DBMS NOTES 3:

Now that we know what a database and DBMS is and what we can do with it we can proceed to understand how we interact with the Database.

To perform certain tasks on our computer we write some code in some language which tells the computer what operations to perform, output to give etc. Similar to programming languages, we have languages that interact with the database and tell it what to do. This language is known as SQL or Structured Query Language.

Definition: The Structured Query Language (SQL) is a language that enables us to create and operate on relational databases, which are sets of related information stored in tables.

Note: Referential Integrity: It is a system of rules that a DBMS uses to ensure that relationships between records in related tables are valid and that users don't accidentally delete or change related data.

SQL can be divided into three types of Languages that are used for different uses:

1. Data Definition Language (DDL): DDL commands are SQL commands used to modify or alter the structure of the database or schema of the database.
   Some commands under DDL are:
   a. CREATE: This command creates database object, tables etc.
   b. ALTER: This command alters the database structure by adding, deleting and modifying columns of the already existing tables.
   c. DROP: This command deleted the defined tabled with all the table data, associated indexes, constraints etc.
   d. TRUNCATE: This command deletes all the data and records from an existing table, including the allocated space for the records.
   e. RENAME: This command changes the table name when the user or administrator wants to give a more relevant name to it.

2. Data Manipulation Language (DML): These commands perform operations on the data within the database rather than on the database itself. They perform operations like storing data in database tables, modifying and deleting existing rows, retrieving data or updating data.

   Some commands under DML are:

   a. SELECT: This command fetches data or records from one or more tables in the RDBMS database. The retrieved data gets displayed in a result table known as the result set.
   b. INSERT: This command inserts one or more new records into the table in the SQL database.
   c. UPDATE: This command updates or changes the existing data or records in a table in the database.
   d. DELETE: This command deletes all the existing records and the allocated spaces from a table in the database.

NOTE: The DELETE and TRUNCATE commands are very similar to each other and the only difference between them is that in the DELETE command we can select which row of data we want to delete or we want to delete the whole table data using something known as the WHERE clause, but in TRUNCATE command, the whole table data is deleted no matter what.

Before we jump into creating and manipulating our database through the above SQL commands, we must have some basic knowledge about the form in which data is being stored in the database.

In programming, we learn about data types. Data types are nothing but specifiers about what kind of data can be stored where. Similar to that, database also has various data types which defines which attribute stores what kind of values, for example in the phone number column/attribute of your database table you would want to only store numbers whatever they might be and not strings. Thus, we define the phone number as an Integer.

For any database the data types are divided into three categories:

1. String Data Type
2. Numeric Data Type
3. Date and Time data type

String Data Type: Some string data types of SQL are:

1. CHAR (size): A FIXED length string containing letters, numbers, and special characters. The size parameter determines the length of the column in characters. The default value is 1. Size: 0 – 255 characters.

2. VARCHAR (size): A VARIABLE length string containing letters, numbers, and special characters. The size option sets the maximum character length for a column. Size: 0 – 65535 characters.

3. LONGTEXT (size): It stores a string. Size: 4,294,967,295 characters.

4. VARCHAR2: It is the same as VARCHAR. The main difference is that VARCHAR is ANSI Standard and VARCHAR2 is ORACLE standard.

Numerical Data Types:

1. INT (SIZE): An integer value. The signed range is -2147483648 to -2147483647. The unsigned range is 0 to 4294967295. The size parameter determines the maximum width of the display (which is 255). Size: 4 bytes.
2. FLOAT (SIZE, d): A number with a decimal value. Size specifies the total number of digits. The d parameter specifies the number of digits after the decimal point.
3. DOUBLE (SIZE, d): A standard-size floating-point number. Size specifies the total number of digits. The d option specifies the number of digits after the decimal point.

In both categories there are many more data types but these are the one's mostly used.