SQL Interview Questions and Answers

What is a primary key?

A **primary key** is a field in a table which uniquely identifies each row in a database table. **Primary keys** must contain unique values. A **primary key** column cannot have NULL values. A table can have only one **primary key**, which may consist of single or multiple fields.

Syntax: `CREATE TABLE ID INT PRIMARY KEY IDENTITY (1,1)`

What are foreign keys?

A **foreign key** is a column that references a column of another table. The purpose of the **foreign key** is to ensure referential integrity of the data.

Syntax: `ALTER TABLE Orders ADD FOREIGN KEY (PersonID) REFERENCES Persons(PersonID)`

What is CHECK Constraint?

A CHECK constraint is used to limit the values or type of data that can be stored in a column. They are used to enforce domain integrity.

What is a stored procedure?

A stored procedure is a set of SQL queries which can take input and send back output.

What is identity in SQL?

An identity column in the SQL automatically generates numeric values. We can define a start and increment value of identity column.

What is Trigger?

Trigger allows us to execute a batch of SQL code when a table event occurs (Insert, update or delete command executed against a specific table)

What are different types of statements supported by SQL?

There are 3 types of SQL statements

1. **DDL (Data Definition Language):** It is used to define the database structure such as tables. It includes three statements such as Create, Alter, and Drop.
2. **DML (Data Manipulation Language):** These statements are used to manipulate the data in records. Commonly used DML statements are Insert, Update, and Delete.
3. **DCL (Data Control Language):** These statements are used to set privileges such as Grant and Revoke database access permission to the specific user**.**

Difference between TRUNCATE, DELETE and DROP commands?

DELETE removes some or all rows from a table based on the condition. It can be rolled back.

TRUNCATE removes ALL rows from a table by de-allocating the memory pages. The operation cannot be rolled back

DROP command removes a table from the database completely.

Define UNION, MINUS, UNION ALL, INTERSECT?

MINUS – returns all distinct rows selected by the first query but not by the second.

UNION – returns all distinct rows selected by either query

UNION ALL – returns all rows selected by either query, including all duplicates.

INTERSECT – returns all distinct rows selected by both queries.

What is a transaction?

A transaction is a sequence of code that runs against a database. It takes the database from one consistent state to another.

What is the difference between UNIQUE and PRIMARY KEY constraints?

A table can have only one PRIMARY KEY whereas there can be any number of UNIQUE keys. The primary key cannot contain Null values whereas unique key can contain Null values.

How can we avoid duplicating records in a query?

By using DISTINCT keyword duplicating records in a query can be avoided.

What is a View?

A view is a virtual table which contains data from one or more tables. Views restrict data access of table by selecting only required values and make complex queries easy.

Syntax: `CREATE VIEW view_name AS SELECT column1, column2 FROM table_name WHERE condition`

Syntax: `Select* from view_name`

What are the advantages of Views?

Advantages of Views

1. Views restrict access to the data because the view can display selective columns from the table.
2. Views can be used to make simple queries to retrieve the results of complicated queries. For example, views can be used to query information from multiple tables without the user knowing.

What is the different between HAVING CLAUSE and WHERE CLAUSE?

- Both specify a search condition but HAVING CLAUSE is used only with the SELECT statement and typically used with GROUP BY clause.
- If GROUP BY clause is not used then Having behaves like WHERE clause only

What is CTE?

A CTE or common table expression is an expression which contains temporary result set which is defined in a SQL statement.

What are different Clauses used in SQL?

WHERE Clause: This clause is used to define the condition, extract and display only those records which fulfill the given condition

Syntax: `SELECT column_name(s) FROM table_name WHERE condition;`

GROUP BY Clause: It is used with SELECT statement to group the result of the executed query using the value specified in it. It matches the value with the column name in tables and groups the end result accordingly.

Syntax: `SELECT column_name(s) FROM table_name GROUP BY column_name;`

HAVING clause: This clause is used in association with GROUP BY clause. It is applied to the each group of result or the entire result as single group and much similar as WHERE clause, the only difference is you cannot use it without GROUP BY clause

Syntax: `SELECT column_name(s) FROM table_name GROUP BY column_name HAVING condition`

ORDER BY clause: This clause is to define the order of the query output either in ascending (ASC) or in descending (DESC) order. Ascending (ASC) is the default one but descending (DESC) is set explicitly.

Syntax: `SELECT column_name(s) FROM table_name WHERE condition ORDER BY column_name ASC|DESC`

USING clause: USING clause comes in use while working with SQL Joins. It is used to check equality based on columns when tables are joined. It can be used instead ON clause in Joins.

Syntax: `SELECT column_name(s) FROM table_name JOIN table_name USING column_name)`

Why do we use SQL constraints? Which constraints we can use while creating database in SQL?

Constraints are used to set the rules for all records in the table. If any constraints get violated then it can abort the action that caused it.
Constraints are defined while creating the database itself with CREATE TABLE statement or even after the table is created once with ALTER TABLE statement.

There are 5 major constraints are used in SQL, such as

- **NOT NULL:** That indicates that the column must have some value and cannot be left null
- **UNIQUE:** This constraint is used to ensure that each row and column has unique value and no value is being repeated in any other row or column
- **PRIMARY KEY:** This constraint is used in association with NOT NULL and UNIQUE constraints such as on one or the combination of more than one columns to identify the particular record with a unique identity.
- **FOREIGN KEY:** It is used to ensure the referential integrity of data in the table and also matches the value in one table with another using Primary Key
- **CHECK:** It is used to ensure whether the value in columns fulfills the specified condition

What are different JOINS used in SQL?

There are 4 major types of joins made to use while working on multiple tables in SQL databases.

INNER JOIN: It is also known as SIMPLE JOIN which returns all rows from BOTH tables when it has at least one column matched

Syntax: `SELECT column_name(s) FROM table_name1 INNER JOIN table_name2 ON column_name1=column_name2`

LEFT JOIN (LEFT OUTER JOIN): This join returns all rows from a LEFT table and its matched rows from a RIGHT table**.**

Syntax: `SELECT column_name(s) FROM table_name1 LEFT JOIN table_name2 ON column_name1=column_name2`

RIGHT JOIN (RIGHT OUTER JOIN): This joins returns all rows from the RIGHT table and its matched rows from a LEFT table**.**

Syntax: `SELECT column_name(s) FROM table_name1 RIGHT JOIN table_name2 ON column_name1=column_name2`

FULL JOIN (FULL OUTER JOIN): This joins returns all when there is a match either in the RIGHT table or in the LEFT table**.**

Syntax: `SELECT column_name(s) FROM table_name1 FULL OUTER JOIN table_name2 ON column_name1=column_name2`

SELF JOIN – is used to join a table to itself as if the table were two tables, temporarily renaming at least one table in the SQL statement.

CROSS JOIN – returns the Cartesian product of the sets of records from the two or more joined tables.

Syntax: `SELECT column_name(s) FROM table_name1 CROSS JOIN table_name2`

What are transaction and its controls?

A transaction can be defined as the sequence task that is performed on databases in a logical manner to gain certain results. Operations performed like Creating, updating, deleting records in the database comes from transactions.

In simple word, we can say that a transaction means a group of SQL queries executed on database records.

There are 4 transaction controls such as

- **COMMIT**: It is used to save all changes made through the transaction
- **ROLLBACK**: It is used to roll back the transaction such as all changes made by the transaction are reverted back and database remains as before
- **SET TRANSACTION**: Set the name of transaction
- **SAVEPOINT:** It is used to set the point from where the transaction is to be rolled back

What are properties of the transaction?

Properties of transaction are known as ACID properties, such as

- **Atomicity**: Ensures the completeness of all transactions performed. Checks whether every transaction is completed successfully if not then transaction is aborted at the failure point and the previous transaction is rolled back to its initial state as changes undone
- **Consistency**: Ensures that all changes made through successful transaction are reflected properly on database
- **Isolation**: Ensures that all transactions are performed independently and changes made by one transaction are not reflected on other
- **Durability**: Ensures that the changes made in database with committed transactions persist as it is even after system failure

How many Aggregate Functions are available there in SQL?

- **AVG():** Returns the average value from specified columns
- **COUNT():** Returns number of table rows
- **MAX():** Returns largest value among the records
- **MIN():** Returns smallest value among the records
- **SUM():** Returns the sum of specified column values

What are string Functions in SQL?

- **CONCAT():**Adds two or more strings together
- **UPPER():**Converts a string to upper-case
- **LOWER():**Converts a string to lower-case
- **LEFT():**Extracts a number of characters from a string (starting from left)
- **RIGHT():**Extracts a number of characters from a string (starting from right)
- **REVERSE():**Reverses a string and returns the result
- **REPLACE():**Replaces all occurrences of a substring within a string, with a new substring

Syntax: `REPLACE(string, old_string, new_string)`

What are triggers?

Triggers in SQL is kind of stored procedures used to create a response to a specific action performed on the table such as Insert, Update or Delete. You can invoke triggers explicitly on the table in the database.
Action and Event are two main components of SQL triggers when certain actions are performed the event occurs in response to that action.

Syntax: `CREATE TRIGGER name {BEFORE|AFTER} (event [OR]} ON table_name [FOR [EACH] {ROW|STATEMENT}] EXECUTE PROCEDURE functionname {arguments}`

What is View in SQL?

A View can be defined as a virtual table that contains rows and columns with fields from one or more table.

Syntax: *`CREATE VIEW view_name AS SELECT column_name(s) FROM table_name WHERE condition`*

How we can update the view?

SQL CREATE and REPLACE can be used for updating the view. Following query syntax is to be executed to update the created view

Syntax: *`CREATE OR REPLACE VIEW view_name AS SELECT column_name(s) FROM table_name WHERE condition`*

What is the difference between clustered and non-clustered indexes?

- One table can have only one clustered index but multiple non clustered indexes.
- Clustered indexes can be read rapidly rather than non-clustered indexes.
- Clustered indexes store data physically in the table or view and non-clustered indexes do not store data in table as it has separate structure from data row

What is the difference between DELETE and TRUNCATE?

- The basic difference in both is DELETE is DML command and TRUNCATE is DDL
- DELETE is used to delete a specific row from the table whereas TRUNCATE is used to remove all rows from the table
- We can use DELETE with WHERE clause but cannot use TRUNCATE with it

What is the difference between DROP and TRUNCATE?

TRUNCATE removes all rows from the table which cannot be retrieved back, DROP removes the entire table from the database and it cannot be retrieved back.

What is Relationship? How many types of Relationship are there?

The relationship can be defined as the connection between more than one tables in the database.

There are 4 types of relationships

- One to One Relationship
- Many to One Relationship
- Many to Many Relationship
- One to Many Relationship

What do you mean by Stored Procedures? How do we use it?

A stored procedure is a collection of SQL statements which can be used as a function to access the database. We can create these stored procedures previously before using it and can execute these them wherever we require and also apply some conditional logic to it. Stored procedures are also used to reduce network traffic and improve the performance.

Syntax:
```
CREATE Procedure Procedure_Name
(
//Parameters
)
AS
BEGIN
SQL statements in stored procedures to update/retrieve records
END
```

What are Indexes in SQL?

The index can be defined as the way to retrieve the data more quickly. We can define indexes using CREATE statements.

Syntax:
```
CREATE INDEX index_name ON table_name (column_name)
Further, we can also create Unique Index using following syntax;

Syntax: CREATE UNIQUE INDEX index_name ON table_name (column_name)
```