Experiment No. : 1

Title: Draw E-R diagram for different applications.

Objectives:

1. To learn different data models.
2. To learn about notations used to draw Entity-Relationship Diagram.
3. To get hands on experience with drawing E-R diagram.

Key Concepts: Data Models, E-R diagram.

Theory:

Data Models

Underlying the structure of a database is data model. It is a collection of conceptual tools for describing data, data relationships, data semantics, and consistency constraints.

Different Data Models-

- Entity – relationship (E-R) model
- Relational model
- Object-oriented data model
- Object-relational data model
- Semi-structured data models
- Network data model
- Hierarchical data model

The entity – relationship (E-R) model is a high-level data model. It is based on a perception of a real world that consists of a collection of basic objects, called entities, and of relationships among these objects.

The relational model is a lower-level model. It uses a collection of tables to represent both data and the relationships among those data. Its conceptual simplicity has led to its widespread adoption; today a vast majority of database products are based on the relational model. Designers often formulate database schema design by first modeling data at a high level, using the E-R model, and then translating it into the the relational model.

The object-oriented data model is another data model that has seen increasing attention. The object-oriented model can be seen as extending the E-R model with notions of encapsulation, methods (functions), and object identity.

The object-relational data model combines features of the object-oriented data model and relational data model.

Semi-structured data models permit the specification of data where individual data items of the same type may have different sets of attributes. This is in contrast with the other data models, where every data item of a particular type must have the same set of attributes. The extensible markup language (XML) is widely used to represent semi-structured data.

Historically, two other data models, the network data model and the hierarchical data model, preceded the relational data model.

Entity – Relationship (E-R) Diagram

An entity is a "thing" or "object" in the real world that is distinguishable from all other objects. For example, each person in an enterprise is an entity. An entity has a set of properties, and the values for some set of properties may uniquely identify an entity.

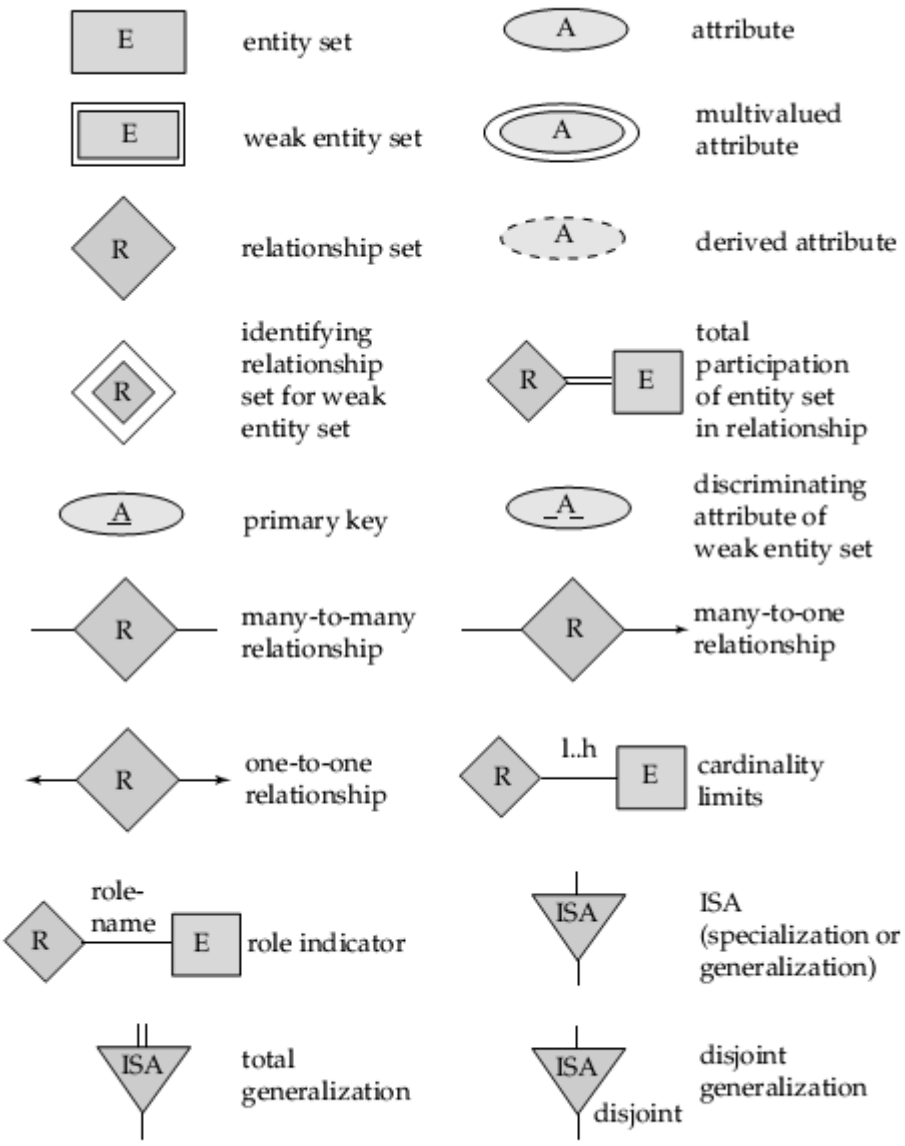
An entity set is a set of entities of the same type that share the same properties, or attributes. An entity is represented by a set of attributes. Attributes are descriptive properties possessed by each member of an entity set. Each entity has a value for each of its attributes. For each attribute, there is a set of permitted values, called the domain, or value set, of that attribute.

A relationship is an association among several entities. A relationship set is a set of relationships of the same type.

E-R diagram consists of the following major components:

- **Rectangles**, which represent entity sets
- **Ellipses**, which represent attributes
- **Diamonds**, which represent relationship sets
- **Lines**, which link attributes to entity sets and entity sets to relationship sets
- **Double ellipses**, which represent multi-valued attributes
- **Dashed ellipses**, which denote derived attributes
- **Double lines**, which indicate total participation of an entity in a relationship set
- **Double rectangles**, which represent weak entity sets.

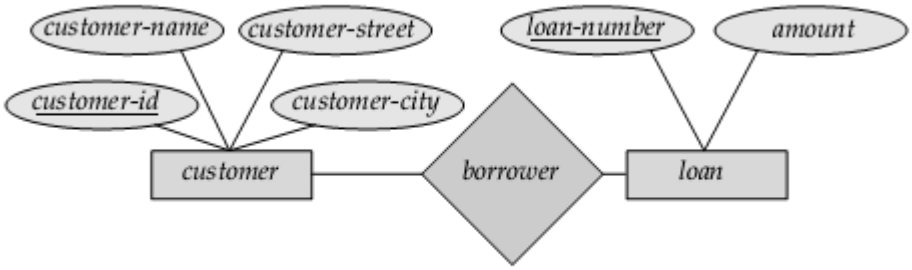
Notations used to draw E-R Diagram



Symbols used in the E-R notation.

Sample E-R Diagram

Consider two entity sets, customer and loan, related through a binary relationship set borrower. The attributes associated with customer are customer-id, customer-name, customer-street, and customer-city. The attributes associated with loan are loan-number and amount



E-R diagram corresponding to customers and loans.