INTRODUCTION TO DATABASE SYSTEMS

Overview

- Data management, which focuses on data collection, storage and retrieval, constitutes a core activity for any organization.
- To generate relevant information efficiently one need quick access to data from which the required information is produced.
- Efficient data management requires the use of a database. A **database** is a shared, integrated computer structure that stores a collection of:
    i. End -user data i.e., raw facts of interest to the user.
    ii. Meta -data through which the end-user data are integrated and managed
- **Data** are raw facts.
- **Information** is the result of processing raw data to reveal its meaning.
- A **database management system** (**DBMS**) is a collection of programs that manages the database structure and controls access to the data stored in the database. Thus, **DBMS** enables users to define, create, maintain, and control access to the database.
- **Database system** is a collection of application programs that interact with the database along with the DBMS and database itself.
- An **application program** is a computer program that interacts with the database by issuing an appropriate request to the DBMS.

Types of database systems

i. Single User database systems

This is a database system that supports one user at a time such that if user A is using the database, users B & C must wait until user A complete his or her database work.
If a single user database runs on a personal computer, it's called a desktop database.

ii. Multi-user database

This is a database that supports multiple users at the same time for relatively small number e.g. 20 users in a department the database is referred to as a workgroup database. While one, which supports many departments is called an **enterprise database**.

iii. Centralized Database system

This is a database system that supports a database located at a single site.

iv. Distributed database system

This is a database system that supports a database distributed across several different sites.

Database System Environment

The database system is composed of 5 major parts:

i. **Hardware**

The DBMS and the applications require hardware to run. The hardware can range from a single personal computer to a network of computers

ii. **Software**

The software component comprises the DBMS software itself and the application programs, together with the operating system, including network software if the DBMS is being used over a network.

iii. **Data**

It is the most important component of the DBMS environment, certainly from the end-users' point of view.

iv. **Procedures**

Procedures refer to the instructions and rules that govern the design and use of the database. The users of the system and the staff that manage the database require documented procedures on how to use or run the system. These consist of instructions on how to:

- log on to the DBMS;
- use a particular DBMS facility or application program;
- start and stop the DBMS;
- make backup copies of the database;
- handle hardware or software failures. This may include procedures on how to identify the failed component, how to fix the failed component and, following the repair of the fault, how to recover the database.

v. **People**

They interact with database. They include:

1. **Systems administrator** - Oversees the database systems general operations.
2. **Database administrator (DBA)** - Manages the DBMS use and ensures that the database is functioning properly. His functions include:

    i. Storage structure and Access Methods Definitions - By writing a set of definitions for appropriate storage structures and access methods, which are translated by the data storage and definition language compiler.
    ii. Granting authorization to data access - This is so as to regulate which parts of the database users can access.
    iii. The database manager keeps integrity Constrains in a special system structure whenever an update takes place in the system.
3. **Database designers** - These are the database architects who design the database structure.
4. **Systems Analysts & Programmers** - They design and implement the application programs they design & create the data entry scheme, reports & procedures

through which users access and manipulate the databases data.

5. **End users -** These are the people who use the application programs to run the organizations daily operations. They fall in the following classes:

    i. Sophisticated users - These interact with the system without writing programs. They form their requests in a database query language.
    ii. Naive – Unsophisticated user who interact with the systems by invoking one of the permanent application programs that have been written previously.