1. What is SQL?

#### It stands for Structured Query Language. A programming language used for interaction with relational database management systems (RDBMS). This includes fetching, updating, inserting, and removing data from tables.

#### What is a database?

#### A structured storage space where the data is kept in many tables and organized so that the necessary information can be easily fetched, manipulated, and summarized.

#### What is an RDBMS, and how is it different from a traditional DBMS?

#### The main difference between a DBMS and an RDBMS is that a DBMS is a software application used to store, retrieve, and manage data in a database, while an RDBMS is a type of DBMS that stores data in a relational database

#### Explain the different types of SQL commands/SQL statements

#### DDL – Data Definition Language

#### DML – Data Manipulation Language

#### DCL – Data Control Language

#### TCL – Transaction Control Language

#### What is constraint? What is the need of it?

#### Constraints are the rules that we can apply on the type of data in a table. That is, we can specify the limit on the type of data that can be stored in a particular column in a table using constraints:

#### Available constraints are:

* **NOT NULL**: This constraint tells that we cannot store a null value in a column. That is, if a column is specified as NOT NULL then we will not be able to store null in this particular column any more.
* **UNIQUE**: This constraint when specified with a column, tells that all the values in the column must be unique. That is, the values in any row of a column must not be repeated.
* **PRIMARY KEY**: A primary key is a field which can uniquely identify each row in a table. And this constraint is used to specify a field in a table as primary key.
* **FOREIGN KEY**: A Foreign key is a field which can uniquely identify each row in a another table. And this constraint is used to specify a field as Foreign key.
* **CHECK**: This constraint helps to validate the values of a column to meet a particular condition. That is, it helps to ensure that the value stored in a column meets a specific condition.
* **DEFAULT**: This constraint specifies a default value for the column when no value is specified by the user.

#### Need of constraints: Constraints in DBMS (Database Management Systems) are rules or conditions that are applied to the data within a database to ensure data integrity, consistency, and adherence to business rules. They define limitations and requirements that the data must meet, thereby preventing the entry of invalid or inconsistent data.

#### What is the difference between Primary key and Foreign key

#### A primary key is a unique identifier for each record in a table. A foreign key establishes a relationship between tables by referencing the primary key of another table.

#### Example – Customer(customerID) => Product(CustomerID)

#### What is UNIQUE constraint

* This constraint when specified with a column, tells that all the values in the column must be unique. That is, the values in any row of a column must not be repeated.

**Example –**

CREATE TABLE Student

(

ID int(6) NOT NULL UNIQUE,

NAME varchar(10),

ADDRESS varchar(20)

);

#### What we need if we wanted to retrieve the data from multiple tables? Can you write a simple query to retrieve the data from two tables.

#### To retrieve data from multiple tables we need to join them. There are different join types available, based on the data relationships we need to choose particular join types(Inner join, left outer join, right outer join or full outer join).

#### Example

#### *Select customers.customerID, Customer.Name, orders.OrderID,Orders.Orderdate from Customers Inner join Orders on (Customers.customerID = Orders.CustomerID)*

#### Assumption – CustomerID is common in these two tables.

#### What is the need of Joins?

#### to combine rows from two or more tables, based on a related column between them.

#### What is Schema? What is instance? And what is their difference?

#### An Instance is the state of an operational database with data at any given time. It contains a snapshot of the database.

#### Schema is the overall description of the database. The basic structure of how the data will be stored in the database is called schema.

#### Schema Types:

* **Logical Schema –** It describes the database designed at a logical level.
* **Physical Schema –** It describes the database designed at the physical level.
* **View Schema** – It defines the design of the database at the view level.

#### I wanted to filter a data from a table, How I do this? Can you write a simple query to filter a data from a table.

#### To filter the data from a table we can use “WHERE” Clause. Here is simple query to retrieve customer records from table customers whose City is Kolhapur.

#### Select \* from customers where City = ‘Kolhapur’

#### If I write this query:

#### *Select a.name, a.phone, sum(salary) from employee a*

#### Will above query will run successfully? If not why not? How to correct it?

#### No this query will not run successfully and will throw an error. To fix this we need to use group by function as below:

#### *Select a.name, a.phone, sum(salary) from employee a group by a.name, a.phone*

#### I have employee table with columns, employee\_name, Salary with below structure

create table employee

(employee\_name varchar(10),

salary numeric )

#### I wanted to insert “employee\_name” in this table, I am writing this query, will this work? If not write proper query

#### Insert into employee values (‘Tejas’)

* **No this query will not work and will give error like “**Column name or number of supplied values does not match table definition.”

We need to give all the column names while inserting the data

Below query will work

Insert into employee values ('Tejas',10000)

Or

Insert into employee (employee\_name,salary) values ('Tejas',10000)

1. In employee table I wanted to write insert 10 multiple records of employee with different salary. Can you write this query.

Insert into employee (employee\_name,salary) values

('Priyansh',50000),

('Ramesh',80000),

('Suresh',90000),

('Ajit',20000),

('Rakesh',80000),

('Saket',50000),

('Saurab',40000),

('Romesh',30000),

('Prakash',20000),

('Rajesh',10000)

1. I wanted to update salary of one particular employee(e.g. Tejas) to 10000, can you write the query for this.

update employee set salary =1000 where employee\_name ='Tejas'

1. Assume I have inserted the record of one employee – “Saurav” and “salary” as 2000 in the employee table. I want to remove this particular record from this table, can you write a query for this.

* delete from employee3 where employee\_name ='Saurav'

1. What is group by function? Why we need this, can you explain with one example.

* allows you to group rows of data based on one or more columns and then perform aggregate calculations on each group. For example, you could use the GROUP BY function to group sales data by month or region and then calculate the total sales for each group.

**Example** – To get employees salary by department wise we can write Group by

*Select employee\_name, Department, sum(Salary) from Employees group by employee\_name, Department;*

1. Assume there is one table have many duplicate records, how we can remove duplicate records from a table. Write a query.

* Select distinct columnname from tablename

1. What is the difference between truncate and delete statement?

* **DML or data manipulation command** used to deletes records from a table that is not required in the database. It removes the complete row from the table and produces the count of deleted rows. We need the delete permission on the target table to execute this command. It also allows us to filter and delete any specific records using the where clause from the table.
* The truncate statement is a **DDL, or data definition language command** used to removes complete data from the table without removing the table structure. We cannot use the **WHERE** clause with this command, so that filtering of records is not possible. After executing this command, we **cannot rollback the deleted data** because the log is not maintained while performing this operation.

1. Why we need primary key and foreign key in a table? What is the exact difference between primary key and foreign key?

* A primary key generally focuses on the uniqueness of the table. It assures the value in the specific column is unique. A foreign key is generally used to build a relationship between the two tables.

1. Are you aware about joins? What types of joins we have in SQL? Why we need joins?

* Joins are used to combine the data from different tables and there are different types of joins :
* Inner join = Retrieves the matching records from two tables
* Left outer join = Retrieves all the records from left table and matching records from right table
* Right outer join= Retrieves all the records from right table and matching records from the left table.
* Full outer join= Retrieves all the records from both the tables irrespective of matching or unmatching.

1. What is a cartesian product in Join? Explain with examples

* The Cartesian product in SQL is the result of combining every row from one table with every row from another table. It occurs when no join condition is specified in the SQL query, resulting in a cross join between the tables. The resulting Cartesian product contains the total number of rows from the first table multiplied by the total number of rows from the second table. It can be useful for generating all possible combinations or finding the union of two tables without any common column. However, it can lead to large result sets, impacting performance. To limit the Cartesian product, a WHERE clause or join condition can be used.

For example, if Table A has 5 rows and Table B has 3 rows, the Cartesian product between the two tables would result in 5 x 3 = 15 rows.

1. What is Cross join? Explain with example

* In SQL, CROSS JOINs are used to combine each row of one table with each row of another table, and return the Cartesian product of the sets of rows from the tables that are joined.

When to use Cross join - The CROSS JOIN query in SQL is used to generate all combinations of records in two tables. For example, you have two columns: size and color, and you need a result set to display all the possible paired combinations of those—that's where the CROSS JOIN will come in handy.

Syntax –

*SELECT [column names]*

*FROM [TableA]*

*CROSS JOIN [TableB]*

1. What are different Data Control language commands.

* Grant & Revoke

**Grant Command** - User access privileges to a database are given by this command. It can be used to grant SELECT, INSERT, UPDATE, and DELETE privileges to a user on a single table or several tables.

**Revoke Command** - To take back permissions from the user REVOKE command is used. It is used to revoke a privilege (by default) or a specific command, such as UPDATE or DELETE, depending on the situation.

1. I have one query which is taking too much time to run what are some of the things in the query we can consider, which will improve the performance of the queries.

* Some tips to use:

**Indexes:**Ensure that the tables involved in the query have appropriate indexes on columns used in WHERE clauses and JOIN conditions. Indexes significantly speed up data retrieval.

**Query Structure:**Review the query's structure and complexity. Simplify the query where possible and only retrieve the columns you need. Avoid using unnecessary functions or calculations.

**\*Avoid SELECT :** Instead of selecting all columns using SELECT \*, explicitly list only the columns you need. This reduces the amount of data that needs to be retrieved.

**Use JOINs Appropriately:** Use the appropriate type of JOIN (INNER JOIN, LEFT JOIN, etc.) based on your requirements. Ensure that the join conditions are efficient and make use of indexes.

**Subqueries and EXISTS:** Avoid using subqueries in SELECT clauses, especially correlated subqueries. Use JOINs or EXISTS clauses where possible.

**Statistics:** Update statistics for tables and indexes. This helps the query optimizer make better decisions about the execution plan.

**Caching:**Consider caching frequently used or static data to reduce the need for repeated queries, especially if the data doesn't change frequently.

**Hardware and Server Configuration:** Ensure that your server has sufficient resources (CPU, memory, disk speed) to handle the workload. Adjust database server configurations and allocate enough memory to the database engine.

**Query Execution Plan:** Analyze the query execution plan to understand how the database is processing the query. This can help identify bottlenecks and areas for improvement.

1. I wanted to update the data in multiple columns in a table, can you write a query.

Update Employee

Set employee\_name = ‘Ajay’ and Salary = 50000

Where employee\_ID = 10

1. Why HAVING clause is needed? Can we write HAVING clause without the Group by function? Justify?

* A HAVING clause restricts the results of a GROUP BY in a SelectExpression. The HAVING clause is applied to each group of the grouped table, much as a WHERE clause is applied to a select list. **If there is no GROUP BY clause, the HAVING clause is applied to the entire result as a single group**.

We can not write Having clause without group by

1. What Is subquery? Can you explain why subquery we should use? How it is different than Joins?

* A subquery is **a nested query (inner query) that's used to filter the results of the outer query**. Subqueries can be used as an alternative to joins. A subquery is typically nested inside the WHERE clause. Subqueries must always be enclosed within parentheses.

1. What is DISTINCT keyword? Where to use? What is its purpose ? can you write a query with usage of DISTINCT?

* DISTINCT keyword in SQL **eliminates all duplicate records from the result returned by the SQL query**. The DISTINCT keyword is used in combination with the SELECT statement. Only unique records are returned when the DISTINCT keyword is used while fetching records from a table having multiple duplicate records.

1. What is the difference between WHERE and HAVING clause?

* The main difference between WHERE and HAVING clause is that the WHERE clause allows you to filter data from specific rows (individual rows) from a table based on certain conditions. In contrast, the HAVING clause allows you to filter data from a group of rows in a query based on conditions involving aggregate values.

1. What do you understand by functions?

* SQL functions are programs that database management software runs across a database to perform operations on data or database objects. They can be classified as data definition language (DDL), data manipulation language (DML), or data query language (DQL) functions. There are also other types of functions that do not fall within those classifications.

1. What is scalar functions? What are different scalar functions in SQL?

* **Scalar functions are the built-in functions in SQL, and whatever be the input provided to the scalar functions, the output returned by these functions will always be a single value.**

**Common scalar functions :**

* + UCASE()
  + LCASE()
  + MID()
  + LENGTH()
  + ROUND()
  + NOW()
  + FORMAT()

1. Now assume following table structure

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | First\_Name | Last\_Name | City | Family Income |
| 1 | Karen | Kole | Pune | 100000 |
| 2 | Ramesh | More | Mumbai | 400000 |
| 3 | Umesh | Nehal | Pune | 30000 |
| 4 | Ramen | Patil | Pune | 78000 |
| 5 | Meenakshi | Sharma | Nashik | 60000 |
| 6 | Lokesh | Kumar | Mumbai | 40000 |
| 7 | Uday | Yadav | Kolhapur | 1000000 |
| 8 | Rajintha | Jadhav | Nagpur | 4300000 |
| 9 | Priyanka | Pate | Nagpur | 130000 |
| 10 | Ajay | Gowda | Kolhapur | 40000 |
| 11 | Rohit | Saxena | Nagpur | 50000 |

1. Now you have to write a query to create this table name as “Family\_Details” with auto increment primary key on ID column. Insert the above data in that table.

* Create table family\_details( ID int primary key identity not null, first\_name varchar(12), last\_name varchar(20), city varchar(8), salary decimal(10,2))

1. Now I wanted to retrieve only records from “Family\_Details” table with City as “Kolhapur” please write a query for this.

* Select \* from Family\_Details where City = ‘Kolhapur’

1. Can you write q query where I wanted to get the totals of all employees with city wise. (Hint – use group by)

* Select first\_name,last\_name, city, sum(family\_Income) from family\_details group by first\_name,Last\_name, City;

1. Can you update the family income of person “Uday” in the “Family\_Details” table to 500000

* Update table family\_details

Set family\_income = 50000 where first\_name= ‘Uday’

1. Can you retrieve the data from “Family\_details" table combining “First\_Name” and “Last\_name” as Full name, write a query

* Select concat(first\_name, last\_name) as full\_name from family\_details

1. Can you retrieve the data from only Pune and Mumbai cities from “Family\_Details” table, write a query.

* Select \* from family\_details where city IN (‘Pune’, ‘Mumbai’)

1. What are aggregate functions? Can you list them, have you used any of them? Explain with example

* An aggregate function in SQL performs a calculation on multiple values and returns a single value. SQL provides many aggregate functions that include **avg, count, sum, min, max**, etc. An aggregate function ignores NULL values when it performs the calculation, except for the count function.

1. What is index? Why we need it?

* Indexes are used to retrieve data from the database more quickly than otherwise. The users cannot see the indexes, they are just used to speed up searches/queries.

1. What is alias in sql? How to use it?

* SQL aliases are used to give a table, or a column in a table, a temporary name.

Aliases are often used to make column names more readable.

An alias only exists for the duration of that query.

An alias is created with the AS keyword.

Example : SELECT CustomerID AS ID  
FROM Customers;

1. I wanted to create another table with same structure as “Family\_Details”, only name will be different how I can do this?

* CREATE TABLE florist AS SELECT \* FROM product

1. I want to sort the data in “Family\_Details” by First\_name, how to do this? Write a SQL query

* Select \* from family\_details order by first\_name;

1. What is Manipulation of data in SQL, Why we need it?

* Insert, update, delete and select are some commands of data manipulation and it is required because in a business there are some changes happening due to which we need to update or change the data in the table accordingly.

1. What are different data types available in SQL?

Char, varchar, int, numeric, float, decimal, blob, Boolean etc.

1. What is difference between SQL and PL/SQL?

* Here are some common difference :

|  |  |
| --- | --- |
| SQL | PL/SQL |
| It is a database Structured Query Language. | It is a database programming language using SQL. |
| Variables are not available in SQL | Variables, constraints, and data types features are available in PL/SQL. |
| No Supported Control Structures like for loop, if, and other | Control Structures are available like, for loop, while loop, if, and other. |
| Query performs the single operation in SQL. | |  | | --- | | PL/SQL block performs Group of Operation as a single block resulting in reduced network traffic. | |  | |
| SQL is a declarative language. | |  | | --- | | PL/SQL is a procedural language. | |  | |
| SQL can be embedded in PL/SQL. | |  | | --- | | PL/SQL can’t be embedded in SQL. | |  | |

1. What is entities and relationships?

**Below topics I will share later, I request all you to explore this topics**

**New things to explore:**

### What are UNION, UNION ALL, MINUS, and INTERSECT set operators?

### What is a stored procedure?

What is SQL cursor? How do you use it?

What are ACID properties? Explain