# Database Management System -I

### Introduction of DBMS and Model

- Need of DBMS
- Data vs Information
- Role and Advantage of DBMS
- Function & Environment of DBMS
- DBMS Users
- Types of Database
- DBMS Advantages & Disadvantages
- Database Model

# Why do we need a database?

- Data is easier to manage
  - Too much data in individual files
  - Too many separate files
- Need multiple views of data
- Improved data sharing (concurrent updating)
- Improved data security
- Databases can better enforce data quality
- Leads to better data integration

## Database

#### What is a database?

A collection of information organized in such a way that a computer program can quickly select desired pieces of data. You can think of a database as an electronic filing system.

### Why do we use databases?

Databases are used to store, organize, and retrieve large amounts of data, quickly. Therefore, databases can be used in any situation where data needs to be found quickly.

## Definition of Database

- A database is a collection of data that is organized so the information within can be easily accessed later. Your data will be more accurate, reliable, and easy to use if you have a database.
- A database is a logically organized collection of information, designed in such a way that the information within can be accessed for later use by a computer program.

## **Data Vs. Information**

## DATA

RS.35,000 12Units
RS.12,000 Akash
Indian East Region
Rs.1,00,000 100Units
35 Units

Data Processing

## Information

Sales Person: Akash Sales Territory: Indian East Region Current Sales: 147 Units = Rs.1,47,000



#### DIFFERENCE BETWEEN DATA AND INFORMATION

	Data	Information
1.	Derived from Latin word 'Datum'	Derived from word 'informare'
2.	Data is raw fact.	2. Processed form of data.
3.	May or may not be meaningful.	3. Always meaningful.
4.	Input to any system may be treated as data.	Output after processing system is information.
5.	Understanding is difficult	5. Understanding is easy.
6.	Data may not be in order.	6. Information should be in order.
7.	Example: survey data	7. Example: census report

#### DBMS and its Role

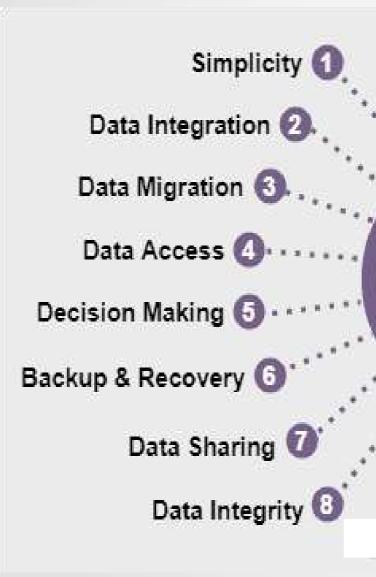
DBMS is a collection of programs that manages the database structure and controls access to the data stored in the database.

#### ROLE OF DBMS

The DBMS Serves as the Intermediary between the User and the Database.

A DBMS Provides his Roles/Advantages Such as:

- Improved Data Sharing
- Improved Data Security
- Better Data Integration
- Minimized Data Inconsistency
- Improved Data Access
- Improved Decision Making
- Increased User Productivity





Advantages

of

DBMS

- Data Security
  - Data Privacy
    - Data Concurrency
      - Data Redundancy
      - Data Inconsistency
    - 🔼 Low Maintenance
  - Multi-Access Support
- The End-User Productivity

## Advantages

- Improved data sharing: DBMS enables the data in the database to be shared among multiple applications or users.
- Improved data security. The more users access the data, the greater the risks of data security breaches. A DBMS provides a framework for better enforcement of data privacy and security policies.
- Better data integration: It becomes much easier to see how actions in one segment of the company affect other segments.
- Minimized data inconsistency: Data inconsistency exists when different versions of the same data appear in different places. The probability of data inconsistency is greatly reduced in a properly designed database.
- Improved data access: The DBMS makes it possible to produce quick answers to the queries.

## Advantage of DBMS

- Improved decision making: Better-managed data and improved data access make it possible to generate better quality information, on which better decisions are based.
- Increased end-user productivity: The availability of data, combined with the tools that transform data into usable information, empowers end users to make quick, informed decisions that can make the difference between success and failure in the global economy.



## Disadvantages of DBMS

- Increased costs: The cost of maintaining the hardware, software, and personnel required to operate and manage a database system can be costly
- Management complexity: databases systems hold crucial company data that are accessed from multiple sources, security issues must be assessed constantly.
- Maintaining currency: To maximize the efficiency of the database system, you must keep your system updated.
- **Vendor dependence**: Given the heavy investment in technology and personnel training, companies might be reluctant to change database vendors.
- Frequent upgrade/replacement cycles: DBMS vendors frequently upgrade their products by adding new functionality.

## **DBMS** Function and Environment

**Data definitions** 

Data retrieval

Data manipulation

Access control

**Data sharing** 

**Data integrity** 

### **DBMS** Functions

- A DBMS performs several important functions that guarantee the integrity and consistency of the data in the database.
- Data dictionary management. The DBMS stores definitions of the data elements and their relationships (metadata) in a data dictionary.
- Data storage management. The DBMS creates and manages the complex structures required for data storage, thus relieving you from the difficult task of defining and programming the physical data characteristics.
- Data transformation and presentation. The DBMS transforms entered data to conform to required data structures.
- Security management. The DBMS creates a security system that enforces user security and data privacy.

- Multiuser access control. To provide data integrity and data consistency, the DBMS uses sophisticated algorithms to ensure that multiple users can access the database concurrently without compromising the integrity of the database
- Backup and recovery management. The DBMS provides backup and data recovery to ensure data safety and integrity
- Data integrity management. The DBMS promotes and enforces integrity rules, thus minimizing data redundancy and maximizing data consistency.

- Database access languages and application programming interfaces. The DBMS provides data access through a query language.
- A **query language** is a nonprocedural language—one that lets the user specify what must be done without having to specify how it is to be done.
- Structured Query Language (SQL) is the de facto query language and data access standard supported by the majority of DBMS vendors.
- Database communication interfaces. Current-generation DBMSs accept end-user requests via multiple, different network environments.

## **Enviornment/Component of DBMS**

**Software** 

Hardware

Procedure

Component of DBMS

Data

People

Data access language

## The Database System Environment

- The term database system refers to an organization of components that define and regulate the collection, storage, management, and use of data within a database environment
- The database system is composed of the five major parts i.e hardware, software, people, procedures, and data.

- Hardware. Hardware refers to all of the system's physical devices; for example, computers storage devices, printers, network devices, and other devices
- **Software.** To make the database system function fully, three types of software are needed: operating system software, DBMS software, and application programs and utilities.
  - Operating system software manages all hardware components and makes it possible for all other software to run on the computers. Examples of operating system software include Microsoft Windows, Linux, Mac OS, UNIX, and MVS.
  - DBMS software manages the database within the database system. Some examples of DBMS software include Microsoft SQL Server, Oracle Corporation's Oracle, MySQL AB's MySQL and IBM's DB2.
  - Application programs and utility software are used to access and manipulate data in the DBMS and to manage the computer environment in which data access and manipulation take place.

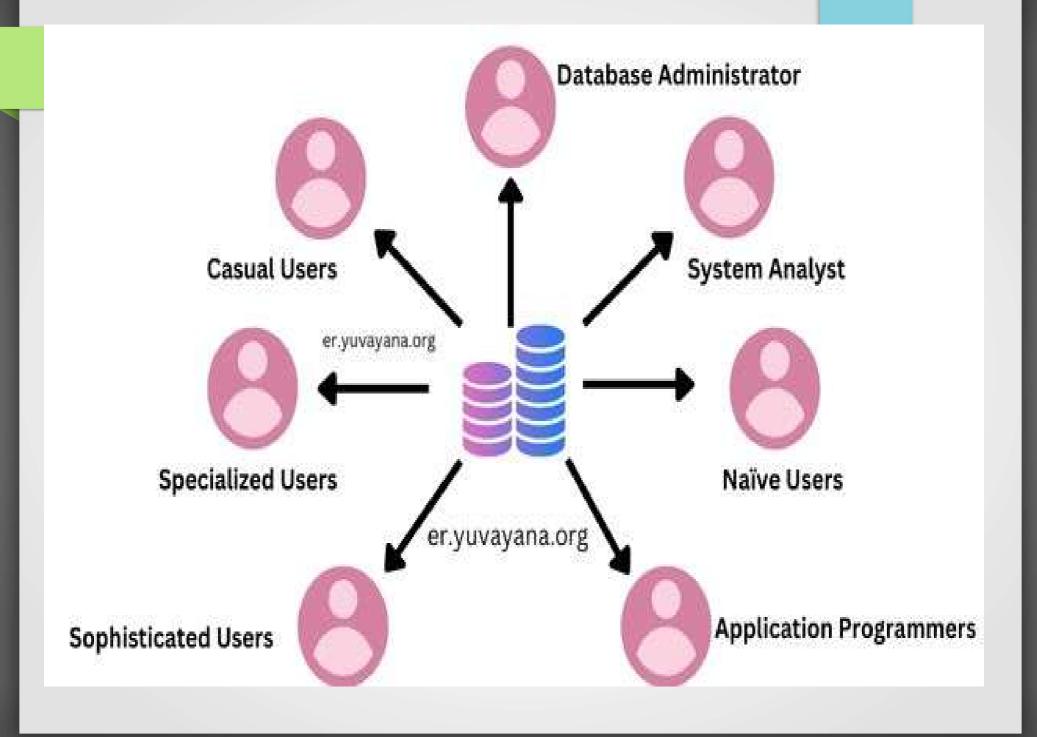
- **People.** This component includes all users of the database system. On the basis of primary job functions, five types of users can be identified in a database system: systems administrators, database administrators, database designers, systems analysts and programmers, and end users.
  - System administrators oversee the database system's general operations.
  - Database administrators, also known as DBAs, manage the DBMS and ensure that the database is functioning properly.
  - Database designers design the database structure. If the the architecture is poor then the DBA or System adminstrator cannot produce produce a useful database environment
  - Systems analysts and programmers design and implement the application programs.
     They design and create the data entry screens, reports, and procedures through which end users access and manipulate the database's data.
  - End users are the people who use the application programs to run the organization's daily operations.

#### Procedures.

- Procedures are the instructions and rules that govern the design and use of the database system.
- Procedures also are used to ensure that there is an organized way to monitor and audit both the data that enter the database and the information that is generated through the use of that data.

#### Data.

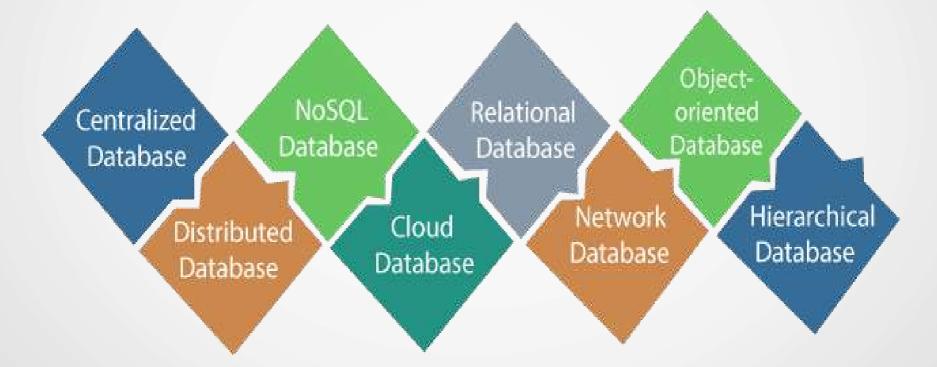
- The word data covers the collection of facts stored in the database.
- the determination of what data are to be entered into the database and how that data are to be organized is a vital part of the database designer's job.



## Types of database users

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## Types of Database



## Types of Databases

#### 1. Single-user database :

- It supports only one user at a time. In other words, if user A is using the database, users B and C must wait until user A is done.
- A single-user database that runs on a personal computer is called a desktop database.

#### 2. Multiuser database

- It supports multiple users at the same time.
- When the multiuser database supports a relatively small number of users (usually fewer than 50) or a specific department within an organization, it is called a workgroup database.
- When the database is used by the entire organization and supports many users (more than 50, usually hundreds) across many departments, the database is known as an enterprise database.

- **3. Centralized database**: A database that supports data located at a single site is called a centralized database.
- **4. Distributed database**: A database that supports data distributed across several different sites is called a distributed database.
- **5. Operational database**: A database that is designed primarily to support a company's day-to-day operations is classified as an **operational database** (sometimes referred to as a transactional or production database).
- **6. Data warehouse**: This type of database focuses primarily on storing data used to generate information required to make tactical or strategic decisions