Entity Relationship Model

What is an Entity Relationship Model?

- The **Entity Relationship (ER) model** is a conceptual data modeling technique used in software engineering and database design.
- It represents entities (objects or concepts) as rectangles, and relationships (associations between entities) as diamonds.
- ER models are typically used to design relational databases, which are used to store and manage data. The ER model helps to ensure that the database is well-designed and organized, and that it meets the requirements of the users.

Components of ER Model

- The basic components of an ER model are:

1. **Entity:** An entity is a real-world object or concept that has its own set of attributes or properties. For example, a customer, a product, or an order can be entities.

2. **Attribute:** An attribute is a property of an entity that describes its characteristics. For example, a customer's name, address, and email address can be attributes.

3. **Relationship:** A relationship is an association between two or more entities. For example, a customer can place an order, and an order can contain one or more products.

4. **Cardinality:** Cardinality is the number of instances of an entity that can be associated with another entity. For example, a customer can place many orders, but an order can only belong to one customer.

5. **Participation:** Participation describes whether an entity is mandatory or optional in a relationship. For example, a customer can place an order, but an order cannot exist without a customer.

Types of Relationship in ER model

- In the Entity Relationship (ER) model, there are three types of relationships:

1. **One-to-One (1:1) Relationship:** In a one-to-one relationship, one instance of an entity is associated with only one instance of another entity. For example, a person can have only one passport, and a passport can belong to only one person.

2. **One-to-Many (1:N) Relationship:** In a one-to-many relationship, one instance of an entity is associated with multiple instances of another entity. For example, a customer can have many orders, but an order can belong to only one customer.

3. **Many-to-Many (N:N) Relationship:** In a many-to-many relationship, multiple instances of an entity are associated with multiple instances of another entity. For example, a student can enroll in many courses, and a course can have many students enrolled in it.

- To represent these relationships in an ER diagram, different symbols are used:

1. **One-to-One relationship** is represented by a line connecting two entities with a straight line and a cardinality of "1" on both sides.

2. **One-to-Many relationship** is represented by a line connecting two entities with an arrow pointing towards the entity with a cardinality of "1" and a cardinality of "N" on the other side.

3. **Many-to-Many relationship** is represented by a line connecting two entities with arrows pointing towards both entities, and a cardinality of "N" on both sides. A separate table (also known as a junction table) is used to store the relationship between the two entities.