

## **DBMS (Database Management System)**

DBMS is a computerized record keeping system. It is a software that defines, manipulates and manage the database. It allows to access the file, update the record and retrieve data as requested. In other word, DBMS is defined as the collection of interrelated data and set of programs to access their data. The collection of data is usually a database which contains the information about any particular organization. The primary goal of DBMS is to provide an effective and efficient environment for both data retrieval and storing data in database. For example MS Access, Oracle, MY SQL, Fox-Pro, D-base etc

### **Advantages of DBMS**

- 1) Sharing data: Using DBMS, data stored in database can be shared among multiple users or computer. For example, branches of bank share data from database.
- 2) Reduce data redundancy: Data redundancy refer to duplication or repetition of same data over and over. DBMS reduces such type of unnecessary repetition of data.
- 3) Data backup and recovery: Using DBMS, we can easily create spare copy of original files and documents that can be later used in case of accidental or intentional loss and damages.
- 4) Data security: Using DBMS we can restrict use of database to the unauthorized person. It helps to ensure date security.
- 5) Multiple user interfaces: DBMS facilitates sharing of data which means same data can be accessed from multiple device and location. Hence, user can experience multiple interfaces to access same set of data.
- 6) Data Integrity: Data Integrity refers to consistency of data. Using database we can arrange same sort of data in a like order. We can define and enforce constraints for data integrity.

### **Disadvantages of DBMS**

- 1) Expensive: It may be expensive to run and operate DBMS for any organization.
- 2) Changing Technology: It is very much difficult to incorporate latest changing technology in existing system. In order to create and maintain database technical manpower and trainings are required.
- 3) Backup is needed: Since data maybe damage anytime accidentally or intentionally. So, it is mandatory to create a backup.

## **Database Model**

There are different forms of Database Management system. Each characterized by the way where data are defined and structured. This arrangement of data in several structure are known as data base model. Different types of database model. Click here for full explanation with pros, cons and diagram.

### **Hierarchical database model**

It is one of the oldest type of database model. In this model data are represented in the forms of record, each record has multiple field or attributes. All records are arranged in database as tree like structure. The relationship between the records is called parent child relationship in which one child record relates to only a single parent i.e child posses property only property of a single parent. Here child are restricted to use the property of a parent to whom it doesn't belong.

#### **Advantages**

- It is the simplest and the easiest model.
- It supports one to one or one to many relationship.
- Searching is easier and faster if parent is known.

#### **Disadvantages**

- It is an old fashion and outdated database model.
- It doesn't support many to one relationship.
- It doesn't reduce data redundancy because some data are written over different places.

### **Network database model**

This network model replace hierarchical model due to some limitation on the model. Suppose an employee relates to two different department then hierarchical model cannot be able to arrange record in proper place. So, network database model was emerged to arrange non-hierarchical database. The structure of database is more like graph rather than tree structure. A network model consists of collection of record which are interrelated to each other with the help of relationship. Each records have multiple fields and each field has only one data value. In this type of model a parent may have multiple child, as well as child can have multiple parent.

## **Advantages**

- It accepts many to many relationships. So, It is more flexible .
- It reduces data redundancy.
- This network mode is simple and easy to design.
- Searching is faster due to use of multi-directional pointer.

## **Disadvantages**

- Needs long program to handle the relationship.
- Lack of structural independence.
- Less security

## **Relational database model**

In relational database model, the data are organized into tables which contains multiple row and columns. These tables are called relations. A row in a table represents a relationship among a set of values. Since, a table is collection of such relationship. It is generally referred to the mathematical term relations from which the relational database model derives its name. It is also known as RDBMS.

Note: The database system which stores and display data in tabular format of rows and column like spreadsheet is known as RDBMS. It is the most practical DBMS those days. For example, MS-Access, MY SQL, Oracle etc

## **Advantages**

- There is less data redundancy.
- Breaking of complex database into simple is very much easier.
- Database processing is faster than other model.

## **Disadvantage**

- Establishing more relationships complex.
- It requires powerful computer and data storage device.

## **Centralized database VS Distributed database**

### **Centralized database**

It is a simple type which works on client server basis. In this type clients or user are directly connected to the centrally totally located server. This server hosts the data of its client or user and helps them to store and retrieve data as requirement. This type of system are used in small scale industries which doesn't have to deal with large volume of data and user. Centralized database runs on single computer which may have single or multiple user. Since database is centralized, security is not a crucial part here. The maintenance of database is easier because of data are centrally stored. This type of system denote allow unauthorized person to access data.

### **Advantages**

- Suitable for small scale industries.
- Operation and maintenance is easier.
- Since it prevent unauthorized person being accessed to database, it minimizes risk factor.

### **Disadvantages**

- Data are not secured in this type of system.
- Not suitable for large scale industries.
- Failure of centrally located serves will collapse whole network.

## Distributed database

This type of database system are complex in structure, instead of storing and retrieving data from centrally located server, it uses several numbers of database and server randomly located at different place. It is the collection of multiple logically interrelated database which are distributed in many geographical location. Since server are located at different locations user can experience a good speed of bandwidth. Similarly, back up and recovery process is lot more easier there, which makes data more secured. This type of system is used by large organization who has to deal with large volume of data and user all around the world. Since it is distributed in nature there may arises security issue and are costly to maintain and operate. Simply, distributed database system are the collection of several number of centralized database system in different locations.

### Advantages

- Backup and recovery of data is easier.
- It can handle large volume of data and user all over the word.
- User can experience high speed bandwidth.
- Disadvantages
- Very expensive to operate and maintain.
- Data security may be real issue.

### Disadvantages

- Very expensive to operate and maintain.
- Data security may be real issue.

### Different between centralize and distributed database system

Centralized database system	Distributed database system
Simple type	Complex type
Located on particular location	Located in many geographical locations.
Consists of only one server	Contains servers in several locations
Suitable for small organizations	Suitable for large organizations
Less chance of data lost	More chances of data hacking, lost
Maintenance is easy and security is high	Maintenance is not easy and security is low
Failure of system makes whole system down	Failure of one server does not make the whole system down
There is no feature of load balancing	There is feature of load balancing
Data traffic rate is high	Data traffic rate is low
Cost of centralized database system is low	Cost of distributed database system is high

## **DBA and responsibilities of DBA**

DBA is the most responsible person in an organization with sound knowledge of DBMS. He/she is the overall administrator of the system. He/she has the maximum amount of privileges (permission to access the database) for accessing the database, settings up system and defining the role of the employees which use the system.

Responsibilities of DBA:

1. DBA defines data security, schemas, forms, reports, relationships and user privileges.
2. DBA has responsibility to install. Monitor and upgrade database server.
3. DBA provides different facilities for data retrieving and making reports as required.
4. DBA has responsibility to maintain database security, backup-recovery strategy, and documentation of data recovery.
5. DBA supervises all the activities in the system: addition, modification and deletion data from the database.

## Entity Relationship Database model (ER Model)

The entity relationship database model (ER diagram) is based on the perception of a real world that contains a collection of basic object called entities and relationship among these objects. The ER diagram is an overall logical structure of database that can be expressed graphically. It was developed to facilitates database design. The major objectives of ER diagram is to show relationship among different entities. It has following components.

- 1) Entity: The distinguishable object of this real world is known as entities. It has a set of properties which uniquely identifies an entity. For eg, if student is an entity then his/her name may be property. It is denoted by rectangle.
- 2) Attributes: Attributes are the properties possessed by an entity. They are represented by ellipse or oval sign. For eg, if student is an entity then its attribute can be registration number, name, roll no, class, address, etc.
- 3) Link: The flow of information is indicated by the link in ER diagram. It is simply denoted by a line. It is a connection of entity, attributes and relationships.
- 4) Relationships: A relationship is a association among several entities. It is represented by diamond. For eg, if teachers and students are two entities the association can be derived as teacher teachers students. It shows meaningful dependencies between several entities. There are 3 types of relationships. One to one. One to many, Many to many.

## Structure query Language (SQL)

SQL stands for Structured Query Language. It is an international standard data base query language for accessing and managing data in the database. SQL was introduced and developed by IBM in early 1970's. It was able to control relational database. SQL is not a complete programming language. It is only used for communicating with database. SQL has statement for data definition (DDL), data manipulation (DML) and data control (DCL). A query is a request to a DBMS for the retrieval, modification, insertion and deletion of the data from database.

SQL is made of three sub languages: DDL, DML and DCL

1) **DDL (Data Definition Language):** DDL is used by the database designer and programmers to specify the content and the structure of table. It is used to define the physical characteristics of record. It includes commands that manipulate the structure of object such as tables: For eg, to create table

Syntax:

```
CREATE TABLE table_name (field_name1 data_type1 field_name2 data_type2 .....);
```

```
CREATE TABLE Student (SN Number Fname text);
```

2) **DML (Data Manipulation Language):** DML is related with manipulation of records such as retrieval, sorting, display and deletion of records or data. It helps user to use query and display report of the table. It provide technique for processing the database. It includes commands like insert, delete, select, and update to manipulate the information stored in the database.

Syntax:

```
INSERT INTO table_name VALUES (list of values);
```

```
INSERT INTO student VALUES (1 RAM);
```

3) **DCL (Data Control Language):** All provides additional feature for security of table and database. It includes commands for controlling data and access to the database. Some of the example of this command are grant, commit, etc