

FILE SYSTEMS VERSUS A DBMS

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CONTENTS

- What is traditional file system?
- Overview of traditional file system.
- Advantages of traditional file system.
- Limitations of traditional file system.
- What is DBMS?
- Overview of DBMS.
- Components of DBMS.
- Advantages of DBMS.
- Limitations of DBMS

Traditional File Processing System

- In a typical file processing system, each department has its own set of applications and its own files, designed specifically for those applications.
- The department itself, working with the data processing staff, set policies or standards for the format and maintenance of its files.
- Computer readable data in file system are kept in files stored on magnetic tape or disk.

FIGURE:-File System



➤ **For example:**

To illustrate Traditional File Processing Systems definition, lets us take an example of **college** where student record for examination is stored in one file, admission records on other file and library record is stored in different file that creates many duplicate values like ***roll Number, Name and Father Name*** that **creates data redundancy.**

Overview OF Traditional File Processing System

- It stores data of an organization in group of files.
- **Files carrying data are independent** on each other.
- **COBOL, C, C++** programming languages were used to design the files.
- Each file contains data for some specific area or department like library, student fees, and student examinations.
- It is **less flexible** and has many limitations.
- It is very difficult to maintain file processing system.
- Any change in one file affects all the files that creates burden on the programmer.
- File in Traditional File Processing Systems are called **flat files**.

NOTE:-A flat file stores data in plain text format. In a relational database, a flat file includes a table with one record per line. The different columns in a record are delimited by a comma or tab to separate the fields. Data stored in flat files have no folders or paths associated with them.

Advantages of Traditional File System

- Companies mainly use file processing to handle large volumes of structured data on a regular basis
- File processing design approach was well suited to mainframe hardware and batch input
- File processing can be more efficient and cost less than a DBMS in certain situations
- The design of file processing is more simple than designing Database
- File processing cost less and can be more speed than Database
- We can customize file processing more easily and efficiently than Database because files are related with the application and it have all the data needed for that application

Limitations of Traditional File system

- **Separated and Isolated Data:** To make a decision, a user might need data from two separate files. First, the files were evaluated by analysts and programmers to determine the specific data required from each file and the relationships between the data and then applications could be written in a programming language to process and extract the needed data. Imagine the work involved if data from several files was needed.
- **Duplication of data:** Often the same information is stored in more than one file, that requires additional storage space, more costs time and money to enter the data more than once.
- Duplication can lead to loss of data integrity
- **Data Dependence:** in file based approach application programs are data dependent. It means that, with the change in the physical representation (how the data is physically represented in disk) or access technique (how it is physically accessed) of data, application programs are also affected and needs modification. In other words application programs are dependent on the how the data is physically stored and accessed.

- **Data Redundancy:** occurs when data common to two or more information systems is stored in several places. Data redundancy requires more storage space, and maintaining and updating data in several locations is expensive.
- **Data Integrity:** Refers to the validity of data. Data integrity can be compromised in a number of ways: human errors when data is entered, errors that occur when data is transmitted from one computer to another, software bugs or viruses, hardware malfunctions, such as disk crashes and natural disasters, such as fires and floods.
- **Rigid Data Structure:** A data structure that is hard to work with and inflexible. File-processing is rigid when compared to a typical database management system.
- **Data inconsistency:** The same attribute may have different values.

- **Simplicity:** the design of file processing is more simple than designing Database
- **Efficiency:** file processing cost less and can be more speed than Database
- **Customization:** you can customize file processing more easily and efficiently than Database because files are related with the application and it have all the data needed for that application
- **Difficulty in representing data from the user's view:** To create useful applications for the user, often data from various files must be combined. In file processing it was difficult to determine relationships between isolated data in order to meet user requirements.
- **Data Inflexibility:** Program-data interdependency and data isolation, limited the flexibility of file processing systems in providing users with ad-hoc information requests
- **Data Security.** The security of data is low in file based system because, the data is maintained in the flat file(s) is easily accessible.

- **Incompatible file formats:** As the structure of files is embedded in the application programs, the structures are dependent on the application programming language. For example, the structure of a file generated by a COBOL program may be different from the structure of a file generated by a 'C' program. The direct incompatibility of such files makes them difficult to process jointly.
- **Transactional Problems:** The File based system approach does not satisfy transaction properties like Atomicity, Consistency, Isolation and Durability properties commonly known as ACID properties.
- **Concurrency problems:** When multiple users access the same piece of data at same interval of time then it is called as concurrency of the system. When two or more users read the data simultaneously there is no problem, but when they like to update a file simultaneously, it may result in a problem.
- **Poor data modeling of real world:** The file based system is not able to represent the complex data and relationships, which results poor data modeling properties.

DBMS

- A Database Management System (DBMS) is a system software that allows users to efficiently define, create, maintain and share databases.
- Defining a database involves specifying the data types, structures and constraints of the data to be stored in the database.
- Creating a database involves storing the data on some storage medium that is controlled by DBMS.
- Maintaining a database involves updating the database whenever required to evolve and reflect changes in the database and also generating reports for each change.
- Sharing a database involves allowing multiple users to access the database.
- DBMS also serves as an interface between the database and end users or application programs. It provides control access to the data and ensures that data is consistent and correct by defining rules on them.

An application program accesses the database by sending queries or requests for data to the DBMS. A query causes some data to be retrieved from database.

Examples of DBMS software

MySQL Database

MS- Access

Oracle Database

Microsoft SQL Server

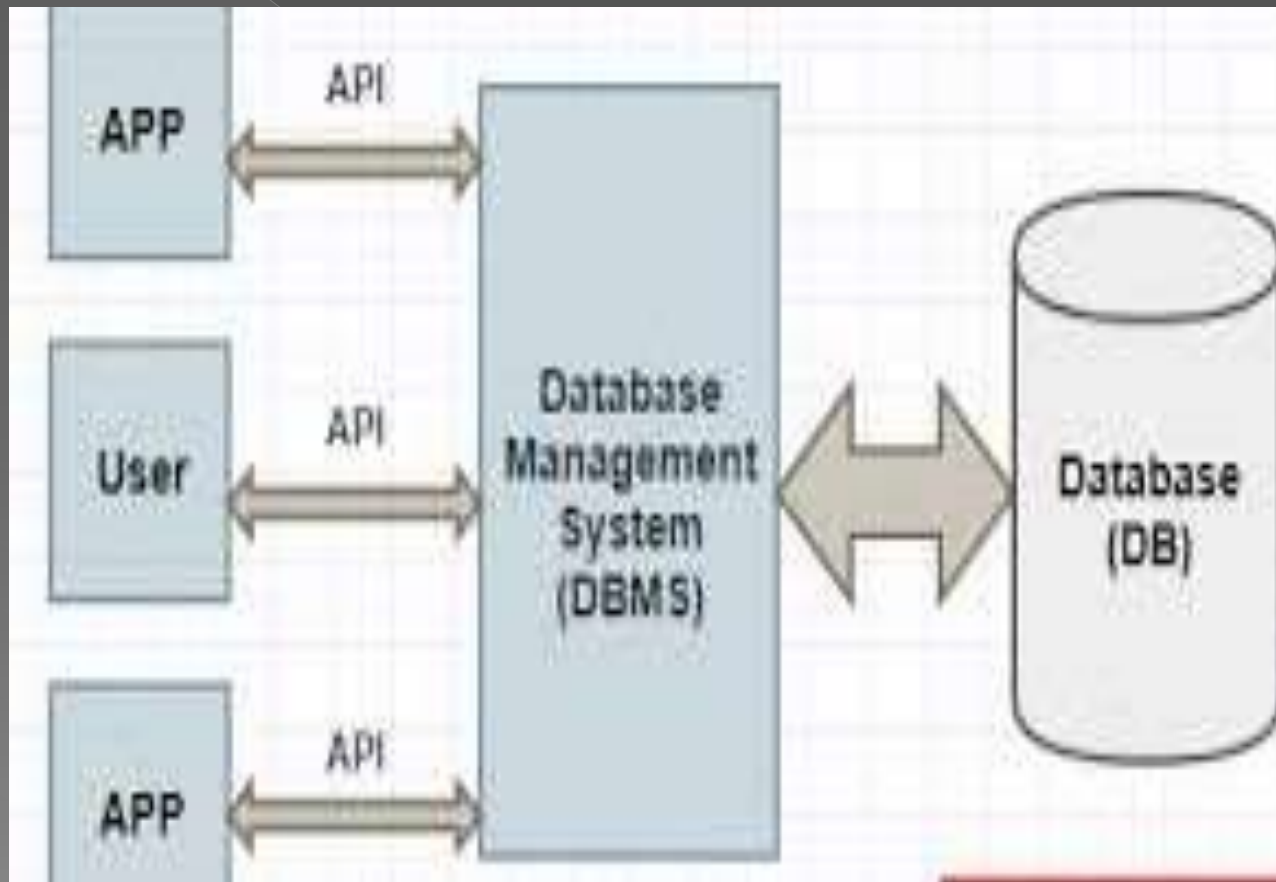
File Maker

NoSQL

Postgresql

MS Fox Pro

FIGURE:- DBMS



OVERVIEW OF DBMS

- Software for creating and maintaining databases
- Permits firms to rationally manage data for the entire firm
- Acts as interface between application programs and physical data files
- Separates logical and design views of data
- Solves many problems of the traditional data file approach

- > Because DBMSs are powerful, they require more expensive hardware, software, and data networks capable of supporting a multi-user environment
- > More complex than a file processing system
- > Procedures for security, backup, and recovery are more complicated and critical

Components of DBMS

- Data definition language: Specifies content and structure of database and defines each data element
- Data manipulation language: Used to process data in a database
- Data dictionary: Stores definitions of data elements and data characteristics

Advantages of DBMS

- **Scalability:** Scalability means that a system can be expanded, modified, or downsized easily to meet the rapidly changing needs of a business enterprise. Also known as extensibility.
- **Better support for client/server systems:** In a client/server system, processing is distributed throughout an organization. Client/server systems require the power and flexibility of database design.
- **Economy of sale:** The inherent efficiency of high-volume processing on larger computers. Database design allows better utilization of hardware. If a company maintains an enterprise-wide database, processing is less expensive using a powerful mainframe server instead of using several smaller computers.

- **Flexible data sharing:** Data can be shared across the enterprise, allowing more users to view the same information in different ways
- **Enterprise-wide application-database administrator(DBA):** (DBA) typically manages a database management system (DBMS). The DBA assesses overall requirements and maintains the database for the benefit of the entire organization rather than a single department or user.
- **Stronger Standards:** effective database administration helps ensure that standards for data names, formats, and documentation are followed uniformly throughout the organization

- **Controlled redundancy:** because the data is stored in a set of related tables, data items do not need to be duplicated in multiple locations
- **Better Security:** the DBA defines authorization procedures to ensure that only legitimate users can access the database and can allow different users to have different levels of access
- **Increased programmer productivity:** programmers do not have to create the underlining file structure for the database, so they can concentrate on logical design
- **Data Independence:** systems that interact with a DBMS are relatively independent of how the physical data is maintained

Disadvantages of DBMS

- **High Cost of DBMS:** A DBMS is a large and sophisticated piece of software, it is expensive to purchase or lease.
- **Higher hardware cost:** Additional memory and processing power may be required to run the DBMS, resulting in need to upgrade hardware.
- **Higher programming cost:** A DBMS is complex tool with many features, programmer's should have thorough knowledge to use the system, for this organization has to pay extra for expertise.

- **High conversion cost:** different formats are used in files, when an organization converts to a database system, data has to be removed from files and loads into the database, this may be difficult and time consuming.
- **Increased vulnerability:** As we know that in DBMS, all the files are stored in single database so chances of database failure become more. Any accidental failure of component may cause loss of valuable data

THANK YOU