What is Database?

A database is an organized collection of data, stored and retrieved digitally from a remote or local computer system. Databases can be vast and complex, and such databases are developed using fixed design and modeling approaches.

What is DBMS?

DBMS stands for Database Management System. DBMS is a system software responsible for the creation, retrieval, updation, and management of the database. It ensures that our data is consistent, organized, and is easily accessible by serving as an interface between the database and its end-users or application software.

there are different types of DBMS

- Network Model
- Hierarchical Model
- Relational Model

What is Database Testing?

Database Testing is also known as Backend Testing.

- Testing of Data Integrity
- Testing of Data Validity
- Database related performance
- Testing of functions, procedure and triggers

What is Data Integrity?

Data Integrity is the assurance of accuracy and consistency of data over its entire life-cycle and is a critical aspect of the design, implementation, and usage of any system which stores, processes, or retrieves data. It also defines integrity constraints to enforce business rules on the data when it is entered into an application or a database.

What are different steps in database testing?

- Constraint Check
- Validation of a Field size
- Stored procedure
- Matching application field size to database
- Indexes for performance based issues

What RDBMS stands for and what are the important RDBMS that SQL use?
RDBMS stands for Relational Database Management Systems that use SQL, and the important RDBMS that SQL uses are Sybase, Oracle, Access ,Ingres, Microsoft SQL server etc.

What is SQL?
Structured Query Language (SQL) being ANSI standard language updates database and commands for accessing.

What are entities and relationship

Answer:

Entity: A person, place, or any real-world thing that can be represented as a table is called an entity.
Example: Employee table represents the details of an employee in an organization.
Relationship: Relationship defines the dependency that entities share amongst each other.
Example: Employee name, id, salary might belong to the same or different tables.

How to test database manually?
Testing the database manually involves checking the data at the back end and to see whether the addition of data in the front end is affecting the back end or not, and same for delete, update, insert etc.

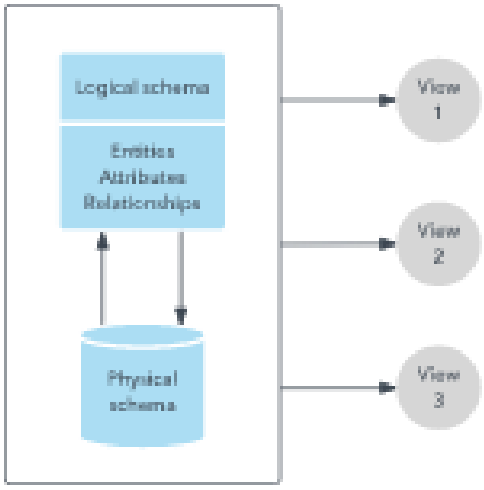
What are the common properties of a database transaction?

- Atomicity: A transaction may contain two or more discrete pieces of information. Atomicity means either commit all the data or nothing.

- Consistency: A transaction creates a new and valid state of data. However, if any failure occurs, it reverts the data to its original state before the start of the transaction.
- Isolation: A transaction under execution and not yet committed must remain isolated from any other transaction.
- Durability: System stores the committed data so that the data is available in its correct state, in case a failure or system restart happens.

What are database schemas?

A database schema represents the logical configuration of all or part of a relational database. It can exist both as a visual representation and as a set of formulas known as integrity constraints that govern a database. These formulas are expressed in a data definition language, such as SQL. As part of a data dictionary, a database schema indicates how the entities that make up the database relate to one another, including tables, views, stored procedures, and more.



Typically, a database designer creates a database schema to help programmers whose software will interact with the database. The process of creating a database schema is called data modeling. When following the three-schema approach to database design, this step would follow the creation of a conceptual schema. Conceptual schemas focus on an organization’s informational needs rather than the structure of a database.

There are two main kinds of database schema:

1. A logical database schema conveys the logical constraints that apply to the stored data. It may define integrity constraints, views, and tables.
2. A physical database schema lays out how data is stored physically on a storage system in terms of files and indices.

At the most basic level, a database schema indicates which tables or relations make up the database, as well as the fields included on each table. Thus, the terms *schema diagram* and *entity-relationship diagram* are often interchangeable.

What is a Table?
A Table in a Relational Database is a predefined format of rows and columns that define an entity.
Each column contains a different type of attribute and each row corresponds to a single record.
Each table is provided with a name.

What is the difference between null, zero and blank space?

Answer: NULL refers to a value that is unknown, not available, inapplicable or unassigned. While zero is a number and blank space is treated as a character.

Are NULL values in a database the same as that of blank space or zero?

No, a NULL value is very different from that of zero and blank space as it represents a value that is assigned, unknown, unavailable, or not applicable as compared to blank space which represents a character and zero represents a number.

Example: NULL value in “number_of_courses” taken by a student represents that its value is unknown whereas 0 in it means that the student hasn’t taken any courses

What is referential integrity?

Referential integrity refers to the consistency that must be maintained between primary and foreign keys, i.e. every foreign key value must have a corresponding primary key value.

How is the SUBSTR keyword used in SQL?

SUBSTR is used for string manipulation with column name, first position and string length used as arguments. E.g. SUBSTR (NAME, 1 3) refers to the first three characters in the column NAME.

How to fetch data from a Database Table?

Using SELECT Statement, we can fetch data from a Database Table

Syntax:

SELECT column1, column2, columnN FROM table_name;

Or

SELECT * FROM table_name;

How to INSERT Values into Tables?

INSERT INTO table_name VALUES (value1, value2,....)

INSERT INTO table_name (column1, column2,...) VALUES (value1, value2,....)

How to Update a Column Name?

UPDATE table_name SET column_name = new_value WHERE column_name = some_value

How to Delete Columns, Rows?

Delete a particular column:

DELETE FROM table_name WHERE column_name = some_value

Delete All Rows:

DELETE FROM table_name or DELETE * FROM table_name

What command is used to get back the privileges offered by the GRANT command?

Revoke command is used to get back the privileges offered by the GRANT command.

To manage and manipulate the test table what are the SQL statements that you have used in Database testing?

The statements like SELECT, INSERT, UPDATE, DELETE are used to manipulate the table, while ALTER TABLE, CREATE TABLE and DELETE TABLE are used to manage tables.

What is DML?
DML stands for Data Manipulation Language, It is used to manage data with schema objects. It is a subset of SQL.

What are DCL commands? What are the two types of commands used by DCL?
DCL stands for Data Control Language, it is used to control data.
The two types of DCL Commands are:
Grant: By using this command user can access privilege to database
Revoke: By using this command user cannot access the database

What is the way of writing test cases for database testing?
Writing test cases is like functional testing. First you have to know the functional requirement of the application. Then you have to decide the parameters for writing test cases like

- Objective: Write the objective that you would like to test
- Input method: Write the method of action or input you want to execute
- Expected: how it should appear in the database

What command is used to get back the privileges offered by the GRANT command?
REVOKE.

How to create a table in SQL? Explain with examples

```
CREATE TABLE <Table_Name>

(Column_Name1 Data_Type (Size),

Column_Name2 Data_Type (Size),

Column_NameN Data_Type (Size)

);
```

Example:

CREATE TABLE Student

(RollNo Number (10),

FName Varchar2 (15),

LName Varchar2 (15),

Class Number (10),

DOB Date,

Gender Varchar2 (15));

What operator performs pattern matching?
LIKE operator.

What are the scalar functions in SQL? Give an example?

Answer: Scalar Functions are used to return a single value based on the input values.

Scalar Functions are as follows:

- **UCASE():** Converts the specified field in upper case
- **LCASE():** Converts the specified field in lower case

What is the use of the DROP option in the ALTER TABLE command?
It is used to drop constraints specified on the table.

What operator tests columns for the absence of data?
IS NULL operator.

What is the use of DESC in SQL?
DESC has two purposes. It is used to describe a schema as well as to retrieve rows from tables in descending order.

Explanation :
The query SELECT * FROM EMP ORDER BY ENAME DESC will display the output sorted on ENAME in descending order.

What is the difference between TRUNCATE & DELETE?
TRUNCATE commits after deleting the entire table i.e., cannot be rolled back. Database triggers do not fire on TRUNCATE

DELETE allows the filtered deletion. Deleted records can be rolled back or committed. Database triggers fire on DELETE.

What is the difference between CHAR and VARCHAR2 datatypes in SQL?

Answer: CHAR is used to store fixed-length character strings, and VARCHAR2 is used to store variable-length character strings.

What is the difference between group by and order by?
Group by controls the presentation of the rows, order by controls the presentation of the columns for the results of the SELECT statement.

Difference between SUBSTR and INSTR?
INSTR (String1, String2 (n, (m)),

INSTR returns the position of the m-th occurrence of the string 2 in string1. The search begins from the nth position of string1.

SUBSTR (String1 n, m)
SUBSTR returns a character string of size m in string1, starting from n-th position of string1.

What is DDL and what are their commands?
To define database structure, a Developer uses DDL. DDL stands for Data Definition Language. The various DDL commands include Create, Truncate, Drop, Alter, Comment and Rename.

DML (Data Manipulation Language):

These are used to manage records in the table. It includes the basic operations carried out on the tabular data like selecting few records, inserting new ones, deleting the unnecessary ones, and updating/modifying the existing ones. Following are different DML statements available in SQL:

- <SELECT> – retrieve data from the database
- <INSERT> – to insert data into a table
- <UPDATE> – it updates existing data within a table
- <DELETE> – to delete all records from a table

DDL (Data Definition Language):

DDL statements are used to alter/modify a database or table structure and schema. These statements handle the design and storage of database objects. Following are different DDL statements available in SQL:

- <CREATE> – to create objects in the database
- <ALTER> – alters the structure of the database
- <DROP> – to delete objects from the database
- <TRUNCATE> – remove all records from a table. It also frees all the space allocated to them
- <RENAME> – to rename an object.

DCL (Data Control Language):

DCL statements control the level of access that users have to the database objects. Following are different DCL statements available in SQL:

- <GRANT> – it gives access privileges to the user for the database
- <REVOKE> – to withdraw the access privileges given by GRANT command.

TCL (Transaction Control Language):
It allows you to control and manage transactions to maintain the integrity of data within SQL statements. Following are different TCL statements:

<COMMIT> – to save the work
<SAVEPOINT> – identify a point in a transaction to which you can rollback at a later point in time when required
<ROLLBACK> – restore the database to original since the last COMMIT

What is the role of COMMIT in an SQL transaction?

Ans.

COMMIT finalizes the changes introduced by all SQL statements included in the transaction as permanent in the database.

Thus the changes made by the SQL statements of a transaction become visible to other user's session transactions that start only after the transaction gets committed.

What are Constraints? Explain the different Constraints available in SQL?

These are the set of rules that determine or restrict the type of data that can go into a table, to maintain the accuracy and integrity of the data inside the table.

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.

Following are the most frequent used constraints, applicable to a table:

- <NOT NULL> It restricts a column from holding a NULL value. It does not work on a table.
- <UNIQUE> It ensures that a field or column will only have unique values. It is applicable to both column and table.
- <PRIMARY KEY> uniquely identifies each record in a database table and it cannot contain NULL values.
- <FOREIGN KEY> It is used to relate two tables. The FOREIGN KEY constraint is also used to restrict actions that would destroy links between tables.

- <CHECK CONSTRAINT> It is used to restrict the value of a column between a range. It performs a check on the values, before storing them into the database. It's like condition checking before saving data into a column.
- <DEFAULT> It is used to insert a default value into a column.

How to add SQL not null constraint in SQL?

The following SQL enforces the "RollNo" Column to NOT accept NULL values:

```
CREATE TABLE Student
(
RollNo Number (10) NOT NULL,
FName Varchar2 (15),
LName Varchar2 (15),
Location Varchar2 (20)
);
```

What is the difference between Primary key and Unique Key?

Both Primary and Unique key carry unique values but the primary key can not have a null value where the Unique key can. And in a table, there cannot be more than one Primary key but unique keys can be multiple.

What is a foreign key?

A foreign key is an attribute or a set of attributes that references the primary key of some other table. Basically, it is used to link together two tables.

What are some common clauses used with SELECT queries in SQL?

There are many SELECT statement clauses in SQL. Some of the most commonly used clauses are:

- FROM

The FROM clause defines the tables and views from which data can be interpreted. The tables and views listed must exist at the time the question is given.

- WHERE

The WHERE clause defines the parameters that would be used to limit the contents of the results table. You can test for basic relationships or for relationships between a column and a series of columns using subselects.

- GROUP BY

This GROUP BY clause is commonly used for aggregate functions to produce a single outcome row for each set of unique values in a set of columns or expressions.

- ORDER BY

ORDER BY clause helps you to choose the columns on which the table's result should be sorted.

- HAVING

By using an aggregate function, the HAVING clause filters the results of the GROUP BY clause.

What is the main difference between Primary Key, Unique Key, and Foreign Key?

Following are the key differences between Primary Key, Unique Key, and Foreign Key.

Primary Key:

- The primary key cannot have a NULL value.
- Every table can have only one primary key.
- By default, Primary key supports clustered index. Thus data in the database table are physically organized in the sequence of clustered indexes.
- It can be related to another table as a Foreign Key.
- It supports the generation of ID automatically with the help of Auto Increment field.

Unique Key:

- Unique Constraint may have a NULL value.
- Each table can have more than one Unique Constraint.
- By default, Unique key is a unique non-clustered index.
- It is not related to another table as a Foreign Key.
- Unique Constraint doesn’t support Auto Increment value.

Foreign Key:

- A Foreign key is a field in a table whereas it is the primary key in another table.
- It can accept multiple null values.
- A Foreign key does not automatically create an index, clustered or non-clustered. You must manually create an index on the foreign key.
- We can have more than one foreign key in a table.
- There are advantages to having a foreign key supported with a clustered index, but you get only one per table. The advantage using a clustered index is that, on selecting the parent plus all child records, it can bring all child records next to each other.
- The Foreign key shouldn’t have a null value. Else, the system will consider it as an orphan record.

What are the main points that differentiate between the “delete”, “truncate” and “drop” commands?

A. DELETE:

- It is a DML statement.
- It applies a filter based on an optional WHERE clause to identify the rows that will get deleted.
- It is possible to roll back a transaction that got deleted.
- It does not reset the identity of the table.
- Triggers will get fired.
- On initiating a DELETE operation, all the data first gets copied into Rollback Tablespace and then delete operation gets performed. Thus we can get back the data by ROLLBACK command.

B. TRUNCATE:

- It is a DDL Statement.
- Removes all rows from a table and it becomes empty. But, the table structures, its columns, constraints, and indexes remain intact.
- It is not possible to roll back the TRUNCATE transaction.
- It resets the identity of the table i.e. the auto-incrementing keys are reset to 1. It’s just like having a brand new table.
- It is faster than DELETE and uses a lesser amount of system and transaction logs.
- TRUNCATE cannot be used on a table referenced by a FOREIGN KEY constraint.
- No Triggers will get fired.
- Cannot use WHERE conditions.
- Use this when you just want an empty table.

C. DROP:

- It is a DDL statement.

- It not only removes the table from the database. Its structures, indexes, privileges, and constraints also get removed.
- It is not possible to roll back the DROP transaction.
- No Triggers will get fired.
- Use this when you don't need that table anymore.

Can we use TRUNCATE with a WHERE clause?

Answer: No, we cannot use TRUNCATE with the WHERE clause.

What is a composite key?

Answer: When more than one column is used to define the primary key, it is called a composite key.

What is the difference between a superkey and the candidate key?

A superkey is a combination of columns that uniquely identifies any row within a relational database management system (RDBMS) table.

Whereas, a candidate key is a superkey containing a minimum number of columns that can uniquely identify each row.

How do we avoid getting duplicate entries in a query?

Answer: The Select DISTINCT is used to get distinct data from tables using a query

Explain Distinct in SQL with an example.

Answer:

DISTINCT statement is used with the SELECT statement. If the records contain duplicate values then DISTINCT is used to select different values among duplicate records.

Syntax:

SELECT DISTINCT column_name(s)

FROM table_name;

Example:

Select distinct empno from Emp;

The above statement will select the distinct employees from a table named Employee.

What is the difference between HAVING and WHERE clauses?

The distinction between HAVING and WHERE clauses in SQL is that while the WHERE clause cannot be used with aggregates, we use the HAVING clause with the aggregated data. The WHERE clause works on the data from a row and not with the aggregated data.

What is the difference between Union and Union ALL?

UNION and UNION ALL merges the contents of two structurally-compatible tables into a single combined table.

The difference between UNION andUNION ALL is that UNION will remove duplicate records whereas UNION ALL will include duplicate records.

The performance of UNION ALL is better than UNION as UNION requires the server to do additional work of removing duplicates.

For performance reasons, it is recommended to use UNION ALL is the scenarios when it is certain that there will be no duplicates or cases where having duplicates is not a problem.

What are the Operators used in SELECT statements?

= Equal

<> or != Not equal

> Greater than

< Less than

>= Greater than or equal

<= Less than or equal

BETWEEN Between an inclusive range LIKE Search for a pattern

What is DBMS?

What is RDBMS?

What is SQL?

=> SQL stands for Structured Query Language , and it is used to communicate with the Database. This is a standard language used to perform tasks such as retrieval, updating, insertion and deletion of data from a database.

What is a Database?

Example: School Management Database, Bank Management Database.

What are tables and Fields?

Different between delete ..drop and truncate?

Explain DML and DDL commands ?

How you can remove duplicate from column in SQL?

Explain join ? What are the types of join and explain each?

Explain constraints ? What is a constraint?

=> Constraint can be used to specify the limit on the data type of table.

Constraint can be specified while creating or altering the table statement. Sample of constraint are

NOT NULL.

CHECK.

UNIQUE.

PRIMARY KEY.

FOREIGN KEY.

What is a primary key?

=> A primary key is a combination of fields which uniquely specify a row. This is a special kind of unique key, and it has an implicit NOT NULL constraint. It means, Primary key values cannot be NULL.

What is a unique key?

What is a foreign key?

Difference between primary key and foreign key ?

Difference between primary key and unique key ?

Explain Aggregate function?

To find the second highest maximum salary ?

To find the Third Highest salary ?

What is normalization?

=> Normalization is the process of minimizing redundancy and dependency by organizing fields and tables of a database.

The main aim of Normalization is to add, delete or modify fields that can be made in a single table.

What are all the different normalizations?

What is a subquery?

=> A subquery is a query within another query. The outer query is called the main query, and the inner query is called subquery. SubQuery is always executed first, and the result of the subquery is passed on to the main query.

Difference between WHERE and HAVING clause.

What is the difference between DELETE and TRUNCATE commands?

=> DELETE command is used to remove rows from the table, and the WHERE clause can be used for a conditional set of parameters. Commit and Rollback can be performed after the delete statement.

TRUNCATE removes all rows from the table. Truncate operation cannot be rolled back.

What is data Integrity?

Data Integrity defines the accuracy and consistency of data stored in a database.

It can also define integrity constraints to enforce business rules on the data when it is entered

into the application or database.

What is Union, minus and Interact commands?

UNION operator is used to combine the results of two tables, and it eliminates duplicate rows from the tables.

MINUS operator is used to return rows from the first query but not from the second query.

Matching records of the first and second query and other rows from the first query will be displayed as a result set.

INTERSECT operator is used to return rows returned by both the queries.

What is an ALIAS command?

What is the difference between TRUNCATE and DROP statements?

=> TRUNCATE removes all the rows from the table, and it cannot be rolled back. DROP command removes a table from the database and the operation cannot be rolled back.

What are aggregate functions?

Aggregate functions are used to evaluate mathematical calculation and return single values.

This can be calculated from the columns in a table.

How to select unique records from a table?

Select unique records from a table by using DISTINCT keyword.

Select DISTINCT ename from emp.

Which operator is used in a query for pattern matching?

LIKE operator is used for pattern matching, and it can be used as -.

% - Matches zero or more characters.

_(Underscore) û Matching exactly one character.

33.What are DML statements

Explain about IN Operators?

The IN operator implements comparison to a list of values, that is, it tests whether a value matches any value in a list of values. IN comparisons have the following general format:
value-1 [NOT] IN (value-2 [, value-3] ...)
This comparison tests if value-1 matches value-2 or matches value-3, and so on. It is equivalent to the following logical predicate:
value-1 = value-2 [OR value-1 = value-3]

Explain UNION, MINUS, UNION ALL and INTERSECT?
INTERSECT - returns all distinct rows selected by both queries.

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.

What is an Index? Explain the different types of index.
Ans.

An index is a performance enhancement method that allows faster retrieval of records from the table. An index creates an entry for each value thus making data retrieval faster.

While creating an index, we should remember the columns which will be used to make SQL queries and create one or more indexes on those columns.

Following are the available indexes.

1. Clustered index:

It sorts and stores the rows of data in the table or view, based on its keys. These are the columns included in the index definition. There can be only one clustered index per table because sorting of data rows can be done only in one order.

2. Nonclustered index:

It contains the nonclustered index key value and each key value entry, in turn, has a pointer to the data row. Thus a nonclustered index contains a pointer to the physical location of the record. Each table can have 999 nonclustered indexes.

3. Unique Index:

This indexing does not allow the field to have duplicate values if the column is unique indexed. It can be applied automatically when a primary key is defined.

What is the purpose of a Subquery?

A Subquery also called a Nested query is a query within another SQL query and embedded within the WHERE clause. A Subquery is always executed first and passes its result to the main query. This data acts as a filter condition in the main query to further restrict the data to be retrieved. Subqueries work with the SELECT, INSERT, UPDATE, and DELETE statements along with the operators like =, <, >, >=, <=, IN, and BETWEEN.

Following are some important properties of a Subquery that we must know:

- Always write a Subquery within a parenthesis.
- It can contain more than one column in the SELECT clause only if the main query has multiple columns.
- We cannot use ORDER BY in a Subquery. Instead, use GROUP BY which performs the same function as ORDER BY.
- We cannot use BETWEEN operator with a subquery but can use it within a Subquery.
- You can nest Subqueries up to 32 levels.

What do you know about Joins? Define different types of Joins.

The Join clause is used to combine rows from two or more tables based on a related column between them. There are various types of Joins that can be used to retrieve data, and it depends upon the relationship between tables.

There are four types of Joins:

- Inner Join: Inner Join basically returns records that have matching values in both tables.
- Left Join: Left Join returns rows that are common between the tables and all the rows of the left-hand-side table, i.e., it returns all the rows from the left-hand-side table even if there are no matches available in the right-hand-side table.
- Right Join: Right Join returns rows that are common between the tables and all the rows of the right-hand-side table, i.e., it returns all the rows from the right-hand-side table even if there are no matches available in the left-hand-side table.
- Full Join: Full Join returns all the rows from the left-hand-side table and all the rows from the right-hand-side table.

Explain Inner Join.

Inner Join basically gives us those records that have matching values in two tables.

Let us suppose, we have two tables Table A and Table B. When we apply Inner Join on these two tables, we will get only those records that are common to both Table A and Table B.

What is the purpose of a JOIN statement? Also, explain the different types of JOIN clauses supported in SQL.

JOIN keyword is used to fetch data from two or more related tables. It returns rows where there is at least one match in both the tables included in the join.

SQL specifies five types of JOIN clauses as follows:

INNER JOIN (also called as “simple join”):

It returns all the rows for which there is at least one match in BOTH the tables. If the join type is not specifically mentioned then “INNER JOIN” works as the default join.

SQL Syntax for INNER JOIN:

```
SELECT column_name(s)

FROM table1

INNER JOIN table2

ON table1.column_name=table2.column_name;
```

LEFT JOIN:

Returns all rows from the left table, and the matching rows from the right table. Thus the result will contain all records from the left table, even if the JOIN condition doesn't find any matching records in the right table. This means that if the "ON" clause does not match to any records in the right table, the JOIN will return a row in the result for that record in the left table, but with NULL in each column from the right table.

SQL Syntax for LEFT JOIN:

```
SELECT column_name(s)

FROM table1

LEFT JOIN table2

ON table1.column_name=table2.column_name;
```

RIGHT JOIN :

It returns all rows from the right table and the corresponding matching rows from the left table. It is the exact opposite of the LEFT JOIN. Thus the result will contain all the records from the right table, even if the JOIN condition doesn't find any matching records in the left table. This means that if the "ON" clause does not match to any records in the left table, the JOIN will return a row in the result for that record in the right table, but with NULL in each column from the left table.

SQL Syntax for RIGHT JOIN:

SELECT column_name(s)

FROM table1

RIGHT JOIN table2

ON table1.column_name=table2.column_name;

FULL JOIN

It returns all the rows for which there is a match in either of the tables. Fundamentally, a FULL JOIN is a combination of the effect produced by both a LEFT JOIN and a RIGHT JOIN. Thus we can say that its result set is equivalent to performing a UNION of the results of left and right outer queries.

SQL Syntax for FULL OUTER JOIN:

SELECT column_name(s)

FROM table1

FULL OUTER JOIN table2

ON table1.column_name=table2.column_name;

CROSS JOIN:

It returns a result set which is the multiplication of the number of rows in the first and the second table. If we do not apply WHERE clause along with CROSS JOIN, it returns the Cartesian Product. However, if we use the WHERE clause along with CROSS JOIN, it functions like an INNER JOIN.

An alternative way of achieving the same result is to use column names separated by commas after SELECT and mentioning the table names involved, after a FROM clause.

SQL Syntax for CROSS JOIN:

SELECT column_name(s)

FROM table1

CROSS JOIN table2;

SELF JOIN:

It is used to join a table to itself as if the table were two tables. To achieve this, we temporarily rename one of the tables in the SQL statement.

Syntax:

SELECT column_name(s)

FROM table1, table2

WHERE table1.common_field = table2.common_field;

What is a View? What are its advantages and disadvantages?

A View is a virtual table which contains data from one or more tables. It selects only required values thus restricting the access to table data. And it also makes complex queries a bit easier.

Following are the advantages of using Views:

- It enables viewing data without storing the data in an object.
- Restrict the view of a table by hiding some of its columns.
- Join two or more tables and display it as a single object.
- Restrict the access of a table so that nobody can insert rows in the table without permission.

Disadvantages of Views:

- Cannot apply DML statements on it.
- A View becomes inactive if a table that is a part of View gets dropped.
- It is an object and hence, it consumes memory.

What are GROUP functions? Why do we need them?

Answer: Group functions work on a set of rows and return a single result per group. The popularly used group functions are AVG, MAX, MIN, SUM, VARIANCE, COUNT

List the built-in functions available in SQL?.

- AVG(): Returns the average value.
- COUNT(): Returns the number of rows.
- FIRST(): Returns the first value.
- LAST(): Returns the last value.
- MAX(): It gives the largest value as output.
- MIN(): It gives the smallest value as output.
- SUM(): Outputs the Sum.
- UCASE(): Converts a value to uppercase.
- LCASE(): Converts a value to lowercase.
- MID(): Extract the middle character from a string or number.
- LEN(): Returns the length of a text field.
- ROUND(): Round Off a numeric field to the number of decimals specified.
- NOW(): Returns the current system date and time.
- FORMAT(): defines how a field is to be displayed.

What is the ALIAS command?

Answer: This command provides another name to a table or a column. It can be used in the WHERE clause of a SQL query using the **as** keyword.

What is Normalization and how does it work?

The process of designing database tables to minimize the data redundancy is called normalization.

We need to divide a database into two or more tables and define relationships between them.

What are the various forms of Normalization?

Database normalization process provides following forms:

1. First normal form (1NF):

As per the rule of 1NF, an attribute(column) of a table can not hold multiple values. It should contain only atomic values.

2. Second normal form (2NF):

A table is in 2NF if the following conditions hold true:

- The table is in 1NF.
- No non-prime attribute is dependent on the proper subset of any candidate key of the table.

An attribute that is not part of any candidate key is known as a non-prime attribute.

3. Third normal form (3NF):

A table is in 3NF if both the given conditions hold true:

- The table is in 2NF.
- For every functional dependency (X-> Y), at least one of the following conditions hold:
    - X is a super key of the table.
    - Y is a prime attribute of the table.

A prime attribute is an attribute that is part of the candidate key.

What is a cursor, and when do you use it?

Answer: A cursor is a database object which is used to manipulate data by traversing row by row in a result set. A cursor is used when you need to retrieve data, one row at a time from a result set and when you need to update records one row at a time.

Define Normalization.

Organized data void of inconsistent dependency and redundancy within a database is called normalization.

Enlist the advantages of normalizing databases.

Advantages of normalizing database are:

- No duplicate entries

- Saves storage space
- Boasts the query performances.

Define DDL and DML.
Managing properties and attributes of a database is called Data Definition Language(DDL).
Manipulating data in a database such as inserting, updating, deleting is defined as Data Manipulation Language. (DML)

Define Aggregate functions.
Functions which operate against a collection of values and returning single value is called aggregate functions

Define Scalar functions.
Scalar function is dependent on the argument given and returns sole value.

While testing stored procedures, what are the steps a tester takes?
The tester will check the standard format of the stored procedures and also it checks if the fields are correct like updates, joins, indexes, deletions as mentioned in the stored procedure.

How would you know for database testing, whether a trigger is fired or not?
On querying the common audit log you would know whether a trigger is fired or not. It is in the audit log where you can see the triggers fired.

What are Triggers? What are its benefits? Can we invoke a trigger explicitly?

Ans.

The trigger is a type of stored program, which gets fired automatically when some event occurs. We write a Trigger as a response to either of the following event:

- A database manipulation (DML) statement (DELETE, INSERT, or UPDATE).
- A database definition (DDL) statement (CREATE, ALTER, or DROP).
- A database operation (SERVERERROR, LOGON, LOGOFF, STARTUP, or SHUTDOWN).
- SQL allows defining Trigger on the table, view, schema, or database associated with the event.

Following are its benefits:

- Generating some derived column values automatically.
- Enforcing referential integrity.
- Event logging and storing information on table access.
- Auditing.
- Synchronous replication of tables.
- Imposing security authorizations.
- Preventing invalid transactions.

It is not possible to invoke a trigger explicitly. It gets invoked automatically if an event gets executed on the table having an association with the trigger.

What are clustered indexes and non-clustered indexes?

Answer: A table can have only one clustered index. In this type of index, it reorders the table based on the key values and physically stores them in that order.

The non-clustered index does not have the physical ordering of the data in the table; it has a logical order.

A non-clustered index doesn't sort the physical data inside the table. A non-clustered index is stored in one place, and table data is stored in another place. This allows for more than one non-clustered index per table.

What are the Clauses available in SQL?

Ans.

Following are some of the frequently used Clauses in SQL:

1. WHERE:

Using WHERE clause, we can specify selection criteria to select required records from a table.

ORDER BY:

It is used to sort the records in your result set.

GROUP BY:

It is used to group values from a column, and, if required, perform calculations on that column. It applies to aggregate functions such as SUM, AVG, MAX, MIN, and COUNT.

HAVING:

It is used in the SELECT statement to specify filter conditions for a group of rows or aggregates.

The MySQL HAVING clause is frequently used with the GROUP BY clause to apply a filter condition to the columns that appear in the GROUP BY clause. The HAVING clause behaves like the WHERE clause in case the GROUP BY clause gets excluded.

Can we embed Pl/SQL in SQL? Justify your answers

Answer: PL/SQL is a procedural language, and it has one or more SQL statements in it. So SQL can be embedded in a PL/SQL block; however, PL/SQL cannot be embedded in SQL as SQL executes a single query at a time.

What is a PL/SQL cursor?

- A PL/SQL cursor is nothing but a pointer to an area of memory having SQL statements and the information of statement processing. This memory area is called a context area. This special area makes use of a special feature called cursor for the purpose of retrieving and processing more than one row.
- In short, the cursor selects multiple rows from the database and these selected rows are individually processed within a program.
- There are two types of cursors:
    - Implicit Cursor:
        - Oracle automatically creates a cursor while running any of the commands - SELECT INTO, INSERT, DELETE or UPDATE implicitly.
        - The execution cycle of these cursors is internally handled by Oracle and returns the information and status of the cursor by making use of the cursor attributes- ROWCOUNT, ISOPEN, FOUND, NOTFOUND.

    - Explicit Cursor:
        - This cursor is a SELECT statement that was declared explicitly in the declaration block.
        - The programmer has to control the execution cycle of these cursors starting from OPEN to FETCH and close.
        - The execution cycle while executing the SQL statement is defined by Oracle along with associating a cursor with it.
- Explicit Cursor Execution Cycle:
    - Due to the flexibility of defining our own execution cycle, explicit cursors are used in many instances. The following diagram represents the execution flow of an explicit cursor:

In what cursor attributes the outcomes of DML statement execution are saved?

- The outcomes of the execution of the DML statement is saved in the following 4 cursor attributes:
    - SQL%FOUND: This returns TRUE if at least one row has been processed.
    - SQL%NOTFOUND: This returns TRUE if no rows were processed.
    - SQL%ISOPEN: This checks whether the cursor is open or not and returns TRUE if open.
    - SQL%ROWCOUNT: This returns the number of rows processed by the DML statement

What is the importance of %TYPE and %ROWTYPE data types in PL/SQL?

- %TYPE: This declaration is used for the purpose of anchoring by providing the data type of any variable, column, or constant. It is useful during the declaration of a variable that has the same data type as that of its table column.
    - Consider the example of declaring a variable named ib_employeeid which has the data type and its size same as that of the column employeeid in table ib_employee.
      The syntax would be : ib_employeeid ib_employee.employeeid%TYPE;

- %ROWTYPE: This is used for declaring a variable that has the same data type and size as that of a row in the table. The row of a table is called a record and its fields would have the same data types and names as the columns defined in the table.
    - For example: In order to declare a record named ib_emprecord for storing an entire row in a table called ib_employee, the syntax is: ib_emprecord ib_employee%ROWTYPE;

What is the purpose of the WHEN clause in the trigger?

- WHEN clause specifies for what condition the trigger has to be triggered

Why is SYSDATE and USER keywords used?

- SYSDATE:
    - This keyword returns the current time and date on the local database server.
    - The syntax is SYSDATE.
    - In order to extract part of the date, we use the TO_CHAR function on SYSDATE and specify the format we need.
    - Usage:
        - SELECT SYSDATE FROM dual;