Unit – 1: Database Management System

Table of Contents

What is Data?

- Facts which can be recorded or stored.
- Text, numbers, audio, video, images etc. can be the examples of data
- Data can be categorized into various categories like Traditional data (Textual Data) and binary data (audio, video, images etc.)

Importance of Data

- In today's world data is the most important thing in our digital life.

- Many businesses and companies only running relying only on the various data
- E.g., Amazon, Google, Ola/Uber, Olx etc. (All Multibillion company only because of the data.)
- Using data, we can predict something or give useful suggestions to the users.

What is Information?

- Data is any fact which can be recorded.
- If Data is in RAW format, it is not much useful.
- If we can organize and relate the raw data, it will be much useful.
- Information is the properly organized data.

What is Database

- A database is an organized collection of structured information or data.
- Generally, data is organized and stored into various tables in the database.

What is DBMS?

- DBMS or Database Management System.
- As said above Database is collection of useful data organized in structured way.
- DBMS as name suggest is general purpose software which is used to manage data by user. DBMS allows different operation on database like inserting data, modifying data, deleting data, validation on data etc.
- DBMS is responsible how to store, manage and retrieve data.

Usage of DBMS

In today's word database is almost used in all type of software and applications. Some of them are listed below.

- Banking sector
- E-Commerce Sector
- Airline Industry
- Institutes
- Etc.

Where to Store Data & Information

- By creating customized programs in various programming languages, data can be stored in Operating System-based File Systems and used in a variety of software.
- Alternatively, we can use a database management system that can store the data and be accessed by different types of software.
- Let's examine the advantages and disadvantages of each.

File System

- We can store data & information into various files e.g., text file, spreadsheet etc.
- We can organize these files in our hard drive using file system manually and make changes to these files.

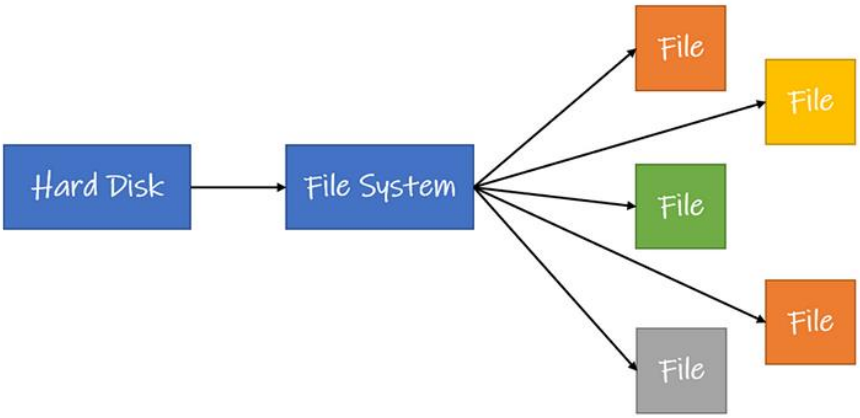

Fig 1.1. File System Diagram. All files have to be managed by user.

File System (Advantages)

- To store different types of data, it is simple to create text files, doc files, spreadsheets, etc., and it is easy to manage them using the operating system's interface (File explorer).
- Only good for small amount of data.

File System (Disadvantages)

- It is very difficult to use files and data in file system when data is in very large amount.
- There are probability of data inconsistency and data redundancy.
- Data may become unstructured and non-validated over time.
- Difficult to search or query the data and obtain useful and relevant information.
- Data is less secure
- Issues with concurrent access of data.
- Programmer must write code for each data operation differently. Can't anticipate all kind of queries/request.

DBMS

- Instead of files, we can also use some database management system software to store the data.
- Here also files of Database are stored in the Hard disk, but all the files are managed by the DBMS software. User do not need to worry about managing files.

Fig 1.2 Database file management Diagrams. All database files are managed by DBMS software itself; no user involvement is necessary.

DBMS (Advantages)

- Easy to handle large amount of data.
- Less probability of data inconsistency.
- Data redundancy is reduced.
- Structured data management.
- Possible to validate data.
- Easy to query different data and obtain useful and relevant information.
- More secure compared to file system.
- No need to write separate program for data management and data retrieval hence system development takes less efforts.
- Standardized Data Access Language (SQL – Structured Query Language) hence querying the data is easier.
- Concentration of logical design is enough
- Provides easy way to backup and restore data.
- Provides way to deal with hardware failure.

- Provides way to deal with multiple concurrent users.
- Provides transaction management.

DBMS (Disadvantages)

- Need of additional software for DBMS as opposed to file system which is built into the operating system.
- Using a DBMS can be too inconvenient if the amount of data is very small.
- Database system can be complex to operate and some times need an extra person to manage DBMS software.
- Some DBMS software are not free to use and need to be purchase to use them.

Popular DBMS Software

- MySQL
- Microsoft SQL Server
- Oracle
- Microsoft Access
- MongoDB
- SQLite
- Firebase