SQL

1. What is a Relational Database Management System?

A Relational Database Management System (RDBMS) refers to the software used to store, manage, and query data. Data is stored in tables and can be linked to other datasets based on shared information, hence the name “relational”.

1. How does a Relational Database Management System differ from a Database Management System?

The key differences between Relational Database Management Systems (RDBMS) and Database Management Systems (DBMS) are:

* An RDBMS stores data in a relational table with rows and columns, whereas a DBMS stores data as a file
* An RDBMS provides access to multiple users (including client-server side interaction), whereas a DBMS only supports single users

1. What are some of the most popular Relational Database Management Systems?

Some of the most popular RDBMSs are:

* Oracle Database
* MySQL
* Microsoft SQL Server
* PostgreSQL
* IBM DB2
* SQLite

1. What is the role of SQL?

SQL is a programming language used to perform data-related tasks; every RDBMS uses SQL as its standard programming language. In these databases, SQL allows users to create tables, update data, make queries, and perform analytics.

1. What is the difference between SQL and MySQL?

SQL is the programming language used in an RDBMS, while MySQL is an example of an RDBMS. MySQL was one of the first open-source database systems on the market, and it is still fairly popular today.

1. What is a query?

A query is a request for data or information from a database. There are two main types of SQL queries:

* A select query is a query that groups data from a table for analytical purposes
* An action query is a query that changes the contents of the database based on specified criteria

1. What is a subquery?

A subquery is a query that is embedded within another statement that requires multiple steps. The subquery provides the enclosing query with additional information needed to execute a task, such as when the completion of one query depends firstly on the results of another.

1. How do you perform a select query with SQL?

The process for performing a select query in SQL is as follows:

* The SELECT statement is used to specify the columns you want to query
* The FROM statement is used to specify the particular table holding the data
* The WHERE statement is used to filter data based on specified conditions

1. What are the most important types of action queries?

There are several SQL statements for running an action query. Their purposes and procedures vary. Some of the important action statements include:

* UPDATE modifies the values of fields in a table
* DELETE removes records from a table
* CREATE TABLE creates a new table
* INSERT INTO adds records to a table

1. What are constraints?

SQL constraints are a set of rules or conditions implemented on an RDBMS to specify what data can be inserted, updated, or deleted in its tables. This is done to maintain data integrity and ensure that the information stored in database tables is accurate.

1. What are join clauses?

The join clause combines columns with related values from two or more tables to create a new table. There are four main types of SQL join clauses:

* JOIN returns records with matching values in both tables
* LEFT JOIN returns all records from the left table and matching records from the right table
* RIGHT JOIN returns all records from the right table and matching records from the left table
* FULL JOIN returns all records from both tables

1. What is the role of indexes?

An SQL index stores important parts of a database table to allow for a quick and efficient lookup. Rather than searching the entire database, users only have to consult the index during data retrieval. Indexes, therefore, help improve performance in an RDBMS.

1. What does a NULL value represent?

A NULL value indicates the data is unknown. This is not the same as 0; NULL values mean no data is stored at all.

1. What is an alias?

Aliases are temporary names given to tables or columns for the duration of a particular SQL query. Their purpose is to reduce the amount of code required for that query, therefore saving time and effort.

1. What is the difference between normalization and denormalization?

* Normalization is the process of dividing data into tables to remove redundant data and improve data integrity.
* Denormalization is used to combine multiple tables to reduce the time required to perform queries

1. What are the most important SQL constraints and how are they used?

Here are some of the most used SQL constraints:

* NOT NULL ensures a column cannot contain a NULL value
* UNIQUE ensures all values in a column are different
* DEFAULT provides a default value for a column when none is specified
* INDEX creates an index for data retrieval purposes
* CHECK checks values in a column against certain specified conditions

1. What are the key differences between clustered and non-clustered indexes?

The key differences between clustered and non-clustered indexes are:

* Clustered indexes define the physical order in which tables are stored and sort them accordingly.
* Clustered indexes sort data rows based on their key values.
* There can be only one clustered index per table
* Non-clustered indexes create a logical order that doesn’t match the physical order of the rows on the disk
* Non-clustered indexes use a structure separate from the data rows
* There can be multiple non-clustered indexes per table

1. What are the different types of subqueries?

There are three main types of SQL subqueries. These are:

* Single-row subqueries, which return one row in results
* Multi-row subqueries, which return two or more rows in results
* Correlated subqueries, which return results according to outer queries

1. What are the different types of collation sensitivity?

Collation refers to a set of rules or conditions that influence how data is stored and ordered. There are several types of SQL collation, including:

* Case sensitivity, which distinguishes between uppercase and lowercase characters
* Accent sensitivity, which distinguishes between accented and unaccented characters
* Width sensitivity, which distinguishes between full-width and half-width characters

1. What are the key differences between the DELETE and TRUNCATE SQL commands?

The main differences between the DELETE and TRUNCATE commands are:

* DELETE is a DML command, whereas TRUNCATE is a DDL command
* DELETE removes records and records each deletion in the transaction log, whereas TRUNCATE deallocates pages and records each deallocation in the transaction log
* TRUNCATE is generally considered quicker as it makes less use of the transaction log

1. How do you delete a column?

A column in a table can be deleted by following these steps:

* Use ‘ALTER TABLE table name’ to select the table with the column you want to delete
* Use ‘DROP COLUMN column name’ to select the column you want to delete

1. What are some of the most important aggregate functions?

Aggregate values are used to perform calculations on a set of values to return a single value. Some of the most widely used aggregate functions are:

* AVG calculates the average set of values
* COUNT counts the total number of rows in a table
* MIN finds the minimum value in a table
* MAX finds the maximum value in a table
* SUM calculates the sum of the values

1. What does schema mean?

A schema refers to a collection of database objects—such as tables, functions, indexes, and procedures—associated with a database.

The schema helps segregate database objects for different applications and access rights; it’s generally used to define who can and who cannot view specific objects in the database.

1. What are some of the most important scalar functions?

Scalar functions are user-defined functions applied to a set of data to return a single value. Some of the most common scalar functions include:

* UCASE converts values to uppercase
* LCASE converts values to lowercase
* MID extracts textual data based on specified criteria
* ROUND rounds numerical data to a specified number of decimals
* NOW returns the current system date and time

1. What are SQL injections and how can they be prevented?

An SQL injection is a type of cyber-attack in which hackers insert malicious SQL code into the database to gain access to potentially valuable or sensitive information. It’s a common occurrence with web applications or websites that use an SQL-based database.

It’s possible to prevent SQL injections by creating multiple database accounts to limit access or by using a third-party web application firewall.

1. How can SQL queries be optimized?

There are several ways to optimize queries and improve performance. For example:

* Specify particular columns with SELECT rather than by using SELECT \* (select all)
* Make joins with INNER JOIN rather than WHERE
* Define filters using WHERE rather than HAVING
* Avoid looping statements in the query structure
* Avoid correlated subqueries

1. What are the ACID properties in SQL?

ACID is an acronym for Atomicity, Consistency, Isolation, and Durability. These are the four key properties for ensuring data integrity during a transaction.

The role of each property is as follows:

* Atomicity: Changes to data are performed as a single, unified operation
* Consistency: Data values are consistent at the start and end of the transaction
* Isolation: The intermediate state of a transaction is hidden from other transactions
* Durability: Changes to data remain the same after the transaction is completed

1. What are the different types of stored procedures?

Stored procedures are chunks of SQL code that can be saved and reused. The main types of stored procedures are:

* User-defined stored procedures, which are created by users
* System stored procedures are default procedures placed permanently on the system
* Temporary stored procedures are procedures that are dropped when the session is closed
* Remote stored procedures, which are created and stored on remote servers

1. How do you create a trigger with SQL?

A trigger is a type of stored procedure that runs when a specific event occurs, such as when a new record is added to the database.

Trigger creation varies depending on the RDBMS. Some systems feature a CREATE TRIGGER statement, while others require the users to navigate to a triggers folder in the toolbar. Once created, users must write the trigger’s code, specifying its conditions and effect.

1. What are the main differences between HAVING and WHERE SQL clauses?

* The key differences between HAVING and WHERE SQL clauses are:
* The WHERE clause is used in row operations, whereas the HAVING clause is used in column operations
* The WHERE clause comes before GROUP BY in a query, whereas the HAVING clause comes after GROUP BY
* The WHERE clause cannot be used with aggregate functions, contrary to the HAVING clause

1. What are some ways to prevent duplicate entries when making a query?

There are several methods to avoid duplicate entries when making a query, such as:

* Create a unique index
* Add the DISTINCT keyword to the SELECT statement
* Use the NOT EXISTS or NOT IN commands

1. What is meant by dynamic SQL?

Dynamic SQL is a programming technique used to build SQL statements at runtime, rather than at compile time. Dynamic SQL is more challenging and less efficient than static SQL, but it allows developers to create more flexible general-purpose applications.

1. What are the different types of relationships in SQL?

Three types of relationships can exist between a pair of database tables. These are:

* One-to-one, where each record in a table can be related to one record in the paired table
* One-to-many, where each record in a table can be related to one or more records in the paired table
* Many-to-many, where each record in both tables can be related to one or more records in the paired table
* Self-Referencing Relationships – When a table has to declare a connection with itself, this is the method to employ.

1. What is a Self-Join?

A self-join is a type of join that can be used to connect two tables. As a result, it is a unary relationship. Each row of the table is attached to itself and all other rows of the same table in a self-join. As a result, a self-join is mostly used to combine and compare rows from the same database table.

1. What are UNION, MINUS, and INTERSECT commands?

The UNION operator is used to combine the results of two tables while also removing duplicate entries.

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

The INTERSECT operator is used to combine the results of both queries into a single row.

Before running either of the above SQL statements, certain requirements must be satisfied –

Within the clause, each SELECT query must have the same amount of columns.

The data types in the columns must also be comparable.

In each SELECT statement, the columns must be in the same order.

1. NoSQL vs SQL

In summary, the following are the five major distinctions between SQL and NoSQL:

* Relational databases are SQL, while non-relational databases are NoSQL.
* SQL databases have a specified schema and employ structured query language. For unstructured data, NoSQL databases use dynamic schemas.
* SQL databases scale vertically, but NoSQL databases scale horizontally.
* NoSQL databases are document, key-value, graph, or wide-column stores, whereas SQL databases are table-based.
* SQL databases excel in multi-row transactions, while NoSQL excels at unstructured data such as documents and JSON.

1. What is Database Black Box Testing?

Black Box Testing is a software testing approach that involves testing the functions of software applications without knowing the internal code structure, implementation details, or internal routes. Black Box Testing is a type of software testing that focuses on the input and output of software applications and is driven by software requirements and specifications. Behavioral testing is another name for it.

1. What is the difference between CHAR and VARCHAR2 datatype in SQL?

Both Char and Varchar2 are used for characters datatype but varchar2 is used for character strings of variable length whereas Char is used for strings of fixed length. For example, char(10) can only store 10 characters and will not be able to store a string of any other length whereas varchar2(10) can store any length i.e 6,8,2 in this variable.

1. What is a Primary key?

* A Primary key in SQL is a column (or collection of columns) or a set of columns that uniquely identifies each row in the table.
* Uniquely identifies a single row in the table
* Null values not allowed

1. What is a Unique key?

* Uniquely identifies a single row in the table.
* Multiple values allowed per table.
* Null values allowed.

1. What is a Foreign key in SQL?

* Foreign key maintains referential integrity by enforcing a link between the data in two tables.
* The foreign key in the child table references the primary key in the parent table.
* The foreign key constraint prevents actions that would destroy links between the child and parent tables.

1. What are Entities and Relationships?

* Entities: A person, place, or thing in the real world about which data can be stored in a database. Tables store data that represents one type of entity. For example – A bank database has a customer table to store customer information. The customer table stores this information as a set of attributes (columns within the table) for each customer.
* Relationships: Relation or links between entities that have something to do with each other. For example – The customer name is related to the customer account number and contact information, which might be in the same table. There can also be relationships between separate tables (for example, customer to accounts).

1. What is the difference between DROP and TRUNCATE commands?

* DROP command removes a table and it cannot be rolled back from the database.
* TRUNCATE command removes all the rows from the table.

1. Are NULL values the same as that of zero or a blank space?

A NULL value is not at all same as that of zero or a blank space. The NULL value represents a value that is unavailable, unknown, assigned, or not applicable whereas zero is a number and blank space is a character.

1. What is the main difference between ‘BETWEEN’ and ‘IN’ condition operators?

* BETWEEN operator is used to displaying rows based on a range of values in a row.
* IN condition operator is used to check for values contained in a specific set of values.

1. Why are SQL functions used?

SQL functions are used for the following purposes:

* To perform some calculations on the data
* To modify individual data items
* To manipulate the output
* To format dates and numbers
* To convert the data types

1. What are the various levels of constraints?

Constraints are the representation of a column to enforce data entity and consistency. There are two levels of a constraint, namely:

* column level constraint
* table-level constraint

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

* SQL is a query language that allows you to issue a single query or execute a single insert/update/delete.
* PL/SQL is Oracle’s “Procedural Language” SQL, which allows you to write a full program (loops, variables, etc.) to accomplish multiple operations such as selects/inserts/updates/deletes.

1. What are Views used for?

A view refers to a logical snapshot based on a table or another view. It is used for the following reasons:

* Restricting access to data.
* Making complex queries simple.
* Ensuring data independence.
* Providing different views of the same data

1. What is Auto Increment in SQL?

Autoincrement keyword allows the user to create a unique number to get generated whenever a new record is inserted into the table.

This keyword is usually required whenever PRIMARY KEY in SQL is used.