**Database management system (DBMS)**

**What is DBMS ?**

A DBMS is a software that allows creation, deletion and manipulation of database, allowing users to store, process and analyse data easily. DBMS provides us with an interface or a tool, to perform various operations like creating database, storing data in it, updating data, creating tables in the database and a lot more.

DBMS also provides protection and security to the databases. It also maintains data consistency in case of multiple users.

**eg.** MongoDB , Apache Cassendra , Microsoft SQL Server ,

**Advantages of DBMS:**

* Minimal data Duplicacy or data redundancy.
* Easy retrieval of data using the Query Language.
* Reduced development time and maintainance need.

**Disadvantages of DBMS:**

It's Complexity, They are large in size

* Except MySQL, which is open source, licensed DBMSs are generally costly.

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| --- | --- | --- | --- |
| **s.no** | **DBMS** | **s.no** | **RDBMS** |
| 1 | Stores data as file | 1 | Stores data in tabular form |
| 2 | Normalization is not here | 2 | Normalization can be performed |
| 3 | Distributed database is not supported | 3 | Distributed database is supported |
| 4 | We have to follow the hierarchical manner to extract the data | 4 | We can directly find the data |
| 5 | Relation can’t be shown as data stored in file system | 5 | Relation can be shown as data stored in Tabular form |
| 6 | .xml, Mongodb | 6 | Mysql, Postgre sql etc |

**Normalization –** It is a technique to remove or reduce redundancy/duplicacy from table.

**SQL Data Types**

Data types are used to represent the nature of the data that can be stored in the database table.

Data types mainly classified into **three** categories for every database.

* 1. String Data types
  2. Numeric Data types
  3. Date and time Data types

1. String Data types :
2. **VARCHAR(Size):** It is used to specify a variable length string that can contain numbers, letters, and special characters. Its size can be from 0 to 65535 characters.
3. **TEXT(Size):** It holds a string that can contain a maximum length of 255 characters.
4. Numeric Data types :
5. INT(size): It is used for the integer value. Its signed range varies from -2147483648 to 2147483647 and unsigned range varies from 0 to 4294967295. The size parameter specifies the max display width that is 255.
6. FLOAT(size, d): It is used to specify a floating point number. Its size parameter specifies the total number of digits. The number of digits after the decimal point is specified by d parameter.
7. DECIMAL(size, d): It is used to specify a fixed point number. Its size parameter specifies the total number of digits. The number of digits after the decimal parameter is specified by d parameter. The maximum value for the size is 65, and the default value is 10. The maximum value for d is 30, and the default value is 0.
8. DOUBLE(size, d):It is a normal size floating point number. Its size parameter specifies the total number of digits. The number of digits after the decimal is specified by d parameter.
9. BOOL:It is used to specify Boolean values true and false. Zero is considered as false, and nonzero values are considered as true.
10. Date and Time Data Types
11. DATE: It is used to specify date format YYYY-MM-DD. Its supported range is from '1000-01-01' to '9999-12-31'.
12. DATETIME(fsp) : It is used to specify date and time combination. Its format is YYYY-MM-DD hh:mm:ss. Its supported range is from '1000-01-01 00:00:00' to 9999-12-31 23:59:59'.
13. TIMESTAMP(fsp): It is used to specify the timestamp. Its value is stored as the number of seconds since the Unix epoch('1970-01-01 00:00:00' UTC). Its format is YYYY-MM-DD hh:mm:ss. Its supported range is from '1970-01-01 00:00:01' UTC to '2038-01-09 03:14:07' UTC.
14. TIME(fsp): It is used to specify the time format. Its format is hh:mm:ss. Its supported range is from '-838:59:59' to '838:59:59'
15. YEAR: It is used to specify a year in four-digit format. Values allowed in four digit format from 1901 to 2155, and 0000.

**SQL Constraints**

SQL constraints are used to specify rules for the data in a table.

If there is any violation between the constraint and the data action, the action is aborted.

The following constraints are commonly used in SQL:

* 1. NOT NULL - Ensures that a column cannot have a NULL value
  2. UNIQUE - Ensures that all values in a column are different
  3. PRIMARY KEY - A combination of a NOT NULL and UNIQUE. Uniquely identifies each row in a table
  4. FOREIGN KEY - Prevents actions that would destroy links between tables
  5. CHECK - Ensures that the values in a column satisfies a specific condition
  6. DEFAULT - Sets a default value for a column if no value is specified

**What is SQL ?**

SQL stands for Structured Query Language and is a computer language that we use to interact with a relational databases. SQL is a tool for organizing, managing, and retrieving data from database. The original name was given by IBM as Structured English Query Language, abbreviated by the acronym SEQUEL.

RDBMS which supports SQL : **Mysql, Oracle, Infomix, Sybase, MS Access**

**Types of Database Languages or SQL commands :**

1. DDL Commands (Data Definition Language)
2. DML Commands ( Data Manipulation Language)
3. DCL Commands ( Data Control Language )
4. TCL Commands ( Transaction Control Language )
5. DQL Commands ( Data Query Language )
6. **DDL( Data Definition Language ) :-** This includes changes to the structure of the table like creation of table, altering table, deleting a table etc.
7. Create ------ Creates new table or database

Syntax : - create database databasename;

CREATE TABLE table\_name

(

column\_Name1 data\_type ( size of the column ) ,

column\_Name2 data\_type ( size of the column) ,

column\_Name3 data\_type ( size of the column) ,

...

column\_NameN data\_type ( size of the column )

) ;

1. Alter -------- For alteration
   * 1. Syntax to add a newfield in the table:

ALTER TABLE name\_of\_table ADD column\_name column\_definition;

* + 1. Syntax to remove a column from the table:

ALTER TABLE name\_of\_table DROP Column\_Name\_1 , column\_Name\_2 , ….., column\_Name\_N;

* + 1. Syntax to modify the column of the table:

ALTER TABLE table\_name MODIFY ( column\_name column\_datatype(size));

1. Drop -------- To drop a table
2. Truncate --- Delete Data from table