What is DBMS? Application, Types, Example, Advantages

What is a Database?

A database is a collection of related data which represents some aspect of the real world. A database system is designed to be built and populated with data for a certain task.

What is DBMS?

Database Management System (DBMS) is a software for storing and retrieving users' data while considering appropriate security measures. It consists of a group of programs which manipulate the database. The DBMS accepts the request for data from an application and instructs the operating system to provide the specific data. In large systems, a DBMS helps users and other third-party software to store and retrieve data.

DBMS allows users to create their own databases as per their requirement. The term “DBMS” includes the user of the database and other application programs. It provides an interface between the data and the software application.

Example of a DBMS

Let us see a simple example of a university database. This database is maintaining information concerning students, courses, and grades in a university environment. The database is organized as five files:

- The STUDENT file stores data of each student
- The COURSE file stores contain data on each course.
- The SECTION stores the information about sections in a particular course.
- The GRADE file stores the grades which students receive in the various sections

- The TUTOR file contains information about each professor.
- To define a database system:

History of DBMS

Here, are the important landmarks from the history:

1960 – Charles Bachman designed first DBMS system

1970 – Codd introduced IBM'S Information Management System (IMS)

1976– Peter Chen coined and defined the Entity–relationship model also know as the ER model

1980 – Relational Model becomes a widely accepted database component

1985– Object–oriented DBMS develops.

1990s– Incorporation of object–orientation in relational DBMS.

1991– Microsoft ships MS access, a personal DBMS and that displaces all other personal DBMS products.

1995: First Internet database applications

1997: XML applied to database processing. Many vendors begin to integrate XML into DBMS products.

Characteristics of Database Management System

- Provides security and removes redundancy
- Self–describing nature of a database system
- Insulation between programs and data abstraction
- Support of multiple views of the data
- Sharing of data and multiuser transaction processing
- DBMS allows entities and relations among them to form tables.
- It follows the ACID concept (Atomicity, Consistency, Isolation, and Durability).

- DBMS supports multi-user environment that allows users to access and manipulate data in parallel.

DBMS vs. Flat File

Table 1 : DBMS Comparison with Flat File

DBMS	Flat File Management System
Multi-user access	It does not support multi-user access
Design to fulfill the need for small and large businesses	It is only limited to smaller DBMS system.
Remove redundancy and Integrity	Redundancy and Integrity issues
Expensive. But in the long term Total Cost of Ownership is cheap	It's cheaper
Easy to implement complicated transactions	No support for complicated transactions

Users in a DBMS environment

Following, are the various category of users of a DBMS system

Table 2 : Users in a DBMS environment

Component Name	Task
Application Programmers	The Application programmers write programs in various programming languages to interact with databases.
Database Administrators	Database Admin is responsible for managing the entire DBMS system. He/She is called Database admin or DBA.
End–Users	The end users are the people who interact with the database management system. They conduct various operations on database like retrieving, updating, deleting, etc.

Popular DBMS Software

Here, is the list of some popular DBMS system:

- MySQL
- Microsoft Access
- Oracle
- PostgreSQL
- dBASE
- FoxPro

- SQLite
- IBM DB2
- LibreOffice Base
- MariaDB
- Microsoft SQL Server etc.

Application of DBMS

Table 3 : DBMS Applications

Sector	Use of DBMS
Banking	For customer information, account activities, payments, deposits, loans, etc.
Airlines	For reservations and schedule information.
Universities	For student information, course registrations, colleges and grades.
Telecommunication	It helps to keep call records, monthly bills, maintaining balances, etc.
Finance	For storing information about stock, sales, and purchases of financial instruments like stocks and bonds.
Sales	Use for storing customer, product & sales

	information.
Manufacturing	It is used for the management of supply chain and for tracking production of items. Inventories status in warehouses.
HR Management	For information about employees, salaries, payroll, deduction, generation of paychecks, etc.