

ER diagram

- Explained in 3rd chapter

E-Er diagram

- **EER diagram** is a visual representation of data, based on the **EER model** that is an extension of the original **entity-relationship (ER) model**.

Subclasses and Super class

Sub class and Super class relationship leads the concept of Inheritance. The relationship between sub class and super class is denoted with symbol.

1. Super Class

Super class is an entity type that has a relationship with one or more subtypes. An entity cannot exist in database merely by being member of any super class.

For example: Shape super class is having sub groups as Square, Circle, Triangle.

2. Sub Class

Sub class is a group of entities with unique attributes. Sub class inherits properties and attributes from its super class.

For example: Square, Circle, Triangle are the sub class of Shape super class.

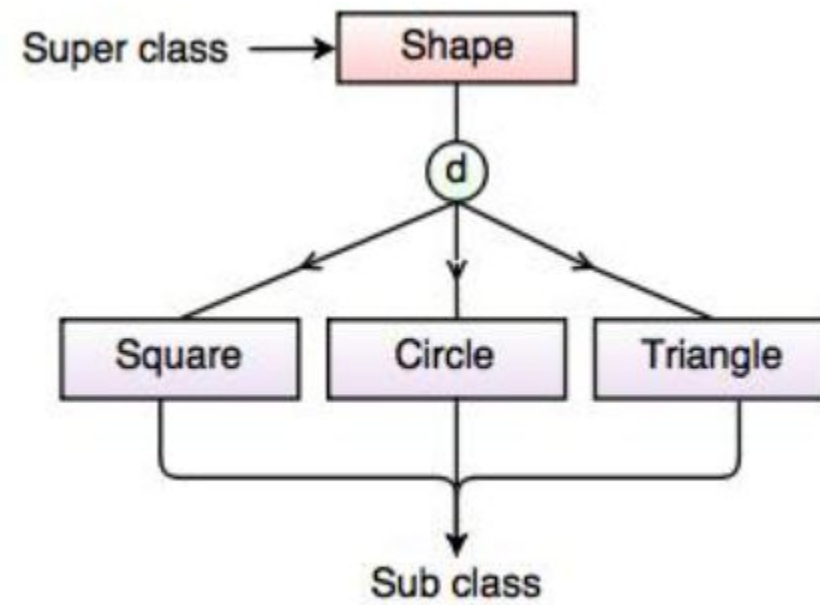


Fig. Super class/Sub class Relationship

Specialization and Generalization

1. Generalization

- Generalization is the process of generalizing the entities which contain the properties of all the generalized entities.
- It is a bottom approach, in which two lower level entities combine to form a higher level entity.
- Generalization is the reverse process of Specialization.
- It defines a general entity type from a set of specialized entity type.
- It minimizes the difference between the entities by identifying the common features.

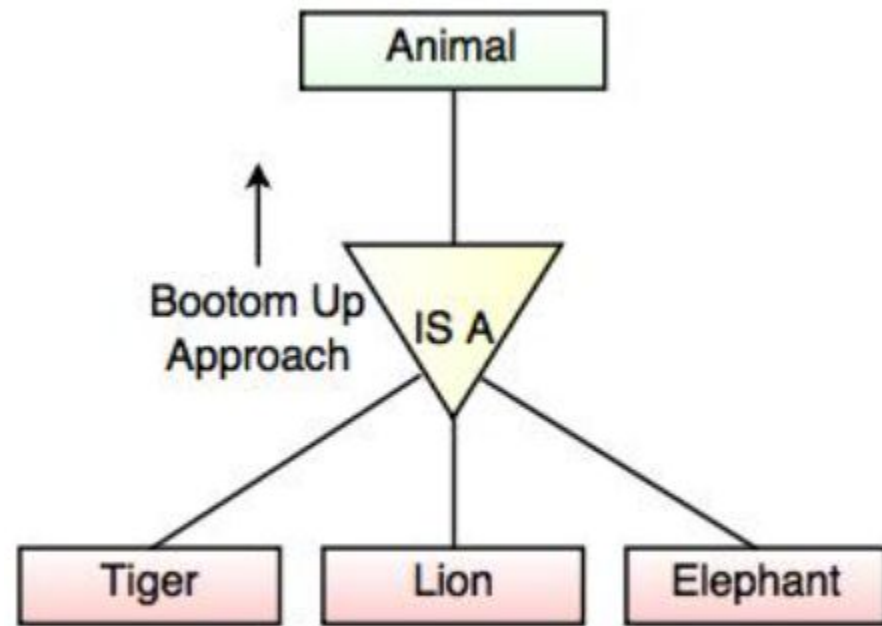


Fig. Generalization

Specialization

- Specialization is a process that defines a group entities which is divided into sub groups based on their characteristic.
- It is a top down approach, in which one higher entity can be broken down into two lower level entity.
- It maximizes the difference between the members of an entity by identifying the unique characteristic or attributes of each member.
- It defines one or more sub class for the super class and also forms the superclass/subclass relationship.

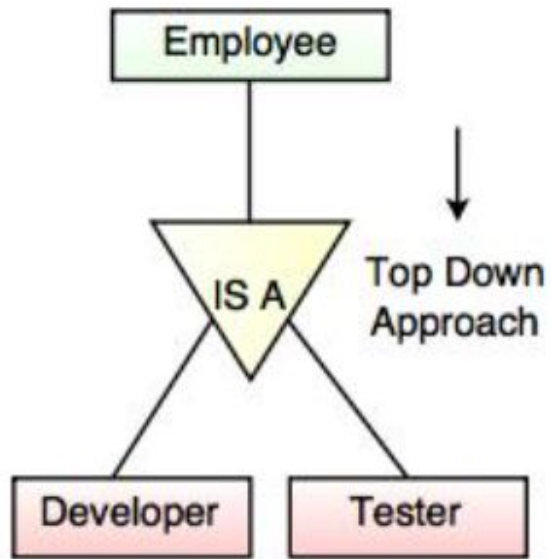


Fig. Specialization

In the above example, Employee can be specialized as Developer or Tester, based on what role they play in an Organization.

Inheritance



- ❑ **Inheritance** is an important feature of generalization and specialization.
- ❑ **Attribute inheritance** allows lower level entities to inherit the attributes of higher level entities.
 - **For example**, Consider relations Car and Bus inheriting the attributes of Vehicle. Thus, Car is described by attributes of super-class Vehicle as well as its own attributes.
- ❑ This also extends to **Participation Inheritance** in which relationships involving higher-level entity-sets are also inherited by lower-level entity-sets.
 - A lower-level entity-set can participate in its own relationship-sets, too



Category or Union

Relationship of one super or sub class with more than one super class.

Owner is the subset of two super class: Vehicle and House.

Category represents a single super class or sub class relationship with more than one super class.

It can be a total or partial participation.

For example Car booking, Car owner can be a person, a bank (holds a possession on a Car) or a company.

Category (sub class) → Owner is a subset of the union of the three super classes → Company, Bank, and Person. A Category member must exist in at least one of its super classes.

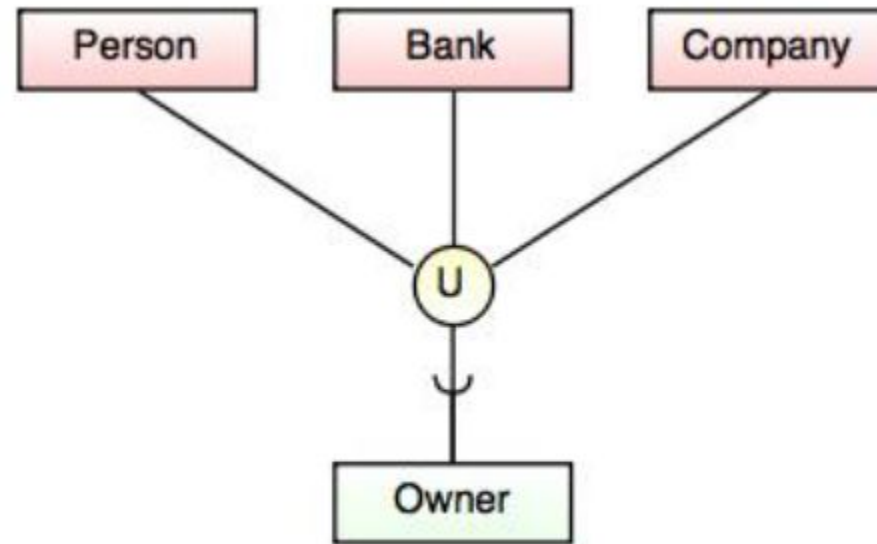
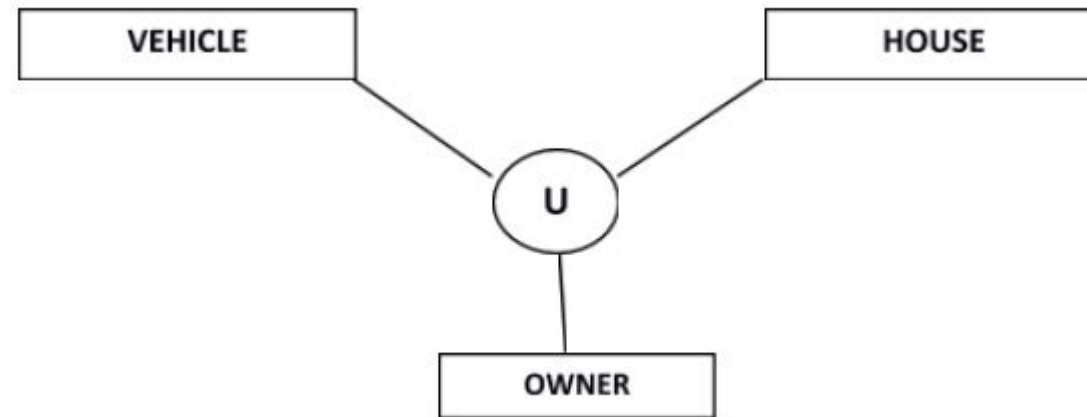


Fig. Categories (Union Type)



Aggregation

- Aggregation is a process that represent a relationship between a whole object and its component parts.
- It abstracts a relationship between objects and viewing the relationship as an object.
- It is a process when two entity is treated as a single entity.

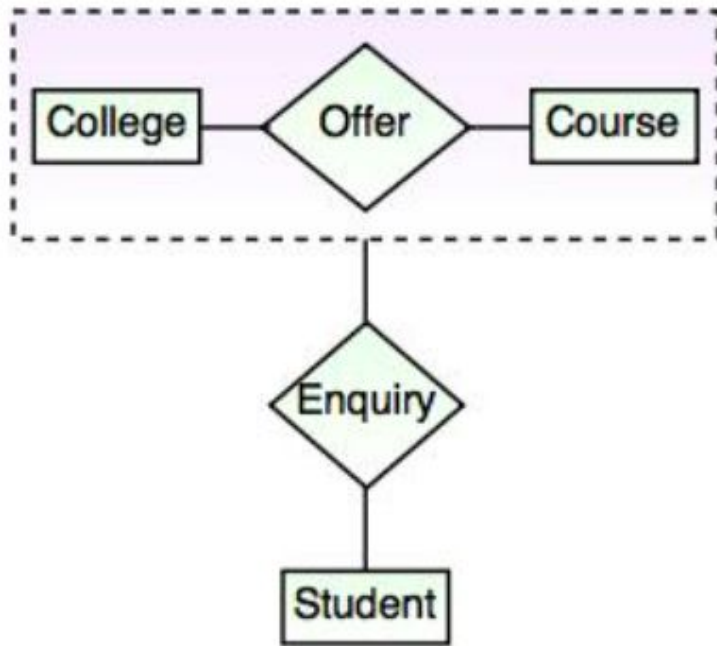
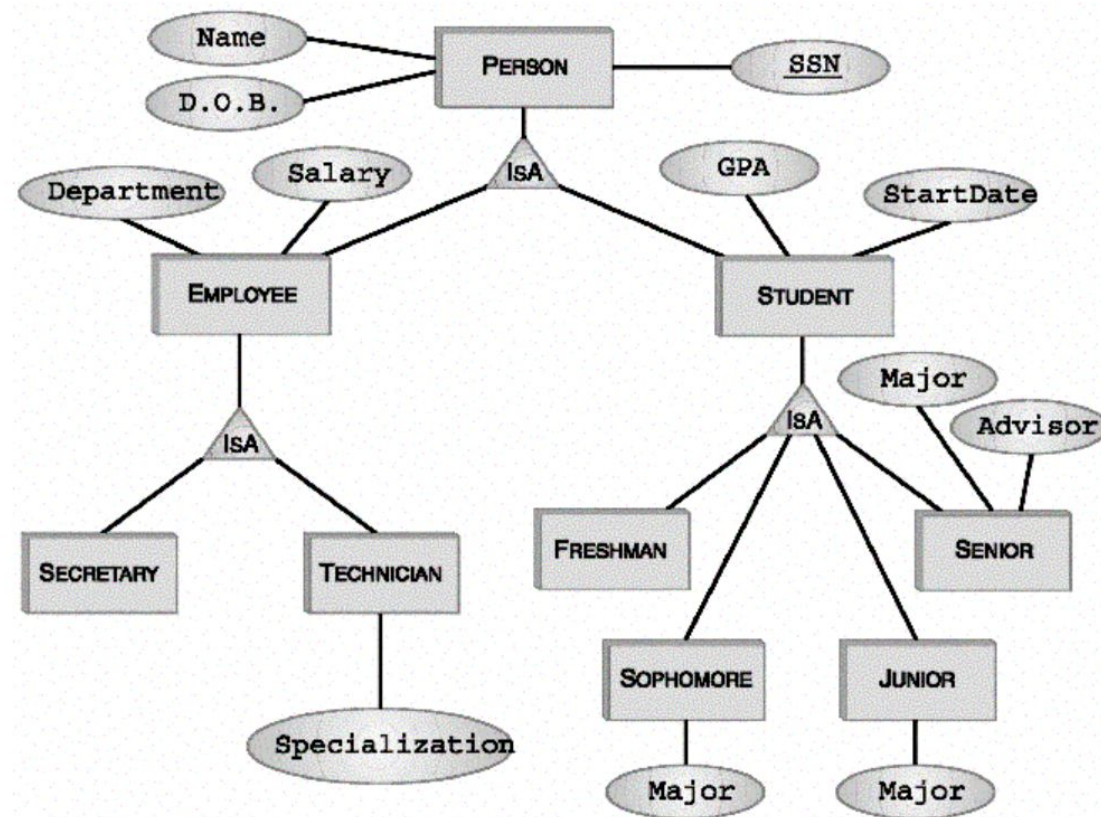


Fig. Aggregation

In the above example, the relation between College and Course is acting as an Entity in Relation with Student.



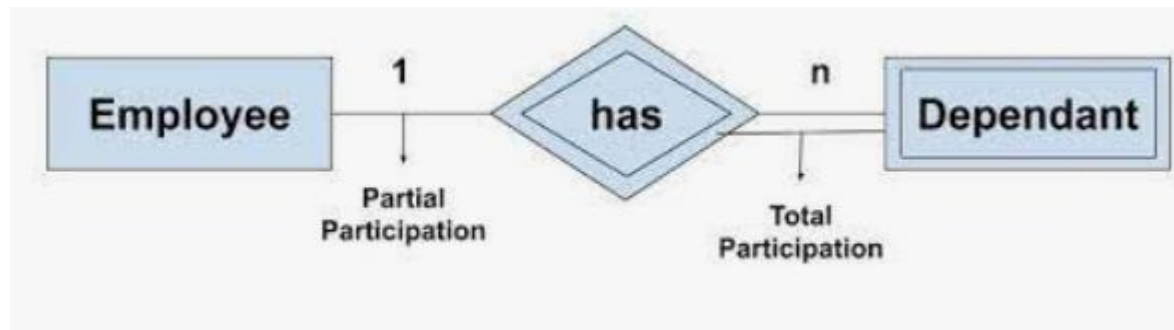
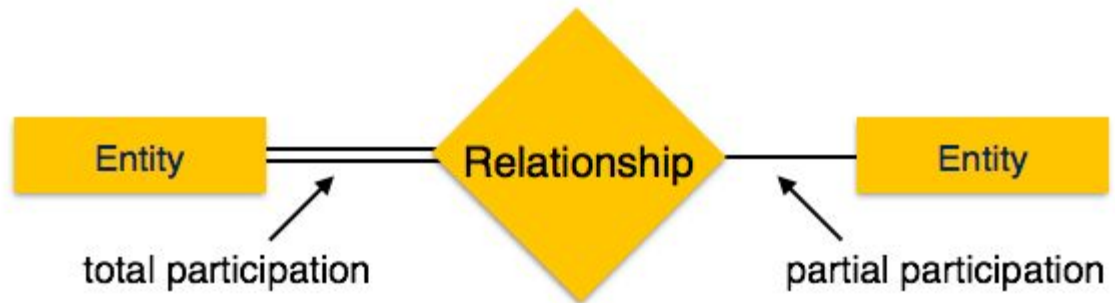
Cardinality

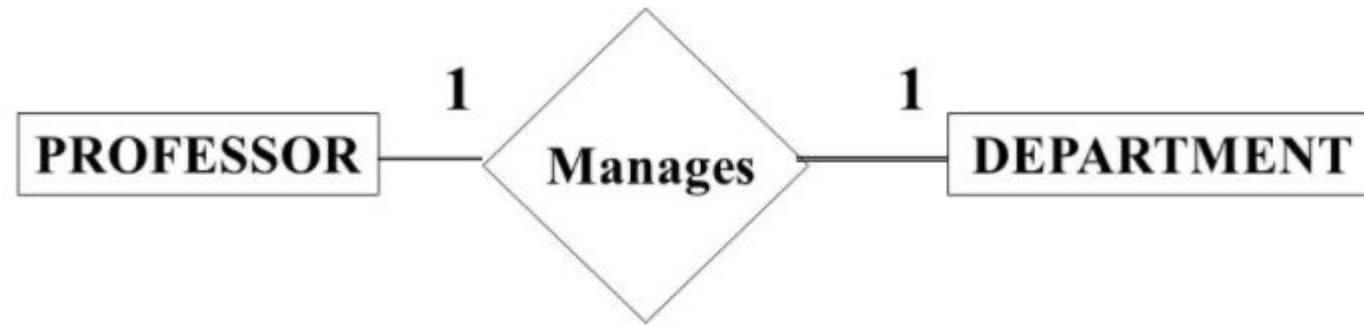
- ***Cardinality*** refers to the maximum number of times an instance in one entity can relate to instances of another entity. There are three types of cardinalities.

1. one to one (1 to 1)
2. one to many (1 to N)
3. many to many (M to N)

Participation

- **Participation** constraint specifies the existence of an entity when it is related to another entity in a **relationship** type. There are two types. Partial and Total participation.
- **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.





A professor **may manage** a department (*partial participation*), but a department **must be managed** by a professor (*total participation*).

Strong Entity Set	Weak Entity Set
Strong entity set always has a primary key.	It does not have enough attributes to build a primary key.
It is represented by a rectangle symbol.	It is represented by a double rectangle symbol.
It contains a Primary key represented by the underline symbol.	It contains a Partial Key which is represented by a dashed underline symbol.
The member of a strong entity set is called as dominant entity set.	The member of a weak entity set called as a subordinate entity set.
Primary Key is one of its attributes which helps to identify its member.	In a weak entity set, it is a combination of primary key and partial key of the strong entity set.
In the ER diagram the relationship between two strong entity set shown by using a diamond symbol.	The relationship between one strong and a weak entity set shown by using the double diamond symbol.
The connecting line of the strong entity set with the relationship is single.	The line connecting the weak entity set for identifying relationship is double.