6. RELATIONAL DATABASE

A relational database is a database system in which the database is organized and accessed according to the relationships between data items without the need for any consideration of physical orientation and relationship. Relationships between data items are expressed by means of tables.

It is a tool, which can help you store, manage and disseminate information of various kinds. It is a collection of objects, tables, queries, forms, reports, and macros, all stored in a computer program all of which are inter-related.

It is a method of structuring data in the form of records, so that relations between different entities and attributes can be used for data access and transformation.

6..1 RELATIONAL MODEL

A Relational Database Management System (RDBMS) is a system, which allows us to perceive data as tables (and nothing but tables), and operators necessary to manipulate that data are at the user‘s disposal.

Features of an RDBMS The features of a relational database are as follows:

- The ability to create multiple relations (tables) and enter data into them
- An interactive query language
- Retrieval of information stored in more than one table
- Provides a Catalog or Dictionary, which itself consists of tables (called system tables

Basic Relational Database Terminology

Catalog: A catalog consists of all the information of the various schemas (external, conceptual and internal) and also all of the corresponding mappings (external/conceptual, conceptual/internal).

It contains detailed information regarding the various objects that are of interest to the system itself; e.g., tables, views, indexes, users, integrity rules, security rules, etc. In a relational database, the entities of the ERD are represented as tables and their attributes as the columns of their respective tables in a database schema.

It includes some important terms, such as:

Table: Tables are the basic storage structures of a database where data about something in the real world is stored. It is also called a relation or an entity.

Row: Rows represent collection of data required for a particular entity.

In order to identify each row as unique there should be a unique identifier called the primary key, which allows no duplicate rows. For example in a library every member is unique and hence is given a membership number, which uniquely identifies each member. A row is also called a record or a tuple.

Column: Columns represent characteristics or attributes of an entity. Each attribute maps onto a column of a table. Hence, a column is also known as an attribute.

Relationship: Relationships represent a logical link between two tables. A relationship is depicted by a foreign key column.

Degree: number of attributes

Cardinality: number of tuples

An **attribute** of an entity has a particular value. The set of possible values that a given attribute can have is called its domain.

The data in an RDBMS is stored in database objects which are called as **tables**. This table is basically a collection of related data entries and it consists of numerous columns and rows.The following program is an example of a CUSTOMERS table –

ID	NAME	AGE	ADDRESS	SALARY
1	Ramesh	32	Ahmedabad	2000.00
2	Khilan	25	Delhi	1500.00
3	kaushik	23	Kota	2000.00
4	Chaitali	25	Mumbai	6500.00
5	Hardik	27	Bhopal	8500.00
6	Komal	22	MP	4500.00
7	Muffy	24	Indore	10000.00

Every table is broken up into smaller entities called fields. The fields in the CUSTOMERS table consist of ID, NAME, AGE, ADDRESS and SALARY.

- A **field is a column** in a table that is designed to maintain specific information about every record in the table.
- A **record** is also called as a row of data is each individual entry that exists in a table. For example, there are 7 records in the above CUSTOMERS table. Following is a single row of data or record in the CUSTOMERS table –

```
+----+----------+-----+-----------+----------+
|  1 | Ramesh   |  32 | Ahmedabad |  2000.00 |
+----+----------+-----+-----------+----------+
```

A record is a horizontal entity in a table.

- A **NULL value** in a table is a value in a field that appears to be blank, which means a field with a NULL value is a field with no value.

6.2 OPERATIONS IN RELATIONAL MODEL

Four basic update operations performed on relational database model are

- Insert, update, delete and select.
- **Insert** is used to insert data into the relation
- **Delete** is used to delete tuples from the table.
- **Modify** allows you to change the values of some attributes in existing tuples.
- **Select** allows you to choose a specific range of data.

Whenever one of these operations are applied, integrity constraints specified on the relational database schema must never be violated

Insert Operation

The insert operation gives values of the attribute for a new tuple which should be inserted into a relation.

CustomerID	CustomerName	Status
1	Google	Active
2	Amazon	Active
3	Apple	Inactive

INSERT

CustomerID	CustomerName	Status
1	Google	Active
2	Amazon	Active
3	Apple	Inactive
4	Alibaba	Active

Update Operation

You can see that in the below-given relation table CustomerName= 'Apple' is updated from Inactive to Active.

CustomerID	CustomerName	Status
1	Google	Active
2	Amazon	Active
3	Apple	Inactive
4	Alibaba	Active

UPDATE

CustomerID	CustomerName	Status
1	Google	Active
2	Amazon	Active
3	Apple	Active
4	Alibaba	Active

Delete Operation

To specify deletion, a condition on the attributes of the relation selects the tuple to be deleted.

CustomerID	CustomerName	Status
1	Google	Active
2	Amazon	Active
3	Apple	Active
4	Alibaba	Active

DELETE

CustomerID	CustomerName	Status
1	Google	Active
2	Amazon	Active
4	Alibaba	Active

In the above-given example, CustomerName= "Apple" is deleted from the table.

Select Operation

CustomerID	CustomerName	Status
1	Google	Active
2	Amazon	Active
4	Alibaba	Active

SELECT

CustomerID	CustomerName	Status
2	Amazon	Active

In the above-given example, CustomerName="Amazon" is selected