

# Database Management System

## Data

Data is a raw and unorganized fact that is required to be processed to make it meaningful. Data can be numbers, characters, symbols, etc.

## Information

Information is a processed data in a meaningful way according to the given requirement. For eg. Leela and Nirjala are 18 years old girl.

## Database

Database is a collection of related data that are organized in a useful manner.

## Database management system(DBMS)

A DBMS is a set of programs that manages the database files. It allows accessing the files, updating the records and retrieving data as requested.

## Advantages of DBMS

1. sharing data is possible
2. reduce data redundancy[duplication of data]
3. easy data backup and recovery.
4. data integrity
5. data security

## Database language:

Once data is stored or filled it requires manipulation like insertion, deletion, updating, and modification of data. For these operations a set of languages are provided by the database management system (DBMS). So, the database languages are used to read, update and store data in the database.

The different types of DBMS languages are as follows –

- Data Definition Language (DDL) – Create, Drop, Truncate, Rename.
- Data Manipulation language (DML) – Select, Insert, Delete, Update.
- Data Control Language (DCL) – Revoke, Grant.
- Transaction Control Language (TCL) – Rollback, Commit.

## Data Definition Language (DDL)

It is a language that allows the user to define the data and their relationship to other types of data. The DDL commands are: Create, Alter, Rename, Drop, Truncate.

## Data Manipulation Language(DML)

It is a language that provides a set of operations to support the basic data manipulation operation on data held in the database. The DML commands are: Insert, delete, update, select, merge, call.

## Database Model:

### 1. Hierarchical Database model:

It is one of the oldest type of database model, It is a type of data model in which data are organized into a tree-like structure.

Advantages:

- Easiest and secure model.
- Searching is easy and fast, if parent is known
- Handle one to many relationship.
- Build complex system from simple components.

Disadvantages:

- Outdated model

- Cannot handle many to many relationship
- Create data redundancy
- If we delete parent node, all child node will be deleted.

## 2. Network Database Model:

It is a database model that allows multiple records to be linked to the same owner file. It replaced hierarchical network database model due to some limitations on the model.

Advantages

- Flexible model
- Accept many to many relationship
- Fast searching

Disadvantages

- Complex model
- Need large program to handle relationship
- Less secured model.

## 3. Relational database model:

In this model, the data is organized into tables which contain multiple rows 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.

SID	SName	SAge	SClass	SSection
1101	Alex	14	9	A
1102	Maria	15	9	A
1103	Maya	14	10	B
1104	Bob	14	9	A
1105	Newton	15	10	B

Advantages

- High security
- Data integrity
- normalization

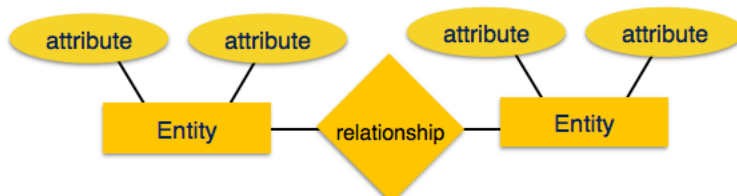
Disadvantages

- Cost
- Performance
- complexity

## 4. Entity-Relationship Database Model:

Entity-Relationship (ER) Model is based on the notion of real-world entities and relationships among them.

An entity in an ER Model is a real-world entity having properties called **attributes**. For example, in a school database, a student is considered as an entity. Student has various attributes like name, age, class, etc.



**Database Administrator (DBA):**

A database administrator (DBA) is the information technician responsible for directing or performing all activities related to maintaining a successful database environment. A DBA makes sure an organization's database and its related applications operate functionally and efficiently.

When adopting a new DBMS, the DBA is responsible for designing, implementing, and maintaining the database system.

**Concept of Normalization:**

Normalization is the process of breaking down larger table into smaller tables to organize data in database.

Advantages:

1. it reduces the data redundancy
2. it reduces the wastage of storage.
3. it makes database operations easier.

**Normal forms**

There are six Normal forms which are as follows:

1. First Normal Form(1NF)
2. Second Normal Form(2NF)
3. Third Normal Form(3NF)
4. Boyce-codd Normal Form (BCNF)
5. Fourth Normal Form(4NF)
6. Fifth Normal Form (5NF)

**Structured Query Language (SQL)**

SQL is a standard language for storing, manipulating and retrieving data stored in a relational databases. All the Relational Database Management Systems (RDMS) like MySQL, MS Access, Oracle, Sybase, Informix, Postgres and SQL Server use SQL as their standard database language.

**Centralized database**

Centralized database management system is the system in which all the data is stored and managed in a single unit. This is also known as central computer database system.

In a traditional database system, data is stored in multiple files. For example, each customer's data might be stored in a separate file. In contrast, a centralized database system stores all of the data in one file. This makes it easier to manage the data, and it's also easier to search the data because it's all stored in the same place.

**Distributed database**

A distributed database is basically a database that is not limited to one system, it is spread over different sites, i.e, on multiple computers or over a network of computers. A distributed database system is located on various sites that don't share physical components. This may be required when a particular database needs to be accessed by various users globally. It needs to be managed such that for the users it looks like one single database.

**Database Security**

Database security refers to the array of controls, tools, and procedures designed to ensure and safeguard confidentiality, integrity, and accessibility.

Security of databases is a complicated and challenging task that requires all aspects of security practices and technologies.