**UNIT-1**

**Lecture-2**

**Database System Applications**

Databases are widely used. Here are some representative applications:

* **Banking:** For customer information, accounts, and loans, and banking transactions.
* **Airlines:** For reservations and schedule information.
* **Universities:** For student information, course registrations, and grades.
* **Credit card transactions:** For purchases on credit cards and generation of monthly statements.
* **Telecommunication:** For keeping records of calls made, generating monthly bills, maintaining balances on prepaid calling cards, and storing information about the communication networks.
* **Finance:** For storing information about holdings, sales, and purchases of financial instruments such as stocks and bonds.
* **Sales:** For customer, product, and purchase information.
* **Manufacturing:** For management of supply chain and for tracking production of items in factories, inventories of items in warehouses/stores, and orders for items.
* **Human resources:** For information about employees, salaries, payroll taxes and benefits, and for generation of paychecks.

**Advantages of DBMS**

**1. Improved data sharing**

An advantage of the database management approach is, the DBMS helps to create an environment in which end users have better access to more and better-managed data. Such access makes it possible for end users to respond quickly to changes in their environment.

**2. Improved data security**

The more users access the data, the greater the risks of data security breaches. A DBMS provides a framework for better enforcement of data privacy and security policies.

**3. Better data integration**

Wider access to well-managed data promotes an integrated view of the organization’s operations and a clearer view of the big picture. It becomes much easier to see how actions in one segment of the company affect other segments.

**4. Minimized data inconsistency**

Data inconsistency exists when different versions of the same data appear in different places. All data appears consistently across the database and the data is same for all the users viewing the database. Moreover, any changes made to the database are immediately reflected to all the users and there is no data inconsistency.

**5. Improved data access**

The DBMS makes it possible to produce quick answers to ad hoc queries. From a database perspective, a query is a specific request issued to the DBMS for data manipulation. The DBMS sends back an answer (called the query result set) to the application.

**6. Improved decision making**

Better-managed data and improved data access make it possible to generate better-quality information, on which better decisions are based. While the DBMS does not guarantee data quality, it provides a framework to facilitate data quality initiatives.

**7. Increased end-user productivity**

The availability of data, combined with the tools that transform data into usable information, empowers end users to make quick, informed decisions that can make the difference between success and failure in the global economy.

**Disadvantages of DBMS**

**1. Increased costs**

One of the disadvantages of DBMS is Database systems require sophisticated hardware and software and highly skilled personnel. The cost of maintaining the hardware, software, and personnel required to operate and manage a database system can be substantial.

**2. Management complexity**

Database systems interface with many different technologies and have a significant impact on a company’s resources and culture. The changes introduced by the adoption of a database system must be properly managed to ensure that they help advance the company’s objectives.

**3. Maintaining currency**

To maximize the efficiency of the database system, you must keep your system current. Therefore, you must perform frequent updates and apply the latest patches and security measures to all components.

Because database technology advances rapidly, personnel training costs tend to be significant.

**4. Frequent upgrade/replacement cycles**

DBMS vendors frequently upgrade their products by adding new functionality. Such new features often come bundled in new upgrade versions of the software. Some of these versions require hardware upgrades. Not only do the upgrades themselves cost money, but it also costs money to train database users and administrators to properly use and manage the new features.

**Database Systems versus File Systems**

In **traditional file processing**, each user defines and implements the files needed for a specific software application as part of programming the application. For example, one user, the *grade reporting office,* may keep a file on students and their grades. A second user, the *accounting office,* may keep track of students' fees and their payments. Although both users are interested in data about students, 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 data up to date.

Keeping organizational information in a file-processing system has a number of major disadvantages:

* **Data redundancy and inconsistency:** Since different programmers create the files and application programs the same information may be duplicated in several places (files). In addition, it may lead to data inconsistency; that is, the various copies of the same data may no longer agree.
* **Difficulty in accessing data**
* **Data isolation:** Because data are scattered in various files, and files may be in different formats, writing new application programs to retrieve the appropriate data is difficult.
* **Integrity problems:** The data values stored in the database must satisfy certain types of consistency constraints.
* **Atomicity problems:** All the updations must be done in its entirety or not at all.
* **Concurrent-access anomalies:** For the sake of overall performance of the system and faster response, many systems allow multiple users to update the data simultaneously. In such an environment, interaction of concurrent updates may result in inconsistent data.
* **Security problems:** Not every user of the database system should be able to access all the data.

**Difference between File System and DBMS:**

| **S.NO.** | **FILE SYSTEM** | **DBMS** |
| --- | --- | --- |
| **1.** | File system is a software that manages ad organizes the files in a storage medium within a computer. | DBMS is a software for managing the database. |
| **2.** | Redundant data can be present in a file system. | In DBMS there is no redundant data. |
| **3.** | It doesn’t provide backup and recovery of data if it is lost. | It provides backup and recovery of data even if it is lost. |
| **4.** | There is no efficient query processing in file system. | Efficient query processing is there in DBMS. |
| **5.** | There is less data consistency in file system. | There is more data consistency because of the process of normalization. |
| **6.** | It is less complex as compared to DBMS. | It has more complexity in handling as compared to file system. |
| **7.** | File systems provide less security in comparison to DBMS. | DBMS has more security mechanisms as compared to file system. |
| **8.** | It is less expensive than DBMS. | It has a comparatively higher cost than a file system. |

**CHARACTERISTICS OF THE DATABASE APPROACH**

In the database approach, a single repository of data is maintained that is defined once and then is accessed by various users. The main characteristics of the database approach versus the file-processing approach are the following:

• **Self-describing nature of a database system**

A fundamental characteristic of the database approach is that the database system contains not only the database itself but also a complete definition or description of the database structure and constraints. This definition is stored in the DBMS catalog. The information stored in the catalog is called meta-data, and it describes the structure of the primary database.

**• Insulation between programs and data, and data abstraction**

In traditional file processing, the structure of data files is embedded in the application programs, so any changes to the structure of a file may require changing all programs that access this file. By contrast, DBMS access programs do not require such changes. The structure of data files is stored in the DBMS catalog separately from the access programs. This is called **program-data independence**. Users can define operations on data as part of the database definitions. This is called **program-operation independence.** The characteristic that allows program-data independence and program-operation independence is called **data abstraction**.

• **Support of multiple views of the data**

A database typically has many users, each of whom may require a different perspective or view of the database. A view may be a subset of the database or it may contain virtual data that is derived from the database files but is not explicitly stored.

**• Sharing of data and multiuser transaction processing**

A multiuser DBMS, must allow multiple users to access the database at the same time.