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

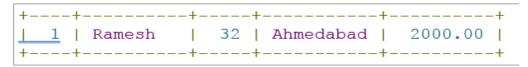
An **attribute** of an entity has a particular value. The set of possible values that a given attribute can have is called its domain.

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 –

++								
1	ID	I	NAME	T	AGE	Ī	ADDRESS	SALARY
+-		+-		+-		+-		t+
1	1	Ī	Ramesh	T	32	ĺ	Ahmedabad	2000.00
	2	I	Khilan		25	Ī	Delhi	1500.00
	3		kaushik		23	Ī	Kota	2000.00
	4	Ī	Chaitali	Τ	25	Ī	Mumbai	6500.00
	5	Ī	Hardik		27	Ī	Bhopal	8500.00
	6	I	Komal		22	Ī	MP	4500.00
	7	I	Muffy	1	24	l	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 –



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

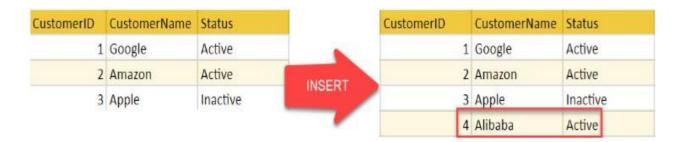
Four basic update operations performed on relational database model are

- 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.



Update Operation

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



Delete Operation

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



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

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