UNIT -1

Database and Database User

Flat-file Systems

- In early processing systems, an organization's information was stored as groups of records in separate files. The *file processing systems* consisted of a few data files and many application programs. Each file, called a *flat file,* contained processed information for one specific function, such as accounting or inventory.

- A flat file system stores data in a plain text file. Each line of the text file holds one record, with fields separated by delimiters, such as commas or tabs.

- A File Management System (FMS) accommodate flat files that have no relation to other files. This type of database is ideal for a simple databases that do not contain a lot of repeated information. Examples include excel spreadsheet or word data list file. Nanda Kishor Ray

Database Management System

- A **database** is the collection of related persistent data and contains information relevant to an enterprise. The database is also called the repository or container for a collection of data files. For example, **university database** for maintaining information about *students*, *courses* and *grades* in university.

- A **database system** is basically just a computerized record-keeping system. A database system involves four major components: **data**, **hardware**, **software**, and **users**.

- The **database management system (DBMS)** is the software that handles all access to the database. It is defined as the collection of interrelated data and a set of programs to access those data.

Database Management System

- Users of a DBMS system can perform the following basic operations on the database:
    - Adding new, empty files to the database.
    - Inserting data into existing files.
    - Retrieving data from existing files.
    - Changing data in existing files.
    - Deleting data from existing files.
    - Removing existing files from the database.

Database Applications

- Databases form an essential part of almost all enterprises. Some database applications are given below:
  - **Banking:** For customer information, accounts, and loans, and banking transactions.
  - **Airlines:** For reservation and schedule information.
  - **Universities:** For student information, course registrations, and grades.
  - **Credit card transactions:** For purchase on credit cards and generation of monthly statements.
  - **Telecommunication:** For keeping records of call 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 purchase of financial instruments such as stocks and bonds.

Database Applications

- **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.

Purpose of DBMS

- In early days, database applications were built on top of file systems. These systems have many drawbacks. Database systems offer solutions to all the drawbacks of file systems. The benefits using DBMS are:

    - **Redundancy can be reduced:** The database is said to be redundant if the same information is duplicated in several places (data files). For example, the address and telephone number of a particular customer may appear in a file that consists of saving-account records and in a file that consists of checking-account records. We can reduce redundancy by using DBMS.

    - **Inconsistency can be avoided:** The database is said to be inconsistent if various copies of the same data may no longer agree. For example, a changed customer address may be reflected in saving account but not elsewhere in the system. By using DBMS we can avoid inconsistency.

Purpose of DBMS

- **Data can be shared:** The data in the database can be shared among many users and applications.

- **Transaction support can be provided:** A transaction involves several database operations. For example, transfer of a cash amount from account A to account B. In this example two update operations are required.

- **Integrity can be maintained:** The problem of integrity is the problem of ensuring that the data in database is correct. By using DBMS, we can maintain integrity problems.

- **Security can be enforced:** Not every user of the database system should be able to access all data.

- **Efficient Backup and Recovery can be provided:** Provide facilities for recovering from software and hardware failures to reinstate database to previous consistent state.

- **Data in the database can be accessed easily.**

Database Users

- Database users can be classified into two categories: *actors on the scene* and *workers behind the scene.*

- **Actors on the Scene:**

  ▪ These people's jobs involve develop, use, and administer the database. These people are classified into following categories:

  ▪ **Database administrators:** These people are responsible for authorizing access to the database, for coordinating and monitoring its use, acquiring software and hardware resources, controlling its use and monitoring efficiency of operations. Thus DBA is responsible for the overall control of the system at technical level. Hence, DBA is responsible for the following tasks:

    - Defining Conceptual Schema
    - Defining Internal Schema
    - Defining Security & Integrity Constraints

Database Users

- Monitoring performance & responsibilities to changing requirements
- Liaising with users
- Defining Dump and Reload policies

- **Database Designers:** These people are responsible for defining the content, the structure, the constraints, and functions or transactions against the database. They must communicate with the end-users and understand their needs.

- **End Users:** They use the database for querying, updating and generating reports. End-users can be categorized as follows:
  - **Casual end users:** They access database occasionally when needed. They use sophisticated database query language. They are middle or high-level managers.
  - **Naive or Parametric end users:** They make up a large section of the end-user population. They use previously well-defined functions in the form of "canned transactions" against the database. For example, bank-tellers, reservation clerks.

Database Users

- **Sophisticated end users:** They have clear knowledge of database system facilities to construct complex queries. They are Engineers, Scientists. They make use of most database facilities.

- **Stand-alone end user:** They make use of personal databases by using ready-made program packages that provide easy-to-use menu based interface.

- **System Analysts and Application Programmers:**

  - **System analysts** determine the requirements of end users, especially naive and parametric end users and develop specifications for canned transactions that meet these requirements.

  - **Application programmers** implement these specifications as programs; then they test, debug, document and maintain these canned transactions.

Database Users

- **Workers Behind the Scene:**
  - These people are associated with the design, development, and operation of the *DBMS software and system environment*. These people are not actively interested in the database itself. These people are classified into following types:
  - **DBMS System Designers and implementers:** These people design and implement the DBMS modules and interfaces as a software package.
  - **Tool Developers:** These persons design and implement **tools** – the software packages that facilitate database system design and use and that help improve performance.
  - **Operators and Maintenance Personnel:** These personnel are responsible for the actual running and maintenance of the hardware and software environment for the database system.

Questions

- What is Database Management System?

- What are different types of Database users and their roles?

- What are the advantages of using Database Management System over traditional filing system?

- What is flat-file system? What are the advantages of using DBMS approach?