What is Entity Relationship Diagram?

An Entity-Relationship Diagram (ERD) is a visual representation used in database design to illustrate the structure of data and the relationships between different data entities. It helps in organizing and understanding the data requirements of a system, providing a blueprint for building the database.

Key Components of an E-R Diagram

1. **Entities**: Represent objects or concepts, such as "Student," "Book," or "Course," that have a distinct existence. Entities are typically shown as rectangles.
2. **Attributes**: Describe properties or characteristics of an entity, like "Name," "ID," or "Address" for a "Student" entity. Attributes are usually represented as ovals connected to their entity.
3. **Relationships**: Define the associations between entities, for example, a "Student" *borrows* a "Book." Relationships are typically depicted by diamonds connecting entities.
4. **Primary Key**: A unique identifier for each entity instance, often represented with an underline in ER diagrams. For example, "Student ID" might be the primary key for the "Student" entity.
5. **Foreign Key**: A field in one entity that links to the primary key of another entity, establishing a relationship between the two.

What are attributes in ER Model? Explain Multivalued and Derived attribute?

In an Entity-Relationship (ER) model, **attributes** represent properties or characteristics of an entity or relationship. Attributes define the type of information stored for each entity, helping to describe and identify entities in the database. For example, in an ER model for a "Student" entity, attributes might include *Name*, *Student ID*, *Address*, and *Phone Number*.

Types of Attributes

Attributes can be classified based on their characteristics. Two important types are **Multivalued Attributes** and **Derived Attributes**.

1. **Multivalued Attribute**:
    - A multivalued attribute can have multiple values for a single entity instance.
    - For example, a "Phone Number" attribute for a "Student" entity could store multiple phone numbers (e.g., home, mobile, office).
    - In ER diagrams, multivalued attributes are typically represented with a double oval around the attribute name.
2. **Derived Attribute**:
    - A derived attribute is one that can be calculated or derived from other attributes in the database, rather than being explicitly stored.
    - For example, an "Age" attribute for a "Student" entity could be derived from the "Date of Birth" attribute.
    - Derived attributes are typically shown with a dashed oval in ER diagrams to indicate that they are computed rather than stored.