

# **DATABASE MANAGEMENT SYSTEM**

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**E-R MODELING**

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# E-R MODELING

The ER model defines the conceptual view of a database. It works around real-world entities and the associations among them. At view level, the ER model is considered a good option for designing databases.

## **Entity**

An entity can be a real-world object, either animate or inanimate, that can be easily identifiable. For example, in a school database, students, teachers, classes, and courses offered can be considered as entities. All these entities have some attributes or properties that give them their identity.

An entity set is a collection of similar types of entities. An entity set may contain entities with attribute sharing similar values. For example, a Students set may contain all the students of a school; likewise a Teachers set may contain all the teachers of a school from all faculties. Entity sets need not be disjoint.



# ATTRIBUTES

Entities are represented by means of their properties, called **attributes**. All attributes have values. For example, a student entity may have name, class, and age as attributes.

There exists a domain or range of values that can be assigned to attributes. For example, a student's name cannot be a numeric value. It has to be alphabetic. A student's age cannot be negative, etc.



# TYPES OF ATTRIBUTES

- **Simple attribute** – Simple attributes are atomic values, which cannot be divided further. For example, a student's phone number is an atomic value of 10 digits.
- **Composite attribute** – Composite attributes are made of more than one simple attribute. For example, a student's complete name may have `first_name` and `last_name`.
- **Derived attribute** – Derived attributes are the attributes that do not exist in the physical database, but their values are derived from other attributes present in the database. For example, `average_salary` in a department should not be saved directly in the database, instead it can be derived. For another example, age can be derived from `data_of_birth`.
- **Single-value attribute** – Single-value attributes contain single value. For example – `Social_Security_Number`.
- **Multi-value attribute** – Multi-value attributes may contain more than one values. For example, a person can have more than one phone number, `email_address`, etc.

# ENTITY-SET AND KEYS

Key is an attribute or collection of attributes that uniquely identifies an entity among entity set.

For example, the roll\_number of a student makes him/her identifiable among students.

- **Super Key** – A set of attributes (one or more) that collectively identifies an entity in an entity set.
- **Candidate Key** – A minimal super key is called a candidate key. An entity set may have more than one candidate key.
- **Primary Key** – A primary key is one of the candidate keys chosen by the database designer to uniquely identify the entity set.



# RELATIONSHIP

**The association among entities is called a relationship**

**For example, an employee works\_at a department, a student enrolls in a course. Here, Works\_at and Enrolls are called relationships.**

## **Relationship Set**

**A set of relationships of similar type is called a relationship set. Like entities, a relationship too can have attributes. These attributes are called descriptive attributes.**

## **Degree of Relationship**

**The number of participating entities in a relationship defines the degree of the relationship.**

- Binary = degree 2**
- Ternary = degree 3**
- n-ary = degree n**

## REFERENCES

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