

## 2.1 Database Models

A data model is a collection of tools that describes how data are represented and accessed. Data models formally define data elements and relationships among data elements for a domain of interest (data element is an unit of data that has precise meaning or precise semantics)

A data model explicitly determines the structure of data . The main aim of data models is to support the development of information systems by providing the definition and format of data.

If the same data structures are used to store and access data then different applications can share data .

Communication and precision are the two key benefits that make a data model important to applications that use and exchange data. A data model is the medium which project team members from different backgrounds and with different levels of experience can communicate with one another. **(Precision means that the terms and rules on a data model can be interpreted only one way and are not ambiguous)**

There are many deferent models:

- 1- The Entity Relationship model
- 2- The Relational data model
- 3- Object Based data model
- 4- The Network data model
- 5- The Hierarchical data model

### **2.1.1 : The Entity Relationship model**

The entity-relationship model (or ER model) is a way of graphically representing the logical relationships of entities (or objects) in order to create a database.

In ER modeling, the structure for a database is portrayed as a diagram, called an entity relationship diagram (or ER diagram),

The ER model consists of the following :

- Entity: a thing that exists and which can be uniquely identified  
e.g. person, automobile, department, employee
- Entity Set: a group of similar entities  
e.g. all persons, all automobiles, all employees
- Relationship: association between entities  
e.g. a person is assigned to a department
- Relationship Set : set of similar relationships
- Attribute: property of an entity or relationship  
e.g. person - name, address
- Domain: set of values allowed for an attribute

An entity may be a physical object such as a house or a car, an event such as a house sale or a car service, or a concept such as a customer transaction or order

A relationship captures how two or more entities are related to one another. Relationships can be thought of as verbs, linking two or more nouns.

Examples: an owns relationship between a company and a computer.

: a supervises relationship between an employee and a department

: a performs relationship between an artist and a song,.

: a proved relationship between a mathematician and a theorem

Entity sets are drawn as rectangles, attributes are drawn as oval. Entity is connected with an attribute with lines. Diamonds represent relationship among entity set.

Figure 2.1 shows an ER diagram notation for an attribute (Grade) of an entity(student)

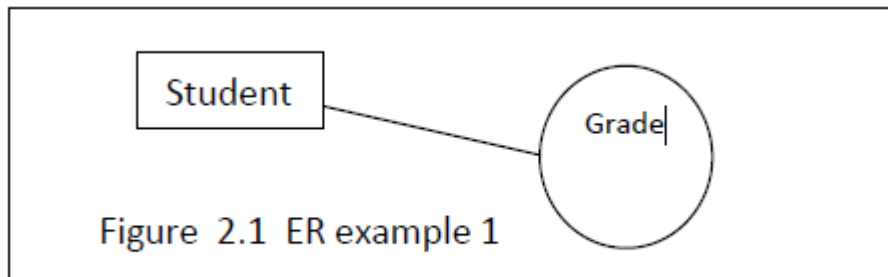


Figure 2.1 ER example 1

Figure 2.2 shows the following example :

There are three entity:

- 1- Employees : E#,ENAME, ADDRESS
- 2- Departments : D#,DNAME
- 3-Projects : PNAME

There are two relations that connect the three entities

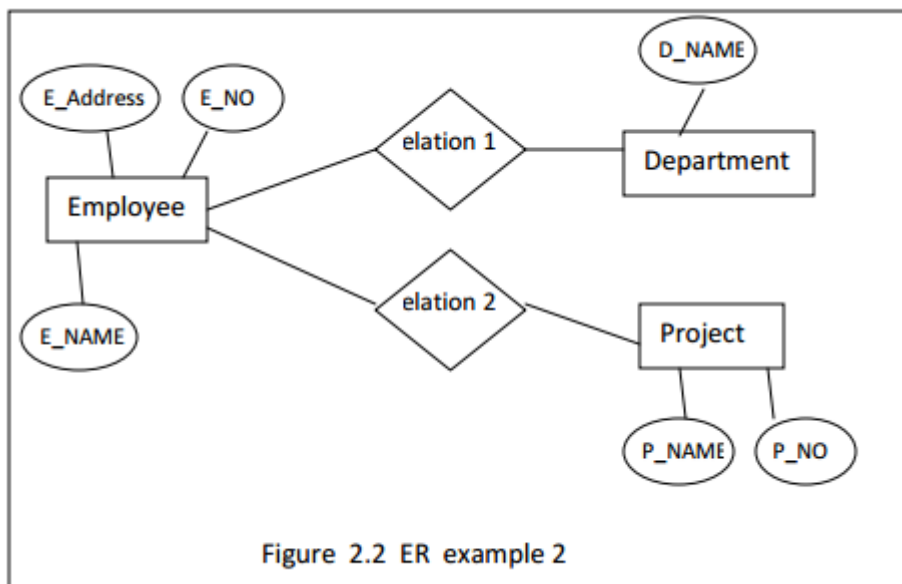


Figure 2.2 ER example 2

### 2.1.2 The Relational model

The Relational Model is a clean and simple model that uses the concept of a relation using a table rather than a graph or shapes. The information is put into a grid like structure that consists of columns running up and

down and rows that run from left to right, this is where information can be categorized and sorted.

The relational model used the basic concept of a relation or table. The columns or fields in the table identify the attributes such as name, age, and so. A tuple or row contains all the data of a single instance of the table such as a person named Doug. In the relational model, every tuple must have a unique identification or key based on the data as shown in figure 2.3 , a social security account number (SSAN) is the key that uniquely identifies each tuple in the relation. Often, keys are used to join data from two or more relations based on matching identification.

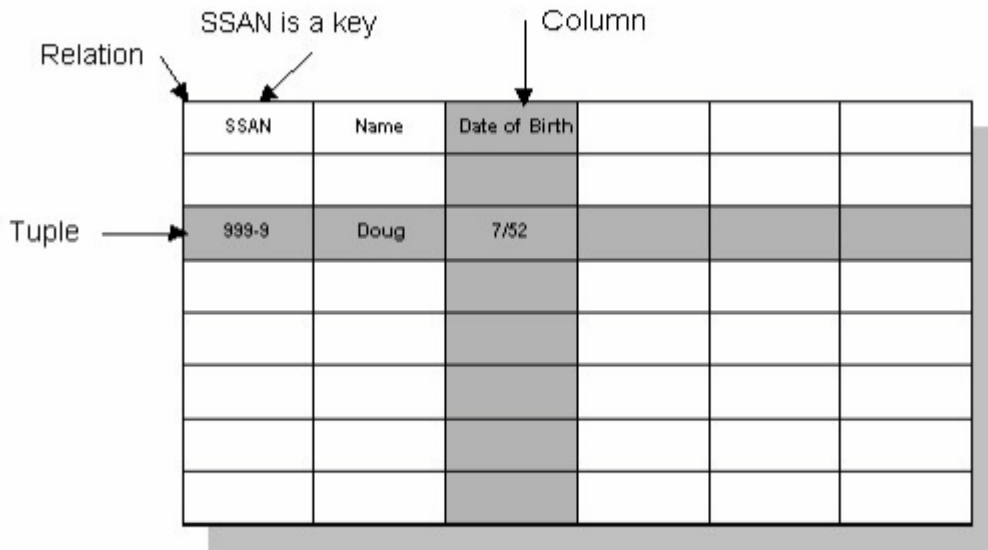


Figure 2.3 Relation (Table)