Module - I

Lecture-02

File Systems Versus Database Systems

- File Systems Versus Database Systems

- Disadvantages of File System

- Advantages of Database Systems

File Systems Versus Database Systems

- The traditional file-oriented approach to information processing has a separate master file and its own set of personal files for each application.

- An organization needs flow of information across its various applications also and this requires sharing of data, which is significantly lacking in the traditional approach.
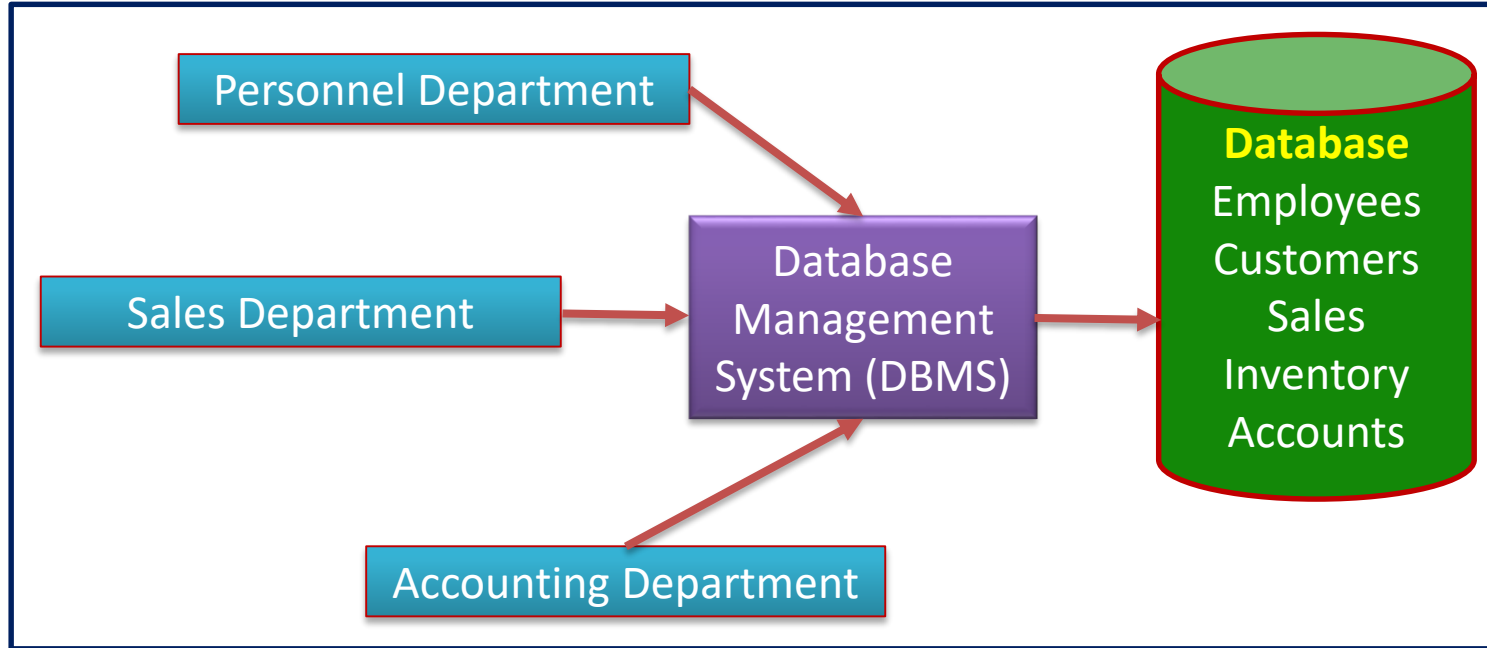
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File Systems Versus Database Systems

Fig. Database System
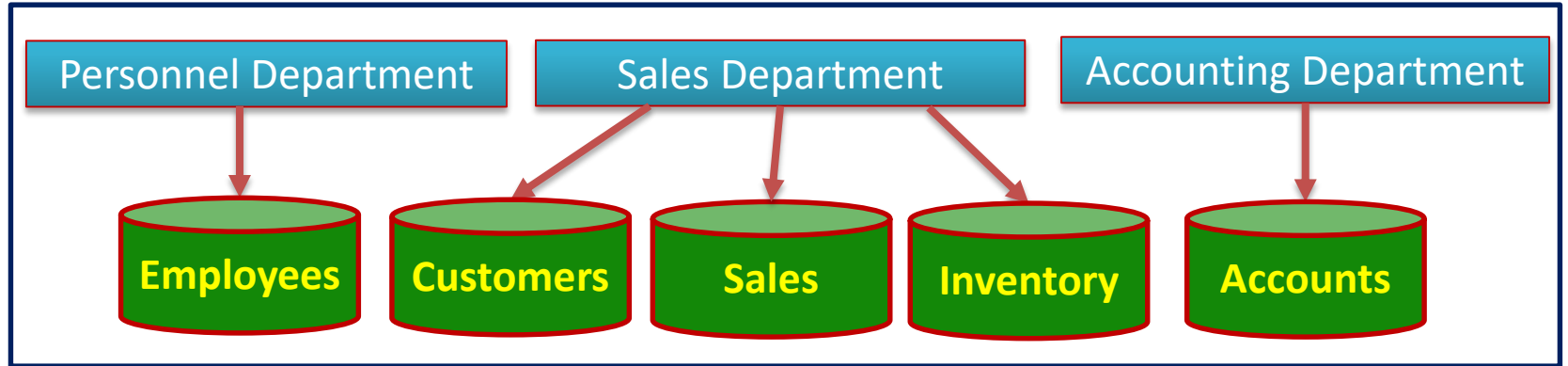
File Systems Versus Database Systems

Fig. **File System**

Disadvantages of File System

Although file-based approaches which came into being with the first commercial applications of computers suffered from the following significant disadvantages.

1. **Data Redundancy:** Data Redundancy means same information is duplicated in several files. This makes data redundancy.

2. **Data Inconsistency:** Data Inconsistency means different copies of the same data are not matching. That means, different versions of same basic data are existing. This occurs as the result of update operations that are not updating the same data stored at different places. For Example, *Address Information* of a *customer* is recorded differently in different files.

Disadvantages of File System cont'd

3. **Difficulty in Accessing Data:** It is not easy to retrieve information using a conventional file processing system. Convenient and efficient information retrieval is almost impossible using conventional file processing system.

4. **Data Isolation:** Data are scattered in various files, and the files may be in different format, writing new application program to retrieve data is difficult.

5. **Integrity Problems:** The data values may need to satisfy some integrity constraints. For example, the balance field value must be greater than Rs. 10000/-. One has to handle this through program code in file processing systems. But in database user can declare the integrity constraints along with definition itself.

Disadvantages of File System cont'd

6. **Atomicity Problems:** Atomicity refers to the property of a database transaction, where all the actions within the transaction are executed as a single, indivisible unit of work. It is difficult to ensure atomicity in file processing system. For example, transferring `Rs. 500/-` from Account `A` to Account `B`. If a failure occurs during execution, there could be situation like `Rs. 500/-` is deducted from Account `A` and not credited in Account `B`.

Disadvantages of File System cont'd

7. **Concurrent Access Anomalies:** If multiple users are updating the same data simultaneously it will result in inconsistent data state. In file processing system, it is very difficult to handle this using program code. This result in concurrent access anomalies.

8. **Security Problems:** Enforcing security constraints in file processing system is very difficult as the application programs are added to the system in an *ad-hoc* manner.

Disadvantages of File System cont'd

The comparison between file systems and database systems is summarized as shown below:

Basis	File System	Database System
Data Redundancy	High	Minimal
Data Inconsistency	Possible	Can be avoided
Data Access	Not Easy	Convenient / Efficient
Data Isolation	Yes	No
Data Sharing	Minimal	Maximal
Search Capability	Minimal	Maximal
Security	Minimal	Maximal
Concurrent Access	Minimal Effect	Yes (Maximal)

Advantages of Database Management System (DBMS)

1. **Data Redundancy can be reduced:** In a database system, the redundancy of the data is controlled, and the system is aware of the redundancy and assumes the responsibility for propagating updates (automatic change at other places in case of duplicate data).

2. **Data Inconsistency can be avoided:** If the redundancy is controlled, the inconsistency is automatically controlled. Inconsistency means the mismatch in the two entries with the same data. It must be avoided to get correct information.

Advantages of Database Management System (DBMS)

3. **Data can be shared:** It means the data requirements of the new applications may be satisfied without creating any new stored files. New applications operate on the same stored data.

4. **Standards can be enforced:** The applicable standards (company, installation, departmental, industry, national and international) are followed in the representation of data. It is useful for data interchange or migration between systems.

Advantages of Database Management System (DBMS)

5. **Security Restrictions can be applied:** The access to the database is through proper channels and authorization checks are carried out whenever access to sensitive data is desired.

6. **Integrity can be maintained:** It means ensuring that the data in the database is accurate. As the database is shared so data integrity is very important.