DATABASE MANAGEMENT SYSTEMS
UNIT 1 – TOPIC 1
INTRODUCTION TO DBMS

Database

A database is a collection of data, typically describing the activities of one or more related organizations.

Example: a university database might contain information about the following:
• *Entities* such as students, faculty, courses, and classrooms.
• *Relationships* between entities, such as students' enrollment in courses, faculty teaching courses, and the use of rooms for courses.

Database Management System (DBMS)

- A database management system, or DBMS, is software designed to assist in maintaining and utilizing large collections of data.
- The alternative to using a DBMS is to store the data in files and write application-specific code to manage it.

A Historical Perspective or History of Data base Systems

- Finding information from a huge volume of papers or deleting/modifying an entry is a difficult task in pen and paper based approach.
- To overcome the hassles faced in manual record keeping, it is desirable to computerize storage of data.
- From the earliest days of computers, storing and manipulating data have been a major application focus.
- In the late 1960s, IBM developed the Information Management System (IMS) DBMS, used even today in many major installations.
- IMS formed the basis for an alternative data representation framework called the *hierarchical data model*.
- In 1970, Edgar Codd, at IBM's San Jose Research Laboratory, proposed a new data representation framework called the *relational data model.*
- In the 1980s, the relational model consolidated its position as the dominant DBMS paradigm, and database systems continued to gain widespread use.
- SQL was standardized in the late 1980s, and the current standard, SQL: 1999, was adopted by the American National Standards Institute (ANSI) and International Organization for Standardization (ISO).
- Specialized systems have been developed by numerous vendors for creating *data warehouses,* consolidating data from several databases, and for carrying out specialized analysis.
- Commercially, database management systems represent one of the largest and most vigorous market segments.

FILE SYSTEMS VERSUS DBMS

File System	Database Management System (DBMS)
1. It is a software system that manages and controls the data files in a computer system.	1. It is a software system used for creating and managing the databases. DBMS provides a systematic way to access, update, and delete data.
2. File system does not support multi-user access.	2. Database Management System supports multi-user access.
3. Data consistency is less in the file system.	3. Data consistency is more due to the use of normalization.
4. File system is not secured.	4. Database Management System is highly secured.
5. File system is used for storing the unstructured data.	5. Database management system is used for storing the structured data.
6. In the file system, data redundancy is high.	6. In DBMS, Data redundancy is low.
7. No data backup and recovery process is present in a file system.	7. There is a backup recovery for data in DBMS.
8. Handling of a file system is easy.	8. Handling a DBMS is complex.
9. Cost of a file system is less than the DBMS.	9. Cost of database management system is more than the file system.
10. If one application fails, it does not affect other application in a system.	10. If the database fails, it affects all application which depends on it.
11. In the file system, data cannot be shared because it is distributed in different files.	11. In DBMS, data can be shared as it is stored at one place in a database.
12. These system does not provide concurrency facility.	12. This system provides concurrency facility.
13. **Example:** NTFS (New technology file system), EXT (Extended file system), etc.	13. **Example:** Oracle, MySQL, MS SQL Server, DB2, Microsoft Access, etc.

ADVANTAGES OF A DBMS

- **Data Independence**: The DBMS provides an abstract view of the data that hides data representation and storage details.
- **Efficient Data Access**: A DBMS utilizes a variety of sophisticated techniques to store and retrieve data efficiently.
- **Data Integrity and Security**: If data is always accessed through the DBMS, the DBMS can enforce integrity constraints. For example, before inserting salary information for an employee, the DBMS can check that the department budget is not exceeded. Also, it can enforce *access controls* that govern what data is visible to different classes of users.
- **Data Administration**: When several users share the data, centralizing the administration of data can offer significant improvements.
- **Concurrent Access and Crash Recovery**: A DBMS schedules concurrent accesses to the data in such a manner that users can think of the data as being accessed by only one user at a time. Further, the DBMS protects users from the effects of system failures.
- **Reduced Application Development Time:** The high-level interface to the data, facilitates quick application development.

Database System Applications

Applications where we use Database Management Systems are:

- **Telecom**: There is a database to keep track of the information regarding calls made, network usage, customer details etc. Without the database systems it is hard to maintain that huge amount of data that keeps updating every millisecond.
- **Industry**: Where it is a manufacturing unit, warehouse or distribution centre, each one needs a database to keep the records of ins and outs. For example distribution centre should keep a track of the product units that supplied into the centre as well as the products that got delivered out from the distribution centre on each day; this is where DBMS comes into picture.
- **Banking System**: For storing customer info, tracking day to day credit and debit transactions, generating bank statements etc. All this work has been done with the help of Database management systems.
- **Education sector**: Database systems are frequently used in schools and colleges to store and retrieve the data regarding student details, staff details, course details, exam details, payroll data, attendance details, fees details etc. There is a hell lot amount of inter-related data that needs to be stored and retrieved in an efficient manner.
- **Online shopping**: You must be aware of the online shopping websites such as Amazon, Flipkart etc. These sites store the product information, your addresses and preferences, credit details and provide you the relevant list of products based on your query. All this involves a Database management system.