* 1. **Entity-Relationship Diagram (ERD)**

**Entity-Relationship Diagram (ERD) with Different Types of Relationships**

An **Entity-Relationship Diagram (ERD)** is a visual representation of entities (data objects) and the relationships between them. It is widely used in **conceptual and logical data modeling**.

**Core Components of an ERD**

| **Element** | **Description** |
| --- | --- |
| **Entity** | A real-world object or concept (noun) |
| **Attribute** | Properties or characteristics of an entity |
| **Relationship** | How entities are related to each other |
| **Primary Key** | Unique identifier for an entity |
| **Foreign Key** | Attribute that links one entity to another |

n an **Entity-Relationship Diagram (ERD)** or **data modeling**, a **relationship** is typically represented by a **verb or verb phrase**.

**🔹 Answer:**

**A relationship is represented by a *verb*** (or a **verb phrase**).

**Explanation:**

| **Component** | **Representation Type** | **Example** |
| --- | --- | --- |
| **Entity** | **Noun** | Customer, Order, Product |
| **Attribute** | **Adjective/Noun** | Email, Price, Date of Birth |
| **Relationship** | **Verb/Verb Phrase** | Places, Buys, Manages, Enrolls in |

**🔹 Example ERD:**

Customer —— places ——> Order

* **Entities**: Customer, Order (both are nouns)
* **Relationship**: *places* (verb) — shows the action or association between entities.

**🔹 More Examples:**

| **Entity A** | **Relationship (Verb)** | **Entity B** |
| --- | --- | --- |
| Employee | manages | Employee |
| Student | enrolls in | Course |
| Doctor | treats | Patient |
| Supplier | provides | Product |

So in summary:

* **Entities** = **Nouns**
* **Relationships** = **Verbs**
* **Attributes** = **Nouns** (sometimes function like adjectives to describe entities)

**Types of Relationships in ERD**

| **Relationship Type** | **Symbol** | **Description** | **Example** |
| --- | --- | --- | --- |
| **One-to-One (1:1)** | ―――――― | Each entity instance relates to only one in the other entity | Each **person** has one **passport** |
| **One-to-Many (1:N)** | ――――< | One entity instance relates to many in the other entity | A **customer** places many **orders** |
| **Many-to-Many (M:N)** | >――< | Many instances in one entity relate to many in the other | Students enroll in many **courses** and vice versa |
| **Recursive** | Loop | An entity has a relationship with itself | An **employee** manages another **employee** |
| **Ternary** | Triangle | A relationship involving **three entities** | A **doctor** prescribes a **medicine** to a **patient** |

**Relationships:**

* **Customer (1)** ―――< **Order (Many)**  
  (One customer can place many orders)
* **Order (1)** ―――< **Order\_Details (Many)**  
  (One order can have many products)
* **Product (1)** ―――< **Order\_Details (Many)**  
  (One product can be in many orders)
* **Employee (Recursive)**  
  (One employee can manage many others)

A **unary relationship** (also known as a **recursive relationship**) is a relationship **between instances of the same entity**—in other words, **an entity is related to itself**.

**🔹 Definition:**

A **unary relationship** occurs when **an entity participates more than once in a relationship**, but in **different roles**.

**🔹 Example: Employee manages Employee**

**Entity: Employee**

* Employee\_ID (Primary Key)
* Name
* Manager\_ID (Foreign Key to Employee\_ID)

Here, an **employee** (in the role of manager) supervises other **employees** (in the role of subordinates).