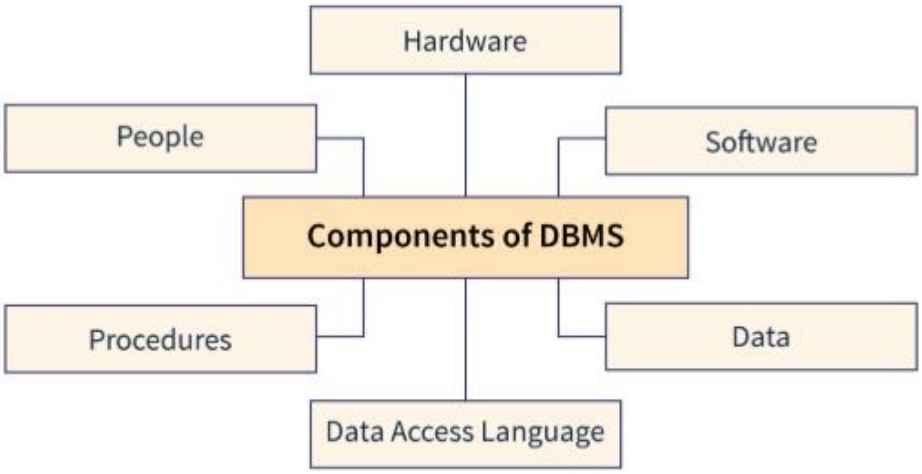
Components of DBMS

A DBMS is like software that helps us store, organize, and use data. It has several important parts:



1.Hardware

- **Meaning:**
  Hardware is the physical part of the computer system where the database runs. It provides the environment where the software and data can work together. The DBMS needs hardware to store all the data safely and to process queries quickly. Without hardware, the DBMS cannot function because it has no place to save data or perform operations.
- **Includes:**
  - Computers and servers (where the DBMS is installed)

    - Storage devices like **hard disks** and **SSDs** (to store database files)
    - Memory (RAM) for fast access to data
    - Input/Output devices (keyboard, monitor, printer)
    - Network devices (routers, switches) if the database is accessed online
- **Role in DBMS:**
  Hardware is essential because without it, the DBMS cannot operate. It ensures that data is stored permanently and retrieved quickly whenever needed.
- **Example 1 (School):** A school database runs on a server computer. Teachers access student records using desktop PCs, which are all part of the hardware.
- **Example 2 (Bank):** In a bank, customer account details are stored on high-capacity servers with backup storage devices to prevent data loss.
- **Example 3 (Personal use):** On your laptop, when you install MySQL and store student records, the laptop's hard disk and RAM are the hardware components.

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2. Software

- **Meaning:**
  Software is the **DBMS program itself** that manages the database. It controls how data is stored, organized, and accessed. It provides

features for backup, recovery, and security. The software makes it easy for users to interact with data using queries.

- **Includes:**
    - DBMS software (MySQL, Oracle, PostgreSQL, SQL Server, MongoDB, etc.)
    - Operating System (Windows, Linux) which supports the DBMS
    - Utility programs (backup, recovery, performance tools)
- **Role in DBMS:**
  The software provides features like storing data, retrieving information using queries, maintaining security, and ensuring data consistency.
- **Example 1 (School):** A school may use MySQL DBMS software to keep records of students, teachers, and results.
- **Example 2 (Bank):** A bank might use Oracle DBMS to manage customer accounts, loans, and transactions securely.
- **Example 3 (E-commerce):** Amazon uses DBMS software to manage millions of product details and customer orders.

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3. Data

- **Meaning:**
  Data is the actual information stored in the database. It can be anything from numbers and text to images or videos. Data is the

most valuable part of a DBMS because it is the reason the system exists.

- **Types of Data:**
  - **User Data:** Names, phone numbers, transactions, etc.
  - **Metadata:** Data about data (e.g., table names, column types).
- **Role in DBMS:**
  The main purpose of DBMS is to keep this data **organized, accurate, and easy to access**.
- **Example 1 (School):** Student names, roll numbers, marks, and attendance records.
- **Example 2 (Bank):** Customer details, account balances, transaction history.
- **Example 3 (Hospital):** Patient records, doctor schedules, medical reports.

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4. Procedures

- **Meaning:**
  Procedures are the **rules and instructions** that explain how to use and manage the database properly. These are followed by people, not by the DBMS software.
- **Includes:**
  - Steps for data entry
  - Backup and recovery plans

- Security policies
- User creation and permission rules

- **Role in DBMS:**
  Procedures ensure that the database is used safely and works smoothly without errors.
- **Example 1 (School):** A rule that student records must be updated at the end of every term.
- **Example 2 (Bank):** A daily procedure to back up customer transaction data at 10 PM.
- **Example 3 (Company):** A company may have a procedure to take a full backup of its employee database every night at 10 PM to prevent data loss.

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5. People

- **Meaning:**
  People are the **users who interact** with the DBMS. Without people, a DBMS has no purpose.
- **Types of People:**
  - **Database Administrators (DBA):** Manage and secure the DB.
  - **Developers:** Create applications and queries.
  - **End Users:** Enter and use the data.
  - **System Operators:** Maintain the hardware and OS.

- **Role in DBMS:**
  People give meaning to the system by using it to solve real-world problems.
- **Example 1 (Railways):**
  - DBA: Manages train reservation system database.
  - Developer: Builds the ticket booking website.
  - End user: A passenger booking tickets online.
- **Example 2 (School):**
  - DBA: Maintains student database.
  - Teacher: Enters marks.
  - Student: Checks results online.

Data Access Language

- **Meaning:**
  Data Access Language is the **language used to talk to the DBMS**. The most common is **SQL (Structured Query Language)**.
- **Types in SQL:**
  - **DDL (Data Definition Language):** CREATE, ALTER, DROP (defines structure).
  - **DML (Data Manipulation Language):** SELECT, INSERT, UPDATE, DELETE (works with data).

- **DCL (Data Control Language):** GRANT, REVOKE (controls permissions).
- **TCL (Transaction Control Language):** COMMIT, ROLLBACK (handles transactions).

- **Role in DBMS:**
  It helps users to create, read, update, and delete data easily.
- **Example 1 (School):**
  - Add a student:
    INSERT INTO students (roll_no, name, class) VALUES (15, 'Aman', '10');
  - View all Class 10 students:
    SELECT name FROM students WHERE class = '10';
- **Example 2 (Bank):**
  - Show customer balance:
    SELECT balance FROM accounts WHERE account_no = 12345;