODEL

- E-R diagram is the short form of “Entity-Relationship” diagram. An E-R diagram efficiently shows the relationships between various entities stored in a database.
- E-R diagrams are used to model real-world objects like a person, a car, a company etc. and the relation between these real-world objects.
- An E-R diagram has following features:
- E-R diagrams are used to represent E-R model in a database, which makes them easy to be converted into relations (tables).
- E-R diagrams provide the purpose of real-world modeling of objects which makes them intently useful.
- E-R diagrams require no technical knowledge & no hardware support.
- These diagrams are very easy to understand and easy to create even by a naive user.
- It gives a standard solution of visualizing the data logically.

## COMPONENTS OF AN E-R DIAGRAM

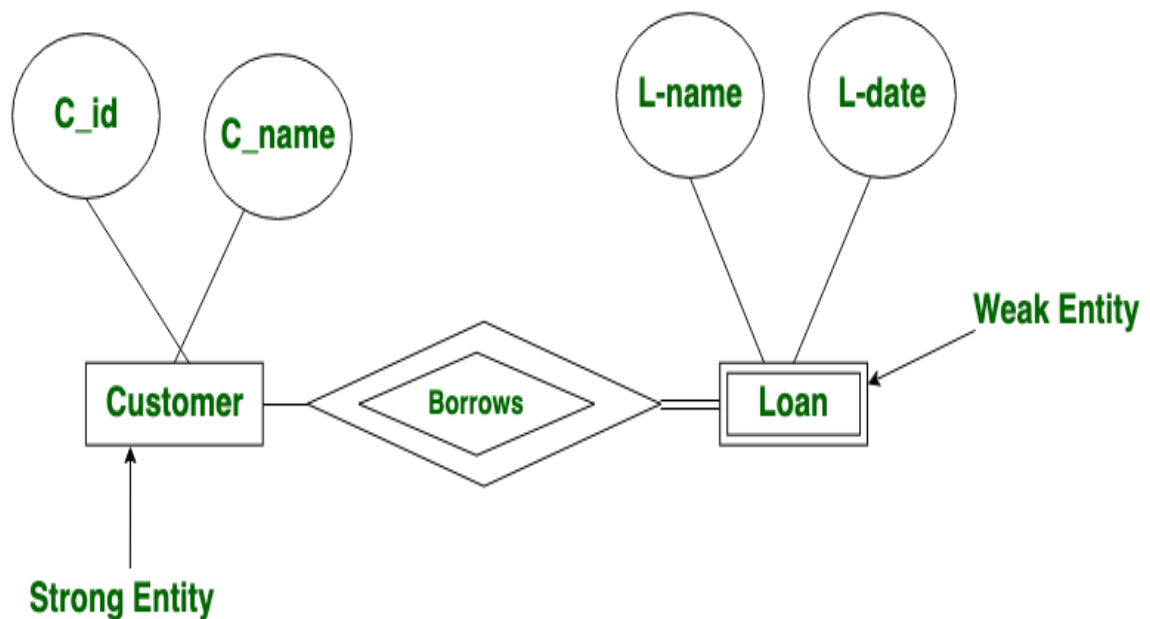
An E-R diagram constitutes of following Components






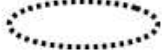



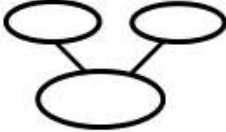

- A. Entity:-** Any real-world object can be represented as an entity about which data can be stored in a database. All the real world objects like a book, an organization, a product, a car, a person are the examples of an entity. Any living or non-living objects can be represented by an entity.

An entity is symbolically represented by a rectangle enclosing its name.

Entities can be characterized into two types:

- Strong entity:** A strong entity is not dependent of any other entity in the schema. A strong entity will always have a primary key. Strong entities are represented by a single rectangle. The relationship of two strong entities is represented by a single diamond. Various strong entities, when combined together, create a strong entity set.
- Weak entity:** A weak entity is dependent on a strong entity to ensure the existence. Unlike a strong entity, a weak entity does not have any primary key. It instead has a partial discriminator key. A weak entity is represented by a double rectangle. The relation between one strong and one weak entity is represented by a double diamond.

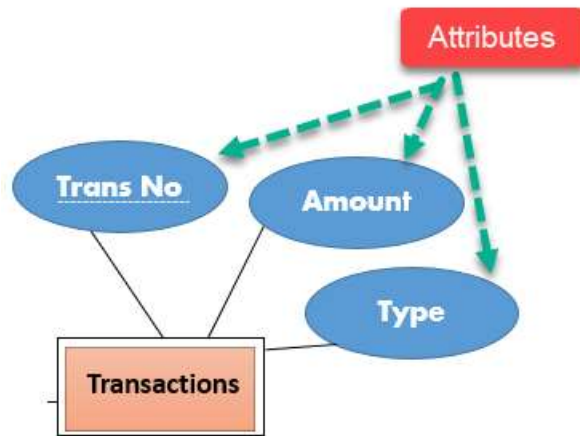


	Represents Entity
	Represents Attribute
	Represents Relationship
	Links Attribute(s) to entity set(s) or Entity set(s) to Relationship set(s)
	Represents Multivalued Attributes
	Represents Derived Attributes
	Represents Total Participation of Entity
	Represents Weak Entity
	Represents Weak Relationships
	Represents Composite Attributes
	Represents Key Attributes / Single Valued Attributes

**Attribute:-** Each entity has a set of properties. These properties of each entity are termed as attributes. It is a single-valued property of either an entity-type or a relationship-type. For example, a lecture might have attributes: time, date, duration, place, etc.

An attribute is represented by an Ellipse

- Attributes are indicated by ovals in an E-R diagram. A primary key attribute is depicted by an underline in the E-R diagram.



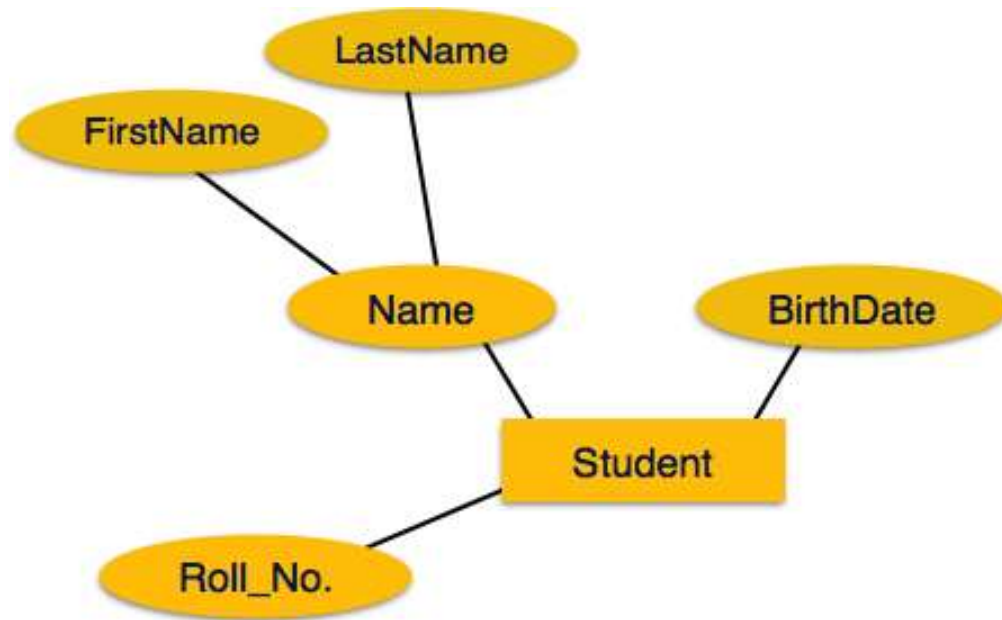
- An attribute can be characterized into following types:

**Simple attribute:-** An attribute is classified as a simple attribute if it cannot be partitioned into smaller components.

For example, age and sex of a person. A simple attribute is represented by an oval.



**Composite attribute:-** A composite attribute can be subdivided into smaller components which further form attributes. Every node is then connected to its attribute. That is, composite attributes are represented by ellipses that are connected with an ellipse.

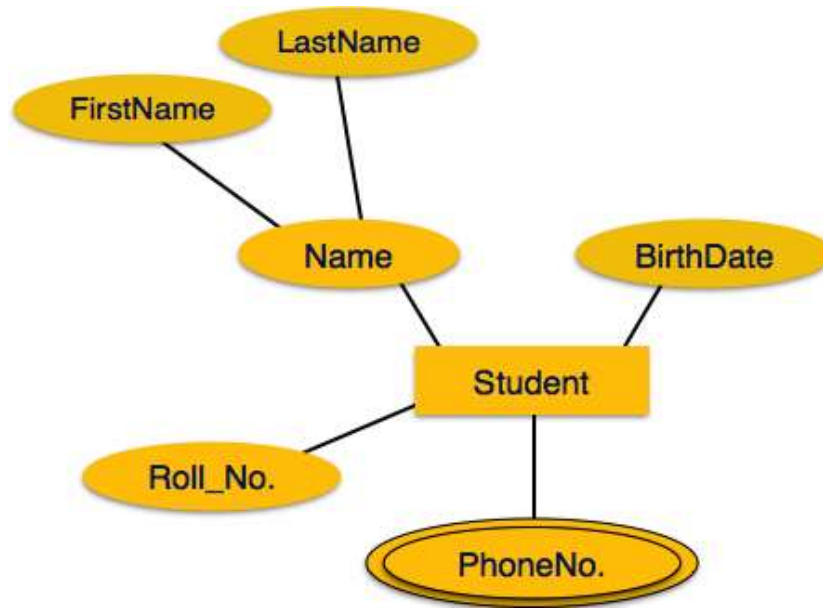


**Single valued attribute:-** If an attribute of a particular entity represents single value for each instance, then it is called a single-valued attribute. For example, Ramesh, Kamal and Suraj are the instances of entity 'student' and each of them is issued a separate roll number. A single oval is used to represent this attribute.

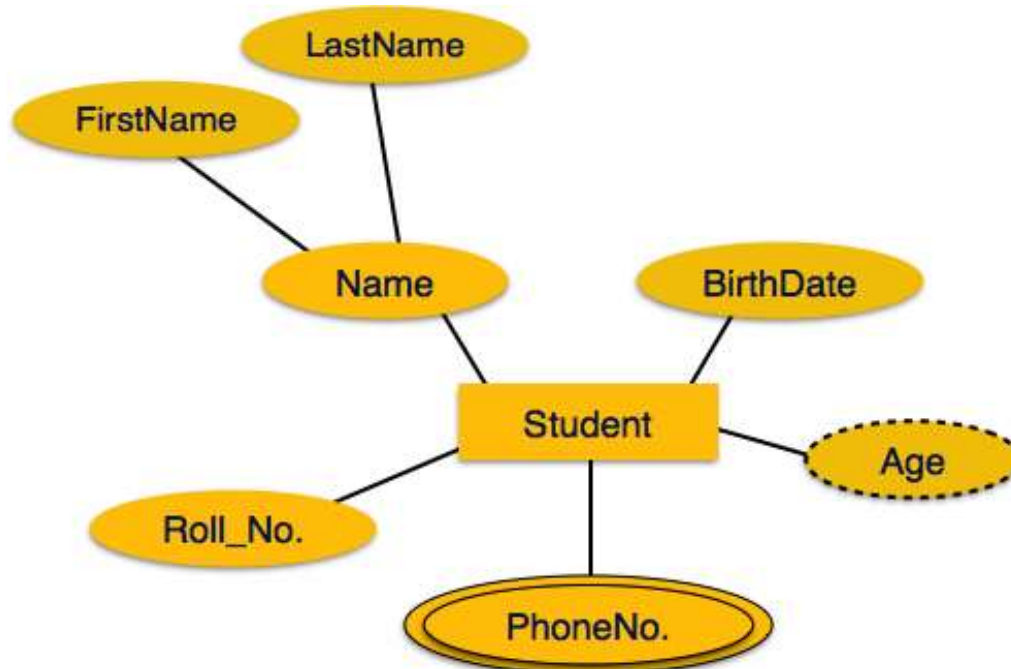


**Multi valued attribute:-** An attribute which can hold more than one value, it is then termed as multi-valued attribute. Multivalued attributes are depicted by double ellipse.





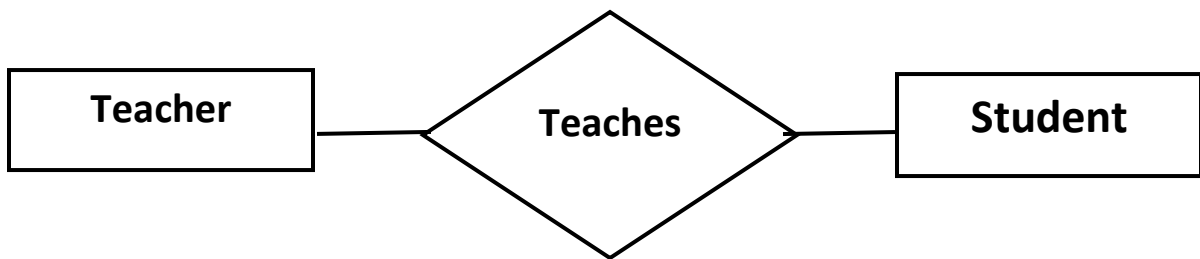
**Derived attribute:** A derived attribute calculate its value from another attribute. Derived attributes are depicted by dashed ellipse.



**B. Relationships:-** A relationship is defined as bond or attachment between 2 or more entities. Normally, a verb in a sentence signifies a relationship.

For example,

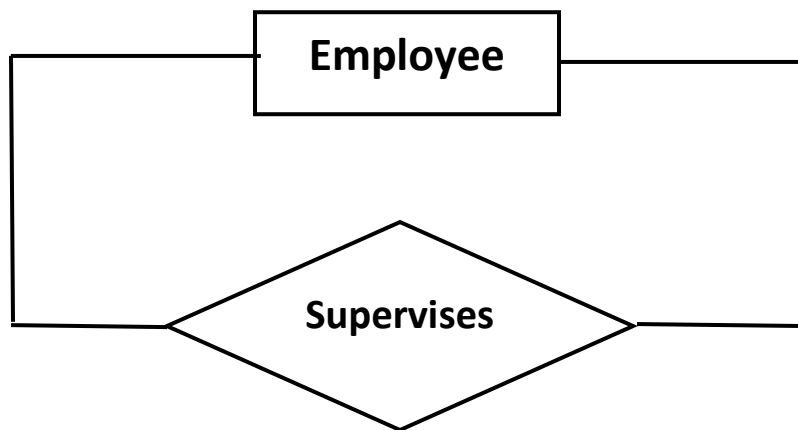
- An employee assigned a project.
- Teacher teaches a student.
- Author writes a book. A diamond is used to symbolically represent a relationship in the e-r diagram.



### VARIOUS TERMS RELATED TO RELATIONSHIPS

a). **Degree of relationship:-** It signifies the number of entities involved in a relationship. Degree of a relationship can be classified into following types:

- **Unary relationship:-** If only single entity is involved in a relationship then it is a unary relationship. For example, An employee(manager) supervises another employee.





**Binary relationships:-** when two entities are associated to form a relation, then it is known as a binary relationship.

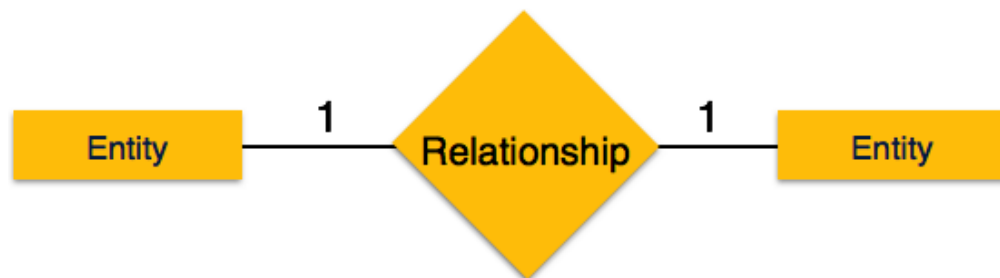
For example, A person works in a company. Most of the times we use only binary relationship in an e-r diagram. The teacher-student example shown above signifies a binary relationship.

Other types of relationships are ternary and quaternary. As the name signifies, a ternary relationship is associated with three entities and a quaternary relationship is associated with four entities.

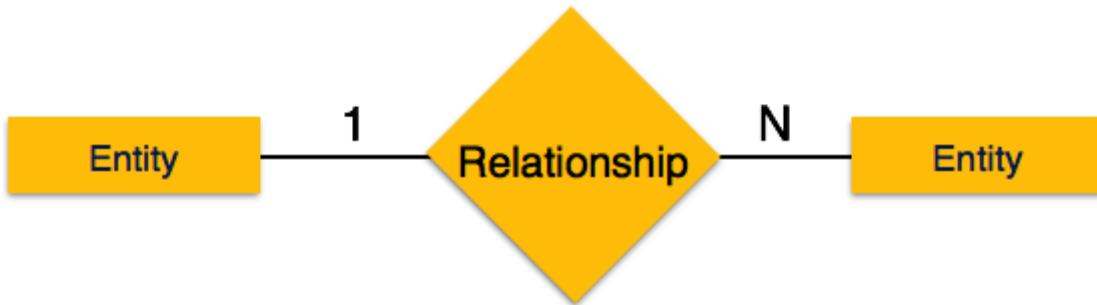
**b.) Connectivity of a relationship:-** Connectivity of a relationship describes, how many instances of one entity type are linked to how many instances of another entity type.

Various categories of connectivity of a relationship are:

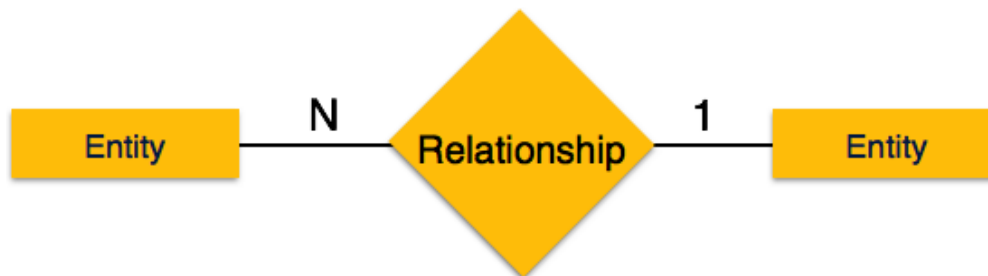
- **One to One (1:1)** – When only one instance of an entity is associated with the relationship, it is marked as '1:1'. The following image reflects that only one instance of each entity should be associated with the relationship. It depicts one-to-one relationship.



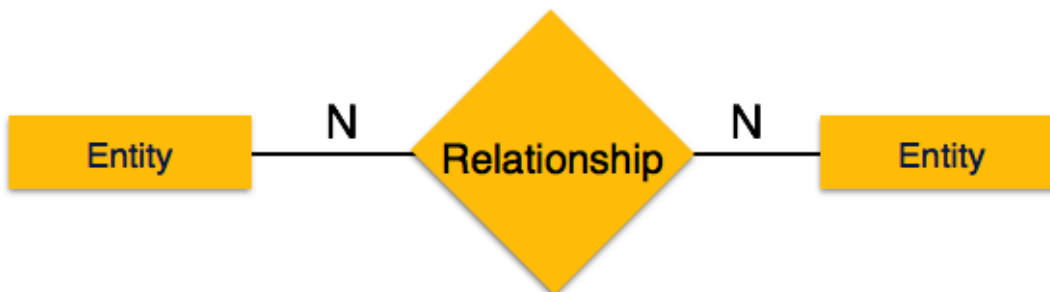
- **One to Many (1:M)** – When more than one instance of an entity is associated with a relationship, it is marked as '1:N'. The following image reflects that only one instance of entity on the left and more than one instance of an entity on the right can be associated with the relationship. It depicts one-to-many relationship.



- **Many to One (M:1)** – When more than one instance of entity is associated with the relationship, it is marked as 'N:1'. The following image reflects that more than one instance of an entity on the left and only one instance of an entity on the right can be associated with the relationship. It depicts many-to-one relationship.



- **Many to Many (M:N)** – The following image reflects that more than one instance of an entity on the left and more than one instance of an entity on the right can be associated with the relationship. It depicts many-to-many relationship.



**c) Weak Entity Type and Identifying Relationship:** An entity type has a key attribute which uniquely identifies each entity in the entity set. But there exists some entity type for which key attribute can't be defined. These are called Weak Entity type.

For example, A company may store the information of dependants (Parents, Children, Spouse) of an Employee. But the dependents don't have existence without the employee. So Dependent will be weak entity type and Employee will be Identifying Entity type for Dependant.

A weak entity type is represented by a double rectangle. The participation of weak entity type is always total. The relationship between weak entity type and its identifying strong entity type is called identifying relationship and it is represented by double diamond.

