

## **WHAT IS A DATABASE?**

A database is an organized and structured collection of related data stored electronically in a computer system.

It allows users to efficiently store, retrieve, update, and manage large amounts of data while ensuring data accuracy, consistency, and security.

Databases reduce data redundancy and are widely used in applications such as banking systems, educational institutions, hospitals, and e-commerce platforms.

## **TYPES OF DATABASES**

Databases are classified based on how data is stored and managed.

### **1. Relational Database**

A relational database stores data in the form of tables consisting of rows and columns.

Relationships between tables are established using keys, making data easy to manage and query.

### **2. Hierarchical Database**

A hierarchical database organizes data in a tree-like structure where each parent record can have multiple child records, but each child has only one parent.

### **3. Network Database**

A network database allows multiple parent-child relationships, supporting many-to-many relationships between records.

### **4. Object-Oriented Database**

An object-oriented database stores data as objects, similar to object-oriented programming concepts such as classes and objects.

## 5. NoSQL Database

A NoSQL database is designed to store unstructured or semi-structured data and is used in applications that require high scalability and performance.

### WHAT IS SCHEMA?

A schema is the logical blueprint of a database that defines how data is organized.

It describes the structure of the database, including tables, columns, data types, relationships, and constraints.

A schema does not store actual data; it only defines the structure.

### WHAT IS SQL?

SQL (Structured Query Language) is a standard programming language used to communicate with relational databases.

It is used to create database structures, insert data, retrieve information, update records, delete data, and manage access permissions.

### CONCEPT OF SQL

SQL commands are categorized based on their functionality.

#### DDL (Data Definition Language)

DDL commands are used to define, modify, and delete database structures.

**CREATE** – Used to create database objects such as tables, views, or databases.

**ALTER** – Used to modify the structure of existing database objects.

**DROP** – Used to permanently delete database objects.

**TRUNCATE** – Used to remove all records from a table without deleting its structure.

**RENAME** – Used to rename database objects.

## **DML (Data Manipulation Language)**

DML commands are used to manipulate data stored inside database tables.

**SELECT** – Used to retrieve data from one or more tables.

**INSERT** – Used to add new records into a table.

**UPDATE** – Used to modify existing records in a table.

**DELETE** – Used to remove records from a table.

## **DCL (Data Control Language)**

DCL commands are used to control access and permissions in the database.

**GRANT** – Used to provide access privileges to users.

**REVOKE** – Used to remove previously granted privileges.

## **TCL (Transaction Control Language)**

TCL commands are used to manage database transactions and maintain data integrity.

**COMMIT** – Used to permanently save changes made during a transaction.

**ROLLBACK** – Used to undo changes made since the last commit.

**SAVEPOINT** – Used to create a point within a transaction to which rollback can occur.

## **KEYS AND TYPES OF KEYS**

A key is an attribute or a set of attributes used to uniquely identify records in a table and establish relationships between tables.

### **1. Super Key**

A super key is a set of one or more attributes that uniquely identify a record in a table. It may contain extra attributes.

## **2. Primary Key**

A primary key is a candidate key chosen to uniquely identify each record in a table.

It cannot contain NULL values and must be unique.

## **3. Unique Key**

A unique key ensures that all values in a column are unique. Unlike a primary key, it can allow one NULL value.

## **4. Foreign Key**

A foreign key is an attribute that establishes a relationship between two tables by referencing the primary key of another table.

## **5. Composite Key**

A composite key is formed by combining two or more columns to uniquely identify a record.

## **6. Candidate Key**

A candidate key is a minimal set of attributes that can uniquely identify a record in a table.

## **7. Alternate Key**

An alternate key is a candidate key that is not selected as the primary key.

## **8. Secondary Key**

A secondary key is used to retrieve records based on non-unique fields and is mainly used for searching purposes.

## **9. Surrogate Key**

A surrogate key is an artificially generated key, usually numeric, that has no business meaning and is used only for record identification.