UNIT I

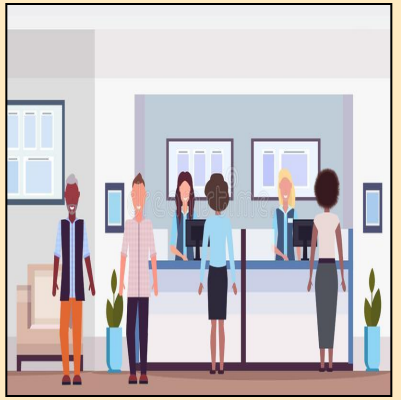
INTRODUCTION

Our Everyday Interactions with Databases…

- Most of us use databases daily and may not realize it.
- To say that the databases are everywhere would be an understatement.
- They virtually permeate our lives:
  - Online stores,
  - health care providers,
  - clubs, libraries,
  - video stores,
  - beauty salons,
  - travel agencies,
  - phone companies,
  - government agencies etc.

all use

Our Everyday Interactions with Databases…



Types of Databases

- Numeric and Textual Databases
- Multimedia Databases
- Geographic Information Systems (GIS)
- Data Warehouses
- Real-time and Active Databases

Basic Definitions

- **Database**: A collection of related data.
- **Data**: Known facts that can be recorded and have an implicit meaning.
- **Mini-world**: Some part of the real world about which data is stored in a database.

  For example, student grades and transcripts at a university.
- **Database Management System (DBMS)**: A software package/ system to facilitate the creation and maintenance of a computerized database.
- **Database System**: The DBMS software together with the data itself. Sometimes, the applications are also included.

Implicit properties of a Database

1) A database represents some aspect of the real world, sometimes called the miniworld or the universe of discourse (UoD). Changes to the miniworld are reflected in the database.
2) A database is a logically coherent collection of data with some inherent meaning. A random assortment of data cannot correctly be referred to as a database.
3) A database is designed, built, and populated with data for a specific purpose. It has an intended group of users and some preconceived applications in which these users are interested.

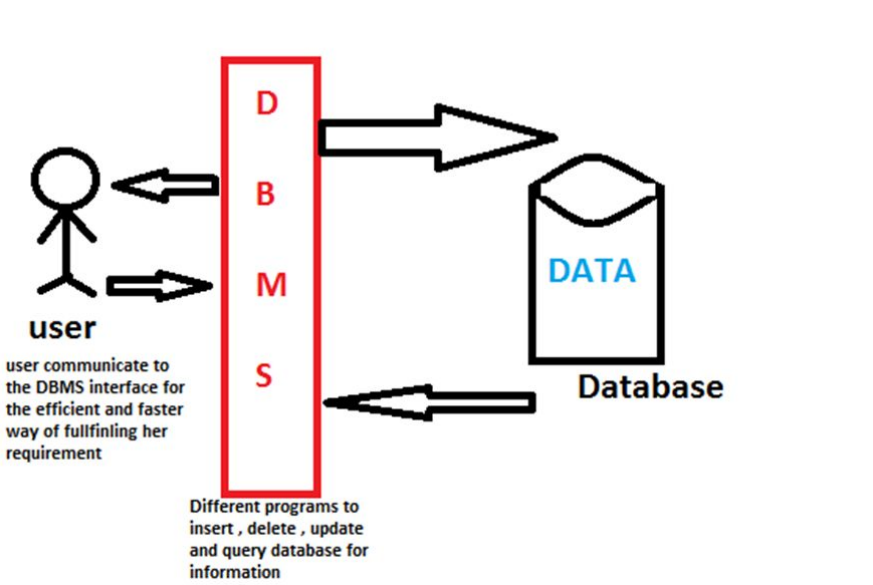
- **In other words, a database has some source from which data is derived, some degree of interaction with events in the real world, and an audience that is actively interested in its contents.**
- In order for a database to be accurate and reliable at all times, it must be a true reflection of the miniworld that it represents; therefore, changes must be reflected in the database as soon as possible

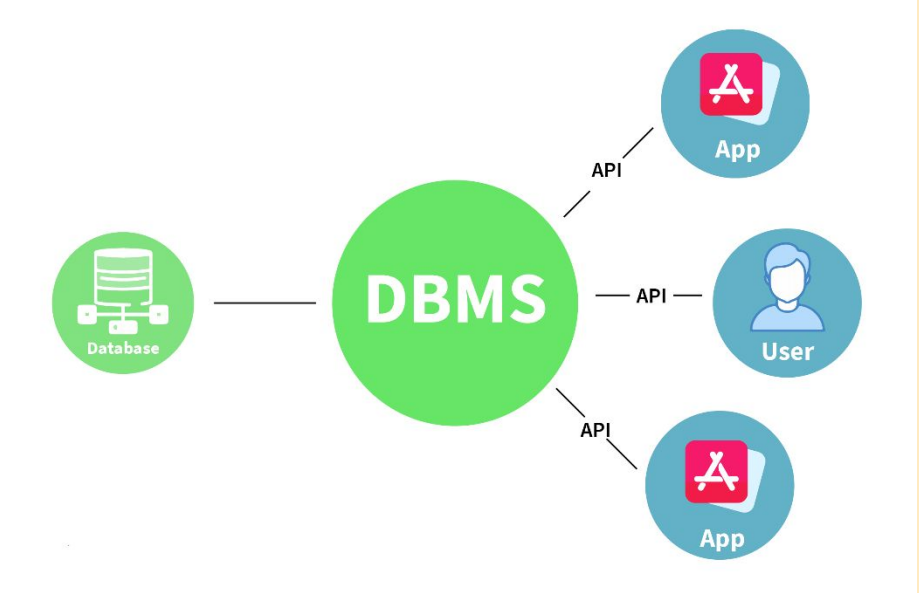
What is a DBMS ?

- Acronym **for Database Management System**
- A DBMS is a **general-purpose software**.
- Is a collection of programs that enables the user to **create, access, and manage/maintain databases**.
- With the help of DBMS you can easily:
  - create,
  - retrieve and
  - update data in databases.

What is a DBMS ?

- Acts as an interface between the end-users and the database.





Typical DBMS Functionality

- The DBMS is a general-purpose software system that facilitates the processes of :
  - defining,
  - constructing,
  - manipulating, and
  - sharing databases.
- Defining a database - involves specifying the data types, structures, and constraints of the data to be stored in the database.

Typical DBMS Functionality

- Constructing the database - is the process of storing the data on some storage medium that is controlled by the DBMS.
- Manipulating a database - includes functions such as querying the database to retrieve specific data, updating the database to reflect changes in the miniworld, and generating reports from the data.
- Sharing a database - allows multiple users and programs to access the database simultaneously

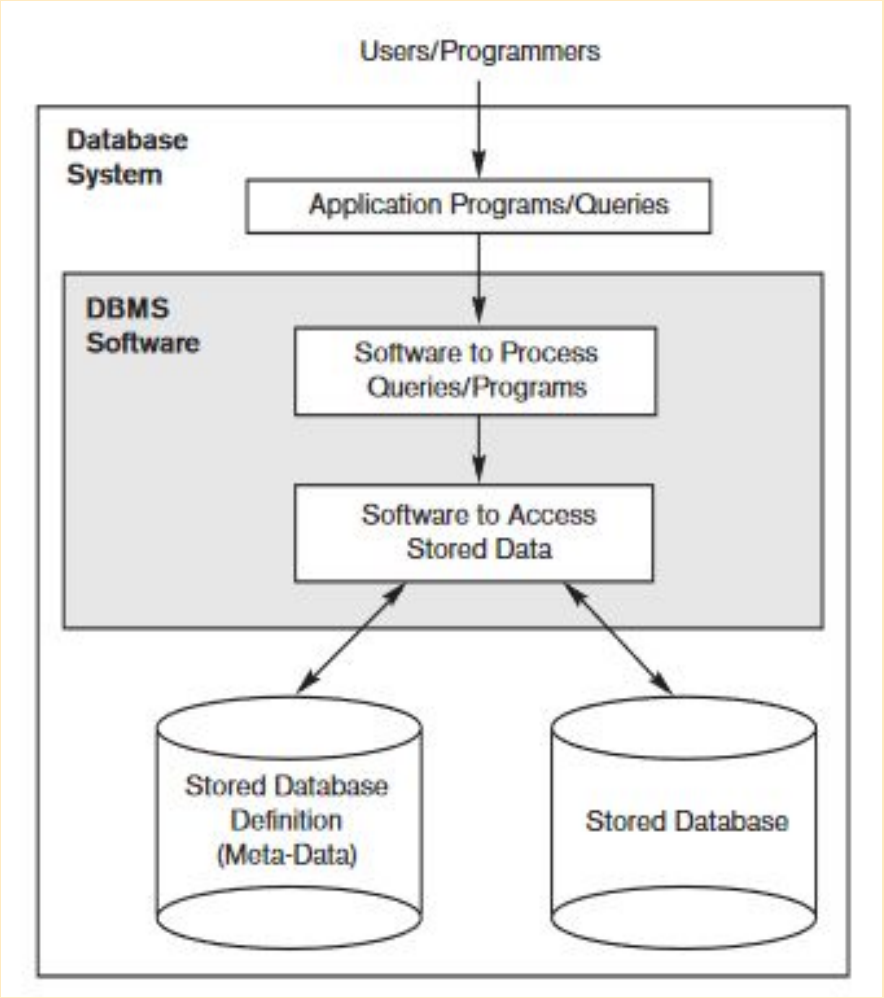
Other important functions provided by the DBMS include:

- Protection and
- Maintenance

Typical DBMS Functionality

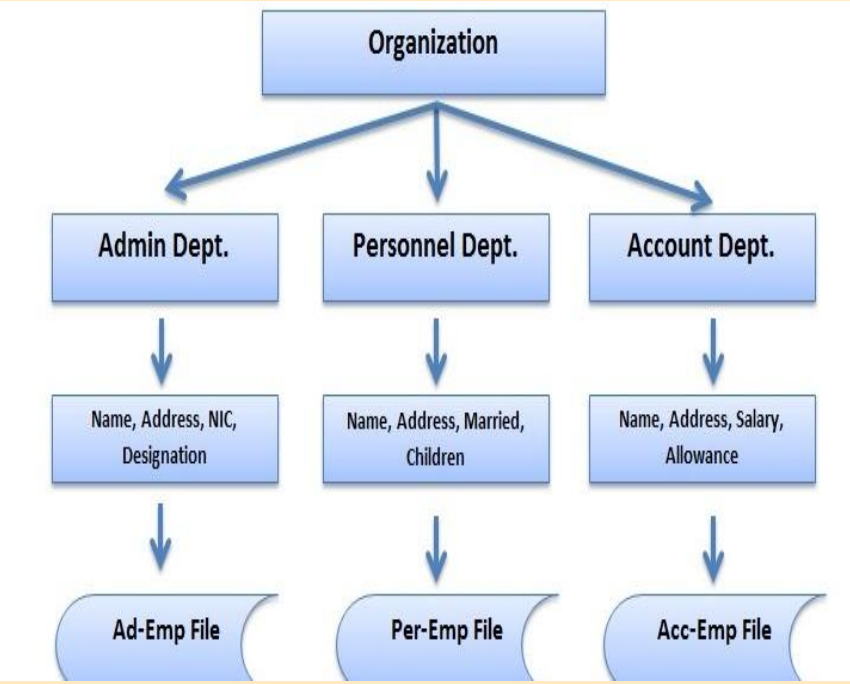
- Protection - includes:
  - system protection - against hardware or software malfunction (or crashes) and
  - security protection - against unauthorized or malicious access.
- Maintenance - A typical large database may have a life cycle of many years, so the DBMS must be able to maintain the database system by allowing the system to evolve as requirements change over time.

A simplified DB System Environment



File Processing V/s DB Approach

File Processing System:



- Although all users are interested in data about employees, each user maintains separate files— and programs to manipulate these files—because each requires some data not available from the other user's files.
- This redundancy in defining and storing data results in wasted storage space and in redundant efforts to maintain common up-to-date data.
- In file systems, each application is free to name data elements independently.

File Processing V/s DB Approach

- In the database approach, a single repository maintains data that is defined once and then accessed by various users.
- In a database, the names or labels of data are defined once, and used repeatedly by queries, transactions, and applications.