Database Management System (DBMS)

- A Database is an organized, persistent collection of logically related data of an organization.

- The DBMS manages the database of an enterprise, thus <u>controls access to this data</u> and thus needs to provide features for <u>database creation</u>, <u>data manipulation</u> (Data value modification), <u>data retrieval</u>, <u>data integrity</u> and <u>security</u>.

- The database approach has many advantages over file bases system:

  1. <u>Reduction of Redundancy</u> – In database approach data can be stored at a single place or with controlled redundancy under DBMS, which saves space and does not permit inconsistency.

  2. Shared Data – A database belongs to the entire organization and is shared by all authorized users.

  3. Data Independence – DBMS separates <u>data description</u> from <u>Data</u>, hence it is not affected by changes – this is data independence. DBMS provides an <u>abstract view of data</u> and hides details – thus the interface window to user may remain same but the internal structure of the data may be changed.

  4. Improved Integrity – This refers to the <u>validity and consistency of data</u> – This is done by providing some

checks or constraints, which again may apply to data items within a record or relationship between records.

5. **Efficient Data Access** – DBMS utilizes techniques to store and retrieve data efficiently.

6. **Multiple User Interface** – A DBMS provides a variety of interfaces:
   (a) Query language for casual users
   (b) programming language interface for application programs
   (c) forms and codes for parametric users
   (d) Menu driven interfaces.

7. **Representing complex relationship among data** – DBMS must have the capability to represent a variety of relationships among the data as well as to retrieve and update related data easily and efficiently.

8. **Improved Security** – The DBA provides usernames and passwords only to authorized users as well as granting privileges or type of operation allowed.

9. **Improved Backup and Recovery** – DBMS provides facilities for recovering hardware and Software failures. A backup and recovery subsystem is responsible for this. In case a program fails, it restores the database to a state in which it was before the execution of the program.

10. **Support for concurrent transaction** – A DBMS allows multiple transactions to occur simultaneously.

The Logical DBMS Architecture

There are two different ways to look at the architecture of a DBMS:

- The logical DBMS architecture
- The Physical DBMS architecture.

The logical architecture deals with the way data is stored and presented to the users, while the physical architecture is concerned with the software components that makes up the DBMS.

Three-Level Architecture of DBMS

1. **External or view level** → allows user to see only the data of interest to them.
2. **The conceptual level** → It presents a logical view of the entire database as a unified whole. The first stage of a database design is to define the conceptual view, and a DBMS provides a Data Definition Language (DDL) for this purpose.
   It describes all the records and relationships included in a database.
3. **The Internal or Physical Level** → The collection of files permanently stored on secondary storage device is known as the physical database. It provides a low level description of the operating system's file system and the record structures.