ASSIGNMENT NO 1

Title: Propose a conceptual design for the given application using ER features and convert the ER diagram into relational tables and normalize relational data model.

Objectives: To understand the ER modelling concept and normalization

Outcome: Students will be able to learn and understand ER Modelling and Normalization

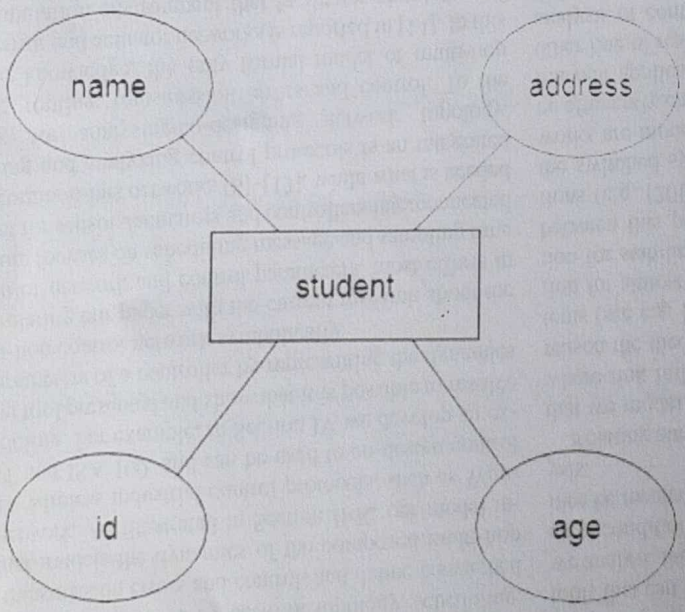
Hardware requirements: Any CPU with Pentium Processor or similar, 256 MB RAM or more, 1 GB Hard Disk or more. Software requirements: Ubuntu 14 Operating System, MySQL

Theory:

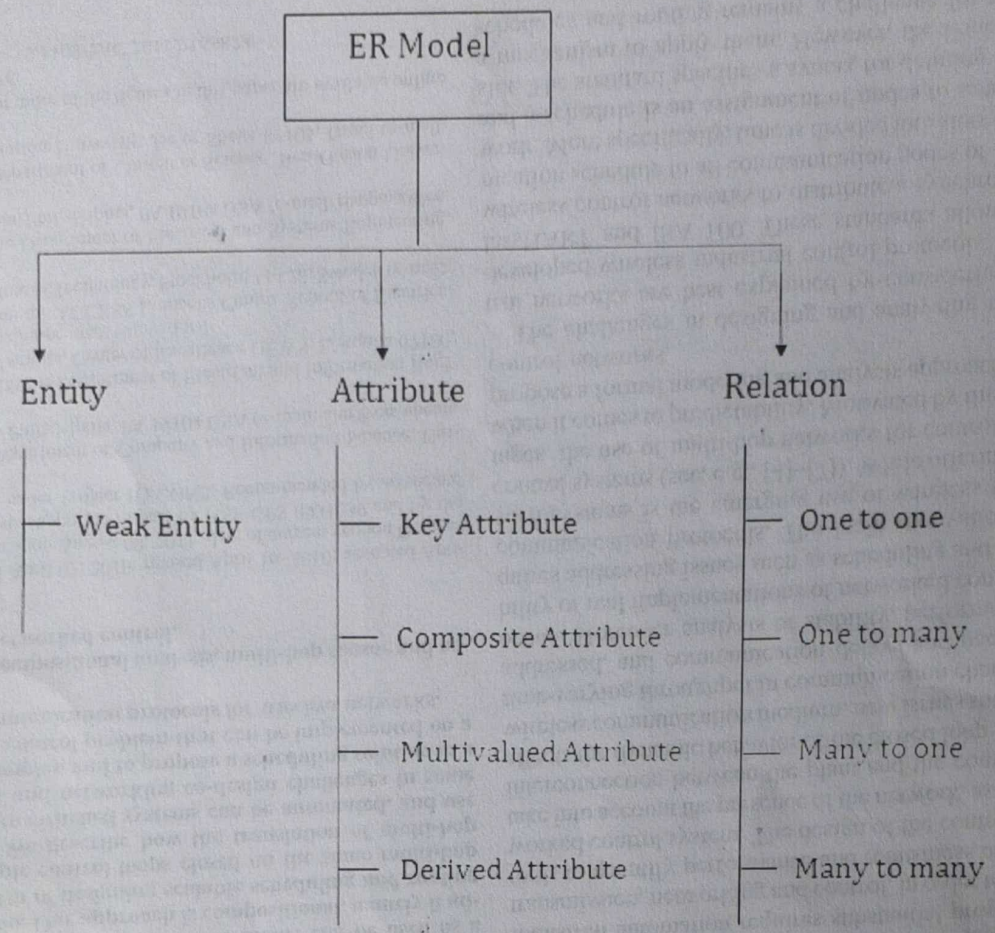
ER model

- ER model stands for an Entity-Relationship model. It is a high-level data model. This model is used to define the data elements and relationship for a specified system.
- It develops a conceptual design for the database. It also develops a very simple and easy to design view of data.
- In ER modeling, the database structure is portrayed as a diagram called an entity-relationship diagram.

For example, Suppose we design a school database. In this database, the student will be an entity with attributes like address, name, id, age, etc. The address can be another entity with attributes like city, street name, pin code, etc and there will be a relationship between them.



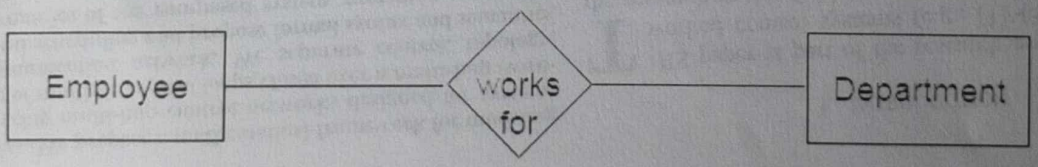
Component of ER Diagram



1. Entity:

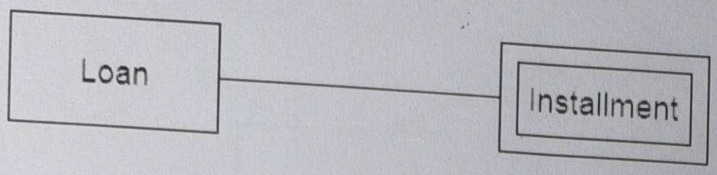
An entity may be any object, class, person or place. In the ER diagram, an entity can be represented as rectangles.

Consider an organization as an example- manager, product, employee, department etc. can be taken as an entity.



a. Weak Entity

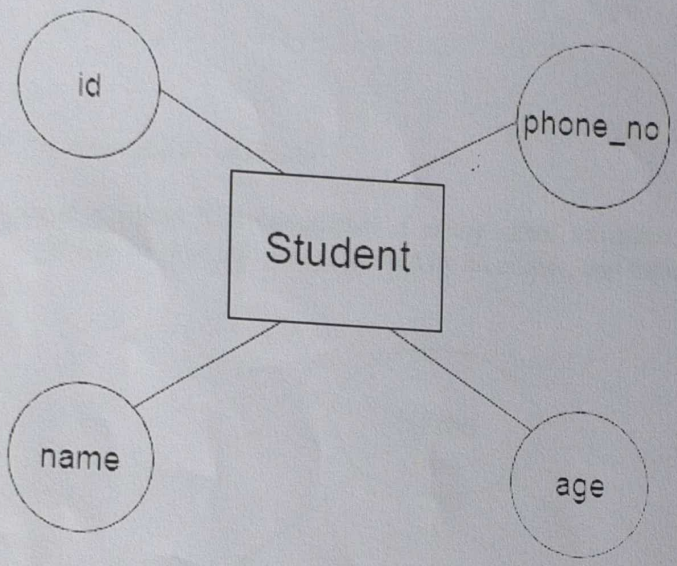
An entity that depends on another entity called a weak entity. The weak entity doesn't contain any key attribute of its own. The weak entity is represented by a double rectangle.



2. Attribute

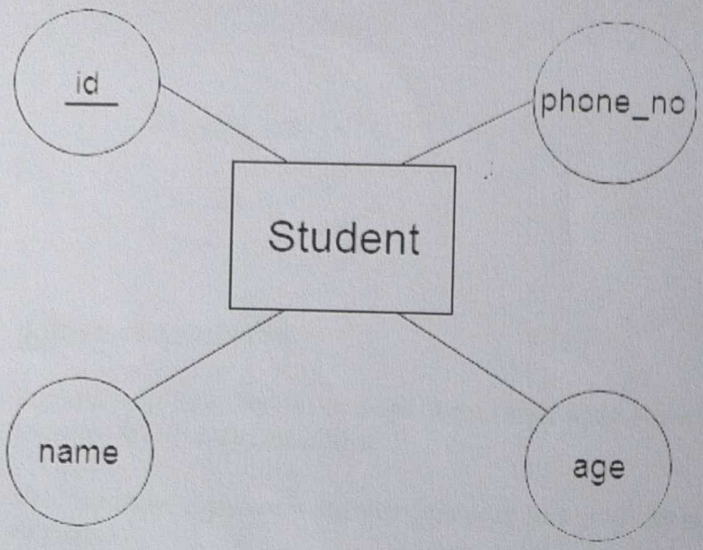
The attribute is used to describe the property of an entity. Eclipse is used to represent an attribute.

For example, id, age, contact number, name, etc. can be attributes of a student.



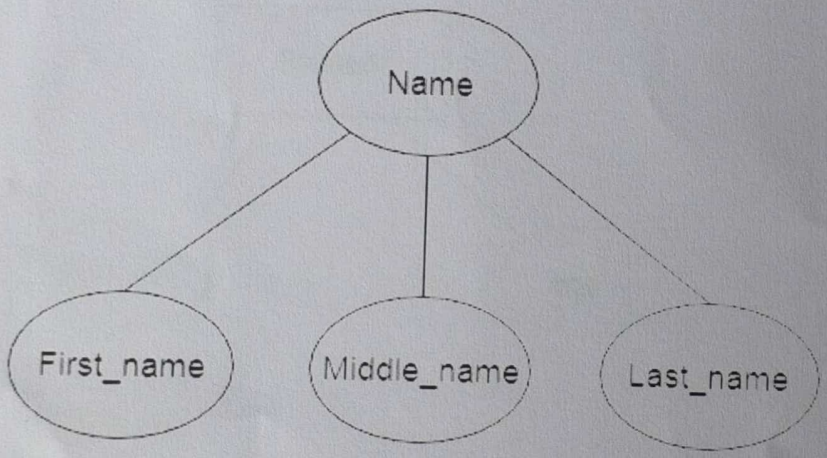
a. Key Attribute

The key attribute is used to represent the main characteristics of an entity. It represents a primary key. The key attribute is represented by an ellipse with the text underlined.



b. Composite Attribute

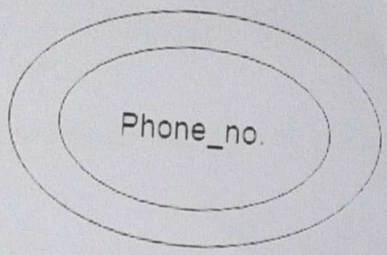
An attribute that composed of many other attributes is known as a composite attribute. The composite attribute is represented by an ellipse, and those ellipses are connected with an ellipse.



c. Multivalued Attribute

An attribute can have more than one value. These attributes are known as a multivalued attribute. The double oval is used to represent multivalued attribute.

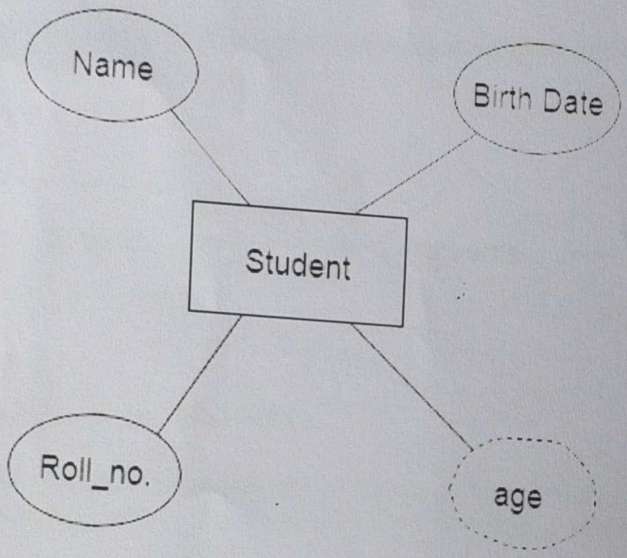
For example, a student can have more than one phone number.



d. Derived Attribute

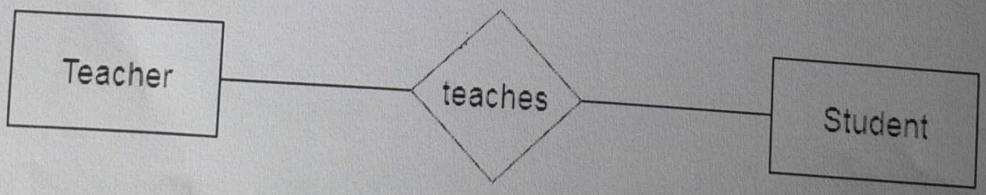
An attribute that can be derived from other attribute is known as a derived attribute. It can be represented by a dashed ellipse.

For example, A person's age changes over time and can be derived from another attribute like Date of birth.



3. Relationship

A relationship is used to describe the relation between entities. Diamond or rhombus is used to represent the relationship.

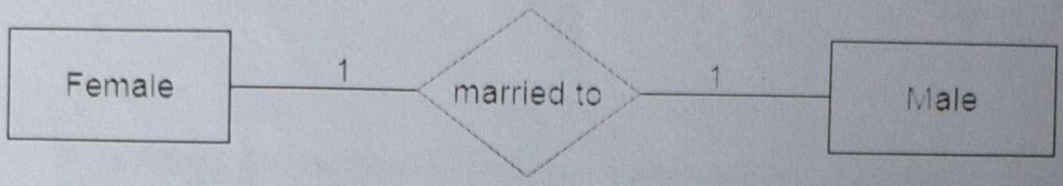


Types of relationship are as follows:

a. One-to-One Relationship

When only one instance of an entity is associated with the relationship, then it is known as one to one relationship.

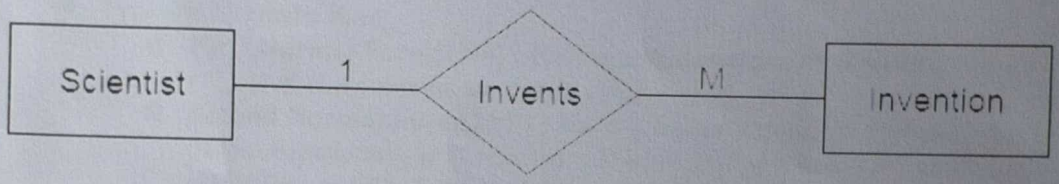
For example, A female can marry to one male, and a male can marry to one female.



b. One-to-many relationship

When only one instance of the entity on the left, and more than one instance of an entity on the right associates with the relationship then this is known as a one-to-many relationship.

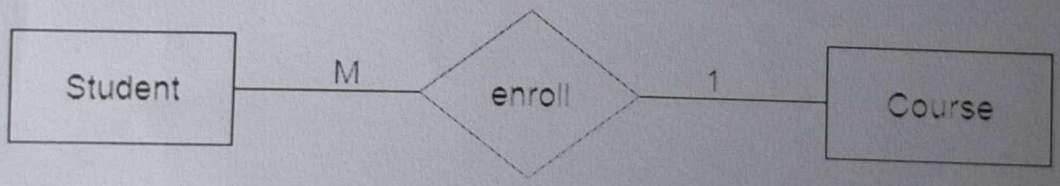
For example, Scientist can invent many inventions, but the invention is done by the only specific scientist.



c. Many-to-one relationship

When more than one instance of the entity on the left, and only one instance of an entity on the right associates with the relationship then it is known as a many-to-one relationship.

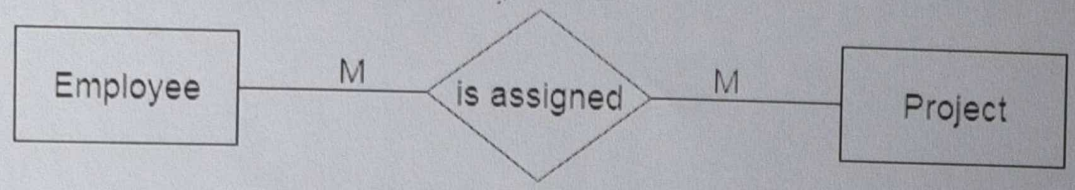
For example, Student enrolls for only one course, but a course can have many students.



d. Many-to-many relationship

When more than one instance of the entity on the left, and more than one instance of an entity on the right associates with the relationship then it is known as a many-to-many relationship.

For example, Employee can assign by many projects and project can have many employees.



Normalization :

- Dr Edgar F. Codd proposes normalization as an integral part of a relational model.
- Normalization is the process of organizing the data in the database.
- Normalization is a database design technique which is used to organize the tables in such a manner that it should reduce redundancy and dependence of data.
- It divides the larger tables to smaller tables and links these smaller tables using their relationships.
- Normalization is implemented by following some formal rules either by a process of synthesis or decomposition.
- Normalization is used to minimize the redundancy from a relation or set of relations. It is also used to eliminate the undesirable characteristics like Insertion, Update and Deletion Anomalies.

- Types of Normalization:
  - **First Normal Form(1NF) :** Having unique values, no repeating groups or A relation is in 1NF if it contains an atomic value.
  - **Second Normal Form(2NF) :** Having unique values, no repeating groups , no partial dependency or A relation will be in 2NF if it is in 1NF and all non-key attributes are fully functional dependent on the primary key.
  - **Third Normal Form(3NF) :** Same like second normal form and having transitive dependency or A relation will be in 3NF if it is in 2NF and no transition dependency exists.
  - **Boyce-codd Normal Form(BCNF)** : It is more developed version than 3NF
  - **Fourth Normal Form(4NF) :** No multi-valued dependency or
    A relation will be in 4NF if it is in Boyce Codd normal form and has no multi-valued dependency.