

SQL

1. What is DBMS?

Answer:

A database management system (DBMS) enables users to create, read, update and delete data in a database. It lets end users use data while managing data integrity. It stores data that can be shared by multiple users in a controlled manner concurrently.

2. What is RDBMS?

Answer:

- Has tables, records
- connected using relations (primary keys and foreign keys)
- uses normalization to reduce redundancy.

A relational database management system (RDBMS) is based on the relational model. This model uses relationship between tables using primary keys, foreign keys and indexes.

RDBMS uses constraints of primary and foreign keys to establish relationships between rows of data in different database tables. It uses the concept of normalization to eliminate the need to redundantly store related data in multiple tables.

3. What is SQL?

Answer:

SQL stands for Structured Query Language, is a language to communicate with the Database. It performs tasks such as retrieval, updation, insertion and deletion of data from a database.

4. What is a primary key?

Answer:

A primary key is a unique identifier that uniquely identify a record in a database table. It has implicit NOT NULL constraint (means primary key values can't be NULL).

5. What is the unique key?

Answer:

A Unique key ensures rows are unique within the database. It provides uniqueness of the column on which it is defined. → This applies to the data.

6. Difference between a Primary Key and a Unique Key.

P.id	name	nic
Primary key		unique key.

Answer:

PK	UK
→ uniquely identify row	→ unique data
→ entity integrity	→ can be null once
→ cannot be null	→ can have many UKs

A primary key job is to uniquely identify a row within a table while a Unique key ensures additional unique conditions on column(s).

A primary key enforces entity integrity whereas Unique key enforces unique data. There may be many unique key constraints for one table, but only one PRIMARY KEY constraint for one table.

Primary key doesn't allow NULLs, but unique key allows one NULL only.

- ④ Primary key creates a clustered index on the column by default, whereas unique creates a non-clustered index by default.

7. What is a foreign key?

Answer:

Primary key → entity integrity
Unique key → data integrity
Foreign key → referential integrity

A foreign key is a column or group of columns that establishes a link between the data in two tables. A foreign key ensures referential integrity of the data.

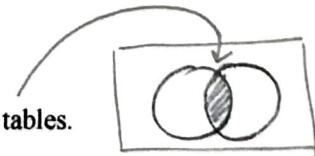
8. What is a join? What are the types of join?

Answer:

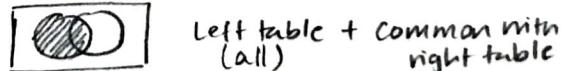
Join is used in SQL queries for joining and fetching data from two or more table.

Types of JOIN that we can use in SQL:

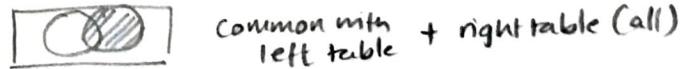
The **INNER JOIN** returns records that have matching values in both tables.



The **LEFT JOIN** returns all records from the left table, and the matched records from the right table.



The **RIGHT JOIN** returns all records from the right table, and the matched records from the left table.



A **SELF JOIN** is a join in which a table is joined with itself. Aliases should be used for the same table comparison.

Full Join returns all the rows from the left hand side table and all the rows from the right hand side table.



9. What is Normalization? Explain the Advantages of normalizing database.

Answer:

- make large / break down into smaller ones
- basically reducing redundancy
- create relationships

Normalization is a process of organizing database by splitting larger tables into smaller ones that are easier to maintain and linking them using relationships. It reduces redundant data and optimize data dependencies.

Advantages:

- Eliminates duplicate entries
- Saves storage space
- Improves the query performances

10. What are the different type of normalization?

Answer:

1. First Normal Form (1NF)

→ reduce data redundancy

A relation is in the first normal form if it contains no repeating columns.

2. Second Normal Form (2NF)

A relation is said to be in 2NF if and only if it is in 1NF and every non-key attribute is fully dependent on the primary key.

3. Third Normal Form (3NF)

A relation is said to be in 3NF, if and only if it is in 2NF and every non-key attribute is non-transitively dependent on the primary key.

11. What is Denormalization?

Answer:

Denormalization is the process of attempting to optimize data retrieval by adding redundancy. It is basically the process of undoing the normalization done in a database design to optimize the performance of a database.

12. What are the different types of SQL statements?

Answer:

1. DDL - Data Definition Language – structure related of database

DDL defines the structure that holds the data. It creates and modifies the structure of database objects in database. For example, Create, Alter, Drop and Truncate table.

e.g. Create DB
Drop DB
Truncate DB

eg. SELECT
INSERT INTO
DELETE

2. DML - Data Manipulation Language — to manipulate data inside the database. It is used to retrieve, modify, delete, insert data in database. Typical operations are Insert, Delete, Update and retrieving the data from the table.

3. DCL - Data Control Language — to ensure security

DCL controls the visibility of data and enforces database security in a multiple user database environment. It includes operations like granting database access, setting privileges to create, tables etc. Two types of DCL commands are GRANT and REVOKE.

4. Transaction Control Language (TCL) → manage transactions.

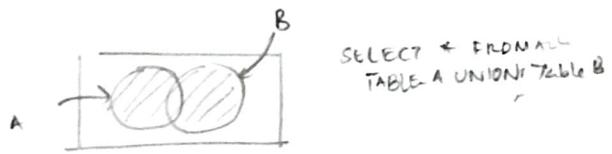
TCL commands are used to manage transactions in database. e.g. COMMIT and ROLLBACK.

13. Define Union and Union All.

Answer:

Union is a distinct recording of two tables.

UNION = 2 or more SELECT statements
ALL



UNION ALL operator is a combine result set of 2 or more SELECT statements.

14. Define cursor.

Answer:



A Cursor is a database object which helps in manipulating data row by row representing a result set.

15. What is sub-query? Explain properties of sub-query.

Answer:

A subquery is a SELECT statement that is nested within another T-SQL statement, executed independently in which it is nested and returns a result set.

Properties of Sub-Query:

- A subquery must be enclosed in the parenthesis.
- A subquery must be put in the right hand of the comparison operator.
- A subquery cannot contain ORDER-BY clause.
- A query can contain more than one sub-queries.

16. What is the difference between Clustered and Non-Clustered Index?

Answer:

A clustered index reorders the way records in the table are physically stored.

A Non-Clustered index creates a separate object within the table and does not reorders the way records in the table was stored.

Non-clustered index has data pointers so there can be many non-clustered indexes per table. While clustered index is distinct for every table.

17. What is database Trigger?

Answer:

A trigger is a special type of stored procedure that fires automatically in response to DML and DDL events.

DML triggers execute when data is modified through a data manipulation language (DML) event such as INSERT, UPDATE, or DELETE statements on a table. DDL triggers execute in response to Transact-SQL CREATE, ALTER, and DROP statements.

18. What are stored procedures? And what are the advantages of using them?

Answer:

A stored procedure is a set of SQL statements that performs a user defined operation. Since it is precompiled and stored in the database, it runs queries faster. It also reduces network traffic as many queries can be included in a stored procedure, round trip time to execute multiple queries from an application to database and back is avoided.

19. What are properties of a transaction?

Answer:

Properties of the transaction can be summarized as ACID Properties, i.e., Atomicity, Consistency, Isolation, Durability. These are the set of properties of database transactions that ensure accuracy, completeness, and data integrity.

1. Atomicity

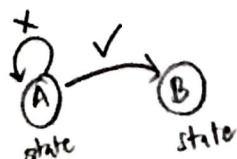
A transaction may consist of many statements. The database should get reflected only when all statements are run successfully. If any of the statement fails, all the transactions must be rolled back.

$\begin{matrix} \checkmark & \checkmark & \rightarrow & \text{successfull!} \\ \checkmark & \times & \checkmark & \rightarrow & \text{FAIL!} \end{matrix}$

} should remain if
at least one fails!

2. Consistency

The database should create a new state if the transaction succeeds. If the transaction fails, the



database should bounce back to its original state, i.e. the state before the transaction was started.

3. Isolation

A transaction in process must remain isolated from any other transaction.

4. Durability

Once a transaction has completed successfully, the updated rows/records must be available for all other transactions on a permanent basis.

20. What is a Database Lock ? What are the type of locks ?

Answer:

Database lock provides exclusive access to the record. A user can only modify those records to which he has applied a lock. This prevents data from being corrupted when multiple users try to write to the database.

Type of lock

1. Shared Lock

When a shared lock is applied on data item, other transactions can only read the item, but can't write into it.

2. Exclusive Lock

When an exclusive lock is applied on data item, other transactions can't read or write into the data item.

21. What is a Composite Key?

Answer:

A composite primary key represents a set of columns whose values uniquely identify every row in a table.

For example: if "StudentId" and "Student Name" in a table are combined to uniquely identify a row, it is a Composite Key.

22. What is a Foreign Key?

Answer:

A foreign key is used to link two tables together. A foreign key in one table points to a primary key in another table.

They are used to enforce referential integrity and prevent any actions that would destroy links between tables with the corresponding data values.

23. What are the advantages and disadvantages of views in a database?

Answer:

Advantages:

1. The result set of a view is not stored physically, doesn't consume extra disk space.
2. The view hide some of the columns and complexity of joins from the user.
3. Views help limit data access to specific users.

Disadvantages:

1. When a table is dropped, associated view become irrelevant.
2. Since the view is created when a query requesting data from view is triggered, its a bit slow.

24. What is a materialized view?

Answer:

It is a database object that contains the results of a query. Unlike Views which are virtual tables composed of the result set of a SQL query, Materialized Views store result set in a physical object like a table.

We can index materialized view.

Materialized view is used to improve the response time on expensive operations such report queries which join two very large tables.

25. Explain the difference between DELETE, TRUNCATE and DROP commands?

Answer:

DELETE operation deletes the data of a table but we can perform Commit and Rollback to retrieve data. Where condition can be used along with a delete statement.

TRUNCATE is used to delete the data of a table. Here, Commit and Rollback statement can't be performed. Where condition can't be used along with TRUNCATE statement.

Drop command is used to drop a table definition and all the data, indexes, triggers, constraints and permission specifications for that table.

MySQL

1. What is MySQL? In which language MySQL is written?

MySQL is an Oracle-backed open source RDBMS, based on Structured Query Language (SQL). It is often accessed using PHP to create powerful and dynamic server-side applications. It is pretty easy to master in compare to Oracle Database, or Microsoft SQL Server.

MySQL is written in C, C++.

2. Why should we use MySQL?

Top Reasons to Use MySQL:

- The MySQL database server is very fast, reliable and easy to use.
- It is open source and thus is free to use for developers and a small fee for enterprises.
- It offers a solid data security layer that protects sensitive data from intruders.
- It is scalable and can handle huge amount of data.
- It is compatible with virtually every operating system.
- It is very friendly to PHP, the most appreciated language for web development.
- It has large and extensive community support that can help you manage your database.

3. What are the different tables present in MySQL?

There are mainly five types of tables present in MySQL.

MyISAM - It is the default database engine used in MySQL and is based on the sequential access method.

Heap - It is the table that is used for fast data access, but the data will be lost if the table or the system crashes.

Merge - Merge table type is added to treat multiple MyISAM tables as a single table so it removes the size limitation from MyISAM tables.

INNO DB - It is the table that supports transactions using the COMMIT and ROLLBACK commands.

ISAM - ISAM had been deprecated and removed from version 5.x. All of its functionality is replaced by MyISAM.

Each part of the SQL SELECT statement is executed sequentially, it's important to understand the order of execution as it can save us from unwanted results, and help us create queries that execute faster.

The order of SQL SELECT statement is as follows:

1. **FROM** and **JOINS** - Selects and joins your tables to base data.
2. **WHERE** - Filters the base data
3. **GROUP BY** - Aggregates the base data
4. **HAVING** - Filters the aggregated data
5. **SELECT** - Returns the final data
6. **ORDER BY** - Sorts the final data
7. **LIMIT** - Limits the returned data to a row count

5. What are MySQL Joins and explain different types of MySQL Joins?

Joins help retrieving data from two or more database tables using some interconnected common fields or keys among the selected tables. There are mainly three types joins present in MySQL.

a. **Inner Join**: It fetches the list of rows from specified tables that satisfy the given condition. It is the default join type.

Syntax:

```
SELECT column_name(s) FROM table1 INNER JOIN table2 ON table1.column_name =  
table2.column_name;
```

b. **Left Join**: It returns all rows from the left table even if there is no match in the right table.

Syntax:

```
SELECT column_name(s) FROM table1 LEFT JOIN table2 ON table1.column_name =  
table2.column_name;
```

c. **Right Join**: It returns all rows from the right table even if there is no match in the left table.

Syntax:

```
SELECT column_name(s) FROM table1 RIGHT JOIN table2 ON table1.column_name =  
table2.column_name;
```

6. How can you increase the performance of MySQL SELECT query?

Following are some techniques of query optimization:

- Use indexes. You can significantly increase performance by using indexes.
- Dont use "*" while you are using SELECT command. Also avoid unnecessary columns in SELECT clause.
- DISTINCT and UNION need to be used solely if it is necessary.
- You can use short table aliases while writing queries. A short alias is parsed more quickly than a long table name or alias.
- Avoid the usage of the wildcard (%) at the start of a LIKE pattern. MySQL doesn't use an index for such a query./li>

7. How many TRIGGERS are allowed in MySql table?

MySQL supports triggers that are invoked automatically in response to the INSERT, UPDATE or DELETE event occurring in a table.

SIX triggers are allowed in MySql table. They are as follows:

BEFORE INSERT - It is invoked before an insert, or before an insert statement is executed.

AFTER INSERT - It gets invoked after an insert is implemented.

BEFORE UPDATE - It is invoked before the update is implemented.

AFTER UPDATE - It is invoked after an updatation occurs.

BEFORE DELETE - It is invoked before a delete occurs, or before deletion statement is implemented.

AFTER DELETE - It is invoked after a delete occurs, or after a delete operation is implemented.

8. What are the different set operations available in MySQL?

The various set operations available in MySQL are as follows:

UNION – Combines the results from multiple SELECT queries and returns all the distinct rows. UNION doesn't work with a column that has Text Data Type

UNION ALL – Returns all the rows from all the tables which meet the conditions of your specifics query. It allows duplicate values.

MINUS – Returns all the distinct rows selected by the first query but does not select the rows selected by the second query.

INTERSECT – Returns the intersection of both queries. If a record exists in both data sets, it will be included in the INTERSECT results.

9. How can you test for NULL values in a database?

A field with a NULL value is a field with no value. The conditions involving NULL are special. You cannot use = NULL or != NULL to look for NULL values in columns. To compare the fields with NULL values, you have to use the IS NULL and IS NOT NULL operator.

Syntax of IS NULL:

```
SELECT column_names FROM table_name WHERE column_name IS NULL;
```

Syntax of IS Not NULL:

```
SELECT column_names FROM table_name WHERE column_name IS NOT NULL;
```

10. Can you elaborate on BLOB and TEXT in MySQL?

BLOB stands for Binary Large Objects. It can be used to store binary data that means we can store pictures, videos, sounds etc.

The following are the four types of BLOB

TINYBLOB

BLOB

MEDIUMBLOB

LONGBLOB

TEXT is non-binary, character based string data type and is used for storing large number of strings. Normally a blog or news article would constitute to a TEXT field.

The following are the four types of TEXT

TINYTEXT

TEXT

MEDIUMTEXT

LONGTEXT

11. What is the difference between TRUNCATE and DELETE in MySQL?

DELETE operation deletes the data of a table but we can perform Commit and Rollback to retrieve data. 'Where' condition can be used along with a delete statement.

TRUNCATE is used to delete the data of a table permanently. You can't perform Commit and Rollback statement with TRUNCATE. Also, 'Where' condition can't be used along with TRUNCATE statement.

12. What is the difference between CHAR and VARCHAR?

Both **CHAR** and **VARCHAR** data types are used to store string data in the field of the table.

The differences between these data types are mentioned below:

CHAR stores the data or values in fixed length format. If the size of the string is smaller than the specified length, it is padded with space characters with space characters to match the specified length. On the other hand, **VARCHAR** stores values in variable lengths. Values are not padded with any characters. But 1 or 2 extra bytes are added to store the length of the data.

CHAR is used to store small data whereas **VARCHAR** is used to store large data.

CHAR works faster than **VARCHAR**.

JAVA CODES

Printing largest number

```
int a,b, c;
a = 10;
b = 71;
c = 15;

if (a>b && a>c){
    System.out.println("The largest number out of the lot is
A");
} else if (b>c){
    System.out.println("The largest number out of the lot is
B");
} else{
    System.out.println("The largest number out of the lot is
C");
}
```

Fibonacci Sequence

```
1 1 2 3 5 8 13 21 34 ... n  
int i = 0, a=1, b=1;  
System.out.print(a + " " + b);  
while (i < 34){  
    i = a+b;  
    System.out.print(" " +i);  
    a = b;  
    b = i;  
}
```

Printing if a number is palindrome (when the number is reversed, it's the same value) or not

```
int a = 121, r, res = 0;  
int b = a;  
while (a>0){  
    r = a % 10; // remainder  
    a = a / 10; // getting the 10s sorted  
    res = (res*10) + r;  
}  
if (b==res){  
    System.out.println("This is Palindrome Number");  
}else{  
    System.out.println("This is not a Palindrome Number");  
}
```

Printing stars without a star in the middle

```
for (int i = 1; i<=3; i++){  
    for (int j = 1; j <=3; j++){  
        if(i == 2 && j == 2){  
            System.out.print(" ");  
        } else {  
            System.out.print("* ");  
        }  
    }  
    System.out.println("");  
}
```

* * *
* *
* * *

Printing number patterns

1234

2341

3412

4123

```
for (int j = 1 ; j<=4 ; j++) {
    for (int i = 1 ; i <=4 ; i++) {
        int k = j + i - 1;
        if (k<5) {
            System.out.print(k + " ");
        } else {
            System.out.print(k-4 + " ");
        }
    }
    System.out.println("");
}
```

Printing Binary Patterns :

```
1
0 1
1 0 1
0 1 0 1
1 0 1 0 1
```

```
for(int i=1; i<=5; i++){
    for (int j= 1; j <=i; j++) {
        int k = (i+j)%2;
        if (k == 0) {
            System.out.print("1 ");
        } else {
            System.out.print("0 ");
        }
    }
    System.out.println("");
}
```

Printing pattern:

```
1
22
333
4444
```

```
for (int i = 1; i<=5; i++) {
    for (int j = 1; j<=i; j++) {
        System.out.print(i + " ");
    }
}
```

```
 }  
 System.out.println("");  
 }
```