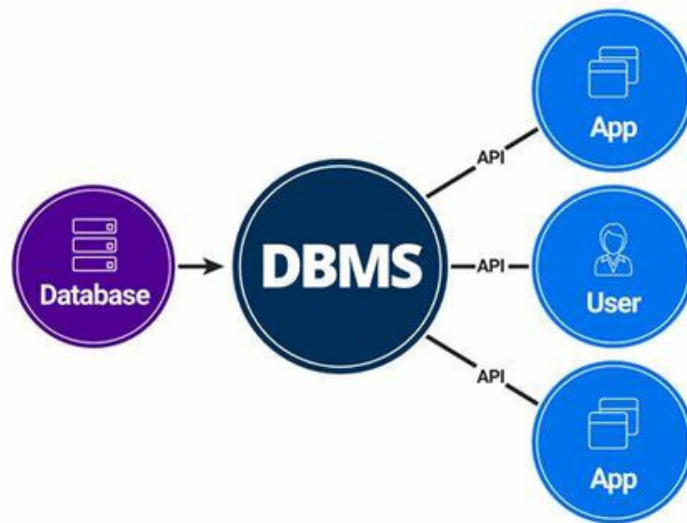




## Database

A database is a system that stores, organizes, and manages data. It allows users to easily access, update, and retrieve information. Databases are commonly used in applications like websites, business systems, and more to keep data structured and efficient



## DBMS

A DBMS, or Database Management System, is software that helps you create, manage, and manipulate databases. It allows users to store data securely, perform queries, and maintain data integrity, making it easier to handle large amounts of information efficiently.

### Advantages of Database:

1. **Data Integrity:** Ensures accuracy and consistency of data across multiple entries and tables.
2. **Data Security:** Allows access control to protect sensitive information from unauthorized users.
3. **Reduced Data Redundancy:** Eliminates duplicate data by storing it in a centralized database.
4. **Data Consistency:** Updates in one part of the database reflect throughout, maintaining consistency.
5. **Efficient Data Management:** Supports complex queries and data retrieval, making data management easier.
6. **Backup and Recovery:** Provides mechanisms for regular backups and data recovery in case of failure.
7. **Scalability:** Can handle large amounts of data and grow as per organizational needs.
8. **Multi-User Access:** Allows multiple users to access and work on the data simultaneously without conflict.

## Why we use DBMS ?

We use a DBMS to manage data effectively. It helps store large amounts of information, keeps it organized, ensures data security, allows easy access and updates, and supports multiple users. This makes it simpler to analyze and work with data while maintaining accuracy and consistency.

## Relational Data Modul

**Relation:** A table in a database is called a relation. It consists of rows and columns, where each row is a record, and each column represents a field or attribute.

**Attribute:** An attribute is a column in a database table, representing a specific piece of information like "Name" or "Age."

**Tuple:** A tuple is a single row in a table. It contains data for each attribute, representing a record.

**Domain:** The domain of an attribute is the set of all possible values it can have. For example, the domain of a "Gender" attribute could be {Male, Female}.

**Degree:** The degree of a relation is the number of attributes (columns) in a table.

**Cardinality:** Cardinality is the number of tuples (rows) in a table, showing how many records the table holds.

## Keys

- **Primary Key:** A unique identifier for each record in a table. No two rows can have the same primary key value, and it cannot be null.
- **Candidate Key:** A column or set of columns that can uniquely identify a record. There can be multiple candidate keys, but only one becomes the primary key.
- **Super Key:** A set of one or more columns that can uniquely identify a row in a table. It includes the primary key and additional attributes.
- **Foreign Key:** A column that links two tables. It references the primary key in another table, helping maintain relationships between data.
- **Composite Key:** A key that consists of two or more attributes to uniquely identify a record. It is used when a single attribute isn't enough.

## SQL (Structured Query Language )

**DDL (Data Definition Language)** in SQL is used to define and manage the structure of database objects like tables, indexes, and schemas. It includes commands that help create, modify, and delete database objects.

### Key DDL Commands:

**CREATE:** Used to create new database objects like tables.

```
CREATE TABLE Students (  
  ID INT,  
  Name VARCHAR(50),  
  Age INT  
);
```

**ALTER:** Used to modify the structure of an existing table.

```
ALTER TABLE Students ADD Email VARCHAR(100);
```

**DROP:** Used to delete a table or other database object.

```
DROP TABLE Students;
```

**TRUNCATE:** Used to remove all records from a table but keep its structure.

```
TRUNCATE TABLE Students;
```

**DML (Data Manipulation Language)** in SQL is used to manage and modify data stored in a database. It focuses on inserting, updating, deleting, and retrieving data from tables.

**INSERT:** Adds new records (rows) to a table.

```
INSERT INTO Students (ID, Name, Age)  
VALUES (1, 'John', 18);
```

**UPDATE:** Modifies existing records in a table.

```
UPDATE Students  
SET Age = 19  
WHERE ID = 1;
```

*DELETE: Removes specific records from a table.*

```
DELETE FROM Students  
WHERE ID = 1;
```

*SELECT: Retrieves data from a table.*

```
SELECT * FROM Students;
```

## Data Type

### Char VS Varchar

#### Char

- Fixed length. It always takes up the same space, even if the data is shorter.
- Pads the remaining space with spaces if the data is shorter than the defined length.
- Faster for fixed-length data as the size is known.
- Good for fixed-length data like postal codes or ID numbers.

#### Varchar

- Variable length. It only uses space for the actual data entered.
- Does not add extra spaces; stores data exactly as entered.
- Slightly slower as it handles variable-length data.
- Suitable for variable-length data like names or descriptions.

INT (Integer): Stores whole numbers (no decimals).

```
CREATE TABLE Products (  
    ProductID INT,  
    Quantity INT  
);  
  
INSERT INTO Products (ProductID, Quantity)  
VALUES (1, 50);
```

FLOAT: Stores numbers with decimals (floating-point numbers).

```
CREATE TABLE Prices (  
    ProductID INT,  
    Price FLOAT  
);  
  
INSERT INTO Prices (ProductID, Price)  
VALUES (1, 199.99);
```

DATE: Stores dates in the format 'YYYY-MM-DD'.

```
CREATE TABLE Orders (  
  OrderID INT,  
  OrderDate DATE  
);  
  
INSERT INTO Orders (OrderID, OrderDate)  
VALUES (1, '2024-10-04');
```

### 1. Explain Relational Database with an example.

Ans: A relational database stores data in tables with rows and columns.

Example: A student table with fields like StudentID, Name, Class.

### 2. What is a Primary Key? Give an example.

Ans: A Primary Key uniquely identifies each record in a table.

Example: StudentID in a student table.

### 3. Differentiate between Primary Key and Foreign Key.

Primary Key: Uniquely identifies a record in its own table.	Foreign Key: A field in one table that refers to the Primary Key of another table.
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### 4. Explain the steps to create a table using Table Wizard.

- Open Database software.
- Choose Create Table using Wizard.
- Select fields and define data types.
- Assign a primary key and save the table.

### 5. What are Forms and Reports in a Database Management System?

- Forms: User interface to enter or edit data in a table.
- Reports: Display formatted data for printing or analysis.

### 6. What is the purpose of the INSERT command in SQL? Give an example.

The INSERT command is used to add new records to a table.

```
INSERT INTO Student (StudentID, Name, Class) VALUES (1, 'Aman', '10th');
```