

## Answer the following Questions

### 1. What is SQL?

## SQL

- SQL stands for Structured Query Language. It is used for storing and managing data in relational database management system (RDMS).
- It is a standard language for Relational Database System. It enables a user to create, read, update and delete relational databases and tables.
- All the RDBMS like MySQL, Informix, Oracle, MS Access and SQL Server use SQL as their standard database language.
- SQL allows users to query the database in a number of ways, using English-like statements.

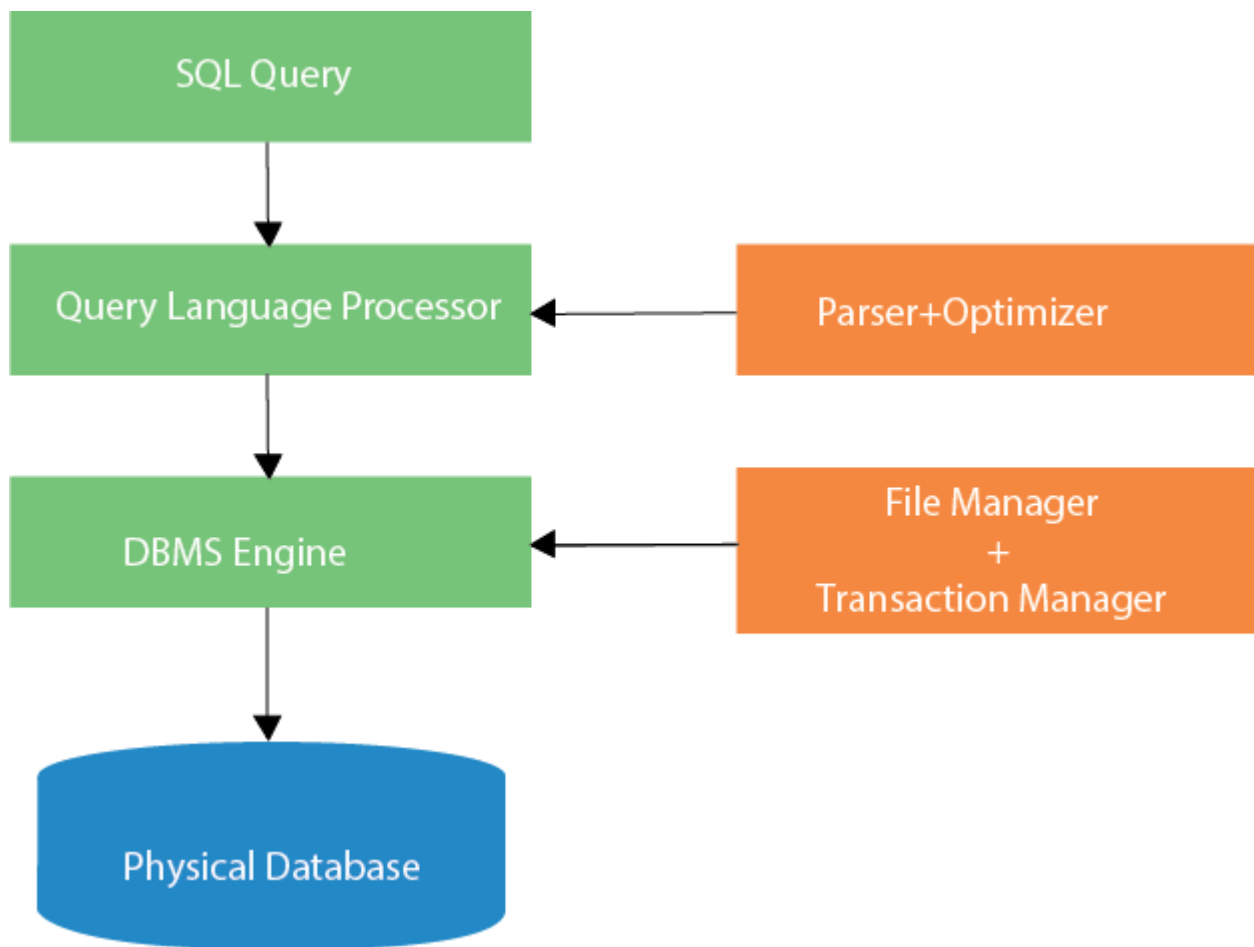
## Rules:

SQL follows the following rules:

- Structure query language is not case sensitive. Generally, keywords of SQL are written in uppercase.
- Statements of SQL are dependent on text lines. We can use a single SQL statement on one or multiple text line.
- Using the SQL statements, you can perform most of the actions in a database.
- SQL depends on tuple relational calculus and relational algebra.

## SQL process:

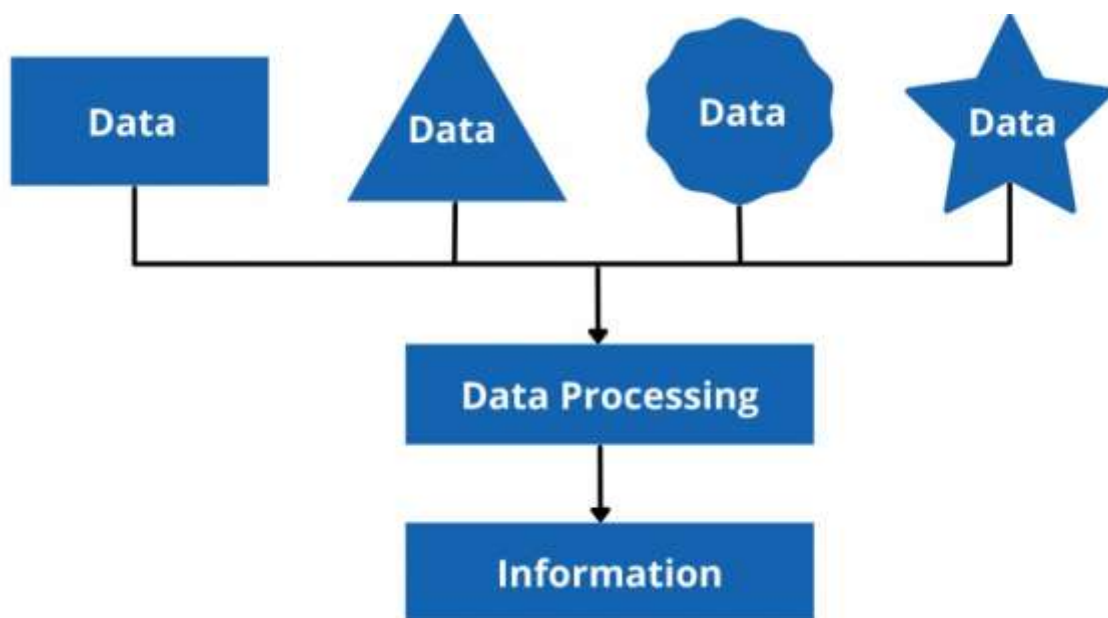
- When an SQL command is executing for any RDBMS, then the system figure out the best way to carry out the request and the SQL engine determines that how to interpret the task.
- In the process, various components are included. These components can be optimization Engine, Query engine, Query dispatcher, classic, etc.
- All the non-SQL queries are handled by the classic query engine, but SQL query engine won't handle logical files.



## 2. what is difference between Data and Information?

	<i>Data</i>	<i>Information</i>
Definition	It is a set of characters, symbols, and numbers that require processing	Information is processed and structured data, which is valuable and contextual
Format	Exist in the form of characters, letters, digits, and symbols	Follows the format of references
Structuring	Can be structured as –  1. Tables 2. Graphs 3. Data tree	Structured as –  1. Insights 2. Ideas 3. Thoughts 4. Languages
Making Decisions	Data in its original form can't support decision making	Information is self-sufficient to help in decision making

Dependency	Independent of information	Depends on data
Feature	Data is raw and doesn't represent any meaning	Represents logical meaning derived from data
Unit	Representation is based on binary digits – Bits and Bytes	Can be represented as time, quantity, etc.
Flow	Data flow is absolute	Information requires a definite flow
Usefulness	Data is raw and discreet and it doesn't communicate any insights	Information communicates insights, impacting decision-making and user behavior
Meaning	It is not much reliable	Much reliable. It allows users to draw conclusions



### 3. What is Database and DBMS?

S. No.	Category	Database	DBMS
1.	Definition	A database is a collection of connected information about people, locations, or things.	A database management system (DBMS) is a collection of programs that allow you to create, manage, and operate a database.

S. No.	Category	Database	DBMS
2.	Storage	Besides computers, databases can even be maintained in physical ledgers, books, or papers.	In a database management system (DBMS), all the records are maintained only on a computer.
3.	Data Retrieval	The retrieval of information from the databases can be done manually, through queries, or by using programs (C, C++, Java, etc.).	We can retrieve the data from the database management system through queries written in SQL.
4.	Speed	As databases can be handled manually or via computers, when SQL is not used to retrieve information, it can be very slow.	As a computer system is involved in a database management system, the retrieval of information is very quick.
5.	Access	The databases are not designed for a large number of people who can access data at the same time, rather it is designed for a very small number of people (preferably few people) who access data at different times.	The database management system is designed for a large number of people who can access the data at the same time.
6.	Data	Data is stored in databases.	A database management system (DBMS) manages and manipulates data.
7.	Data Manipulation	In the case of the databases, very less information can be modified at a time.	In the database management system (DBMS), a lot of information can be changed at one time (as it can have many users using it at the same time).

S. No.	Category	Database	DBMS
8.	Backup and Recovery	The databases do not ensure that the data will be available after failure arises.	The database management system (DBMS) ensures that the data will always be available even after system failures.

## 4. What is Relational Database Management System?

**RDBMS** stands for *Relational Database Management System*.

All modern database management systems like SQL, MS SQL Server, IBM DB2, ORACLE, My-SQL, and Microsoft Access are based on RDBMS.

It is called Relational Database Management System (RDBMS) because it is based on the relational model introduced by E.F. Codd.

### How it works

Data is represented in terms of tuples (rows) in RDBMS.

A relational database is the most commonly used database. It contains several tables, and each table has its primary key.

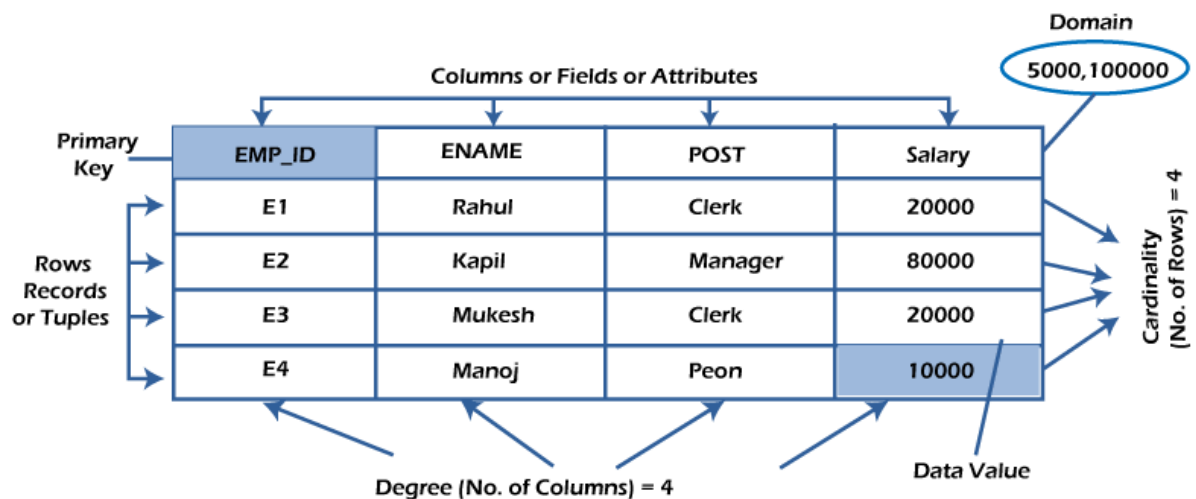
Due to a collection of an organized set of tables, data can be accessed easily in RDBMS.

### Brief History of RDBMS

From 1970 to 1972, E.F. Codd published a paper to propose using a relational database model.

RDBMS is originally based on E.F. Codd's relational model invention.

**Following are the various terminologies of RDBMS:**



## What is table/Relation?

Everything in a relational database is stored in the form of relations. The RDBMS database uses tables to store data. A table is a collection of related data entries and contains rows and columns to store data. Each table represents some real-world objects such as person, place, or event about which information is collected. The organized collection of data into a relational table is known as the logical view of the database.

### Properties of a Relation:

- Each relation has a unique name by which it is identified in the database.
- Relation does not contain duplicate tuples.
- The tuples of a relation have no specific order.
- All attributes in a relation are atomic, i.e., each cell of a relation contains exactly one value.

A table is the simplest example of data stored in RDBMS.

Let's see the example of the student table.

ID	Name	AGE	COURSE
1	Ajeet	24	B.Tech
2	aryan	20	C.A
3	Mahesh	21	BCA
4	Ratan	22	MCA

5	Vimal	26	BSC
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## What is a row or record?

A row of a table is also called a record or tuple. It contains the specific information of each entry in the table. It is a horizontal entity in the table. For example, The above table contains 5 records.

### Properties of a row:

- No two tuples are identical to each other in all their entries.
- All tuples of the relation have the same format and the same number of entries.
- The order of the tuple is irrelevant. They are identified by their content, not by their position.

Let's see one record/row in the table.

ID	Name	AGE	COURSE
1	Ajeet	24	B.Tech

## What is a column/attribute?

A column is a vertical entity in the table which contains all information associated with a specific field in a table. For example, "name" is a column in the above table which contains all information about a student's name.

### Properties of an Attribute:

- Every attribute of a relation must have a name.
- Null values are permitted for the attributes.
- Default values can be specified for an attribute automatically inserted if no other value is specified for an attribute.
- Attributes that uniquely identify each tuple of a relation are the primary key.

Name
Ajeet
Aryan

Mahesh
Ratan
Vimal

## What is data item/Cells?

The smallest unit of data in the table is the individual data item. It is stored at the intersection of tuples and attributes.

### Properties of data items:

- Data items are atomic.
- The data items for an attribute should be drawn from the same domain.

In the below example, the data item in the student table consists of Ajeet, 24 and Btech, etc.

ID	Name	AGE	COURSE
1	Ajeet	24	B.Tech

## Degree:

The total number of attributes that comprise a relation is known as the degree of the table.

**For example, the student table has 4 attributes, and its degree is 4.**

ID	Name	AGE	COURSE
1	Ajeet	24	B.Tech
2	aryan	20	C.A
3	Mahesh	21	BCA
4	Ratan	22	MCA
5	Vimal	26	BSC



## Cardinality:

The total number of tuples at any one time in a relation is known as the table's cardinality. The relation whose cardinality is 0 is called an empty table.

**For example, the student table has 5 rows, and its cardinality is 5.**

ID	Name	AGE	COURSE
1	Ajeet	24	B.Tech
2	aryan	20	C.A
3	Mahesh	21	BCA
4	Ratan	22	MCA
5	Vimal	26	BSC

## Domain:

The domain refers to the possible values each attribute can contain. It can be specified using standard data types such as integers, floating numbers, etc. **For example**, An attribute entitled Marital\_Status may be limited to married or unmarried values.

## NULL Values

The NULL value of the table specifies that the field has been left blank during record creation. It is different from the value filled with zero or a field that contains space.

## Data Integrity

There are the following categories of data integrity exist with each RDBMS:

**Entity integrity:** It specifies that there should be no duplicate rows in a table.

**Domain integrity:** It enforces valid entries for a given column by restricting the type, the format, or the range of values.

**Referential integrity** specifies that rows cannot be deleted, which are used by other records.

**User-defined integrity:** It enforces some specific business rules defined by users. These rules are different from the entity, domain, or referential integrity.

**5. State at least 5 names of Database Management System or Software.**

Here are five popular Database Management Systems (DBMS) or software:

1. **MySQL**
2. **PostgreSQL**
3. **Microsoft SQL Server**
4. **Oracle Database**
5. **MongoDB**