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.

Entities are represented by means of rectangles. Rectangles are named with the entity set they represent.

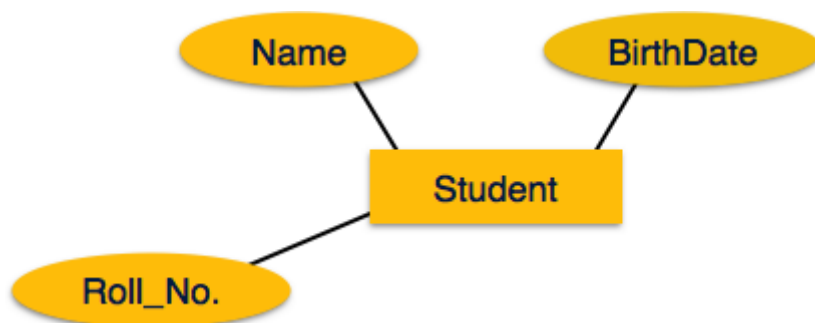| Student	Teacher	Projects

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. Attributes are the properties of entities. Attributes are represented by means of ellipses. Every ellipse represents one attribute and is directly connected to its entity (rectangle).
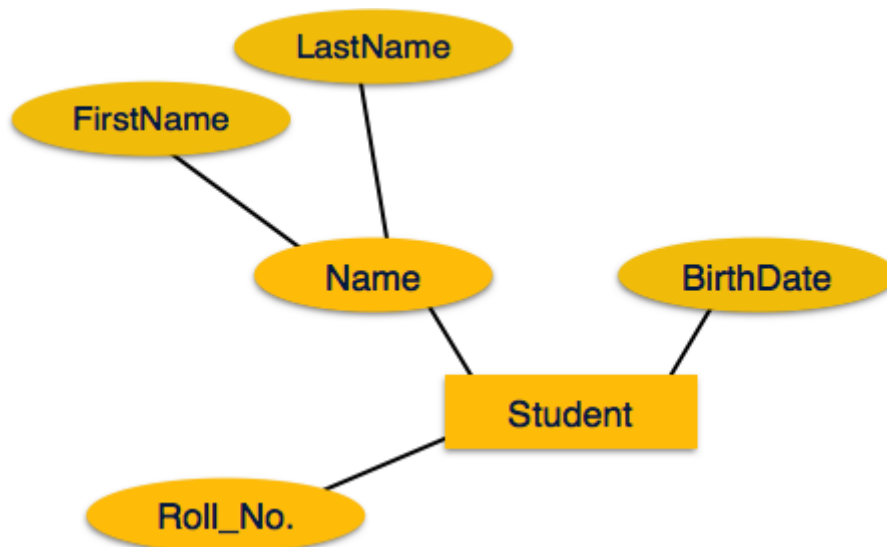
Types:

- **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

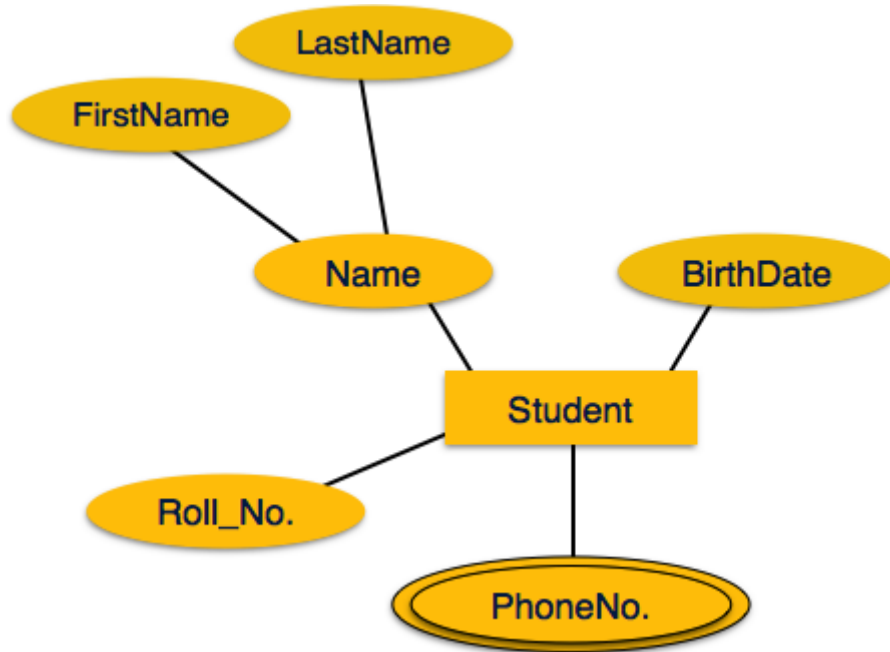database, instead it can be derived. For another example, age can be derived from data_of_birth.

- **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.
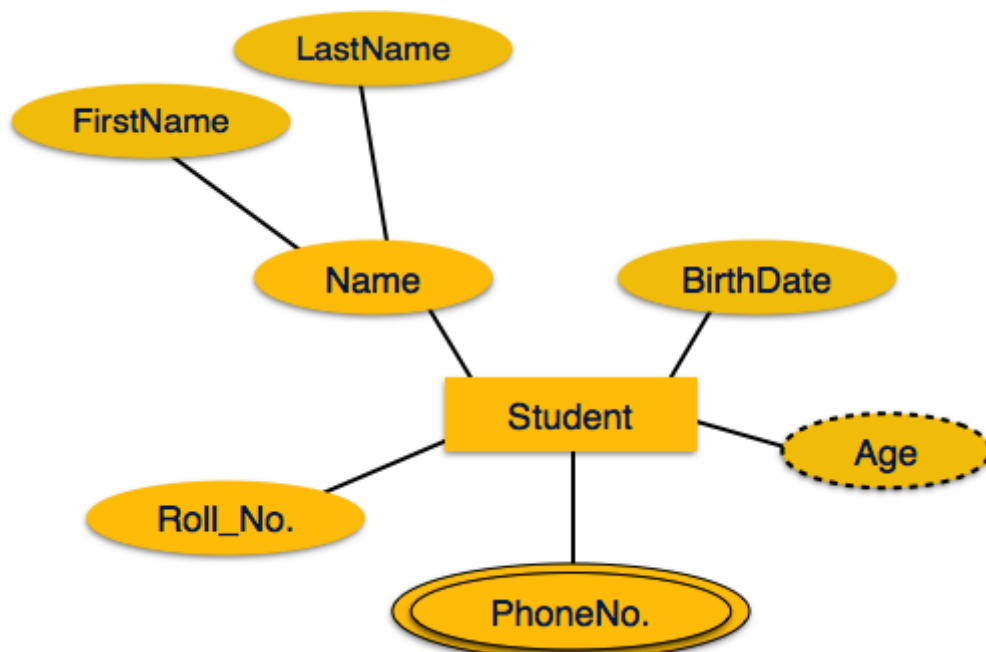
If the attributes are **composite**, they are further divided in a tree like structure. Every node is then connected to its attribute. That is, composite attributes are represented by ellipses that are connected with an ellipse.

Multivalued attributes are depicted by double ellipse.

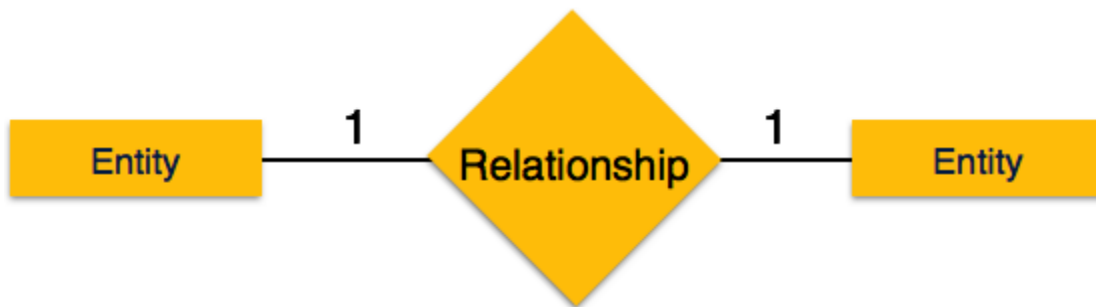**Derived** attributes are depicted by dashed ellipse.
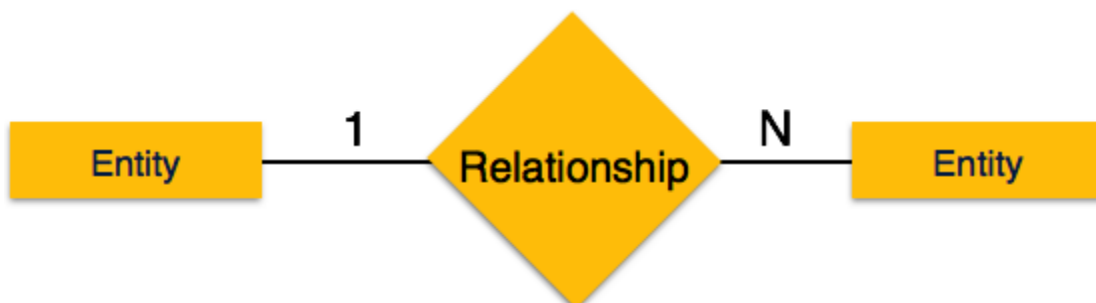
Relationship (Cardinality Ration)

Relationships are represented by diamond-shaped box. Name of the relationship is written inside the diamond-box. All the entities (rectangles) participating in a relationship, are connected to it by a line.

A relationship where two entities are participating is called a **binary relationship**. Cardinality is the number of instance of an entity from a relation that can be associated with the relation.

- **One-to-one** − 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.
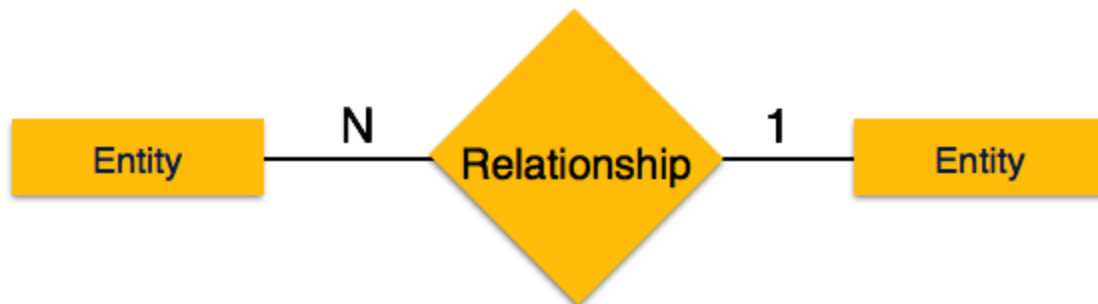

- **One-to-many** − When more than one instance of an entity is associated with a relationship, it is marked as '1:N'. The following image reflects that only one instance of entity on the left and more than one instance of an entity on the right can be associated with the relationship. It depicts one-to-many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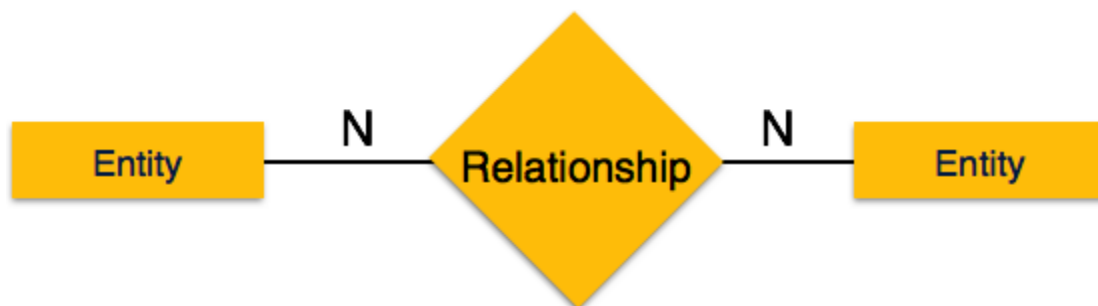

- **Many-to-one** − When more than one instance of entity is associated with the relationship, it is marked as 'N:1'. The

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** − 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.

Participation Constraints

- **Total Participation** − Each entity is involved in the relationship. Total participation is represented by double lines.

- **Partial participation** − Not all entities are involved in the relationship. Partial participation is represented by single lines.